SEVEN
PUBLICAÇÕES ACADÊMICAS
2022



RELEVANT STUDIES FOCUSED ON HEALTH SCIENCES

Carolina Fernandes Souza, Iuri Henrique da Silva Monteiro,
Larissa Caroline Alves Resende Costa and Larissa Soares Lopes
(Organizers)

SEVEN
PUBLICAÇÕES ACADÊMICAS
2022



RELEVANT STUDIES FOCUSED ON HEALTH SCIENCES

Carolina Fernandes Souza, Iuri Henrique da Silva Monteiro,
Larissa Caroline Alves Resende Costa and Larissa Soares Lopes
(Organizers)

EDITOR-IN-CHIEF
Profº Me. Isabele de Souza Carvalho

EXECUTIVE EDITOR
Nathan Albano Valente

BOOK ORGANIZERS
Carolina Fernandes Souza
Iuri Henrique da Silva Monteiro
Larissa Caroline Alves Resende Costa
Larissa Soares Lopes

EDITORIAL PRODUCTION
Seven Publicações Ltda

ART EDITION
Alan Ferreira de Moraes

COVER IMAGES
AdobeStok

AREA OF KNOWLEDGE
health science

2022 by Seven Editora
Copyright © Seven Editora
Text Copyright © 2022 The Authors
Edition Copyright © 2022 Seven Editora

The content of the text and its data in its form, correctness and reliability are the exclusive responsibility of the author, and do not necessarily represent the official position of Seven Eventos Acadêmicos e Editora. The work may be downloaded and shared as long as credit is given to the author, but without the possibility of altering it in any way or using it for commercial purposes.

All manuscripts were previously submitted to blind evaluation by peers, members of the Editorial Board of this Publisher, having been approved for publication based on criteria of academic neutrality and impartiality.

Seven Publicações is committed to ensuring editorial integrity at all stages of the publication process, avoiding plagiarism, fraudulent data or results and preventing financial interests from compromising the publication's ethical standards. Suspected scientific misconduct situations will be investigated to the highest standard of academic and ethical rigor.

 The contents of this Book have been submitted by the author for open access publication under the terms and conditions of the Creative Commons 4.0 International Attribution License

EDITORIAL BODY

EDITOR-IN-CHIEF
Profº Me. Isabele de Souza Carvalho

EDITORIAL BOARD
Pedro Henrique Ferreira Marçal. Vale do Rio Doce University
Adriana Barni Truccolo- State University of Rio Grande do Sul
Marcos Garcia Costa Morais- State University of Paraíba
Mônica Maria de Almeida Brainer - Federal Institute of Goiás Campus Ceres
Caio Vinicius Efigenio Formiga - Pontifical Catholic University of Goiás
Egas José Armando - Eduardo Mondlane University of Mozambique.
Ariane Fernandes da Conceição- Federal University of Triângulo Mineiro
Wanderson Santos de Farias - Universidad de Desarrollo Sustentable
Maria Gorete Valus -University of Campinas

International Data of Cataloging in Publication (CIP)

C898b Valente, Nathan Albano

Relevant studies focused on health Sciences/Nathan Albano Valente. São José dos Pinhais/PR. Seven Publicações Ltda.

ISBN: 978-65-84976-13-9
Format: PDF
System requirements: Adobe Stok

1. Health / 2. Health Sciences

SEVEN
PUBLICAÇÕES ACADÊMICAS

AUTHOR'S DECLARATION

The author of this work DECLARES for the following purposes that:

1. Does not have any commercial interest that gives rise to a conflict of interest in relation to the published content;

2. Declares that he actively participated in the construction of the respective manuscripts, preferably under the following conditions: "a) Study design, and/or data acquisition, and/or data analysis and interpretation; b) Elaboration of the article or revision in order to make the material intellectually relevant;
c) Final approval of the manuscript for submission; "

3. It certifies that the published text is completely free of data and/or fraudulent results and authorship defects;

4. Confirm correct citation and reference of all data and interpretations of data from other research;

5. Acknowledges having informed all sources of funding received to carry out the research;

6. Authorizes the edition of the work, which includes the catalog records, ISBN, DOI and other indexers, visual design and cover creation, interior layout, as well as its launch and dissemination according to Seven Eventos Acadêmicos and Publisher's criteria.

PUBLISHER'S DECLARATION

Seven Publicações DECLARE, for purposes of rights, duties and any methodological or legal meanings, that:

1. This publication constitutes only a temporary transfer of copyright, constituting a right to the publication and reproduction of the materials. Not being jointly responsible for the creation of published manuscripts, under the terms set forth in the Copyright Law (Law 9610/98), in art. 184 of the Penal Code and in art. 927 of the Civil Code; The author(s) is solely and exclusively responsible for verifying such copyright issues and others, thus exempting the Publisher from any civil, administrative and criminal damages that may arise.

2. Authorizes THE DISCLOSURE OF THE WORK, by the author(s) in lectures, courses, events, shows, media and television, provided that due acknowledgment of authorship and editing and without any commercial purpose, with the presentation of the due CREDITS to SEVEN PUBLICATIONS, the author(s) and publishers being liable for the omission/deletion of such information;

3. All e-books are open access, so do not sell them on your website, partner sites, e-commerce platforms, or any other virtual or physical medium. Therefore, it is exempt from transfers of copyright to authors, since the format does not give rise to other rights other than the didactic and advertising purposes of the work that can be consulted at any time.

4. All members of the editorial board are PhDs and linked to public higher education institutions, as recommended by CAPES for obtaining the Qualis book;

5. Seven Eventos Acadêmicos does not assign, sell or authorize the use of the authors' names and e-mails, as well as any other data from them, for any purpose other than the scope of dissemination of this work, in accordance with the Marco Civil da Internet, the General Data Protection Law and the Constitution of the Federative Republic.

Dear

First of all, we would like to congratulate all the organizers and participants of this international multidisciplinary work. Furthermore, it should be noted that the knowledge built by the collectivity is of paramount importance for the development of humanity. In this sense, therefore, the present work seeks to highlight the relevance of studies carried out internationally by professionals, researchers, and academics of all nationalities, being a way to overcome scientific and linguistic barriers, since the translation can reach a wider audience, disseminating the work performed. Finally, we hope that all those present find pertinent the questions brought up in these studies and feel encouraged to be part of the next works and collections.

Sincerely Seven Publicações

Authors

Abdul Habib Mahomed Dadá
Adriana Espíndola Correa
Adriana Olímpia Barbosa Felipe
Agnaldo José Graciano
Alberto de Andrade Reis Mota
Alberto Pereira Lopes
Alessandra Gurgel Câmara
Alessandra Silva Lima Jardim
Alessandre Gomes de Lima
Alexander Gonçalves Ferreira Guimarães
Alexandre da Silva Xavier
Alice De Perdigão Lana
Alice Magro Koscianski
Alice Magro Koscianski
Aline Cristina Peres Rodrigues
Aline Sedorko
Alisson Cordeiro Moreira
Alisson cordeiro Moreira
Alyson Soares Santana
Amanda Bárbara da Silva Guimarães
Amanda de Sousa Loiola
Amanda Ribeiro Dias
Amy Sakakibara
Ana Beatriz Alves Correia de Lima
Ana Beatriz Vieira da Cunha Lopes
Ana Carla Dlugos
Ana Clara Monteiro Laranjeira
Ana Lúcia Basilio Carneiro
André Carminati Lima
Andreia Oliveira Barros de Sousa
Andrés Di Leoni Ferrari
Angélica Aparecida Almeida
Anibal Pires Borges
Anna Luísa Gomes
Anna Maria Pessoa de Carvalho
Antônio Carlos Pereira de Sousa
Antonio Marcelo Tavares Birimba
Barbara Elisabeth Teixeira-Costa
Barbara Elizabeth Teixeira-Costa
Bianca Caroline Damasceno Sousa
Bruna Karas
Bruna Ramos Neves
Bruno Gonçalves da Silva
Camilla Mattia Calixto
Camilla Mattia Calixto
Carla Sousa Guedelha
Carlos Cesar Marques Colella
Carlos Cesar Marques Collela
Carlos Manuel Dutok Sánchez
Carmem Cristina Torquato Nunes
Carolaine Sousa Novaes
Carolina Anunciação Patricio dos Santos
Carolina Costa Pinto
Carolina Fernandes Souza
Catarina Osue Ide Silva
Celina A. Bertoni Lugtenburg
Charlles Nonato da Cunha Santos
Christian Evangelista Garcia
Christianne Alves Pereira Calheiros
Cirley Maria de Oliveira Lobato
Claudia Maria Messias
Claudirene Milagres Araújo
Claudirene Milagres Araújo
Cleandro Matos da Silva
Clebiana Alves e silva Diniz
Clebiana Alves e silva Diniz
Cleson Oliveira de Moura
Daiana Evangelista Rodrigues Fernandes
Daniel Souza Pinto
Daniela Tiepo Gomes
Daniella Santos Guedes Alcoforado
Danielle Monteiro
Daniely Leal da Costa
Dayrana da Silva Furtado
Debora Lia de Lima Castro
Diandra Carvalho de Sá Noleto
Diego Maciel de Oliveira
Dílmerson de Oliveira
Dilza Terezinha Ambros Ribeiro
Edilma Da Silva Soares
Ednaldo Alexandre Zandoná
Eduarda Eugenia Dias de Jesus
Eduardo Alves Nascimento
Eduardo Bartholomay
Eduvale de Avaré
Elaine Cristina Navarro
Eliane dos Santos Nunes
Eliane dos Santos Nunes
Emanoel Rodrigo Melo dos Santos
Emanuel Nildvan Rodrigues da Fonseca
Erika Branco
Erika Marina Rabelo
Erika Rabelo
Erlane Marques Ribeiro
Everson Fraga das Mercês
Everton Souza Capelletto da Cunha
Fabiana Bogéa Lima
Fabiana Bucholdz Teixeira Alves
Fabio Michalsky Velho
Fabíola Oliveira Loba Peres de Freitas
Fabíola Sucasas Negrão Covas
Fabricio Faitarone Brasilino
Felipe Santana e Silva
Felisangela dos Santos de Castro
Fernando Antonio da Silva Santos
Francielle Nocera Viechineski
Francielle Nocera Viechineski
Francisca Aline dos Santos Dias
Francisco Eudes dos Santos
Francisco Lotufo Neto
Gabriel Cavalheiro Lessack
Gabriel Ferreira Lopes
Gabriel Monteiro Amorim
Gabriela Birk Hansen

Gabriela Sá Leitão Gênova de Castro
Gabrielle Bueno Zákia Beltrame
Gianna Carla Alberti Schrut
Gianna Carla Alberti Schrut
Gilberto Baroni
Gilberto Baroni
Gilvana de Jesus do Vale Campos
Gilvânia Smith da Nóbrega Morais
Giovanni Cerrone Junior
Gláucia Maria Torquato Luna
Gleyciane Souza Oliveira
Guilherme Westphal Preuss
Gustavo Benedito Medeiros Alves
Gustavo de Sá Oliveira Lima
Gustavo Martins Lemos Tavares
Gustavo Martins Lemos Tavares
Gustavo Maximiliano Dutra da Silva
Gyzelle Pereira Vilhena do Nascimento
Haroldo Reis Alves de Macêdo
Hilma Keylla de Amorim
Hirlla Karla de Amorim
Iramaia Bruno Silva
Iramir Ribeido da Silva
Isabela Takeshita
Israel Amâncio Mendes
Itaci Alves Ferreira Silva
Ítalo Cordeiro Moreira
Iuri Henrique da Silva Monteiro
Janaína da Silva Nogueira
Jandra Cibele Rodrigues de Abrantes Pereira Leite
Jéssica de Oliveira Farias
Jessica Farias
Jéssica Goretti da Silva
João José Albuquerque de Sousa Júnior
Jogilmira Macêdo Silva Mendes
Jonilson de Melo e Silva
Jorge Luiz Lima da Silva
Jorge Luiz Lima da Silva
José Carlos Pachón Mateos
José Chaves de Medeiros Júnior
Josias Rogerio Paiva
Julia Maria Pacheco Lins Magalhães
Julia Maria Pacheco Lins Magalhães
Juliane Guerra Golfetto
Kadija Gentil Nogueira Garcia
Kahena Giullia de Deus Lopes
Kamila Pereira Olivio
Katia Fernanda Alves Moreira
Kenderly Camila Baltokoski
Kevan Guilherme Nóbrega Barbosa
Kevin Sousa Barbosa
Khivia Kiss da Silva Barbosa
Laércio Medeiros Silva Júnior
Laisla Araujo da Silva Rodrigues
Larissa Almeida Busnello
Larissa Almeida Busnello
Larissa Antônia da Costa Trigueiro Viana
Larissa Caroline Alves Resende Costa
Larissa Matias Lopes
Larissa Soares Lopes
Larissa Trigueiro
Laryssa De Col Dalazoana Baier
Leila Fátima Santos
Leonardo Pereira da Silva
Leticia Gabriela Moraes
Leuda Maria da Silva Davalos
Liana Maria Moreno Moreira
Liene de Fátima Carvalho
Lijane Marques Ferreira
Lincoln Basilio Alves
Lindair Alves da Silva
Liva Gurgel Guerra Fernandes
Lorena Caroline
Lorrane de Andrade Pereira
Lucas da Costa Trigueiro
Lucélia Terra Chini
Luciana Pietro
Lucinéia Claudia de Toni
Aquino da Cruz
Luis Manuel Ley Domingues
Luis Otavio de Sousa Bulhões
Luiz Otávio Carneiro Pereira Proence
Mabel Osório Rodrigues
Mahomed Sidique Abdul Cadar Dadá
Maísa Cristina de Lima Nascimento
Manuelle de Araújo Holanda
Manuelle de Araújo Holanda
Marcela de Souza Figueiras
Marco Antônio Galego Júnior
Marcos Alexandre Carvalho Torres
Marcos Antonio do Nascimento
Margareth Maria de Carvalho Queiroz
Maria Cecilia Queiroga
Maria da Conceição Ferreira
Maria da Soledade Simeão dos Santos
Maria de Fatima Rodrigues da Silva
Maria de Lourdes Pontes Neta
Maria Eduarda Jucá da Paz Barbosa
Maria Julia Doin Vieira
Maria Paula Woelfer
Maria Thereza Ward de Santi Melo
Maria Thereza Ward de Santi Melo
Maria Thereza Ward of Santi Melo
Maria Valcely Ferreira Silva
Mariana Fonseca
Mariana Furtado Barros de Souza
Mariana Mendes Oliveira Lima
Marina Atanaka
Marina de Oliveira Cardoso Macêdo
Marina Lefol Nani Carvalho

Mário Cláudio Soares Sturzeneker
Mário Cláudio Soares Sturzeneker
Mário Ribeiro Alves
Marlene Simões e Silva
Matheus Bom Fraga
Matheus Felipe Cordeiro Souza de Almeida
Matheus Ignácio Rosa
Maura Vieira dos Santos Sousa
Mayara Raíssa de Miranda Bezerra
Mayra Heloise Pereira
Melina Laíse Nascimento do Santos
Michelle Carneiro Fonseca
Milena Vaz Sampaio Santos
Morganna Mendes Ferraro
Natália Mendes Cruz
Nataniele de Albuquerque
Nataniele de Albuquerque
Nathália Torres Costa de Souza
Nelson Barrelo Junior
Neuza Biguinati de Barros
Nicole Oliveira
Orquidea Vasconcelos dos Santos
Osvaldo de Sousa Leal Júnior
Pablo Raphael de Freitas
Paola Gonçalves Moreira de Oliveira
Paola Gonçalves Moreira de Oliveira
Patricia Fabiane Monteiro Laranjeira
Patrícia Scotini Freitas
Paulo Joviniano Alvares dos Prazeres
Pedro Jorge Cortes Morales
Poliana Silva de Brito
Poliana Silva de Brito
Polliana Carvalho de Souza
Priscilla Pereira de Meneze
Rafael Monteiro Laranjeira
Rafaela Fernandes da Mota
Rafaella Maria Monteiro Sampaio
Raquel Fernandes Silva Chagas do Nascimento
Raquel Ramos Schettino
Regina Célia Vilanova-Campelo
Renato de Souza Lima Júnior
Rita de Cássia Almeida Sales
Rogério de Souza Torres
Ronaldo Coelho Pereira
Rosana Moreno de Sousa
Rosângela Vidal de Negreiros
Rui Manuel Lopes Nunes
Ruth Silva Lima da Costa
Sabrina Begot
Sâmela Maria de Oliveira Silva
Sâmela Maria de Oliveira Silva
Sara de Oliveira Cardoso
Semírames Cartonilho de Sousa Ramos
Semírames Cartonilho de Souza Ramos
Shirley Pereira de Almeida
Shirley Pereira de Almeida
Simone da Silva Santos
Suellen Vienscoski Skupien
Sumaya Giarola Cecilio
Suzana Maria de Oliveira Costa Meneses
Suzana Maria de Oliveira Costa Meneses
Tainan de Andrade Rocha
Tainan de Andrade Rocha
Tânia Collares
Tathiane Souza de Oliveira
Taynara Caetano da Silva
Thais da Silva Santana
Thaísa Mirella da Silva
Thaísa Mirella da Silva
Thakimare da Conceição das Neves Garcez
Thamyris Cardoso Vieira
Thatiana Ramos Cavalcante
Valquiria Fernandes Marques
Valquiria Fernandes Marques
Vanessa de Araújo Lima
Vanessa de Carla Batista dos Santos
Vanessa Lima Nolêto
Vânia Ágda de Oliveira Carvalho
Vicente Galber Freitas Viana
Vinícius Moreira de Queiroga
Vitor Steil Deboni
Viviene do Val Rodrigues
Vivienne do Val Rodrigues
Wallace Henrique Pinho da Paixão
Wankarla Barbosa Chaves
Wankarla Barbosa Chaves
Wekadja Alves Lobão
Yngrid Santana Flor
Zulaikhah Mahomed Sidique Dadá

SUMMARY

Humanized care by nurses in the parturition process: a narrative review of the literature
Carolina Fernandes Souza, Iuri Henrique da Silva Monteiro, Larissa Caroline Alves Resende Costa and Larissa Soares Lopes

Crossref doi ***10.56238/rsfohsv1-001***
.....**1-14**

Analysis of quality of life, physical activity and teaching time in higher education in the face of the COVID-19 pandemic
Luiz Otávio Carneiro Pereira Proence, Renato de Souza Lima Júnior, Vânia Ágda de Oliveira Carvalho, Daniel Souza Pinto and Dílmerson de Oliveira

Crossref doi ***10.56238/rsfohsv1-002***
.....**15-21**

The appendicitis inflammatory response (air) score for acute appendicitis: is it importante for early diagnosis?
Vitor Steil Deboni, Matheus Ignácio Rosa, André Carminati Lima, Agnaldo José Graciano and Christian Evangelista Garcia

Crossref doi ***10.56238/rsfohsv1-003***
.....**22-29**

Acute effects of mask use during resistance exercise
Amanda Bárbara da Silva Guimarães, Marcos Alexandre Carvalho Torres, Gustavo de Sá Oliveira Lima, Thakimare da Conceição das Neves Garcez, Leonardo Pereira da Silva, Edilma Da Silva Soares, Vanessa Lima Nolêto, Diandra Carvalho de Sá Noleto and Marcos Antonio do Nascimento

Crossref doi ***10.56238/rsfohsv1-004***
.....**30-39**

Experience report: maternal and child care in a maternity hospital in Ghana
Raquel Ramos Schettino, Kahena Giullia de Deus Lopes, Erika Marina Rabelo, Claudirene Milagres Araújo, Leila Fátima Santos, Shirley Pereira de Almeida, Sumaya Giarola Cecilio and Valquiria Fernandes Marques

Crossref doi ***10.56238/rsfohsv1-005***
.....**40-42**

Health education - malaria awareness based on an experience in Ghana: an experience report
Raquel Ramos Schettino, Bruno Gonçalves da Silva, Erika Rabelo, Isabela Takeshita, Leila Fátima Santos, Shirley Pereira de Almeida, Sumaya Giarola Cecilio and Valquiria Fernandes Marques

Crossref doi ***10.56238/rsfohsv1-006***
.....**43-45**

Experience Report: perception of a nursing student about the assistance in the urgency and emergency sector in Kumasi-Gana
Raquel Ramos Schettino, Alessandra Silva Lima Jardim, Bruno Gonçalves da Silva, Claudirene Milagres Araújo, Leila Fátima Santos, Shirley Pereira de Almeida, Sumaya Giarola Cecilio and Valquiria Fernandes Marques

Crossref doi ***10.56238/rsfohsv1-007***
.....**46-48**

Socioeconomic and neurological development profile of patients with down syndrome at APAE-Juazeiro do Norte
Jéssica de Oliveira Farias, Larissa Antônia da Costa Trigueiro Viana, Alisson cordeiro Moreira, Ítalo Cordeiro Moreira, Carolina Anunciação Patricio dos Santos, Natália Mendes Cruz, Ana Beatriz Vieira da Cunha Lopes, Dayrana da Silva Furtado, Lucas da Costa Trigueiro and Erlane Marques Ribeiro

Crossref doi ***10.56238/rsfohsv1-008***
.....**49-59**

Extreme prematurity in a reference unit: morbidity, viability and mortality
Kevan Guilherme Nóbrega Barbosa, Janaína da Silva Nogueira, Vanessa de Carla Batista dos Santos, Patricia Fabiane Monteiro Laranjeira, Ana Clara Monteiro Laranjeira, Gabriel Monteiro Amorim and Rafael Monteiro Laranjeira

Crossref doi ***10.56238/rsfohsv1-008***
.....**60-75**

Clinical and epidemiological profile of individuals undergoing bariatric surgery
Jogilmira Macêdo Silva Mendes, Francisco Lotufo Neto, Ana Beatriz Alves Correia de Lima, Maria Cecilia Queiroga, Emanuel Nildvan Rodrigues da Fonseca, Khivia Kiss da Silva Barbosa, Rosângela Vidal de Negreiros, Gilvânia Smith da Nóbrega Morais, Mabel Osório Rodrigues and Andreia Oliveira Barros de Sousa

Crossref doi ***10.56238/rsfohsv1-010***
.....**76-82**

Music and gynecological consultation: a relaxation strategy
Maria Eduarda Jucá da Paz Barbosa, Gabriela Sá Leitão Gênova de Castro, Liana Maria Moreno Moreira, Taynara Caetano da Silva, Maria de Fatima Rodrigues da Silva, Maria Valcely Ferreira Silva, Laisla Araujo da Silva Rodrigues, Debora Lia de Lima Castro, Cleandro Matos da Silva and Morganna Mendes Ferraro

Crossref doi ***10.56238/rsfohsv1-011***
.....**83-87**

Araguaia-TO: the grooming of workers who are victims of contemporary slavery
Alberto Pereira Lopes

Crossref doi ***10.56238/rsfohsv1-012***
.....**88-100**

Noonan Syndrome: a case report
Vinícius Moreira de Queiroga

Crossref doi ***10.56238/rsfohsv1-013***
.....**101-105**

Bruns Syndrome
Amanda Ribeiro Dias, Aline Cristina Peres Rodrigues, Anna Luísa Gomes and Fabíola Oliveira Loba Peres de Freitas

Crossref doi ***10.56238/rsfohsv1-014***
.....**106-108**

Imaginary and representation in amazonian literature: Inferno verde and the conditions for teaching regional literature
Antonio Marcelo Tavares Birimba

Crossref doi ***10.56238/rsfohsv1-015***
.....**109-121**

Physiotherapeutic interventions used to treat diastasis of the rectus abdominis muscles in women: an integrative review of the literature
Daniely Leal da Costa, Rafaela Fernandes da Mota, Melina Laíse Nascimento do Santos and Lijane Marques Ferreira

Crossref doi ***10.56238/rsfohsv1-016***
.....**122-131**

Hospital management and organizational culture: a variable to understand the relationship between conflict and leadership
Everton Souza Capelletto da Cunh, Everson Fraga das Mercês, Gabriela Birk Hansen and Paulo Joviniano Alvares dos Prazeres

Crossref doi ***10.56238/rsfohsv1-017***
.....**132-149**

Atrioventricular dyssynchrony in patients with pacemaker due to sinus node dysfunction and 1st degree AV block: Introduction to the Long PR Syndrome
Andrés Di Leoni Ferrari, Eduardo Bartholomay, Fabio Michalsky Velho, Anibal Pires Borges, Matheus Bom Fraga, Luis Manuel Ley Domingues and José Carlos Pachón Mateos

Crossref doi ***10.56238/rsfohsv1-018***
.....**150-166**

Methodologies for identification of food standards in brazilian adults: integrative review
Rafaella Maria Monteiro Sampaio, Gláucia Maria Torquato Luna, Thatiana Ramos Cavalcante, Francisco Eudes dos Santos, Yngrid Santana Flor and Iramaia Bruno Silva

Crossref doi ***10.56238/rsfohsv1-019***
.....**167-173**

Evaluation of the stability of anodic thin films on titanium in physiological environment
Daniela Tiepo Gomes and Luis Otavio de Sousa Bulhões

Crossref doi ***10.56238/rsfohsv1-020***
.....**174-182**

Monkeypox in Brazil: epidemiological updates and perspectives
Angélica Aparecida Almeida, Bruna Ramos Neves, Matheus Felipe Cordeiro Souza de Almeida and Gabriel Ferreira Lopes

Crossref doi ***10.56238/rsfohsv1-021***
.....**183-185**

Violence against women in Porto Velho, from 2016 to 2021
Katia Fernanda Alves Moreira, Daiana Evangelista Rodrigues Fernandes, Itaci Alves Ferreira Silva, Gleyciane Souza Oliveira, Mayra Heloise Pereira, Jandra Cibele Rodrigues de Abrantes Pereira Leite, Tathiane Souza de Oliveira and Cleson Oliveira de Moura

Crossref doi ***10.56238/rsfohsv1-022***
.....**186-197**

Table, an imagetic representation in the construction of scientific knowledge
Nelson Barrelo Junior, Josias Rogerio Paiva and Anna Maria Pessoa de Carvalho

Crossref doi ***10.56238/rsfohsv1-023***
.....**198-206**

Abortion: gender and health issues
Erika Branco and Fabíola Sucasas Negrão Covas

Crossref doi *10.56238/rsfohsv1-024*
.....**207-220**

Lifestyle components and their relationship to depression: a review of the literature
Eduarda Eugenia Dias de Jesus, Kamila Pereira Olivio, Leticia Gabriela Moraes, Thais da Silva Santana, Maria Julia Doin Vieira, Maria Paula Woelfer, Gabriel Cavalheiro Lessack, Guilherme Westphal Preuss, Fabricio Faitarone Brasilino and Pedro Jorge Cortes Morales

Crossref doi *10.56238/rsfohsv1-025*
.....**221-231**

Amenities and contributions of point of care technology in the hospital environment
Marlene Simões e Silva, Liene de Fátima Carvalho, Hilma Keylla de Amorim, Pablo Raphael de Freitas, Milena Vaz Sampaio Santos, Carolina Costa Pinto, Juliane Guerra Golfetto, Hirlla Karla de Amorim, Emanoel Rodrigo Melo dos Santos and Rita de Cássia Almeida Sales

Crossref doi *10.56238/rsfohsv1-026*
.....**232-238**

Form of constitution of brazilian sports entities and the impacts on the management model and the level of indebtedness
Fagner da Silva Pereira

Crossref doi *10.56238/rsfohsv1-027*
.....**239-256**

Imaginary and representation in amazonian literature: inferno verde and the conditions for teaching regional literature
Antonio Marcelo Tavares Birimba

Crossref doi *10.56238/rsfohsv1-028*
.....**257-269**

Music and gynecological consultation: a relaxation strategy
Maria Eduarda Jucá da Paz Barbosa, Gabriela Sá Leitão Gênova de Castro, Liana Maria Moreno Moreira, Taynara Caetano da Silva, Maria de Fatima Rodrigues da Silva, Maria Valcely Ferreira Silva, Laisla Araujo da Silva Rodrigues, Debora Lia de Lima Castro, Cleandro Matos da Silva and Morganna Mendes Ferraro

Crossref doi *10.56238/rsfohsv1-029*
.....**270-275**

Development of a jelly formulation with bioactive components
João Pedro Paiva Silveira, Iramaia Bruno Silva, Cícera Maruzia Granjeiro Martins and Rafaella Maria Monteiro Sampaio

Crossref doi *10.56238/rsfohsv1-030*
.....**276-282**

Construction process of an illustrated guide for health education on airway obstruction in children
Liliana Barbosa, Sabrina Neves Satti and Wesley Martins

Crossref doi *10.56238/rsfohsv1-031*
.....**283-290**

Clinical-epidemiological profile of prematurity in Mato Grosso in the 2015-2020 period
Amanda Oliveira Correia, Eugenio da Silva Taques Neto, Heloisa Mazetto Camargo, Gustavo Gomes da Silva Rosa, Larissa Lopes Belline, Tulio Cardoso Gonçalves, Almindo Pereira da Silva Filho, Ageo Mário Cândido da Silva and Luciana Marques da Silva

Crossref doi ***10.56238/rsfohsv1-032***
.....**291-300**

Supravalvar Aortic Stenosis- A review of literature
Bárbara Liss de Sousa Freire, Ana Carolina Brito de Alcantara, Pedro Barroso Girão, Carlos Einardy Teixeira Lima Filho, Mateus Lacerda Lima, Gustavo Lima Adjafre, Giovanna Rolim Pinheiro Lima, Carolina Gomes Fernandes, Ana Luisa Sant'ana Figueiredo and Carlos José mota de Lima

Crossref doi ***10.56238/rsfohsv1-033***
.....**301-307**

Low flow, low gradient paradoxical aortic stenosis: case report and literature review
Saulo Farias Lustosa Da Costa, Ana Carolina Brito de Alcantara, Anderson Alberto Façanha Lima, Viviane Maria Sydrião Peixoto, Ranna Jorge de Araújo, Marcos Paulo Ildefonso, Giovanna Rolim Pinheiro Lima, Carolina Gomes Fernandes, Ana Luisa Sant'ana Figueiredo and Carlos José Mota de Lima

Crossref doi ***10.56238/rsfohsv1-034***
.....**308-317**

Turcot syndrome, a case report
Carolina Maria Monteiro e Silva, Lucas Arantes, Mayana Cerqueira Martins da Silva, Rodrigo Marcelo Moreira de Oliveira Filho, Ardala Policena Alexandre Fernandes, Beatriz Geraldo Moitinho, Sarah Souza Quiste Schwening, Talita Trindade França, Mariana de Arruda Frazao, Victoria de Oliveira Carmo Borges, Thaciane Karen Ribeiro, Maria Carolina de Moraes Marques, Mariana Queiroz Souza Pereira, Beatriz Plotegher Zaramella, José Roberto Beretta Paiano de Oliveira, Luiza Helena Bauermann Gubert Carvalho, Nathália Borges de Paiva, Bruna Cunha de Mello, Júlia Saliba Santos Avelans, Kênia Marques Novato Rolindo, Kamila Basilio Arruda, Lays Nascimento Leão and Giovanna Machado Prudente

Crossref doi ***10.56238/rsfohsv1-035***
.....**318-323**

Gestational depressure: factors associated with its occurrence and influences on the mother-child bond
Denise da Silva Modolo, Beatriz Angieuski Camacho and Adriana Cunha Vargas Tomaz

Crossref doi ***10.56238/rsfohsv1-036***
.....**324-336**

Animal-assisted activities: alternative therapy in oncologic patients in light of the literature
Simone Maria de Araújo Martins, Marilene Lopes de Jesus, Aliana Amandula Santos, Liliane Dutra de Amorim, Ana Cláudia Agra Vieira, Kennya Nunes Araujo, Beatriz de Queiroz Rosa dos Santos, Josele da Rocha Schräder, Eduardo da Silva and Claudemir Santos de Jesus

Crossref doi ***10.56238/rsfohsv1-037***
.....**337-347**

Spiritual anamnesis and doctor-patient relationship: review and reconstruction of a daily routine instrument
Claudio Martins de Queiroz, Ivy Redi Abdalla, Raquel Delatorre Dupas and Rodolfo Pessoa de Melo Hermida

Crossref doi ***10.56238/rsfohsv1-038***
.....**348-357**

The importance of nurses actions in basic health units and their impact on reducing maternal mortality
Francisca Regilene de Sousa de Deus, Carlos Renan Barboza Eduardo, Jessica de Andrade Santos Duarte, Maria Regina Bernardo da Silva, Halene Cristina Dias de Armada e Silva and Natane Cristina dos Santos Vieira

Crossref doi ***10.56238/rsfohsv1-039***
.....**358-368**

Comprehension of the aggravating factors of falls in the elderly at home
Nayra Vanessa de Oliveira Silva, Lucas Manoel Oliveira Costa, Gaubeline Teixeira Feitosa , Luís Eduardo Martins da Costa, Silmara Alves Oliveira da Conceição Silva, Wenderson Felipe Moreira Lima, Sara Bianka Ribeiro Martins, Jordeilson Luis Araujo Silva, Luzia da Paiva Silva and Francisca Regina de Oliveira Sousa

Crossref doi ***10.56238/rsfohsv1-040***
.....**369-379**

Decision making when dealing with endodontic-periodontal lesions
Rosana Maria Coelho Travassos, Maria do Socorro Orestes Cardoso, José Afonso Milhomens Filho, Mônica Maria de Albuquerque Pontes, Vânia Cavalcanti Ribeiro da Silva and Kattyenne Kabbaz Asfora

Crossref doi ***10.56238/rsfohsv1-041***
.....**380-396**

Reception and flow of patients with mental disorders in Primary Care: Experience report
Letícia Beatriz Fonseca Barcelos, Tatiany Cristine Silva and Caroline Jonas Rezaghi Ricomini Nunes

Crossref doi ***10.56238/rsfohsv1-042***
.....**397-406**

Cannabidiol: therapeutic perspectives in its topical use
Matheus Neves dos Santos, Jaqueline Rocha Borges dos Santos, Renata Barbosa Lacerda and Luciana Macedo Brito

Crossref doi ***10.56238/rsfohsv1-043***
.....**407-430**

Feelings aroused during the COVID-19 pandemic in the elderly accompanied by the Family Health Strategy
Mineia da Costa Figueiredo and João Maria Corrêa Filho

Crossref doi ***10.56238/rsfohsv1-044***
.....**431-449**

Reflections on the mental health of the university student
Vânia Regina Bressan, Lucélia Terra Chini, Simone Albino da Silva, Sueli de Carvalho Vilela, Fábio de Souza Terra, Adriana Olímpia Barbosa Felipe, Cristiane Aparecida Silveira, Dênis da Silva Moreira, Mônica La Salette da Costa Godinho and Murilo César do Nascimento

Crossref doi ***10.56238/rsfohsv1-045***
.....**450-456**

Mortality trend in women outside the breast cancer screening age group from 2000 to 2019 in Brazil
Beatriz Angieuski Camacho, Carolina Alves Terra Martins, Rodolfo Dourado Bagano and Adriana Cunha Vargas

Crossref doi ***10.56238/rsfohsv1-046***
.....**457-466**

Anemia and its implications in the interpretation of glycated hemoglobin levels in institutionalized elderlies
Andréa Timóteo dos Santos, Andressa de Lima Godoi Zardo, Margarete Aparecida Salina Maciel and Stella de Bortoli

Crossref doi ***10.56238/rsfohsv1-047***
.....**467-480**

Use of psychoactive substances among nursing students
Marília Nunes de Andrade and Wesley Martins

Crossref doi ***10.56238/rsfohsv1-048***
.....**481-497**

SLEEP: influence of nutrition and physical activity
Leonardo Pereira da Silva, Alex Araujo do Nascimento, Domingos Fares Ferreira Brito, Edilma da Silva Soares, Amanda Bárbara da Silva Guimarães, Ana Maria Siqueira Neiva, Pedro Gabriel Dias Coêlho, Diandra Carvalho de Sá Noleto, Vanessa Lima Nolêto and Marcos Antonio do Nascimento

Crossref doi ***10.56238/rsfohsv1-049***
.....**498-515**

Acute transverse myelitis in puerperal women
Patrícia Leite Brito, Taiane Bentes Kimura and Henrique Bacellar

Crossref doi ***10.56238/rsfohsv1-050***
.....**516-521**

The facilities and contributions of point of care technology in the hospital environment
Hilma Keylla de Amorim, Pablo Raphael de Freitas , Milena Vaz Sampaio Santos, Carolina Costa Pinto, Juliane Guerra Golfetto, Hirlla Karla de Amorim, Emanoel Rodrigo Melo dos Santos and Rita de Cássia Almeida Sales

Crossref doi ***10.56238/rsfohsv1-051***
.....**522-528**

Revenge Porn and the Body Exposed in Superior Court of Justice Decisions
Adriana Espíndola Correa and Alice De Perdigão Lana

Crossref doi ***10.56238/rsfohsv1-052***
.....**529-547**

Vitamin D supplementation in patients after bariatric surgery
Gabrielle Bueno Zákia Beltrame, Sara de Oliveira Cardoso and Luciana Pietro

Crossref doi ***10.56238/rsfohsv1-053***
.....**548-561**

"CRISPR" Performances in genetic reconfiguration
Eduardo Alves Nascimento, Gyzelle Pereira Vilhena do Nascimento and Alberto de Andrade Reis Mota

Crossref doi ***10.56238/rsfohsv1-054***
.....**562-572**

Syphilis: diagnosis, treatment and control
Fabiana Bogéa Lima, José Chaves de Medeiros Júnior, Marco Antônio Galego Júnior, Neuza Biguinati de Barros and Celina A. Bertoni Lugtenburg

Crossref doi ***10.56238/rsfohsv1-055***
.....**573-581**

Bionomics of Peckia (Euboettcheria) anguilla and Peckia (Euboettcheria) collusor (Diptera: Sarcophagidae) in the laboratory
Raquel Fernandes Silva Chagas do Nascimento, Alexandre da Silva Xavier, Lorrane de Andrade Pereira, Carlos Manuel Dutok Sánchez and Margareth Maria de Carvalho Queiroz

Crossref doi ***10.56238/rsfohsv1-056***
.....**582-598**

Riverside women from Amazonas: traditional knowledge and care practices in climacteric
Semírames Cartonilho de Souza Ramos, Carla Sousa Guedelha, Adriana Olímpia Barbosa Felipe and Ana Lúcia Basílio Carneiro

Crossref doi ***10.56238/rsfohsv1-057***
.....**599-612**

Humanized nursing assistance in emergency and emergency: an integrative literature review
Felipe Santana e Silva, Rosana Moreno de Sousa, Fernando Antonio da Silva Santos, Charlles Nonato da Cunha Santos, Wekadja Alves Lobão, Diego Maciel de Oliveira, Antônio Carlos Pereira de Sousa, Vanessa de Araújo Lima, Thamyris Cardoso Vieira, Iramir Ribeido da Silva, Israel Amâncio Mendes and Felisangela dos Santos de Castro

Crossref doi ***10.56238/rsfohsv1-058***
.....**613-621**

Anti-inflammatory activities in Amazonian leaginous plants
Danielle Monteiro, Lorena Caroline, Nicole Oliveira, Tânia Collares, Sabrina Begot, Marcela de Souza Figueiras, Barbara Elizabeth Teixeira-Costa and Orquidea Vasconcelos dos Santos

Crossref doi ***10.56238/rsfohsv1-059***
.....**622-649**

Functional foods in prebiotic sources, inulin in unconventional sources and their applications: a review
Amanda de Sousa Loiola, Jonilson de Melo e Silva, Simone da Silva Santos, Marcela de Souza Figueiras, Barbara Elisabeth Teixeira-Costa and Orquidea Vasconcelos dos Santos

Crossref doi ***10.56238/rsfohsv1-060***
.....**650-662**

Geographical distribution and monitoring of dengue in 141 municipalities in the center-west of Brazil
Alexander Gonçalves Ferreira Guimarães, Lucinéia Claudia de Toni Aquino da Cruz, Gustavo Benedito Medeiros Alves, Mário Ribeiro Alves and Marina Atanaka

Crossref doi ***10.56238/rsfohsv1-061***
.....**663-686**

Effects of aromatherapy on menopausal symptoms: an integrative literature review
Kenderly Camila Baltokoski, Maísa Cristina de Lima Nascimento and Gustavo Maximiliano Dutra da Silva

Crossref doi ***10.56238/rsfohsv1-062***
.....**687-699**

The vision of bioethical principles regarding immunization
Alessandre Gomes de Lima, Ruth Silva Lima da Costa, João José Albuquerque de Sousa Júnior, Gilvana de Jesus do Vale Campos, Laércio Medeiros Silva Júnior, Leuda Maria da Silva Davalos, Osvaldo de Sousa Leal Júnior, Cirley Maria de Oliveira Lobato, Dilza Terezinha Ambros Ribeiro and Rui Manuel Lopes Nunes

Crossref doi ***10.56238/rsfohsv1-063***
.....**700-708**

Knowledge of pregnant women about exclusive breastfeeding in front of COVID-19
Aline Sedorko, Suellen Vienscoski Skupien, Fabiana Bucholdz Teixeira Alves and Laryssa De Col Dalazoana Baier

Crossref doi ***10.56238/rsfohsv1-064***
.....**709-713**

Level of physical activity and quality of sleep among high school students in Maranhão
Leonardo Pereira da Silva, Mayara Raíssa de Miranda Bezerra, Francisca Aline dos Santos Dias, Bianca Caroline Damasceno Sousa and Regina Célia Vilanova-Campelo

Crossref doi ***10.56238/rsfohsv1-065***
.....**714-721**

Assistance for the newborn in the birth room
Michelle Carneiro Fonseca, Nathália Torres Costa de Souza, Mariana Furtado Barros de Souza, Carmem Cristina Torquato Nunes , Alyson Soares Santana, Polliana Carvalho de Souza, Liva Gurgel Guerra Fernandes, Daniella Santos Guedes Alcoforado, Priscilla Pereira de Menezes, Kadija Gentil Nogueira Garcia, Alessandra Gurgel Câmara and Maria de Lourdes Pontes Neta

Crossref doi ***10.56238/rsfohsv1-066***
.....**722-729**

Implications of vaginal and elective cesarean deliveries in the formation of the oral microbiota of the individual as a subject of rights
Maria da Conceição Ferreira, Rogério de Souza Torres and Giovanni Cerrone Junior

Crossref doi ***10.56238/rsfohsv1-067***
.....**730-737**

Unusual case of intentional ingestion of foreign body in patient with mental retardation
Mahomed Sidique Abdul Cadar Dadá, Abdul Habib Mahomed Dadá and Zulaikhah Mahomed Sidique Dadá

Crossref doi ***10.56238/rsfohsv1-068***
.....**738-741**

Social isolation and common mental disorders among nursing academics at the federal university in the municipality of Rio
Jorge Luiz Lima da Silva, Wallace Henrique Pinho da Paixão, Maria da Soledade Simeão dos Santos, Claudia Maria Messias, Gustavo Martins Lemos Tavares and Kevin Sousa Barbosa

Crossref doi ***10.56238/rsfohsv1-069***
.....**742-751**

Knowledge of nurses working in primary health care: prenatal and puerperium
Marina Lefol Nani Carvalho, Lucélia Terra Chini, Jéssica Goretti da Silva, Mariana Mendes Oliveira Lima, Christianne Alves Pereira Calheiros and Patrícia Scotini Freitas

Crossref doi ***10.56238/rsfohsv1-070***
.....**752-759**

Connecting extension, teaching and research through a broad academic project
Bruna Karas, Ana Carla Dlugosz, Larissa Almeida Busnello, Alice Magro Koscianski, Camilla Mattia Calixto, Francielle Nocera Viechineski, Paola Gonçalves Moreira de Oliveira, Mariana Fonseca, Amy Sakakibara, Gilberto Baroni, Gianna Carla Alberti Schrut and Mário Cláudio Soares Sturzeneker

Crossref doi ***10.56238/rsfohsv1-071***
.....**760-765**

Perception of pregnant women about labor and childbirth during prenatal care
Wankarla Barbosa Chaves, Suellen Vienscoski Skupien and Laryssa De Col Dalazoana Baier

Crossref doi ***10.56238/rsfohsv1-072***
.....**760-771**

Epidemiological profile of acquired, gestational and congenital syphilis in Brazil between 2011 and 2020 with emphasis on the southeastern region
Catarina Osue Ide Silva, Elaine Cristina Navarro, Ednaldo Alexandre Zandoná, Carolaine Sousa Novaes, Maria Thereza Ward de Santi Melo, Eduvale de Avaré, Larissa Matias Lopes and Carlos Cesar Marques Collela

Crossref doi ***10.56238/rsfohsv1-073***
.....**772-784**

Impact of the pandemic of Covid-19: comparison of the epidemiological profile of the cuesta pole and Jurumirim valley
Carolaine Sousa Novaes, Elaine Cristina Navarro, Vivienne do Val Rodrigues, Ednaldo Alexandre Zandoná, Larissa Matias Lopes, Carlos Cesar Marques Colella, Maria Thereza Ward de Santi Melo and Catarina Osue Ide Silva

Crossref doi ***10.56238/rsfohsv1-074***
.....**785-804**

Human anatomy: speech-language pathology students' preferences and perspectives
Ana Lúcia Basilio Carneiro, Semírames Cartonilho de Sousa Ramos, Lindair Alves da Silva and Lincoln Basilio Alves

Crossref doi ***10.56238/rsfohsv1-075***
.....**805-815**

Characterization of chitosana films produced with incorporation of anacardium microcarpum ducke extract
Ronaldo Coelho Pereira, Maura Vieira dos Santos Sousa, Marina de Oliveira Cardoso Macêdo, Vicente Galber Freitas Viana and Haroldo Reis Alves de Macêdo

Crossref doi ***10.56238/rsfohsv1-076***
.....**816-831**

Pregnant nursing professionals in the context of the covid-19 pandemic: an experience report
Nataniele de Albuquerque, Thaísa Mirella da Silva, Suzana Maria de Oliveira Costa Meneses, Sâmela Maria de Oliveira Silva, Clebiana Alves e silva Diniz, Tainan de Andrade Rocha, Julia Maria Pacheco Lins Magalhães, Poliana Silva de Brito, Manuelle de Araújo Holanda and Eliane dos Santos Nunes

Crossref doi ***10.56238/rsfohsv1-077***
.....**832-836**

Hypertensive crisis in hospital urgency and emergency care: How to care?
Clebiana Alves e silva Diniz, Tainan de Andrade Rocha, Julia Maria Pacheco Lins Magalhães, Nataniele de Albuquerque, Sâmela Maria de Oliveira Silva, Poliana Silva de Brito, Suzana Maria de Oliveira Costa Meneses, Thaísa Mirella da Silva, Eliane dos Santos Nunes Manuelle de Araújo Holanda

Crossref doi ***10.56238/rsfohsv1-078***
.....**837-845**

Analysis of Drug Interactions in Patients With Heart Disease : An Experience Report
Pedro de Almeida Rischard Poletto, Rafaela Bernardo Alaite,Laura Alves Estevo, Luiz Minuzo and Luciana Vismari

Crossref doi ***10.56238/rsfohsv1-078***
.....**846-848**

Analysis of Drug Interactions in Patients With Heart Disease : An Experience Report
Pedro de Almeida Rischard Poletto, Rafaela Bernardo Alaite, Laura Alves Estevo, Luiz Minuzo and Luciana Vismari

Crossref doi ***10.56238/rsfohsv1-079***
.....**849-851**

CHAPTER 1

Humanized care by nurses in the parturition process: a narrative review of the literature

10.56238/rsfohsv1-001

Carolina Fernandes Souza
Nursing Student
UNA University Center, Bom Despacho - MG
BR 262, KM 480, S/N - Rural Area - Bom Despacho - MG, Zip Code: 35600-000
E-mail: carolinafernades2012@gmail.com

Iuri Henrique da Silva Monteiro
Nursing Student
UNA University Center, Bom Despacho - MG
BR 262, KM 480, S/N - Rural Area - Bom Despacho - MG, Zip Code: 35600-000
E-mail: monteiroiuri9@gmail.com

Larissa Caroline Alves Resende Costa
Nursing Student
UNA University Center, Bom Despacho - MG
BR 262, KM 480, S/N - Rural Area - Bom Despacho - MG, Zip Code: 35600-000
E-mail: larissacarolinear@hotmail.com

Larissa Soares Lopes
Nursing Student
UNA University Center, Bom Despacho - MG
BR 262, KM 480, S/N - Rural Area - Bom Despacho - MG, Zip Code: 35600-000
E-mail: larissalopes.2473@aluno.una.br

ABSTRACT
INTRODUCTION: Labor and delivery, as well as many other health procedures, have been undergoing transformations over the years in order to improve the experience for the woman, and reduce the risks for her and the baby. OBJECTIVE: To identify nursing actions in humanized care for women during pre-delivery, childbirth and the immediate postpartum period. METHODOLOGY: A narrative review study, of the descriptive type, carried out in the year 2022. Data collection was carried out through the data sources BVS - Biblioteca Virtual em Saúde and SciELO - Scientific Electronic Library Online. RESULT: The final sample consisted of 7 articles. Some articles in this study highlighted the importance of humanization of nurses during labor and its importance for optimal care, on the other hand, other articles report that obstetric violence still exists and emphasize that nurses need to be trained and always updated to provide humanized assistance. CONCLUSION: It is concluded that the humanization of nurses in labor contributes to a better experience for the pregnant woman, child and companion, but there are still many flaws in humanization as well as obstetric violence, so the training of the team is totally necessary.

Keywords: Nursing, Humanizing Delivery, Maternal-Child Nursing, Humanization of Assistance, Obstetric Nursing.

1 INTRODUCTION

Childbirth, like many other health procedures, has been going through changes over the years in order to improve the experience for the woman, and decrease the risks for her and the baby. Previously, this procedure was performed at home by women called midwives or healers, who had no preparation and assistance of pain relief methods, only basins with hot water and towels, thus making the process more painful and time consuming (SANTOS; MOITA, 2018).

With the technical-scientific advances employed in assistance from pregnancy to the puerperium, childbirth has become a hospital intervention, relying on specialized teams, humanized methods and modern equipment, thus in the vast majority of times, the pregnant woman can choose the form of birth of the baby, being from cesarean section to natural deliveries (SILVA et al., 2019).

In this sense, the view of pregnant women about humanized childbirth shows ignorance, where patients are not used to the topic, many assimilate humanized childbirth as synonymous with natural childbirth, and not an integrative action of the team between natural and surgical procedures. Puerperae

highlight negative points such as pain, mistreatment, risky maneuvers, lack of education and understanding, importance of free choice for your companion, and positive points such as: "better choice" and the "best experience" (JANEIRO, 2013; OLIVEIRA et al. , 2014).

When talking about humanized labor the first impression referred to is the procedures performed, the labor itself covers a broader concept, and may cover several dimensions and complementary forms in the same concept, aiming a healthy labor and birth is adopted a set of procedures and conducts that automatically prevent perinatal morbidity and mortality, in addition to defending the strategies used in this process, reinforces all the basic principles of nursing care as the integrality, equality and equity (BRITO, 2020; NASCIMENTO; SILVA; VIANA, 2018).

In recent years the need to humanize health care has been questioned, especially when promoted by the Unified Health System (SUS), in order to change the way of managing and caring, according to the Ministry of Health (2013), humanizing is about the inclusion of differences in the mechanisms of care and management, however, it is still common the fragmentation of this process as evidenced by Lima et al. (2021), which cites the separation of body and mind in the practice of care, promoting the devaluation of users' rights.

In view of this, the nurse participates in the process of humanization continuously, thus giving the standard of hospital care, whether in the prepartum, intensive care, psychiatric ward or among many others. Santos et al. (2021) say that humanized care is part of the good professional relationship with users of the health service and as a primary point that helps in the healing process and promotes development.

The present study was developed aiming at the need for humanized assistance to pregnant women due to their emotional and physical vulnerability that requires greater attention and sensitivity from the professionals who are accompanying them, avoiding and circumventing the deficiencies of assistance. Thus, the general objective of this study was to identify nursing actions in humanized care for women during labor, delivery and immediate postpartum, and the specific objectives were: to describe the actions of nurses in humanized care and promotion of childbirth, to highlight the good and bad obstetric practices as well as to know the potentialities and limitations of the nurse's role during hospitalization of pregnant women for labor.

2 METHODOLOGY

The present study is a narrative review of literature, with descriptive analysis, carried out with the objective of answering the following question: what are the nurse's actions in humanized assistance to women during labor, delivery and immediate postpartum?

The search was conducted using health terminology consulted in the Descriptors in Health Sciences (DeCS), through which the following descriptors were identified: "Nursing"; "Humanization of childbirth care"; "Maternal and Child Nursing"; "Humanization of care"; "Obstetric Nursing" and "Humanization of childbirth". In addition, the Boolean operator "AND" was used at the time of the searches.

Two databases were used for the literature search, the *Scientific Electronic Library Online* (SciELO) and the Virtual Health Library (VHL). The search strategy used included reading the title and abstract of each study.

The criteria used for the inclusion of the sample were: materials that addressed the guiding question, full text, Portuguese language, articles, TCC and monographs from 2017 to 2022. The criterion related to the publication period was stipulated in order to obtain the most updated data consistent with the current reality.

The exclusion criteria were: case reports, review and/or reflection articles, articles that are repeated in the database, non-scientific texts, and incomplete data (no publication dates and/or unknown sources).

The selected studies were analyzed in detail, critically, seeking explanations for contrary or conflicting results. Because it is a very broad subject and in order to facilitate the selection of the material, the search was divided into three parts, in which each one was crossed with different descriptors, and after obtaining the total value, the inclusion and exclusion criteria were applied, and the reading was carried out in its entirety in order to verify its contemplation in all the criteria.

3 RESULTS

Initially, 898 articles were found, 179 of them indexed to *SciELO*, and 719 indexed to VHL. The crossing of descriptors occurred in pairs with a Boolean operator as follows:

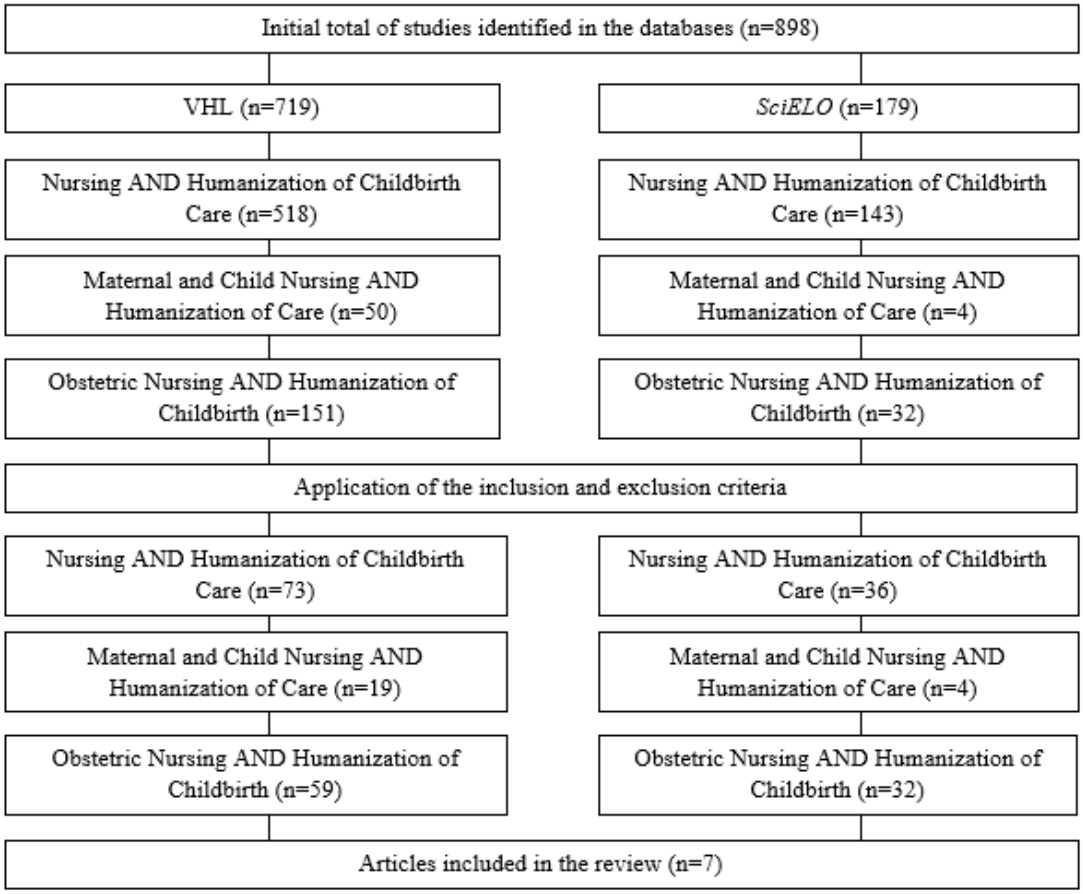
The first crossing was made through the descriptors and boolean operator "Nursing *AND* Humanization of Childbirth Care", obtaining a total of 661 articles (518 from the BVS and 143 from *SciELO*), which, after applying the inclusion and exclusion criteria, obtained a total of 109 articles (73 from the BVS and 36 from *SciELO*).

The second crossing was made through the descriptors and boolean operator "Enfermagem Materno-Infantil *AND* Humanização de Assistência", obtaining a total of 54 articles (50 from the BVS and 4 from *SciELO*), which, after applying the inclusion and exclusion criteria, obtained a total of 23 articles (19 from the BVS and 4 from *SciELO*).

The third crossing was done through the descriptors and boolean operator "Enfermagem Obstétrica AND Humanização do Parto", obtaining a total of 183 articles (151 from the BVS and 32 from *SciELO*), which, after applying the inclusion and exclusion criteria, obtained a total of 91 articles (59 from the BVS and 32 from *SciELO*).

A total of 223 articles were cross-referenced, and the title, abstract, and full text were read, resulting in a final sample of seven articles included in the research, represented in Figure 1 and described in Table 1.

Figure 1 - Flowchart



Source: Authors, 2022.

Of the 7 articles found, two are from 2017, one from 2019, two from 2020, and two from 2021. As for their research methods, five are characterized as descriptive studies where two have a quantitative and retrospective approach, of which one is a cross-sectional method; the other three have a qualitative approach, of which two are exploratory; finally, the other two are qualitative in nature.

The articles that met the inclusion criteria were analyzed in full and their data were collected following the following items: (1) author and year of publication; (2) type of study; (3) results and (4) contribution, represented in the table below (Chart 1).

Table 1 - Sample of articles included in the review.

(1) Author and year of publication	(2) Type of study	(3) Results	(4) Contribution
GIANTÁGLIA, Fernanda Nogueira et al. , 2020.	Descriptive, qualitative, and exploratory study.	It is perceived that the residents in obstetric nursing still need to conquer their space in the maternity hospitals in a more emphatic way, which will allow for greater autonomy, with a view to putting into practice the implementation of new strategies, based on the humanization of care.	To describe the potentialities and challenges of residents in Obstetric Nursing, with regard to the humanization of childbirth and the puerperium.
BOMFIM, Aiara Nascimento Amaral et al, 2021.	Descriptive and qualitative study	The women verbalized satisfaction with the nursing care related to the application of non-pharmacological methods for pain relief, support, and promotion of well-being, although the verticalization of relationships and the lack of professional accompaniment were also present.	Describes women's perceptions of the Nursing care received during the process of normal childbirth.
LEHUGEUR Danielle; STRAPASSON, Márcia Rejane; FRONZA, Edegar, 2017.	A descriptive, quantitative, retrospective, cross-sectional study.	It describes that 98.3% used some non-pharmacological method of pain relief, namely: walking (79.2%), bath (73.1%), massage (60.0%), variety of position (58.8%), aromatherapy (46.9%), ball (42%), among others.	Describes non-pharmacological methods for pain relief and their benefits to the parturient.
ANDRADE Larisse Ferreira Benevides de; RODRIGUES, Quessia Paz; SILVA, Rita de Cássia Velozo da, 2017.	A descriptive, quantitative, retrospective study.	The use of the following good practices was identified: presence of a companion (79.2%), non-pharmacological methods for pain relief (23.1%), immediate skin-to-skin contact (51.6%), and breastfeeding in the delivery room (38%). Most deliveries (95.3%) were attended by physicians.	Describes good care practices and their contributions.
ALEXANDRIA, Samara Teles de et al, 2019.	Qualitative study.	The participating nurses pointed out which techniques, practices and maneuvers they consider to be obstetric violence. It was identified from the professionals' experiences that the occurrence of obstetric violence is still widely practiced. It was noticed that nursing professionals have knowledge about obstetric violence, as well as their practices.	Describes various types of obstetric violence and the nurse's knowledge and role in dealing with them.
FERREIRA JUNIOR, Antônio Rodrigues et al, 2021.	Descriptive, qualitative, and exploratory study.	It says that the nurse's performance enhances good obstetric practices for labor and birth, as well as increases the importance and visibility of the maternal and child professional. Clinical care and management emerge as the focus of nurses' actions in normal birth centers.	It describes the main potentials: knowledge and autonomy, credentialism, division of labor, labor market, and value framework.
SILVA, Angelina Carmo et al. , 2020.	Qualitative study.	It works in two categories: knowing and being with the client, emphasizing welcoming and orientations; and limitations to maintaining beliefs, noting specialization in obstetric nursing, precariousness of prenatal care, cultural diversity, and teenage pregnancy.	It confirms the autonomy of the nursing professional as well as its benefits to care.

Source: Authors, 2022.

The articles listed showed about the humanization of care for pregnant and postparturient women, also highlighting obstetric violence and the potential and limitations of nurses in obstetric care for women, according to the following results.

The article by Giantaglia et al. (2020) is a descriptive, exploratory study, with a qualitative approach, conducted with six nurses who are graduates of the residency course in obstetric nursing at a public university, aiming to describe the potentialities and challenges of the residents about their experience in a National Residency Program in Obstetric Nursing, with regard to the humanization of childbirth and puerperium. It was possible to notice that the residents were in the age range of 25 to 47 years old, with a prevalence of 25 to 27 years old.

Through the study, the importance of the National Residency Program in Obstetric Nursing in the maternity hospitals of the public health service became evident, since obstetric nursing is of utmost importance to spread humanization in the care of the pregnant woman/parturient/puerperal woman, in order to provide quality, satisfactory, and holistic care.

It was noticed that the residents in obstetric nursing still need to conquer their spaces in the maternity wards more emphatically, in order to allow for more autonomy, with a view to putting into practice the implementation of new strategies based on the humanization of care, learning to deal with the conflicts generated between residents and the multiprofessional team of the institution, and residents and preceptors, thus imposing the practice of humanized care with more autonomy.

The article by Bomfim et al., (2021) is a descriptive research with a qualitative approach, carried out in two public maternity hospitals in Salvador, Bahia, Brazil. Thirteen women participated in the research. In the results, two scientific categories emerged: nursing care permeated by satisfaction; and care permeated by vertical relationships and feelings of abandonment. The women verbalized satisfaction with Nursing care related to the application of non-pharmacological methods for pain relief, support and promotion of well-being, although the verticalization of relationships and the absence of professional monitoring were also present.

Still according to Bomfim et al., (2021) on the Nursing assistance received during the process of normal delivery, satisfaction was obtained in relation to the care received by the team, which provided well-being through the development of a relationship of trust, existentiality, offer of support, words of encouragement and use of non-pharmacological methods for pain relief in the delivery process. However, there were findings of dissatisfaction related to the verticalization of relationships, absence of professional accompaniment, and trivialization of pain during labor. This problem needs to be constantly discussed because it demonstrates fragility in assistance and exposes women and newborns to unexpected outcomes in the birth process, including with a gender cut, since these women are more vulnerable to violation of rights.

The article by Lehugeur; Strapasson; Fronza (2017) was developed with a study of 232 medical records of parturients with vaginal delivery, with a mean maternal age of 25 years, seen at a large public

hospital located in Porto Alegre (RS). The objective of the study was to characterize the deliveries assisted by an obstetric nurse as to the non-pharmacological methods of pain relief in the process of parturition. The non-pharmacological methods used for pain relief during labor were: ambulation (79.2%), bath (73.1%), massage (60.0%), variety of position (58.8%), aromatherapy (46.9%), Swiss ball (42.0%), rebozo (12.7%), foot scalding (2.4%) and music therapy (2%). The result of this study shows us that non-pharmacological methods for pain relief change the whole scenario of labor, making it humanized, welcoming and beneficial for the pregnant woman and the multiprofessional team.

The study by Andrade; Rodrigues; Silva (2017) besides highlighting the good practices to women also highlights the same practices for the newborn, was composed of 337 medical records of women who had normal deliveries in a public maternity hospital, inserted in a teaching hospital of the state health network, in the municipality of Salvador, in September 2015. The mean age of women was between 20 and 35 years. The results of this study describe the difference in the adherence to two best practices when compared to race/color. The first difference regarding race and color was the presence of a companion, in which 6.6% of white women were not accompanied and in contrast, 25.7% of black women were not accompanied. The second difference was in relation to skin to skin contact, among white women 28.5% did not have this contact, but this absence among black women was much higher, 69%. The results also show that 79.2% of pregnant women had freedom of choice of a companion during hospitalization, only with 23.1% of women were used non-pharmacological methods for pain relief, 66.2% of women adopted the semi-recumbent position, or the most usual, thus showing that most did not have free choice of position in childbirth, the immediate skin to skin contact occurred with 51.6% of women, early breastfeeding was not adopted by 55.8% and 38% adopted this practice. The study concludes that the adherence to good practices among the women studied was low.

Alexandria et al., (2019) aimed to evaluate the knowledge of nursing professionals involved in childbirth care about obstetric violence. The target population was composed of 10 of the 15 nurses in the sector, who met the inclusion criteria: being a nurse (a) of the maternity hospital of choice, holding an undergraduate degree for a minimum period of six months, and working directly in assisting women in the period before delivery, at the time of delivery, and postpartum. The results show that the participating nurses pointed out which techniques, practices and maneuvers they consider to be obstetric violence. It was identified from the professionals' experiences that the occurrence of obstetric violence is still widely practiced. It was perceived that nursing professionals have knowledge about obstetric violence, as well as their practices. The findings emphasize the need for education on the subject and training with the teams.

The article by Ferreira Junior et al., (2021) is a qualitative, exploratory and descriptive study conducted in 2018, as a research sample, they used six nurses working in an intra-hospital normal delivery center (CPN) of a public institution in the metropolitan area of Fortaleza, Ceará. The participating nurses were selected based on their availability in the hospital environment, with an age range of 26 to 59 years. Data collection occurred between July and August 2018 through individual interview conducted by one of

the researchers. Thus, the study aimed to understand the potentialities and limitations of the nurse's role in the CPN. The highlights of the article surround five main themes, highlighting within each one the potentialities and limitations of the nurse's performance, which are: the knowledge and autonomy where it can be observed nursing actions able to fortify the valuation of assistance and potentiator of good healthy practices of labor and birth; the credentialism where it highlights that specialized professionals communicate clearly and respectfully as well as interpersonal collaboration; about the division of labor in the context of leadership and resource management can be seen as a way of expanding the range of professional domain; about the labor market can be seen as an increasing form of evolution of professional development; finally the values framework represents the perception of the nursing team about their autonomy, working and employment conditions, service quality evaluation, team competencies, defense of public interest, responsibility and altruism. As challenges and limitations faced by nurses in their daily routine reported by the research participants, the following stand out: the application of autonomy and respect for accreditation, the harmonization between work process management and clinical care management, often hinders their performance in the assistance provided. With this, it could be noted that the results related to each other and at the same time complemented each other, describing the reality about the limitations of the assistance provided by nurses; however, it is concluded that even with professional development, there is still a need for recognition of the competencies and autonomy of nurses in obstetric care by other professionals.

The article by Silva et al. (2020a) is a qualitative study, developed in a Brazilian hospital on the border strip of the state of Amapá located in the municipality of Oiapoque. The interviews took place between October and November 2018, with 8 nurses, using Kristen Swanson's Theory of Care for analysis. The research aimed to understand the perceptions of nurses about the assistance to hospital delivery and birth, in the French-Brazilian border, this way they evidenced two categories of results: knowing and being with the client and limitations to the maintenance of beliefs, finally the collaborators evidenced the importance of knowing the context in which it is inserted to base the care plan and the insufficient autonomy, through lack of training, was evidenced as a complicating factor for quality obstetric assistance.

4 DISCUSSION

In agreement with the article by Giantaglia et. al., (2020) the articles by Pereira et al., (2018) and Silva et al., (2020b) demonstrated the satisfaction and importance of the residency course in obstetrics, from the point of view of the residents. In Pereira et al., (2018) the egresses considered that the course provides a satisfactory theoretical and practical basis, conferring knowledge and enabling skills necessary for safe professional practice. From this perspective, they highlighted that residency allowed the acquisition of a large amount of practical experiences, which translates into a primordial component for the perception of safety for the exercise of the specialty; what is affirmed in Silva et al., (2020b) where nurses highlighted the importance of the residency training modality with the movement between theory and practice, bringing

knowledge. They also reinforced the learning in childbirth care, enabling the different experiences in this scenario as essential to their autonomy and professional safety in the area; also demonstrating new attitudes in the performance of care adhering to the humanized model.

(2021), the article by Silva et al. (2016), states that when considering care and comfort during labor, one should not simplify and consider only pain relief. This comfort is transmitted through the look, sensitive listening, understanding the uniqueness of the moment of birth and the professional's empathy with the parturient woman. Silva et al., (2016) also brings that the biggest challenges of current obstetrics is to ensure the quality of humanized care to women in the gravidic-puerperal cycle, through the construction of bonds, stimulating the woman's autonomy over her own body and recognizing this woman as an active being in her process of pregnancy and childbirth.

In agreement with the articles by Lehugeur, Strapasson, Fronza (2017) and Andrade; Rodrigues; Silva (2017), the article by Coelho; Rocha; Lima (2017) reports that massage is able to reduce anxiety and stress, promoting muscle relaxation, has sedative and analgesic action, generates emotional benefits and balance between the sympathetic and parasympathetic system. Massage enables interaction between the companion and the parturient woman, generating contentment for her. The bath is another method, which is used to effect cutaneous stimulation, through heat, time, and intensity, providing a local and global effect on the woman. The ideal is that the water is around 37º and that the bath period is at least 20 minutes, the warm water will reduce the painful sensibility, this occurs due to the release of catecholamine and the elevation of endorphin levels. This technique should be avoided in pregnant women who suffer from arterial hypotension, due to the temperature of the water that causes vasodilatation. The Swiss ball is also used, in which the pregnant woman remains seated in a vertical position and thus the pelvis is allowed to swing and works the pelvic floor muscles; the movement facilitates the descent and rotation of the fetus and improves uterine circulation, promoting more efficient contractions. Walking reduces pain by accelerating the active phase. The connection between ambulation and the action of gravity gives the pregnant woman a shorter time in the duration of the dilation period, the expulsion period, and better dynamics of uterine contractility. We conclude then that this article is in agreement with the studies found in the results on non-pharmacological methods for pain relief. In addition to non-pharmacological methods for pain relief, the article by Lima et al. (2020) highlights the importance of "hands off", which is a good obstetric practice, being a less interventionist method that favors physiological birth; in this practice there is no touching the baby's head or maternal perineum, unless the period of expulsion of the baby's head is very fast.

The article by Souza et al., (2019) reinforces the findings found in the article by Alexandria et al., (2019). Souza et al., 2019 reports that among the main malpractices cited are verbal and psychological offense, expropriation of the female body, deprivation of escorts, failure to provide information, deprivation of movement in labor and delivery, trivialization of pain, lack of privacy, and performance of the Kristeller maneuver. Offensive phrases, scoldings, threats, jargon, jokes, and irony are used against women and their babies during labor and delivery. Changes in tone of voice and the use of words that provoke humiliation

are frequent and even consented to by the professionals. It is noteworthy that women, whether pregnant, parturient, in abortion or postpartum, are frequent victims of obstetric violence. For these women, who somehow suffered obstetric violence, the process of childbirth is directly associated with pain and suffering, they are traumatized and cannot see this moment in any other way. Thus, this study reaffirms that of Alexandria et al., (2019), obstetric violence exists and needs attention.

Linked to quality care, with the characteristics of humanization is necessary knowledge and continuous study of the nurse who works in obstetrics and in this sense, Bonfada; Pinno; Camponogara, (2018), brings in his article, which is a research of bibliographic integrative character, where the author, amid the analysis of the articles studied, reached the apex of confirmation of his research, dissertating that the limitation of the nurse is linked to factors such as knowledge and autonomy in the practical application, since the professional who has more knowledge will have more availability and confidence to perform certain procedure, since in credentialism the nurse is always compared to the doctor for his lack of wisdom, making the professional more dependent on medical knowledge. It is also commented that depending on the area in which the nurse works, he/she will have more knowledge, as for example, the nurse who works in a critical area compared to the one who works in a non-critical area. The issue of physical and emotional exhaustion and work overload is also highlighted, which will always interfere with professional care, since the nurse will not have the physical and emotional availability for the necessary training, thus leading to a failed care with total medical dependence, as also highlighted by Ferreira Junior et al.

In evidence of the importance of knowledge and performance of nursing Ferreira Junior et al., (2021), corroborate with Jacob et al., (2022), as they highlight that a professional educated with scientific bases, avoids unnecessary interventions and assists in a humanized way, in addition to raising the standards of care, promoting comfort, respect, quality and autonomy of the parturient, contributing still to the disarticulation of the hospital-centric model already long outdated. Silva et al., (2020a) also focus on the need for qualified personnel, where the lack of expertise on the subject generates doubts and insecurities in obstetric practice, thus the qualification intensifies the autonomy of nursing. Adorno et al., (2017) already contributes reaffirming the process of leadership and resource management, where their data show that nursing for being present full time to the patient should always be prepared to give the first support to pregnant, parturient and puerperal women as well as the family, thus being able to add positive emotions in the commitment to promote humanized care, showing respect and concern for the patient, consequently providing dignified and quality care.

5 CONCLUSION

It is undeniable the importance of humanized assistance performed by nurses during the childbirth processes, to identify the needs of pregnant women. In addition to non-pharmacological methods for pain relief, the use of other practices is necessary for the birth to be humanized, such as hiring professionals with the profile for the maternity sector, who know how to deal with this time of numerous hormonal changes,

who have empathy and are not just there to provide a service, but to seek to understand the needs of women, whether they are pregnant, parturient, or postpartum.

In addition, the alignment of the maternity and surgical team so that they know how to use good obstetric practices, starting from the simple, such as knowing how to listen and dedicate themselves to training and capacity building on humanization.

For, it was clear that bad practices permeate obstetric care and that it is necessary to raise the awareness of professionals who work directly and indirectly and society in general. In this sense, the role that nurses develop as, welcoming care actions, support, preservation of rights and choices, with preference for the "hands off" in direct assistance to the birth, guidance and health education with provision of information that contribute to a better experience for the mother, the newborn and the family, because information and knowledge are significant forms of prevention of obstetric malpractice.

It is also noted, the need for a strengthening of the nursing class, mastery and knowledge to achieve the best perinatal results, respecting the individuality of the woman and family; with this, gain autonomy for better way to achieve good care practices in obstetric nursing.

REFERENCES

ADORNO, A. M. N. G. et al. Gestão hospitalar como ferramenta do cuidado. **Rev enferm UFPE on line.**, Recife, 11(8):3143-50, ago, 2017. Disponível em: <https://periodicos.ufpe.br/r evistas/revistaenfermagem/article/view/110220/22135#>. Acesso em: 16/05/2022.

ALEXANDRIA, S. T. de et al. Violência obstétrica na perspectiva dos profissionais de enfermagem envolvidos na assistência ao parto. Juazeiro do Norte, **Cult. cuid;** 119-128, 2019. Disponível em: <https://rua.ua.es/dspace/bitstream/10045/91758/1/CultCuid_53-119-128.pdf> . Acesso em: 30/04/2022.

ANDRADE, L. F. B. de; RODRIGUES, Q. P; SILVA, R. de C. V. da. Boas Práticas na atenção obstétrica e sua interface com a humanização da assistência. **Rev enferm UERJ**, Rio de Janeiro, 2017; n. 2. p. 5-6. Disponível em: <https://www.e-publicacoes.uerj.br/index.php/enfer magemuerj/article/view/26442/25893>. Acesso em: 31/10/21.

BOMFIM, A. N. A. et al. Percepções de mulheres sobre a assistência de enfermagem durante o parto normal. **Rev. baiana enferm.**, Salvador, v. 35, e39087, 2021. Disponível em: <http://www.revenf.bvs.br/scielo.php?script=sci_arttext&pid=S2178-86502021000100316&l ng=pt&nrm=iso>. Acesso em: 01/05/2022.

BONFADA M. S; PINNO C; CAMPONOGARA S. Potencialidades e limites da autonomia do enfermeiro em ambiente hospitalar. Rev enferm UFPE on line., Recife, 12(8):2235-46, ago., 2018. Disponível em: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/234 915/29743>. Acesso em: 17/05/2022.

BRASIL. PNH: Política nacional de humanização. Brasília: Ministério da Saúde, 2013. 16 p. Disponível em: <https://bvsms.saude.gov.br/bvs/publicacoes/politica_nacional_humanizacao_ pnh_folheto.pdf>. Acesso em: 10/10/2021.

BRITO, A. R. *et al.*, A percepção das gestantes sobre o parto humanizado e violência obstétrica: relato de experiência. **Research, Society And Development**, Pará, v. 8, n. 7, p. 1-11, 16 jun. 2020. Disponível em: <https://www.rsdjournal.org/index.php/rsd/article/view/5086/4423>. Acesso em: 08/10/2021.

COELHO, K. C; ROCHA, I. M. da S; LIMA, A. L. da S. Métodos não farmacológicos para alivio da dor durante trabalho de parto. **Revista Recien,** São Paulo, v. 7, n. 21, p. 14-21. 2017. Disponível em: <https://www.recien.com.br/index.php/ Recien/article/vie w/244/pdf>. Acesso em: 09/05/2022.

FERREIRA JUNIOR, A. R. et. al. Potencialidades e limitações da atuação do enfermeiro no Centro Parto Normal. **Esc. Anna Nery**, v. 25, n. 2, e20200080, 2021. Disponível em: <http://www.revenf.bvs.br/scielo.php?script=sci_arttext&pid=S1414-81452021000200202&l ng=pt&nrm=iso>. Acesso em: 11/11/2021.

GIANTAGLIA, F. N. et al. Humanização do cuidado em um programa de residência enfermagem obstétrica: possibilidades e desafios. **Enfermería (Montevideo)**, Montevideo, v. 9, n. 2, p. 114-128, dic. 2020. Disponível em: <http://www.scielo.edu.uy/scielo.php?script=sci _arttext&pid=S2393-66062020000200114&lng=es&nrm=iso>. Acesso em: 01/05/2022.

JACOB, T. N. O. et al. A percepção do cuidado centrado na mulher por enfermeiras obstétricas num centro de parto normal. **Esc Anna Nery.** Rio de Janeiro. 2022 ;26:e2021. p01-05. Disponível em: <https://www.scielo.br/j/ean/a/GYhvc6TGdgSzZMnFCQfBWXS/?lang=pt>. Acesso em: 16/05/2022.

JANEIRO, P. D. P. **Experiências vivenciadas pela mulher em trabalho de parto e nascimento**. 2013. 102 f. Dissertação (Mestrado) - Curso de Enfermagem, Curso de Mestrado em Enfermagem de Saúde

Materna e Obstetrícia, Escola Superior de Enfermagem do Porto, Porto, 2013. Disponível em: <https://comum.rcaap.pt/bitstream/10400.26/9401/1/Tese_final.p df>. Acesso em: 11/10/2021.

LEHUGEUR, D; STRAPASSON, M. R; FRONZA, E. Manejo não farmacológico de alívio da dor em partos assistidos por enfermeira obstétrica. Revista de Enfermagem UFPE on line, [S.l.], v. 11, n. 12, p. 4929-4937, dez. 2017. ISSN 1981-8963. Disponível em: <https://periodicos.ufpe .br/revistas/revistaenfermagem/article/view/22487/25309>. Acesso em: 27/04/2022.

LIMA, D. W. da C. et al. Humanização no cuidado em saúde mental: compreensões dos enfermeiros. **SMAD, Rev. Eletrônica Saúde Mental Álcool Drog. (Ed. port.)**, Ribeirão Preto, v. 17, n. 1, p. 58-65, mar. 2021. Disponível em: <http://pepsi c.bvsalud.org/scielo.php? script=sci_arttext&pid=S1806-69762021000100009&lng=pt&nrm=iso>. Acesso em: 10/10/2021.

LIMA, E. N. de et al. Hands-on durante o período expulsivo: herói ou vilão? **Rev. Pesqui. Fisioter;** v. 10, n. 2, p. 346-354, maio 2020. Disponível em: < https://www5.bahiana.edu.br/ind ex.php/fisioterapia/article/view/2810/3214>. Acesso em: 18/05/2022.

NASCIMENTO F. C. V; SILVA M. P; VIANA M. R. P. Assistência de enfermagem no parto humanizado. **Rev Pre Infec e Saúde** [Internet]. 2018; 4: 6887. Disponível em: <http://www.ojs.ufpi.br/index.php/nupcis/article/view/6887>. Acesso em: 28/03/2022.

OLIVEIRA, A. D. de et al. Sentimentos e opiniões de mulheres que vivenciaram a experiência do parto humanizado no Hospital Santa Lucinda. **Revista da Faculdade de Ciências Médicas de Sorocaba**, v. 16, n. 1, p. 26–29, 2014. Disponível em: <https://revistas.pucsp.br/index.php/R FCMS/a rticle/view/17525>. Acesso em: 08/10/2021.

PEREIRA A. L. F. et al. Percepções das enfermeiras obstetras sobre sua formação na modalidade de residência e prática profissional. **REME-Rev Min Enferm.** 2018; 22: e-1107. Disponível em: <https://cdn.publisher.gn1 .link/reme.org.br/pdf/e1107.pdf>. Acesso em: 16/05/2022.

SANTOS, A. C. S. dos; MOITA, C. E. A importância dos métodos não farmacológicos utilizados no alívio da dor no parto normal. **Revista Universo**, Salvador, v. 1, n. 3, p. 1-32, jan. 2018. Disponível em: <http://revista.universo.edu.br/index.php?journal=1 UNIVERSOSALV ADOR2&page=article&op=viewFile&path%5B%5D=5681&path%5B%5D=2999>. Acesso em: 10/10/2021.

SANTOS, I. B. C. dos *et al.* A humanização da assistência de enfermagem à criança hospitalizada no olhar materno. **Revisa**, Distrito Federal, v. 2, n. 10, p. 358-367, jun. 2021. Disponível em: <http://revistafacesa.senaaires.com.br/index.php/revisa/article/view/726/643>. Acesso em: 10/10/2021.

SILVA, A. C. et al. Parto e nascimento na fronteira franco-brasileira: percepções de enfermeiros. **Cogitare Enfermagem**, [S.l.], v. 25, jun. 2020a. ISSN 2176-9133. Disponível em: <https://revistas.ufpr.br/cogitare/article/view/67820>. Acesso em: 01/05/2022.

SILVA, F. et al. "Parto ideal": medicalização e construção de uma roteirização da assistência ao parto hospitalar no Brasil em meados do século XXI. **Saúde Soc.** 2019, v. 28, n. 3, p. 171-184. Disponível em: <https://doi.org/10.1590/S0104-12902019180819>. Aceso em: 29/03/2022.

SILVA, G. F. e et al. A formação na modalidade residência em enfermagem obstétrica: uma análise hermenêutico-dialética**. Esc. Anna Nery**, v. 24, n. 4, e20190387, 2020b. Disponível em: <http://www.revenf.bvs.br/scielo.php?script=sci_arttext&pid=S1414-8145202000040020 4&lng=pt &nrm=iso>. Acesso em: 16/05/2022.

SILVA L. S. da; et al. Os saberes das mulheres acerca das diferentes posições de parir: uma contribuição para o cuidar. **Rev enferm UFPE on line**, Recife, 10 (Supl. 4):3531-6, set., 2016. Disponível em: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/viewFile/11127/ 12615>. Acesso em: 16/05/2022.

SOUZA, A. C. A. T. de et al. Violência obstétrica: uma revisão integrativa. **Rev enferm UERJ**, Rio de Janeiro, 2019; P. 3-4. Disponível em: <https://www.epublicacoes.uerj.br/index.php/enfe rmagemuerj/article/view/45746/33096>. Acesso em: 09/05/2022.

CHAPTER 2

Analysis of quality of life, physical activity and teaching time in higher education in the face of the COVID-19 pandemic

10.56238/rsfohsv1-002

Luiz Otávio Carneiro Pereira Proence
Undergraduate student of Physical Education at Centro Universitário FAMINAS Institution: Centro Universitário FAMINAS
Address: Rua Gil Moreira, 109/201, Barra, Muriaé - MG E-mail: luizotaviocarneiro95@gmail.com

Renato de Souza Lima Júnior
PhD in Bioengineering from the University of São Paulo (USP) Institution: FAMINAS University Center
Address: Rua Redentor, 280, Bloco H, 202, Paineiras, Juiz de Fora - MG E-mail: renatosljf@gmail.com

Vânia Ágda de Oliveira Carvalho
Master's degree in Environmental Law and Sustainable Development from Dom Helder Câmara Superior School - MG
Institution: FAMINAS University Center
Address: Rua Cel. Adolfo Gusman, 122/304, Centro, Muriaé - MG E-mail: vaniaagdaocarvalho@gmail.com

Daniel Souza Pinto
Master in High Performance Sports Training by the University of Porto Institution: FAMINAS University Center
Address: Rua Dona Mariana Evangelista, 200/1107-A, Poço Rico, Juiz de Fora - MG E-mail: souza.daniel.p@gmail.com

Dílmerson de Oliveira
PhD and Master in Health from the Federal University of Juiz de Fora (UFJF - MG) Institution: FAMINAS University Center
Address: Rua Cel. Adolfo Gusman, 122/304, Centro, Muriaé - MG E-mail: dilmerson@gmail.com

ABSTRACT
Changes imposed by the pandemic of COVID-19 influenced education, leading institutions and teachers, the frontline actors of the teaching-learning process, to face new challenges, sparking discussions about the necessary care of physical and mental health, environmental changes and social interaction. In view of the concerns related to the health and Quality of Life of teachers, this study, with a transversal, quantitative characteristic and carried out with teachers of a higher education network in Minas Gerais during the mentioned pandemic, has, as objectives, to evaluate the QL of university teachers, to observe their levels of physical activity and the impact of this pandemic on the workday. Os dados foram obtidos através de questionário com questões direcionadas à caracterização da amostra e o WHOQOL-BREF. It was found the need for care with the QL of higher education teachers concerning the psychological aspects and the self-perception of QL, believing it reflects the increase of working hours.

Keywords: COVID-19, education, pandemic, quality of life.

1 INTRODUCTION

Pandemics, which are caused by highly infectious diseases and affect a large part of the world's population, have been present in humanity for centuries. Some reported pandemic occurrences are: "The Black Death", which took place between 1347-1353 and "The Spanish Flu", which took place in the period 1918-1920.[1]

Recently the world was surprised by COVID-19, caused by Sars-Cov-2, which belongs to the virus species called CORONAVIRUS, and is related to severe acute respiratory syndrome. This new disease has spread rapidly, starting a new pandemic moment for mankind, causing global concern, especially because of its high contagion rate[2].

In Brazil, the first registered case was on February 25, 2020, and from that date on, the occurrences were increasing, being registered by the Ministry of Health, until August 10, 2020, 3,057,470 confirmed cases and 101,752 deaths by the disease[2]. On July 1st 2022, the number of confirmed cases reached

32,358,018 and the number of deaths 671,416, according to data released by the Brazilian Ministry of Health[3].

In light of this pandemic scenario, social distancing was a measure suggested by the World Health Organization[4] to minimize the proliferation of COVID-19 spreads through microparticles of saliva by coughing, sneezing, speaking, or even if the infected person has direct and indirect contact with other people.

With this, the entire national structure was faced with the need for adaptations focused on fighting the proliferation of the COVID-19 pandemic, causing, besides the damage to the single health system, the shaking of the economy, with establishments closed or with restricted services, high unemployment, as well as the closing of educational entities.

The population was affected by the reduction of business hours, prohibition of events, closures of establishments of different contexts, such as beauty salons, libraries, religious temples, gyms and sports practice centers, among others. In addition, another significant change was the modification of the classes from the face-to-face environment to the remote environment[5].

In this sense, the teaching profession has been extremely affected, given the joint and simultaneous interference in the family and work spheres. Due to the new conditions in the teaching methods, with the change from face-to-face to remote means, in the same physical environment, it was necessary to quickly and sometimes precariously adapt family and work life[6].

This process impacted society as a whole, bringing to the surface the need for deep discussions about the necessary care of physical and mental health, environmental changes and social interaction during the period of social separation, thus generating great concern regarding the health and quality of life of the population[6].

Quality of Life (QL) is one of the goals to be achieved for the promotion of human well-being and health, referring to any and all actions and conditions present in the individual's life. That is, something that is considered of great importance to live well, allowing comfort and happiness, enabling the performance of their daily activities in their work or family environment in a satisfactory manner, being it one of the main points to be addressed in clinical trials today[7].

According to Praça and De Oliveira[8], QL was directly affected by the pandemic, whether in the professional life or in the social life of people, through all the changes to adapt to a new reality. These changes imposed by the pandemic of COVID-19 have also influenced education, leading institutions and teachers, who are the front-line actors in the teaching x learning process, to face new challenges[9].

Thus, this study aims to assess the QL of university professors of a higher education network in the state of Minas Gerais during the first year of their careers, in view of the joint and simultaneous impact on the family and work spheres of adaptive needs.

COVID-19 pandemic, as well as looking at their levels of physical activity and the impact of this pandemic on their workday.

2 OBJECTIVES

To evaluate the QL of university professors in a private higher education network in the state of Minas Gerais during the pandemic of COVID-19.

To observe the physical activity levels of university professors from a private higher education network in the state of Minas Gerais during the COVID-19 pandemic.

To observe the impact of the pandemic on the workday of university professors in a private higher education network in the state of Minas Gerais during the pandemic of COVID-19.

3 METHODOLOGY

The present study is transversal, quantitative and carried out with professors from a higher education network in Minas Gerais. Data were obtained by means of a questionnaire that presented questions directed to the characterization of the sample and the WHOQOL-BREF questionnaire10 ., made available in an electronic link, along with the TCLE, so that all professors of the teaching network had the opportunity to participate. The teachers who, after reading the TCLE, agreed to participate in the study were directed to the questionnaire in question. This work was submitted to ethical issues evaluation and approved according to opinion n0 5.079.903.

Teachers who had been teaching in this educational group for at least 6 months prior to the beginning of social isolation and, consequently, the beginning of remote teaching activities, were considered eligible for the sample, in order to have a greater possibility of identifying the changes in the entire work scenario due to the pandemic conditions imposed on each one.

The data obtained regarding the sociodemographic characteristics were presented as mean or N and standard deviation or %. The WHOQOL-BREF data analysis was presented as mean and standard deviation and in a specific syntax established by the WHOQOL research group that allows the calculation of scores and presentation of descriptive statistics.

4 RESULTS AND DISCUSSION

The inclusion criteria were met by 51 teachers from this educational network, with a mean age of 38.94 (± 7.36) years, predominantly of the sex female (64.70%). With regard to marital status, most of the teachers are married (64.71%). As for color, 82.35% declared themselves white. Regarding the time of teaching in higher education, 68.63% have been teaching for 5 years or less (Table 1).

Table 1. Characterization of the Sample.

	AVG	SD
Age	38,94	± 7,36
Sex	**N**	**%**
Male	18	35,29
Female	33	64,70
Marital Status		
Single	17	33,33
Married	33	64,71
Divorced	1	1,96
Widower	0	0
Color		
White	42	82,35
Black	1	1,96
Grizzly	8	15,69
Indigenous	0	0,00
Time Teaching in Higher Education		
< 5 years	35	68,63
5 to 10 years	13	25,49
10 to 15 years	2	3,92
>15 years old	1	1,96

Source: author's table

The total mean score of QL of the participating teachers was 67.46 (± 1.77), the highest domain was social relations, with a mean of 69.61 (± 2.89), followed by the physical domain that had a mean of 69.33 (± 2.28), the domain that had the lowest expression was the psychological domain, with a mean of 63.97 (± 2.08) (Table 2). According to the tool that was used during the research, the higher the percentage, the better the individual's QL, thus, it is possible to notice that the population studied for this study presents higher values in the social relations and environment domains and lower values in the physical and psychological domains in relation to the population of public or private network teachers, assessed in the study by ALVARENGA et al.5 .

Table 2. Quality of Life scores obtained by applying the WHOQOL - breef.

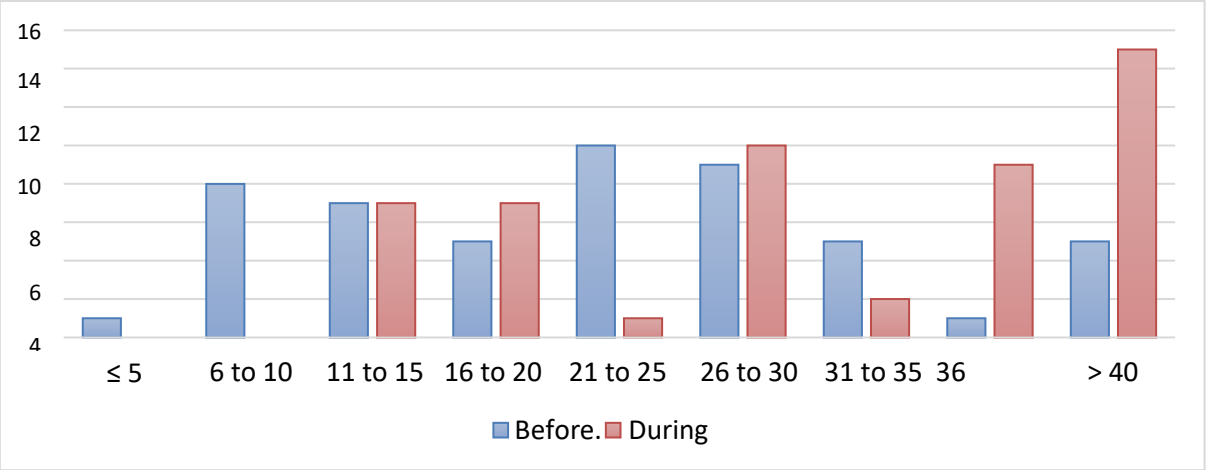
DOMAIN	AVERAGE (± SD)
Physical	69,33 (±2, 28)
Psychological	63,97 (± 2,08)
Social Relations	69,61 (± 2,89)
Environment	67,40 (± 1,80)
QL Self-Assessment	68,38 (± 3,06)
TOTAL	67,46 (±1,77)

Source: author's table

Below (Chart 1) it is possible to observe data related to the teachers' working time before and after the beginning of the pandemic, where we can observe a significant recurrent increase in the substitution of face-to-face teaching for remote teaching, which was necessary due to the restriction of face-to-face classes to reduce the spread of the virus.

This increase is due to the fact that transforming face-to-face classes into digital ones requires a great deal of "renormalization", where external demands require new ways of working, new tools and other knowledge, which tends to require a longer period destined to work activities by the teachers11 .

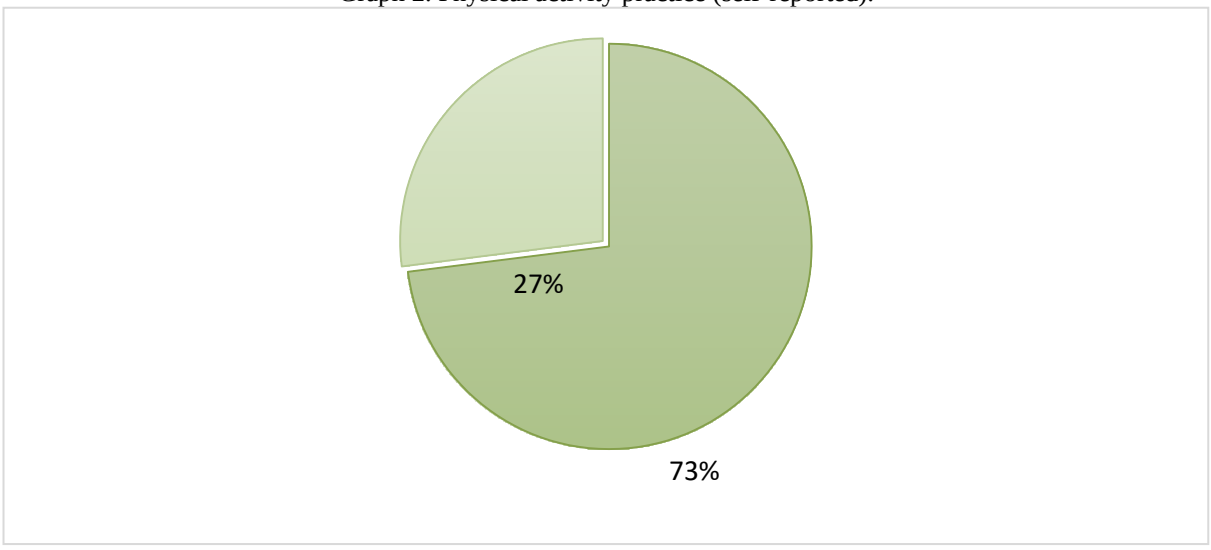
Chart 1- Comparison of hours worked before and after the beginning of the pandemic of COVID- 19



Source: author graphic

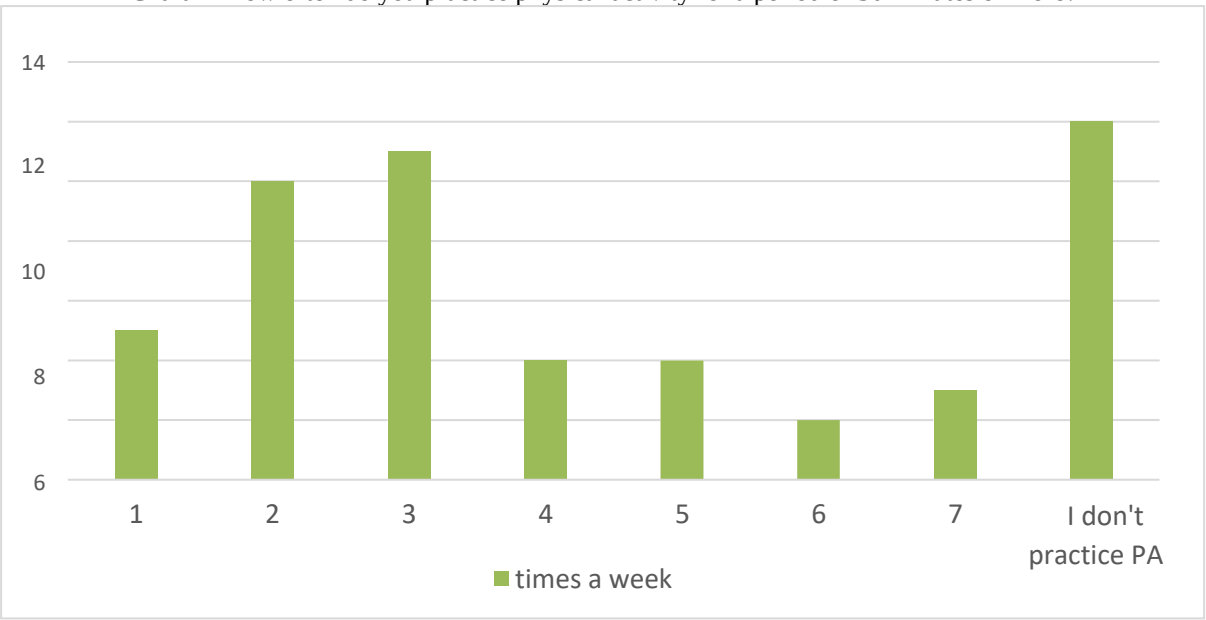
It is also important to note that 73% of the interviewees answered yes to the question "Do you perform physical activity? However, when asked about how often they practice it is possible to observe that less than half of the interviewees 24 (47.05%) of the teachers (Graph 3) actually meet the weekly goal recommended by the WHO of 150 minutes per week to be considered a physically active person12 .

Graph 2. Physical activity practice (self-reported).



Source: author graphic

Chart 2- How often do you practice physical activity for a period of 30 minutes or more?



Source: author graphic

5 CONCLUSIONS

The social detachment imposed by the pandemic of COVID-19 caused changes in the routine of the world's population, which was no different with the population studied. Based on the data presented, there is an emerging need for greater care with the quality of life of higher education teachers, especially regarding the psychological aspects and the self-perception of quality of life. It is believed that this result is a direct reflection of the abrupt increase in teachers' working hours already identified in a recent study.[11]

Another aspect that draws attention concerns the level of physical activity practiced by the teachers who answered the questionnaire. It is known that being physically active has a positive influence on quality of life, and in the sample studied, less than half of the teachers meet the weekly goal recommended by the WHO4 to be a physically active person.

Given the above, it is clear that the data obtained from the population studied corroborates that of similar studies in other samples analyzed, reinforcing the need for greater concern on the part of this population and educational managers with self-care, thus minimizing the awakening of complicating factors that can further compromise the health of employees in an atypical scenario of abrupt increase in hours dedicated to work activities.

REFERENCES

1. FOGAÇA, Priscila Carvalho; AROSSI, Guilherme Anzilero; HIRDES, Alice. Impacto do isolamento social ocasionado pela pandemia COVID-19 sobre a saúde mental da população em geral: Uma revisão integrativa. Pesquisa, Sociedade e Desenvolvimento, v. 10, n. 4, pág. e52010414411-e52010414411, 2021.

2. PRADO, Amanda Dornelas et al. A saúde mental dos profissionais de saúde frente à pandemia do COVID-19: uma revisão integrativa. Revista Eletrônica Acervo Saúde, n. 46, p. e4128-e4128, 2020.

3. Brasil. Ministério da Saúde. Painel de controle COVID-19. Brasília, 2022. Disponível em: <https://covid.saude.gov.br/ >. Acessado em: 01 de julho de 2022.

4. WORLD HEALTH ORGANIZATION et al. Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2019 global survey. 2020.

5. ALVARENGA, Robson et al. Percepção da qualidade de vida de professores das redes públicas e privadas frente à pandemia do covid-19. Revista CPAQV–Centro de Pesquisas Avançadas em Qualidade de Vida, v. 12, n. 3, p. 2, 2020.

6. BEZERRA, Anselmo César Vasconcelos et al. Fatores associados ao comportamento da população durante o isolamento social na pandemia de COVID-19. Ciência & Saúde Coletiva, v. 25, n. suppl 1, p. 2411-2421, 2020.

7. NOBRE, Moacyr Roberto Cucê. Qualidade de vida. Arq Bras Cardiol, v. 64, n. 4, p. 299- 300, 1995.

8. PRAÇA, Letícia Aparecida; DE OLIVEIRA, Victor Miranda. Qualidade de vida no trabalho em tempos de pandemia de COVID-19: os desafios e oportunidades dos docentes do ensino superior. Gestão-Revista Científica, v. 2, n. 2, 2020.

9. LUDOVICO, Francieli Motter et al. COVID-19: desafios dos docentes na linha de frente da educação. Interfaces científicas: educação. Aracaju, SE. Vol. 10, n. 1 (2020), p.[58-74], 2020.

10. FLECK, Marcelo Pio de Almeida et al. Desenvolvimento da versão em português do instrumento de avaliação de qualidade de vida da OMS (WHOQOL-100). Brazilian Journal of Psychiatry, v. 21, p. 19-28, 1999.

11. RIBEIRO, Elaine; BLANK, Julia Caroline Goulart; DE FREITAS, Ernani Cesar. Do presencial ao digital em tempos de pandemia: o ethos revelado pelo professor em atividade remota. fólio-Revista de Letras, v. 13, n. 1, 2021.

12. LIMA, Dartel Ferrari de; LEVY, Renata Bertazzi; LUIZ, Olinda do Carmo. Recomendações para atividade física e saúde: consensos, controvérsias e ambiguidades. Revista Panamericana de Salud Publica, v. 36, p. 164-170, 2014.

CHAPTER 3

The appendicitis inflammatory response (air) score for acute appendicitis: is it importante for early diagnosis?

10.56238/rsfohsv1-003

Vitor Steil Deboni
São José Municipal Hospital, General Surgery Residence, Joinville - Santa Catarina – SC - Brazil
E-mail: vsdeboni@gmail.com

Matheus Ignácio Rosa
São José Municipal Hospital, General Surgery Residence, Joinville - Santa Catarina – SC - Brazil

André Carminati Lima
São José Municipal Hospital, Department of Surgery, Joinville - Santa Catarina – SC - Brazil

Agnaldo José Graciano
São José Municipal Hospital, Department of Surgery, Joinville - Santa Catarina – SC - Brazil

Christian Evangelista Garcia
São José Municipal Hospital, Department of Surgery, Joinville - Santa Catarina – SC - Brazil

ABSTRACT
Background: The use of the Appendicitis Inflammatory Response (AIR) clinical score in patients with suspected acute appendicitis makes the diagnosis more objective and accurate.
Objective: To prospectively compare two groups with suspected acute appendicitis, analyzing the number of imaging tests requested, waiting time in the Emergency Room, until definition of conduct, as well as the sensitivity and specificity of this diagnostic method.
Methods: Prospective randomized study comparing 55 patients submitted to clinical-radiological diagnosis according to the routine of the service (control group), with another 55 patients submitted to the AIR score flowchart (intervention group).
Results: Waiting time for defining the intervention group's conduct was 1.5 hours shorter than he control group (p=0.02). Computed tomography was performed in 42 patients in the control group, compared with 25 in the intervention group (p=0.001). The impact of the flowchart based on the AIR score of the cases compared to the control group was the reduction of appendectomies with a normal-appearing appendix from 5 to 1 and an increase in the exclusion of appendicitis diagnoses. The use of the AIR score resulted in a diagnostic specificity of 92%, compared to 29% in the control group.
Discussion: A critical analysis regarding the AIR score, observed during data collection, was the subjectivity in the abdominal defense criterion, not defining objective criteria to define the score. Tomography showed better accuracy, diagnosing acute appendicitis in 77.6% of patients, compared to 51% of those who underwent US in both groups.
Conclusions: The use of the AIR score reduced the waiting time for the diagnosis of acute appendicitis, decreased the number of imaging tests and increased diagnostic specificity of the disease.

Keywords: Appendicitis, Clinical Diagnosis, Tomography.

1 INTRODUCTION

Acute appendicitis (AA) is a common cause of abdominal pain at all ages, with a lifetime prevalence of one case in seven people [15]. In the initial phase, the symptoms can be vague and non-specific, especially in women [15]. The final diagnosis is usually based on clinical history, physical examination, related laboratory and imaging tests. [6, 17]

Early diagnosis of acute appendicitis is essential for reducing morbidity and mortality associated with advanced stages of the disease. Therefore, imaging tests such as ultrasound and tomography are often used to clarify the diagnosis of AA [2, 3]. However, performing routine imaging tests for patients with abdominal pain can mean an increase in hospital costs and the length of stay of patients in the Emergency Care Units, until the definitive conduct. [12, 14]

Consequently, several diagnostic scores have been developed to aid in the diagnosis of AA, derived from systematic clinical analyses. [5, 7, 13] These scores aim to reduce uncertainty by standardizing the collection and interpretation of clinical and laboratory data [8]. Risk stratification using clinical scores has the potential to improve the diagnosis of AA, and improve the management of hospital resources [6, 18].

Among the clinical scores described, the Appendicitis Inflammatory Response (AIR) was superior to the Alvarado score, most used in clinical studies, with superior accuracy in the evaluation of patients with suspected AA, reducing the need for imaging tests and the number of hospital admissions for low-risk patients without compromising investigation safety [1, 9]

Some studies have evaluated the use of scores to aid decision-making in suspected cases of acute appendicitis, providing agility in follow-up or surgical indication, in cases with low-risk or high-risk scores, respectively [4, 10]. However, the use of the flowchart suggested by the consensus of acute appendicitis is still not a reality among emergency physicians.

The objective of this study was to evaluate the effectiveness of the use of the AIR score against a suspicion of acute appendicitis (AA) in a referral hospital for the care of these patients, to analyze the use of imaging tests and the length of stay of the patient in the Emergency Unit.

2 METHODS

Prospective randomized study comparing patients admitted to the Emergency Room of São José Hospital Municipal from Joinville, with suspected acute appendicitis. Patients were randomly divided into two groups: control or intervention, according to a computerized list generated by the Random Allocation Software program [11].

The control group included patients managed according to the routines and procedures currently used in the Emergency Surgery Service, for the investigation of suspected cases of acute appendicitis.

The intervention group followed the flowchart (Figure 1) adapted from Saverio et al. [4]. Patients under 40 years of age, classified as low risk, were followed up and were instructed to return to the Emergency Room at any time or routinely for reassessment at the Hospital's General Surgery Outpatient Clinic.

The AIR score on signs and symptoms found in patients with clinical suspicion of acute appendicitis is described in Table 1.

Table 1 – Shows the score used in patients with clinical suspicion of acute appendicitis to determine the AIR score

(Appendicitis Inflammatory response)

Symptoms, signs and laboratory tests		Score
vomiting		1
Pain in the right iliac region		1
Tenderness and rigidity in the right iliac region	Light	1
	Moderate	2
	severe	3
Temperature >38,5°C		1
	Moderate-severe	4
leukocytes (x10^9)	>= 10 e <15	1
	>=15	2
neutrophils %	>=70 e <85	1
	>=85	2

The expected sample for the study was 100 patients, based on a retrospective analysis of appendectomies in the last 3 years of the Service. Data collection took place between April and September 2021, totaling 110 cases.

Inclusion criteria were patients, over 16 years old, seen at the Hospital Emergency Room with suspicious clinical symptoms or a definite diagnosis of acute appendicitis. Exclusion criteria were younger than 15 years.

The following data were collected: age, sex and comorbidities, and information on imaging test results (CT scans and ultrasounds - USG), length of stay of the patient in the Emergency Room (beginning of care until discharge or admission), and analysis macroscopic and histopathological analysis of the appendix of the cases submitted to surgical treatment.

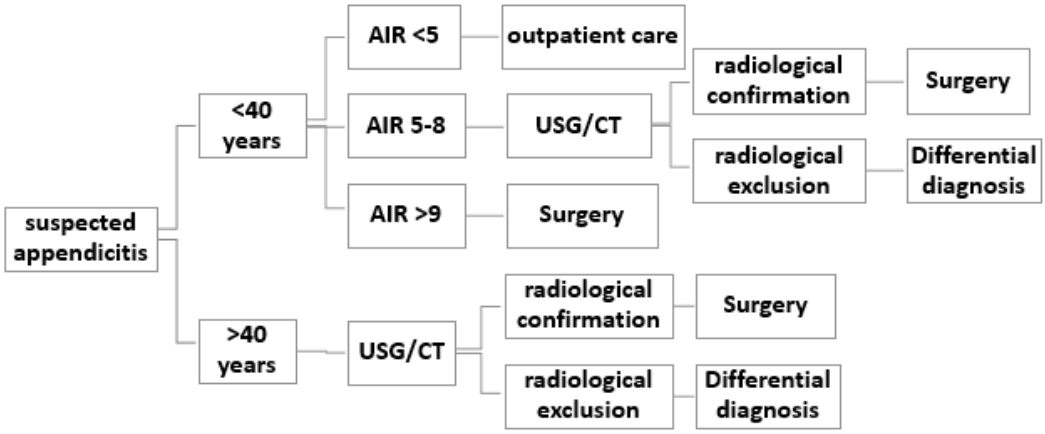
For statistics, analysis of variance or nonparametric Kruskal-Wallis test were used to compare quantitative variables, and the association between qualitative variables was evaluated using the chi-square test.

This research was approved by the Research Ethics Committee of Hospital Municipal São José de Joinville-SC, under number 5362, with informed consent.

3 RESULTS

The flowchart used in this research is shown in Figure 1

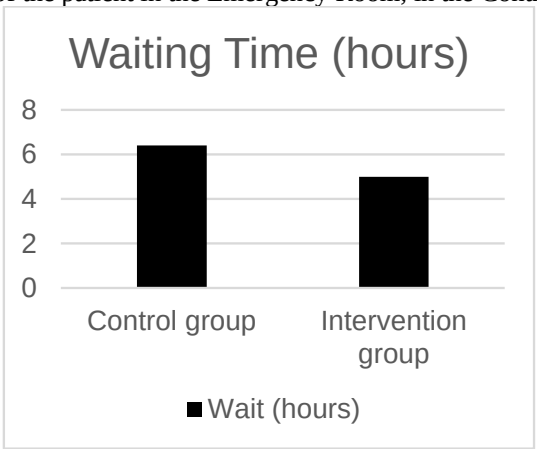
Figure 1 - Flowchart used in the research



Most patients were young adults between 16 and 40 years (71%), with a mean age of 26.3 years. There was a slight predominance of males, 51.8%, without statistical significance (p=0.7).

The patient's waiting time in the Emergency Room, until being admitted for surgery or being discharged for outpatient return, was on average 6.4 hours in the control group and 5 hours in the intervention group with statistical significance, p=0.03 (Figure 2).

Figure 2 – Waiting time in hours of the patient in the Emergency Room, in the Control Group and Intervention Group.



A greater number of imaging tests were performed in patients in the control group. US was performed in 23 patients in the control group compared to 22 indications in the intervention group, without statistical significance (p=0.2) (Table 2). Computed tomography was performed in 42 patients in the control group compared to 25 indications in the intervention group with statistical significance (p=0.001) (Table 3).

Table 2 – Abdominal ultrasound (USG) performed or not, in patients in the Control and Intervention Groups (p=0.2).

USG	CONTROL GROUP	INTERVENTION GROUP
DID NOT PERFORM	32	33
PERFORM	23	22

Table 3 – Abdominal computed tomography (CT) performed or not, in patients in the Control and Intervention Groups (p=0.001).

CT	CONTROL GROUP	INTERVENTION GROUP
DID NOT PERFORM	13	30
REALIZOU	42	25

Surgical treatment was not indicated in 20% of patients in the intervention group versus 3% in the control group. None of the patients in whom surgery was contraindicated were readmitted to the Emergency Department for investigation or treatment of acute appendicitis.

The number of appendectomies without histopathological changes was higher in the control group, 9% of cases versus 1.5% in the intervention group. The diagnostic sensitivity of both groups was 100%, with specificity being 29% in the control group and 92% in the intervention group (Tables 4 and 5).

Table 4 – Sensitivity and specificity of the clinical diagnosis of acute appendicitis in the Control Group (Sensitivity 100%; Specificity 29%).

CONTROL GROUP	APPENDICITIS	NORMAL APPENDIX
Positive clinical diagnosis	48	5
Negative clinical diagnosis	0	2

Table 5 – Sensitivity and specificity of the AIR score in the diagnosis of acute appendicitis in the Intervention Group (Sensitivity 100%; Specificity 92%).

INTERVENTION GROUP	APPENDICITIS	NORMAL APPENDIX
Positive AIR flowchart	42	1
Negativo AIR flowchart	0	12

Patients who scored low on the AIR score or had differential diagnoses such as urolithiasis, pelvic inflammatory disease, and gastroenteritis were followed up on an outpatient basis with treatment aimed at these etiologies (Table 6).

Table 6 – Differential diagnosis of 3 patients treated with suspected acute appendicitis

Differential diagnosis	number of cases
urinary lithiasis	1
acute cholecystitis	1
right colon tumor	1

4 DISCUSSION

CT was the most accurate exam, diagnosing acute appendicitis in 77.6% of patients, compared to 51% of those who underwent US in both groups. CT was necessary to diagnose AA in 13 patients who underwent US with inconclusive results [16].

In the intervention group, all patients who received high risk according to the AIR underwent surgical treatment without performing additional tests, with a histopathological diagnosis of acute appendicitis. In the control group, all patients at high risk according to the AIR underwent CT before appendectomy and no appendices without histopathological changes were observed in patients at high risk. Therefore, the AIR score flowchart proved to be safe in indicating surgical treatment without performing imaging tests for these patients.

A critical analysis regarding the AIR score, observed during data collection, was the subjectivity in the abdominal defense criterion. The original article describing AIR does not set out objective criteria for scoring. This item receives a score from 1 to 3, according to the examiner's assessment. However, a definition in the final conduct was noticed by the weight of this score. A more objective criterion would facilitate the application of the score.

It was possible to determine a difference in the waiting time of patients in the Emergency Room until the definition of the AA diagnosis. Patients in the control group waited 1.4 hours longer than patients in the intervention group. Therefore, the flowchart applied decreased by more than one hour, until the final conduct, hospital discharge or surgical treatment.

As for the final outcome of the cases, there were no false negative results in the diagnosis of AA in the control group, as in the flowchart based on the AIR score of the intervention group, therefore, giving a sensitivity of 100%. Regarding specificity, there was a difference between the group (29% control versus 92% intervention), demonstrating the effectiveness of the flowchart based on the AIR score to safely rule out the diagnosis of appendicitis, reducing the frequency of appendectomies with the appendix showing a normal appearance.

5 CONCLUSIONS

The flowchart used in the present study proved to be effective in reducing the patient's waiting time in the Emergency Room and also in reducing complementary exams for the diagnosis of abdominal pain suspected of acute appendicitis. The reduction in the number of requested imaging tests observed in the intervention group implies lower hospital costs.

REFERENCES

1. Andersson M, Kolodziej B, Andersson RE; STRAPPSCORE Study Group. Randomized clinical trial of Appendicitis Inflammatory Response score-based management of patients with suspected appendicitis. Br J Surg. 2017;104(11):1451-1461. doi: 10.1002/bjs.10637.

2. Brenner DJ, Hall EJ. Computed tomography-an increasing source of radiation exposure. N Engl J Med. 2007;357(22):2277-84. doi: 10.1056/NEJMra072149.

3. Castro ADAE, Skare TL, Yamauchi FI, Tachibana A, Ribeiro SPP, Fonseca EKUN, Sakuma AT, Peixoto MR, Rodrigues MAS, Barreiros MAM. Diagnostic value of c-reactive protein and the influence of visceral fat in patients with obesity and acute appendicitis. Arq Bras Cir Dig. 2018;31(1):e1339. doi: 10.1590/0102-672020180001e1339. PMID: 29513800; PMCID: PMC5863996.

4. Di Saverio S, Podda M, De Simone B, Ceresoli M, Augustin G, Gori A, Boermeester M, Sartelli M, Coccolini F, Tarasconi A, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. World J Emerg Surg. 2020;15(1):27. doi: 10.1186/s13017-020-00306-3. PMID: 32295644; PMCID: PMC7386163.

5. Fleischman RJ, Devine MK, Yagapen MA, Steichen AJ, Hansen ML, Zigman AF, Spiro DM. Evaluation of a novel pediatric appendicitis pathway using high- and low-risk scoring systems. Pediatr Emerg Care. 2013;29(10):1060-5. doi: 10.1097/PEC.0b013e3182a5c9b6.

6. Laupacis A, Sekar N, Stiell IG. Clinical prediction rules. A review and suggested modifications of methodological standards. JAMA. 1997;277(6):488-94. PMID: 9020274.

7. Lintula H, Kokki H, Kettunen R, Eskelinen M. Appendicitis score for children with suspected appendicitis. A randomized clinical trial. Langenbecks Arch Surg. 2009;394(6):999-1004. doi: 10.1007/s00423-008-0425-0.

8. Lintula H, Kokki H, Pulkkinen J, Kettunen R, Gröhn O, Eskelinen M. Diagnostic score in acute appendicitis. Validation of a diagnostic score (Lintula score) for adults with suspected appendicitis. Langenbecks Arch Surg. 2010;395(5):495-500. doi: 10.1007/s00423-010-0627-0.

9. Mán E, Simonka Z, Varga A, Rárosi F, Lázár G. Impact of the Alvarado score on the diagnosis of acute appendicitis: comparing clinical judgment, Alvarado score, and a new modified score in suspected appendicitis: a prospective, randomized clinical trial. Surg Endosc. 2014;28(8):2398-405. doi: 10.1007/s00464-014-3488-8.

10. Ohmann C, Franke C, Yang Q. Clinical benefit of a diagnostic score for appendicitis: results of a prospective interventional study. German Study Group of Acute Abdominal Pain. Arch Surg. 1999;134(9):993-6. doi: 10.1001/archsurg.134.9.993.

11. Random Allocation Software: mahmoodsaghaei.tripod.com/Softwares/randalloc

12. Sammalkorpi HE, Mentula P, Leppäniemi A. A new adult appendicitis score improves diagnostic accuracy of acute appendicitis-a prospective study. BMC Gastroenterol. 2014;14:114. doi: 10.1186/1471-230X-14-114.

13. Sammalkorpi HE, Mentula P, Savolainen H, Leppäniemi A. The Introduction of Adult Appendicitis Score Reduced Negative Appendectomy Rate. Scand J Surg. 2017;106(3):196-201. doi: 10.1177/1457496916683099.

14. Sammalkorpi HE, Leppäniemi A, Lantto E, Mentula P. Performance of imaging studies in patients with suspected appendicitis after stratification with adult appendicitis score. World J Emerg Surg. 2017;12:6. doi: 10.1186/s13017-017-0119-4.

15. Stephens PL, Mazzucco JJ. Comparison of ultrasound and the Alvarado score for the diagnosis of acute appendicitis. Conn Med. 1999;63(3):137-40. PMID: 10218289.

16. Terasawa T, Blackmore CC, Bent S, Kohlwes RJ. Systematic review: computed tomography and ultrasonography to detect acute appendicitis in adults and adolescents. Ann Intern Med. 2004;141(7):537-46. doi: 10.7326/0003-4819-141-7-200410050-00011.

17. Tsze DS, Asnis LM, Merchant RC, Amanullah S, Linakis JG. Increasing computed tomography use for patients with appendicitis and discrepancies in pain management between adults and children: an analysis of the NHAMCS. Ann Emerg Med. 2012;59(5):395-403. doi: 10.1016/j.annemergmed.2011.06.010.

18. Wasson JH, Sox HC, Neff RK, Goldman L. Clinical prediction rules. Applications and methodological standards. N Engl J Med. 1985;313(13):793-9. doi: 10.1056/NEJM198509263131306.

CHAPTER 4

Acute effects of mask use during resistance exercise

10.56238/rsfohsv1-004

Amanda Bárbara da Silva Guimarães
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Marcos Alexandre Carvalho Torres
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Gustavo de Sá Oliveira Lima
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Thakimare da Conceição das Neves Garcez
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Leonardo Pereira da Silva
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Edilma Da Silva Soares
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Vanessa Lima Nolêto
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Diandra Carvalho de Sá Noleto
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil

Marcos Antonio do Nascimento
Maranhão State University, Physiology, Nutrition and Exercise Study Group (FiNEx), São João dos Patos, MA, Brazil
Graduate Program in Physical Education, Federal University of Maranhão, São Luís, MA, Brazil

ABSTRACT
Rationale: The use of face masks during physical exercise (PE) is considered a safe way to prevent the contagion and spread of the disease, however, can it impair the practice of physical exercise?
Objective: To analyze the hemodynamic changes with the use of face masks during resistance exercise.
Methods: Cross-sectional, crossed study, carried out with 20 volunteers, age ranging from 18 to 32 years. Two acute exercise sessions were performed, with and without the use of mask, performing three series of 12 repetitions, with an interval of 3 days between sessions, in the intensity of the exercise session of 70% of 1RM. Cardiovascular parameters were evaluated. After testing for normality, data were presented as mean ± variance, using ANOVA for repeated measures with Tukey post-test.
Results: Systolic blood pressure with mask use resulted in a significant increase after exercise ($p<0.05$) with difference: SBP = 11.2±7.9 vs 7.3±10.1 with mask use and without mask use, SBP = 7.6±10.6 vs 4.8±9.1. And DBP= - 4.5±6.0 vs -2.0±9.4 4.8±9.1 with the use of mask and DBP= -3.3±3.8 vs -6±9.0 without the use of mask, showing no significant difference ($p>0.05$), causing hypotensive effect in their results.
Conclusion: The use or not of a mask during physical exercise influences the increase in heart rate and systolic blood pressure, causing hypotensive effect on diastolic blood pressure in both genders.

Keywords: pandemic, mask use, resistance exercise.

1 INTRODUCTION

In December 2019, severe pneumonia caused by a new type of coronavirus emerged in China1 . The disease was named coronavirus disease 2019 (COVID-19). 2 A virus in which transmission happens through close contact, either through droplets of saliva or by touching contaminated surfaces. On March 11, 2020, the World Health Organization declared that the outbreak of COVID-19 has evolved into a pandemic, spreading to numerous regions across the planet with continuous transmission.3

In this perspective, because it is an emerging infectious-contagious disease, the adoption of COVID-19 prevention measures are the best option for controlling the spread of the virus. 4 Quarantine and/or social isolation are two measures that have been taken to prevent or minimize the impact of the spread of the disease. In public health, quarantine refers to the separation of people or communities that have been exposed to the disease. Isolation applies to people who are known to be infected. 5

Other measures include hand hygiene and the use of protective masks, due to the large number of asymptomatic people detected. 6, 7 Although physical activity is essential in improving quality of life, the measures imposed in the current pandemic scenario have restricted practices by people of all ages. In most countries, indoor and outdoor activities have been restricted, followed by the closing of gyms, parks, playgrounds, and schools.8

As a health measure, the use of face masks during physical exercise (PE) is considered a safe way to prevent the contagion and spread of the disease. But their use has generated much controversy regarding the most appropriate type (N95, FFP2, FFP3, surgical or tissue) in which circumstances to use them and about their effects. 9, 10, 11 Thus, it is necessary to analyze the hemodynamic changes with the use of face masks during resistance exercise, observing the effects before and after an acute session of resistance exercise with and without the use of a mask on heart rate, systolic and diastolic blood pressure.

2 METHODS

The present study is characterized as a cross-sectional, crossover study, carried out with healthy people practicing resistance exercise for at least 3 months and aged between 18 and 45 years, of both genders, who were recruited through outreach at the Maranhão State University and social media.

The participants who agreed to participate in the study were selected according to the inclusion criteria, which are: non-smokers, without comorbidities that could compromise participation in the study, such as locomotor system disorders or limiting cardiovascular disease. Those who use drugs that act on the central nervous system and cardiovascular system, pregnancy, and mental dysfunction did not participate.

After the volunteers were selected, they received an informative material containing the explanation of the procedures used, the recommendations for the days of the tests, as well as the Informed Consent Form - ICF. This term explained the objectives and justifications for the study, the risks and benefits to which the volunteers would be exposed, and other items described in the Guidelines of the National Health Council, in accordance with the resolution on research with human beings 466/2012.

After reading the material, all doubts were explained and then the volunteers signed two copies of the term. One copy remained with the volunteer and the other with the researcher. The volunteer was allowed to refuse to participate in the study at any time, without any harm to him/her. The present study was approved by the Research Ethics Committee, according to opinion 4.938.897.

The study was carried out with a sample of healthy people (N=20), ten males and ten females, in which body composition (lean mass and fat mass) was obtained by assessing skinfolds with a Sanny caliper, following the Pollock, Schmidt, and Jackson (1980) protocol12 for adult men.

Before the study protocol was carried out, the volunteers received masks made and standardized in fabric (cotton).



source: own elaboration (2022)

To perform the protocol, the maximum load test of one repetition maximum (1RM) was used, where each individual performed a maximum of five attempts at each exercise, with a 3-5 minute interval between attempts. The maximum weight that each volunteer lifted in a single repetition was identified as the maximum load.

The volunteers performed two acute PE sessions, one with the use of the mask (SEF-EXP) and one without the use of the mask (SEF-CTL), performing three sets of 12 repetitions, with a minimum interval of 3 days between sessions. The intensity of the exercise session was 70% of 1RM. The exercises that comprised the acute PE session were: straight supine, extension chair, front raise, and triceps pulley. The execution speed used was 2:2 and the recovery interval was 60 seconds between sets and two minutes between exercises. All tests and sessions were performed in the morning.

To meet the objectives proposed in the research, a professional arm blood pressure monitor model HBP-1100 (OMRON, USA) was used to measure blood pressure and heart rate by the oscillometric method. All cardiovascular parameters were evaluated at rest and immediately after the end of the PE session. Recovery was assessed in the sitting position with the feet uncrossed and supported on the floor and the arm supported at heart level according to the VII Brazilian Guideline of Hypertension.13

After testing for normality, data were presented as mean ± standard deviation. ANOVA for repeated measures with Tukey's post-test and Pearson's correlation test were used. With the significance level of $p<0.05$.

3 RESULTS

Anthropometric variabilities

Twenty volunteers were evaluated, of which 10 (50%) were female and 10 (50%) were male, with a mean age of 22.3±0.04, ranging from 18 to 32 years. BMI was 23.9±2 for males and 20.8±2.4 for females.

Table 1. Descriptive analysis of age and anthropometric data of the study volunteers.

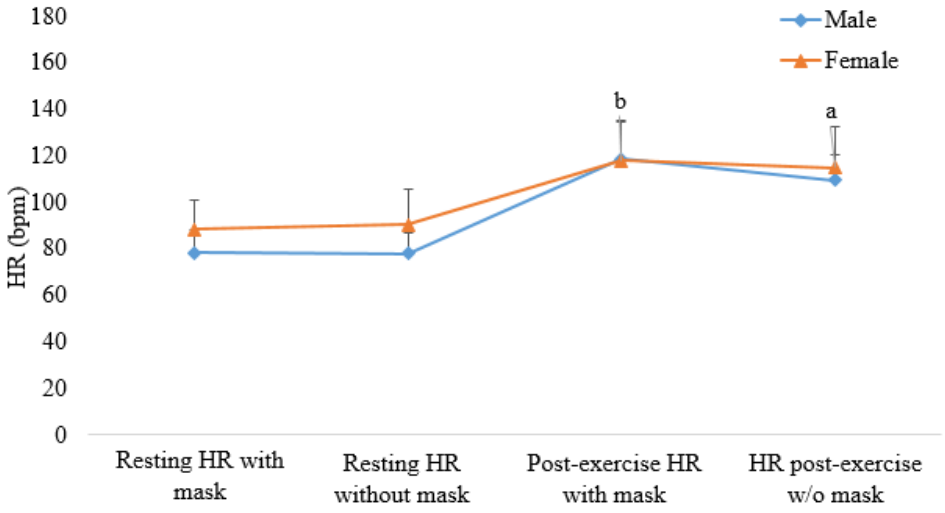
Variables	Average (M)	Mean (F)
Age (years)	24±4,1	21±4,1
Weight (kg)	71,3±7,0	53,9±5,3
Height (m)	1,7±0,1	1,6±0,1
BMI (kg/m²)	23,9±2,0	20,8±2,4
CG (%)	5,3±3,1	17,8±3,8
Fat mass (kg)	67,5±7,3	44,3±6,5
Lean mass (kg)	3,77±2,4	9,59±2,2

Kg = kilogram; m = meters; CG = body fat; M = male; F = female; Data presented as mean ± standard deviation.

Heart Rate Variability

The volunteers performed two acute exercise sessions with 70% of the maximum load, one session with the use of a mask and the other without. Heart rate (HR) and blood pressure (BP) data were collected at rest and immediately after the exercise session. Figure 1 shows the HR results at rest and after exercise with and without the use of a mask.

Figure 1. Heart rate in beats per minute (bpm), with and without the use of masks. Repeated measures ANOVA with Tukey post-test. a = P<0.05 vs resting HR without mask (significant in both groups); b = P<0.05 vs resting HR with mask (significant in both groups).



According to figure 1, the data showed that without the use of mask the HR (bpm) of the volunteers, according to age, were within normal range when at rest, with the female HR resulting higher compared to the male. After the exercise session there was an increase in both genders, with a difference in HR of 31.7±11.2 for males and 24.4±12.4 for females.

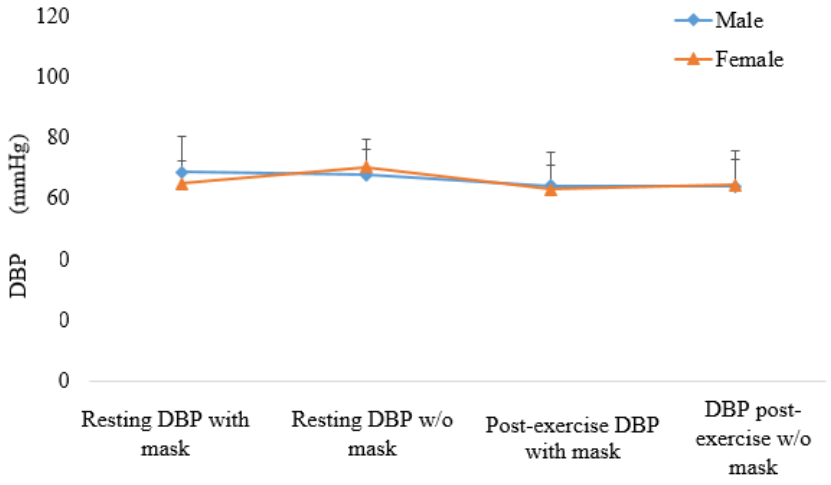
With the use of the mask, the HR at rest is also within normal range, with the female HR higher with an average of 88.5 ± 12.3, compared to 78.5 ± 9.5 for males. Regarding HR after exercise, we can see that there was also an increase in both genders with a difference of 38.4±11.3 for males and 29.6±8.1 for females.

In comparison with the data obtained through the exercise session both HR without the use of mask and with the use of mask had significant difference in both groups ($p < 0.05$).

Variability Blood Pressure (BP)

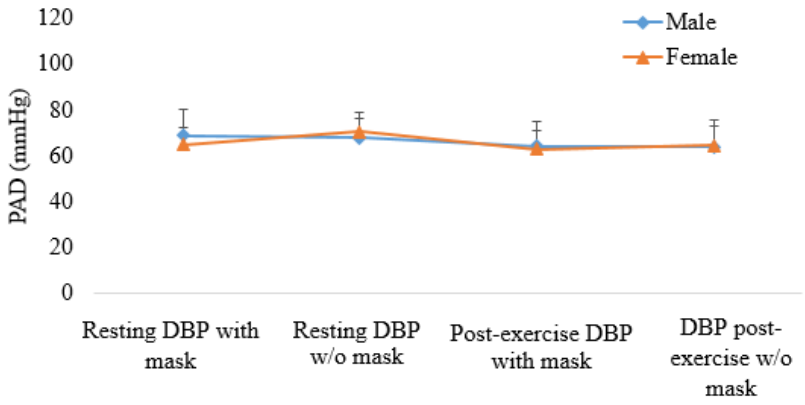
SBP (mmHg) was also within normal range (SBP < 120) when at rest. But after exercise it had a greater change with the use of mask, as shown in figure 2. With a difference of 11.2±7.9 and 7.3±10.1 for male and female, respectively, with the use of mask. And 7.6±10.6 and 4.8±9.1, without the use of mask.

Figure 2. Systolic Blood Pressure (SBP) mmHg, with and without the use of masks. Repeated measures ANOVA with Tukey's post-test. c = P<0.05 SBP post exercise with male mask vs SBP post exercise with female mask.



Studies have shown that after only one session of resistance exercise (RE), BP may be elevated, reduced or unaltered when compared to the pre-exercise measurement. According to the results of the present study, SBP was elevated after the resistance exercise session, thus agreeing with a study by HILL, et. al. (1989). 14

Figure 3. Diastolic Blood Pressure (DBP) mmHg, with and without the use of masks. Repeated measures ANOVA with Tukey post-test. P>0,05.



According to figure 3, the DBP at rest is within normal range. After the exercise session it changes with a difference of -4.7± 6.0 (male) and -2.0±9.4 (female), respectively.

4 DISCUSSION

Physical exercise (PE) and heart rate parameters

In dynamic exercises, occurring a greater volumetric load on the left ventricle, the hemodynamic responses are proportional to the intensity and muscle mass involved in the activity. The maximum values of HR normally occur during the last repetitions of a series, thus confirming that, during resistance exercises, HR measurement should be done at the end of the series, as happened in the present study.14

Without a doubt, one of the main difficulties caused by wearing a mask during exercise is discomfort in breathing. There is a need for a period of adaptation. The pace will be slower and fatigue will appear more quickly, associated with the unpleasant sensation of mask humidification as the activity progresses. Compared to normal breathing, wearing any kind of protective mask decreases the flow of air into the lungs. Less oxygen in the lungs means less oxygen in the blood and muscles, which makes training more difficult. 15

Cloth masks can also be used as it seems less restrictive.16 However, more research is needed to compare the effects of different types of face mask in RE and different exercise intensities and whether the performance impairment observed acutely can occur in a chronic setting. 16

SBP volume oscillation during PE

In continuous activities of progressive intensity, SBP increases in direct proportion to the intensity of the exercise, due to the increase in cardiac output. In maximal exercise, it may exceed 200 mmHg. 17 BP during strength exercises and continuous activities indicated that the blood pressure elevation curves, as a whole, tend to exhibit larger angular coefficients in resistance exercises. The pressure tends to increase more slowly in continuous activities with less force requirement. 17

Studies show that after only one session of resistance exercise (RE), BP may be elevated, reduced, or unchanged when compared to the pre-exercise measurement. 18 According to the results of the present study, SBP was high after the resistance exercise session, in agreement with the data evidenced in previous studies.

Volume oscillation of DBP during PE

During resistance exercise, DBP tends to rise, causing a significant increase in mean arterial pressure, even if for a short period of time; in the present study, DBP did not increase. 18

The hypotensive effect related to resistance training programs was verified by Hill et al. (1989)13 , who investigated the blood pressure responses after strength training program. The results showed a significant reduction in diastolic blood pressure 1 h after the end of the exercises, but no hypotensive effect was found in systolic blood pressure, similar to the results of the present study.

The hemodynamic responses vary according to the intensity of the effort. In exercises performed with light loads there is an increase in heart rate (HR) and systolic blood pressure (SBP), while when high loads are used there is also an increase in diastolic blood pressure.19 According to data from figures 1 and 2, we can notice that during resistance exercise there is an increase in both HR and BP, since they caused significant physiological effects on systolic blood pressure ($P<0.05$) and heart rate in the individuals who participated in the study.

It is known that during the pandemic there was a great incentive to social isolation, with formerly active people being restricted to their homes. With the flexibilization many of them are returning to the gyms. It is important for exercising professionals to remember that, to minimize transmission risks inside gyms, special care must be taken, such as cleaning hands, constantly sterilizing equipment, and the mandatory use of a mask, which is one of the precautions that has left people in doubt about whether or not to use it during resistance exercise. 20,21

First, despite being carried out in a context where the use of the mask is mandatory, some volunteers did not agree to participate, because they reported not practicing resistance exercise with the use of the mask. Secondly, when performing the exercises with the use of the mask, the volunteers showed a lot of discomfort regarding breathing, with three volunteers feeling discomfort and four not being able to perform all the repetitions. And finally, although the use of mask during the practice of resistance exercises caused hemodynamic changes, the n (=20) is small and the study should be repeated in a larger number. Nevertheless, the results obtained show pertinent significance regarding the use of face masks during an exercise session.

5 FINAL CONSIDERATIONS

The findings of this study demonstrate that the use or not of mask during the practice of resistance exercise promotes hemodynamic alterations in both cases, with this, the increase in heart rate and systolic arterial pressure is evident, as seen in other studies before the pandemic of the new coronavirus, causing a hypotensive effect on diastolic arterial pressure. Being that, heart rate and systolic blood pressure have an increase both with the use of mask and without the use of post-exercise mask.

ACKNOWLEDGMENTS

I thank the Maranhão State University for the scholarship made available in the Scientific Initiation Institutional Program of UEMA - edict 11/2021 PPG-UEMA, as well as the research group in physiology, nutrition, and exercise (FiNEx) of UEMA.

REFERENCES

1- CESPEDES, M. D; SOUZA, J. Coronavirus: a clinical update of COVID- 19. Rev Assoc Med Bras (1992), n 66, p. 116---23, 2020.

2- GONZALEZ, J. J. E. SARS-CoV-2 and COVID-19. A pandemic review. Medicina Critica, n. 33, p. 53---67, 2020.

3- LAU, H., et al. (2020). Casos de COVID-19 perdidos internacionalmente. Curitiba. Março de 2020.

4- BERRIÓS, et.al. Protocolo de Tratamento do Novo Coronavírus (2019-nCoV). Brasilia (DF), 2020.

5- PARMET, W. E.; SINHA, M. S. Covid-19 d the law and limits of quarantine. N Engl J Med, 2020.

6- MA, Q. X., et. al. Potential utilities of mask-wearing and instant hand hygiene for fighting SARS-CoV-2. J Med Virol, p.1-5, 2020.

7- GUNER, R.; HASANOGLU, I.; AKTAS, F. COVID-19: Prevention and control measures in community. Turk J Med Sci, n. 50, v. 1, p. 571-7, 2020.

8- SHAHIDI, S. H.; WILLIAMS, J. S.; HASSANI, F. Physical activity during COVID-19 quarantine. Acta Paediatr, n. 109, v. 10, p. :2147-2148, Oct, 2020.

9- ZHOU, Z., et. al. Mask is the possible key for self-isolation in COVID-19 pandemic. J sMed Virol. p. 1–2, 2020.

10- FENG, S., et.al. Rational use of face masks in the COVID-19 pandemic. Lancet. Respir Med, n. 8, v. 5, p. 434-6, 2020.

11- GRANDA, Alana. Especialistas falam sobre cuidados com uso de mascaras em academias. Rio de Janeiro, 08 jul. 2020. Disponível em: Acesso em: 1 jun.2021.

12- POLLOCK M. L.; SCHMIDT, D. H.; JACKSON, A. S. Measurement of cardio-respiratory fitness and body composition in the clinical setting. Compr Ther, v. 6, n. 9, p.12-27, 1980.

13- MALACHIAS, M. V. B, et. al. 7ª Diretriz Brasileira de Hipertensão Arterial. Arq Bras Cardiol, n. 107, Supl.3. p. 1-83, 2016.

14- HILL, D. W., M. A. COLLINS, K. J. CURETON, and J. J. DEMELLO. Blood pressure response after weight training exercise. J. Appl. Sport Sci. Res. 3:44-47, 1989.

15- SKARIA SD, Smaldone GC. Controle de fontes respiratórias usando máscaras cirúrgicas com mídia de nanofibra. Ann Ocupa Hyg. 2014; 58(6): 771-781.

16- KIM, M.-C., Bae, S., Kim, JY, Park, SY, Lim, JS, Sung, M., Kim, SH, (2020). Eficácia das máscaras respiratórias cirúrgicas, KF94 e N95 no bloqueio do SARS-CoV-2: uma comparação controlada em 7 pacientes. Doenças Infecciosas (Londres, Inglaterra), 52 (12), 908-912.

17- BENN SJ, et. al. RS (1996). Circulatory responses to weight lifting, walking, and stair climbing in older males. J Am Geriatr Soc, 22 (2):121-5.

18- BARROSO, W. K. S. et al. Diretrizes Brasileiras de Hipertensão Arterial–2020. Arquivos Brasileiros de Cardiologia, v. 116, p. 516-658, 2021.

19- MACDOUGALL JD, Tuxen D, Sale DG, Moroz JR, Sutton JR (1985). Arterial blood pressure response to heavy resistance exercise. J Appl Physiol, 58 (3):785-90.

20- FORJAZ CL., et.al. Cardiologia do exercício: do atleta ao cardiopata. São Paulo: Manole; 2005.

21- SALES, Vinicius, et.al. Treinamento resistido e COVID-19, Faculdade CEAFI. p. 5, 2020.

CHAPTER 5

Experience report: maternal and child care in a maternity hospital in Ghana

10.56238/rsfohsv1-005

Raquel Ramos Schettino
FCMMG
E-mail: quelsch@gmail.com

Kahena Giullia de Deus Lopes
FCMMG
E-mail: kahena.giullia@hotmail.com

Erika Marina Rabelo
FCMMG
E-mail: erikamarinarabelo@yahoo.com.br

Claudirene Milagres Araújo
FCMMG
E-mail: claudirene_milagres@hotmail.com

Leila Fátima Santos
FCMMG
E-mail: leila.santos@cienciasmedicasmg.edu.br

Shirley Pereira de Almeida
FCMMG
E-mail: shirley.almeida@cienciasmedicasmg.edu.br

Sumaya Giarola Cecilio
FCMMG
E-mail: sumayacecilio@gmail.com

Valquiria Fernandes Marques
FCMMG
E-mail: fernandes.valquiria@gmail.com

ABSTRACT
The infant mortality rate is an international indicator that portrays the stage of economic/social development of a country or region, as it has a direct relationship with socioeconomic characteristics and sensitive to their variations (Interagency Health Information Network, 2002; France & Lansky 2016).

Palavras-chave: Malaria, Ghana, Health Education.

1 INTRODUCTION

The infant mortality rate is an international indicator that portrays the stage of economic/social development of a country or region, as it has a direct relationship with socioeconomic characteristics and sensitive to their variations (Interagency Health Information Network, 2002; France & Lansky 2016). According to WHO in 2019 the infant mortality data in Africa is 8 times higher than in the European continent

2 OBJECTIVE AND METHODOLOGY

To report the experience of a nursing student during her exchange as a volunteer in the maternity ward located in Ghana, on the African continent.

3 METHOD

An observational internship began in January 2020 in the city of Kumasi, where a field diary was kept for observations about the experience in the country. Some data were collected through questionnaires with doctors and nurses working in the maternity ward

4 RESULTS AND DISCUSSION

In the maternity ward it was observed the precariousness of the place, with the absence of many resources and equipment. In the room there were 2 stretchers for delivery and a crib with radiating heat. The delivery is horizontal, stimulating skin-to-skin contact and intramuscular oxytocin administration. Uterine massage and placenta verification was not observed. HIV (human immunodeficiency virus) is prevalent in the population. Lack of resources from prenatal care can worsen the cases of eclampsia which is very high in the hospital as well as abortion according to nurses. After birth, mothers and their newborns are placed on the floor on plastic sheeting due to lack of space and stretchers, also being a factor for high mortality in the country

5 CONCLUSION

It was possible to realize how the lack of resources can influence the quality of care, since a well performed prenatal care can identify changes and prevent complications. Moreover, in the complications during labor and delivery it is essential to have professionals trained to identify and meet such demands, because even with the lack of resources, there are simple measures that can be used as prevention and treatment. It is necessary to train the professionals who work in the maternity hospitals to prevent complications with simple measures, such as: postpartum uterine massage, placenta verification, and verticalization of labor. Health promotion is essential to prevent and reduce harm, empowering the population about their health-disease conditions.

REFERENCES

1.Rede Interagencial de Informações para a Saúde - Ripsa. **Indicadores Básicos para a Saúde no Brasil: conceitos e aplicações.** Brasília: Organização Pan-Americana de Saúde; 2002.

2. França E, Lansky S [homepage on the Internet**]. Mortalidade infantil neonatal no Brasil: situação, tendências e perspectivas** [cited 2016 Jun 15]. Available from: http://www.abep.nepo.unicamp.br/encontro2008/docsPDF/ABEP2008_1956.pdf

3. World health statistics 2019: **monitoring health for the SDGs, sustainable development goals** ISBN 978-92-4-156570-7.

CHAPTER 6

Health education - malaria awareness based on an experience in Ghana: an experience report

10.56238/rsfohsv1-006

Raquel Ramos Schettino
FCMMG
E-mail: quelsch@gmail.com

Bruno Gonçalves da Silva
FCMMG
E-mail: brunoenf87@gmail.com

Erika Rabelo
FCMMG
E-mail: erikamarinarabelo@yahoo.com.br

Isabela Takeshita
FCMMG
E-mail: isa_jx@yahoo.com.br

Leila Fátima Santos
FCMMG
E-mail: leila.santos@cienciasmedicasmg.edu.br

Shirley Pereira de Almeida
FCMMG
E-mail: shirley.almeida@cienciasmedicasmg.edu.br

Sumaya Giarola Cecilio
FCMMG
E-mail: sumayacecilio@gmail.com

Valquiria Fernandes Marques
FCMMG
E-mail: fernandes.valquiria@gmail.com

ABSTRACT
Africa is a continent that is still the most affected by malaria accounting for 90% of cases according to the UN, 2019. Among the 10 countries most affected by malaria, Ghana stands out. The agency considers this a worrying figure, as in these countries, there were estimated to have been more than 3.5 million cases in 2017 compared to the previous year (UN NEWS, 2019).

Keyywords: Malaria, Ghana, Health Education.

1 INTRODUCTION

Africa is a continent that is still the most affected by malaria accounting for 90% of cases according to the UN, 2019. Among the 10 countries most affected by malaria, Ghana stands out. The agency considers this a worrying figure, as in these countries, there were estimated to have been more than 3.5 million cases in 2017 compared to the previous year (UN NEWS, 2019). Health education is a strong method for individual and community empowerment in relation to Malaria and that should be encouraged in health centers and in the community so that we have a reduction of this rate.

2 OBJECTIVE AND METHODOLOGY

This is an experience report of a nursing student during her exchange as a volunteer in a hospital located in Ghana, on the African continent. An observational internship began in January 2020 in the city of Kumasi-Ghana where a field diary was kept for observations about the experience in the country. Some data were collected through questioning with doctors and nurses working in the hospital and others in hospital documents and notes were made correlating them with cases in northern Brazil

3 RESULTS AND DISCUSSIONS

When we started living in Kumasi/Ghana, we observed that the neighborhoods with greater purchasing power used screens on windows and doors in order to prevent the entry of mosquitoes, especially the Anopheles, the vector that transmits malaria. In the city as a whole, there was no such concern. They were instructed to always use local repellents that would be more effective against the mosquitoes. The first day in the hospital in Kumasi, was an adaptation in the urgency and emergency sector. This day was typical of Ghana and the entire African continent; time to administer medicines for malaria treatment. According to the doctors, the cases of malaria in the hospital reached 400 per day in rainy seasons and 20 per day in dry seasons. Most cases are during the rainy season, when there is a large reproduction of the mosquito that is the vector of the disease. Young people are vulnerable at dusk and dawn, because they do not use any protection, which is the active time for mosquitoes. No awareness control programs or routine checkups were observed

4 CONCLUSION

Malaria prevention involves the elimination of mosquitoes and through individual measures such as the use of mosquito nets on house windows, beds, and the use of repellents, as well as better sanitation conditions. The active participation of health centers in raising awareness of mosquito prophylaxis is an important and effective method to reduce the cases of malaria. The governmental incentive to act in the control and elimination of the mosquito is fundamental, as well as the awareness of the population.

REFERENCES

1) ONU NEWS. OMS: mundo livre da malária ainda está “muito longe”. 2019. Disponível em: https://news.un.org/pt/story/2019/04/1669711. Acesso em: 4 mar. 2020.

CHAPTER 7

Experience Report: perception of a nursing student about the assistance in the urgency and emergency sector in Kumasi-Gana

10.56238/rsfohsv1-007

Raquel Ramos Schettino
FCMMG
E-mail: quelsch@gmail.com

Alessandra Silva Lima Jardim
FCMMG
E-mail: aleenf@gmail.com

Bruno Gonçalves da Silva
FCMMG
E-mail: brunoenf87@gmail.com

Claudirene Milagres Araújo
FCMMG
E-mail: claudirene_milagres@hotmail.com

Leila Fátima Santos
FCMMG
E-mail: leila.santos@cienciasmedicasmg.edu.br

Shirley Pereira de Almeida
FCMMG
E-mail: shirley.almeida@cienciasmedicasmg.edu.br

Sumaya Giarola Cecilio
FCMMG
E-mail: sumayacecilio@gmail.com

Valquiria Fernandes Marques
FCMMG
E-mail: fernandes.valquiria@gmail.com

ABSTRACT
The Urgency and Emergency sector is specific and crucial, because it demands complex care and qualified professionals to deal quickly and agilely with the most diverse situations, in addition to its high turnover and work demand (DIAS et al., 2015; SANTOS et al., 2017).

Keywords: Urgency and Emergency, Ghana, Hygiene

1 INTRODUCTION

The Urgency and Emergency sector is specific and crucial, because it demands complex care and qualified professionals to deal quickly and agilely with the most diverse situations, in addition to its high turnover and work demand (DIAS et al., 2015; SANTOS et al., 2017). The role of nurses in this scenario is emphasized

2 OBJECTIVE AND METHODOLOGY

Report of the experience of a nursing student on a voluntary exchange to a hospital located in Kumasi/Ghana, in January 2020. Method: Report using a field diary in the second most populous city of Ghana, Kumasi, with approximately 2 million people (EENI GLOBAL BUSSINES SCHOOL, 2022), volunteering for 2 weeks at the District Hospital and staying with a native family. Some data was collected by questioning doctors and nurses in order to identify points related to the structure and functioning of the hospital

3 RESULTS AND DISCUSSION

It was observed that the professionals and students had no pocket material or their own instruments, and that the internal structures and equipment were precarious. Only sphygmomanometer, thermometer with measurements in fahrenheit (with the need of conversion to celsius), no portable oximeter and only

one multiparameter monitor available in the emergency room with three beds for critically ill patients. The precariousness of the devices made clinical diagnosis difficult, culminating in some cases of death. Basic hand hygiene materials were practically non-existent, compromising asepsis and antisepsis at the site. There were no institutional protocols or rules for the flow of admission of patients, transfer of care, circulation of employees, students and companions, resulting in disorder. The Sterile Material Center did not obey the basic rules of composition and the treatment of contaminated materials was done by immersion in sanitizing solution, without the criteria recommended by the World Health Organization. The experience brought a vision of the difficulties and weaknesses in the assistance given to critically ill patients, providing the opportunity to reflect on how to do health care

4 CONCLUSION

Living this experience as a nursing student, besides fulfilling the dream of getting to know new cultures, made it possible to put into practice and improve the English language, becoming a unique opportunity to live with and get to know people, their beliefs, habits, values and customs. The exchange provided the opportunity for practical experiences, contacts, and activities developed with several professionals, which enabled exchanges in the teaching-learning process, as well as experiences related to socio-cultural and historical aspects, observed in the way people and professionals welcome and care. In addition, the difficulties and weaknesses in providing care to the sick, the lack of structure and hospital equipment were observed.

REFERENCES

1) DIAS, R. A. et al. PET-SAÚDE/REDE URGÊNCIA E EMERGÊNCIA: RELATO DE EXPERIÊNCIA EM UM HOSPITAL TERCIÁRIO DO NORTE DO CEARÁ. S A N A R E: Revista de Políticas Públicas, Sobral/CE, v. 14, n. 2, p. 37-40, dez./2015. Disponível em: https://sanare.emnuvens.com.br/sanare/article/view/862/522. Acesso em: 23 fev. 2020.

2) EENI GLOBAL BUSSINES SCHOOL. Comércio exterior e negócios em Kumasi (Coumassie), cervejaria. Disponível em: https://www.hauniversity.org/pt/Kumasi-Ghana.shtml. Acesso em: 20 set. 2022.

3) SANTOS, José Luís Guedes dos et al. Ambiente de trabalho do enfermeiro em um serviço hospitalar de emergência. Northeast Network Nursing Journal, v. 18, n. 2, 2017. Disponível em: https://www.uninter.com/cadernosuninter/index.php/saude-e-desenvolvimento/article/view/1035/838 Acesso em: 23 fev. 2020.

CHAPTER 8

Socioeconomic and neurological development profile of patients with down syndrome at APAE-Juazeiro do Norte

10.56238/rsfohsv1-008

Jéssica de Oliveira Farias
Médica formada pela Estácio FMJ/CE
Médica residente em Medicina de Família e Comunidade pela UNIFIP/PB

Larissa Antônia da Costa Trigueiro Viana
Médica formada pela Estácio FMJ/CE

Alisson cordeiro Moreira
Médico formado pela Estácio FMJ/CE

Ítalo Cordeiro Moreira
Médico formado pela Estácio FMJ/CE

Carolina Anunciação Patricio dos Santos
Médica formada pela Estácio FMJ/CE

Natália Mendes Cruz
Médica formada pela Estácio FMJ/CE

Ana Beatriz Vieira da Cunha Lopes
Médica formada pela Estácio FMJ/CE

Dayrana da Silva Furtado
Médica formada pela Estácio FMJ/CE

Lucas da Costa Trigueiro
Discente do curso de Medicina pela Estácio FMJ

Erlane Marques Ribeiro
Doutora em Ciências da Saúde pela UFRN; Médica geneticista pela USP-SP e residência médica em Pediatria pela USP

ABSTRACT
This work aims to research the socioeconomic profile of the families of patients with Down Syndrome (DS) at the Associação de Pais e Amigos dos Excepcionais de Juazeiro do Norte (APAE-JN) and relate it to their respective degrees of neurological development. The population consists of 80 patients. The research will consist of home visits, application of a questionnaire and an interview with the participation of the patients' parents. To draw the profile, data collected during the interview and application of the questionnaire will be used, adapting the social indicators of the Brazilian Institute of Geography and Statistics - IBGE, the Brazilian Economic Classification Criterion, and those of the Pan-American Health Organization - PAHO. The results will show the profile of those affected by DS and this will be correlated to the hypothesis that the variation in socioeconomic level alters the NPMD curve of the person with DS. The study was conducted in three stages; the first was qualitative and was based on secondary data aiming to identify educational policies directed to the rural reality, as well as to select the municipalities that fit the profile defined as rural municipalities; the second corresponds to the compilation and organization of the databases; and the third stage, predominantly quantitative, refers to the analysis of the databases by means of descriptive statistics and difference of means (ANOVA, T Test, Bonferroni Test).

1 INTRODUCTION

Down Syndrome (DS) or Trisomy 21 is a genetic syndrome characterized by a chromosomal anomaly (extra chromosome 21). It was first described in 1866 by Sir John L. H. Down, as the first chromosomal anomaly detected in the human species, and it can occur in three forms: free trisomy, translocation or mosaicism[1] .

Although the genetic alteration of DS is the same in all individuals with the disease, the penetrance of the pathologies resulting from the syndrome varies[2] . Most DS patients have learning disabilities, craniofacial alterations, and muscular hypotonia. However, the minority have congenital heart malformations, leukemia, or morphological bowel abnormalities. The severity of specific defects is variable

and the extent of cognitive impairment varies widely among individuals with trisomy 21, although most pediatric Down syndrome patients will require treatment for intellectual delay or growth[3] .

The socioeconomic profile of a population is elaborated from secondary data, collected from the responsible agencies in the several productive sectors of a city, as well as from institutions such as the Central Bank, IBGE Foundation, National Treasury Secretariat, and other organizations that may have information of interest about the data. However, there is scarce knowledge about the reality of families with patients affected by Trisomy 21.

This type of characterization, even if through a cross-sectional study, is able to give indications of how this group of individuals lives, what their reality is like, and how these people are influenced by the social and economic structure that surrounds them; such a study will be able to offer subsidies to better serve this public, evaluating their needs and potentialities.

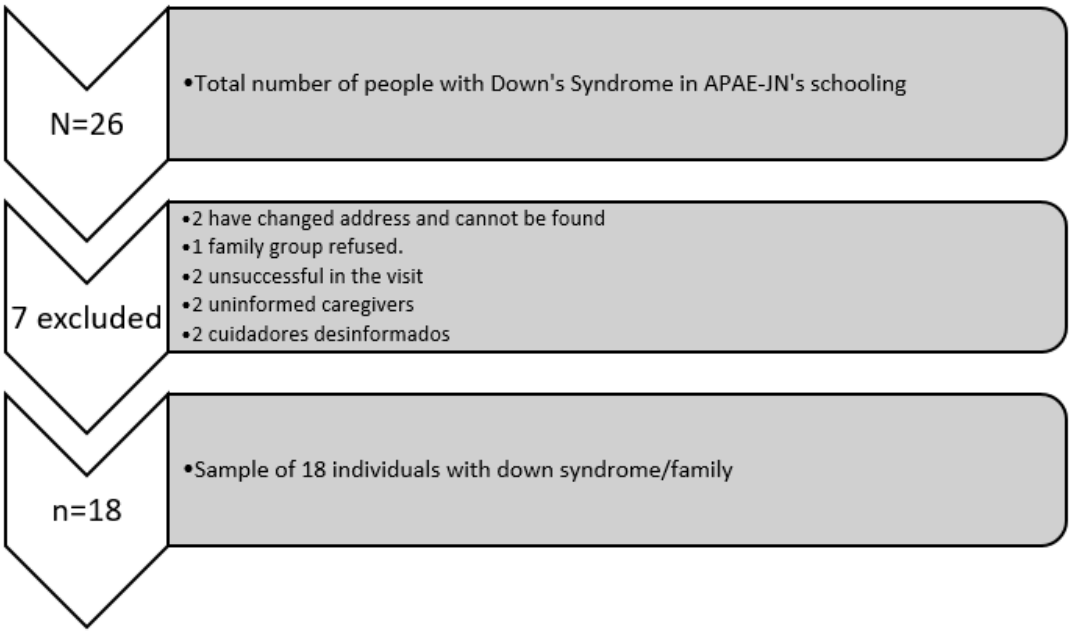
In the absence of scientific studies, common sense tends to associate better neurological development with a child from a higher social level. Does this also occur in Down's Syndrome?[4] . At least, the child's development, especially regarding learning, is closely linked to the family structure, its level of education and socioeconomic conditions .[5,6,7]

2 METHODOLOGY

This study is characterized as observational and quanti-qualitative of the cross-sectional type, with researcher-researched interaction, analyzing the results of questionnaires applied during home visits to the families of DS patients assisted by APAE Juazeiro do Norte. The study protocol was previously approved by the Research Ethics Committee of the Albert Sabin Hospital under number.

The data from the interviews and questionnaires were collected, listed and organized by statistical software suitable for the development of tables and graphs, and the interpretation of these results was made, assessing whether there is a relationship between the socioeconomic level and the NPMD of each affected person. Of the latter, 5 main criteria will be analyzed: age at which he or she held his or her head steady, *sat*, *walked*, *spoke*, and *sphincter control; this* will be evaluated according to the Classification of the Manual for Child Development Surveillance in the context of Integrated Care of Prevalent Childhood Illness[8] .

To evaluate the socioeconomic variables, a standard questionnaire was developed and applied to the person responsible for the patient, regarding the household information, involving questions about family characteristics, such as income, composition, length of residence, social benefits, type of dwelling; number of rooms, water supply, sewage, and garbage collection, as well as information about the interviewee, such as gender, age, occupation, education, marital status, social participation, and smoking, among others.



The participation of the family in the study was conditioned to the signature, by the person responsible for the child, of a Free and Informed Consent Form (FICF). The Research Project was approved by the Ethics Committee on Human Research of the Hospitalo Albert Sabin. The research followed the guidelines provided in the MS/CNS Resolution - 466/2012.

3 RESULTS AND DICURSION

The present research presents a diffuse and heterogeneous population group, with families of diverse profiles, difficult to categorize and group. However, using a standard questionnaire as an interview tool with standard questions, it was possible to structure, as best as possible, useful information about individuals with DS and their family groups. This information includes neurological developmental milestones; patient profiles such as age and sex; maternal data; information on access to health care; household economic variables, and environmental infrastructure. The interviews took place in locus, through home visits, using the entire population of the APAE-JN school.

NEURODEVELOPMENTAL PROFILE

It is observed a general delay of the persons with DS in relation to the neurological development (ND) milestones, proving what is already expected[1] of this population. It is noticed that many families are not concerned with documenting this information; TABLE 1 shows the results of the basic neurodevelopmental milestones (age at which the individual stiffened the neck; age at which he/she sat up without and with support; age at which he/she spoke his/her first comprehensible word, and age at which he/she obtained voluntary daytime sphincter control. These ages were arranged in months .[9]

Table 1: Neurological developmental milestones of people with DS at APAE-JN.

Age at which neck tightening occurred (months)	Sitting without support (months)	Walked without support (months)	You spoke (months)	Sphincter control (daytime) (months)
4	7	12	*24*	*48*
5	*8*	18	11	48
6	8	*21*	12	48
6	*10*	22	24	48
6	*12*	23	24	*72*
7	12	24	30	72
7	12	24	30	72
8	12	*25*	*36*	84
9	13	30	36	96
10	13	30	54	Not Yet
12	16	30	60	Not Yet
24	36	30	96	Not Yet
42	42	31	192	Not Yet
Doesn't remember/doesn't know	Doesn't remember/doesn't know	34	Not Yet	Not Yet
Doesn't remember/doesn't know	Doesn't remember/doesn't know	34	Not Yet	Not Yet
Doesn't remember/doesn't know	Doesn't remember/doesn't know	36	Not Yet	Doesn't remember/doesn't know
Doesn't remember/doesn't know	Doesn't remember/doesn't know	60	Not Yet	Doesn't remember/doesn't know
Doesn't remember/doesn't know	Doesn't remember/doesn't know	60	Don't remember/ Don't know	Doesn't remember/doesn't know

This picture shows a clear developmental delay, imprecise, since it depends on the perception of parents or caregivers, without the technical touch, but it expresses an expected profile. The milestones with the greatest delays, or even those not yet reached, were, in first place, daytime sphincter control, followed by speech development. Many informants did not know how to precisely inform the age of the milestones; more often the older ones, who forgot or had no interest in documenting this information, were observed.

In TABLE 2 are the statistical data of the age of the ND milestones; the mean in months plus the standard deviation (SD). Here you can see that the means are higher than the expected ages in normal individuals without chromosomal defects. It can be seen from TABLE 1 that the most delayed milestones are those of sphincter control (72 months with a SD of $\pm$ 18.11 months, not counting the high number who have not yet reached the milestone - 6 persons with DS) and of the development of spoken expression (30 months with a SD of $\pm$ 48.77 months, 4 of whom have not yet reached the milestone).

Table 2: Statistics of the ND of people with DS of APAE-JN.

	Age that stiffened the neck	Sitting without support	Walked without support	You spoke	Sphincter control (daytime)
Middle Ages (months)/ Standard Deviation	7,0+ 10,55	12,0+ 10,80	30,0+ 12,43	*30,0+ 48,77*	*72,0+ 18,11*
Has reached the milestone, but doesn't remember/doesn't know the age (number of patients)	5	5	-	*1*	*3*
Did not reach the milestone (number of patients)	-	-	-	*4*	*6*
Neurological Developmental Reference Data - taken from Denver 2/ AIDIP. Firm neck: common (90%) between 2 to 4 months (average 4 months). Unsupported sitting: common (90%) between 5 and 10 months (average 9 months). Walking without support: common (90%) between 10 and 15 months (average 12 months) Speaking: common (90%) between the first meaningful word appears between 1.1 and 18 months of life. Daytime sphincter control: common (90%) between 24 and 36 months.					

PATIENT PROFILE

The individuals who attend APAE-JN present varied ages and in general attend the institution's school. TABLE 3 lists this information, showing that 2/3 are older than 10 years and there is a large number of adult DS individuals (around 45%), older than 20 years. The youngest individual is 2 years old and there are 5 with more than years in the 0-10 years group, which corresponds to 33.33 % of the population. There is a balance between genders in the institution, being 44.44% male and 55.56% female, as shown in TABLE 4.

Table 3

AGE (AGE GROUPS)	n	%
0-10 years	6	33,33
11-20 years old	4	22,22
21-30 years old	2	11,11
30-40 years old	3	16,66
41-50 years old	3	16,66
TOTAL	18	100%
n=number of individuals % percentage of each group		

Table 4

SEX/GENDER	N	%
MALE	8	44,44
FEMALE	10	55,56
TOTAL	18	100
n=number of individuals % percentage of each group		

4 MATERNAL AGE AT BIRTH

The frequency of Down's syndrome recorded in South America is one case in about 700 births (1.4/1000), and the possibility of its occurrence increases with maternal age: at 20 years of age it is 0.07%, increasing to 0.3% at 35, 1% at 40, and almost 3% after 45 years of age. Maternal age after 35 years is one of the main contributing factors for the occurrence of trisomy 21. Research shows that advanced paternal age can also be a contributing factor .[10]

In the study o was observed that 55.48% of the mothers conceived their children at an age over 35 years, corroborating the literature, and 1 (5.55%) mother was 15 years old, reinforcing the risk of age extremes[11] . The results are shown in TABLE 5.

Table 5: Maternal age at conception of the DS patient, individual and by groups.

MATERNAL AGE	n	% INDIVIDUAL	MATERNAL AGE BY GROUPS	% BY GROUPS
15 years	1	5,55	≤15 years	5,55
22 years old	1	5,55	16-35 years old	38,88
26 years old	2	11,11		
30 years	1	5,55		
33 years	3	16,67		
36 years	2	11,11	36- 40 years old	38,83
37 years	1	5,55		
38 years	2	11,11		
40 years	2	11,11		
41 years	1	5,55	≥40 years	16,65
45 years	1	5,55		
47 years	1	5,55		
TOTAL	18	100	**TOTAL**	100
n=number of individuals % percentage of each group				

ECONOMIC VARIABLES

Raising capital income for socioeconomic analysis is difficult to capture in research of this nature, however, this is vital information for building a population profile, which may be able to offer equity in care, because income is a factor capable of bringing the understanding of the health-disease process of the subjects[12,13] .

The present study used family income as the sum of the income of the economically active family members, including the assistance offered by the National Institute of Social Security (INSS). They were also asked about access to health insurance, if they have any type of pension, and if they are beneficiaries of the Bolsa Família program (any member of the family). TABLE 6 presents the results of the work, which shows that the average family income is 2.3 salaries; the extremes are represented by 1 family with an average income of 1 minimum wage and 3 families with an average income of 4 minimum wages; the median is of families with 2 minimum wages (7 families). 2 family groups preferred not to give this information.

In most of the households the DS patient contributes to the family income by receiving monetary aid from the INSS. Generally all family groups have more than one breadwinner, with only two households having only one economically active member.

Only the groups that have more than 3 salaries and that did not report recently any type of pension (read sick pay) and family allowance. The results of the questioning about access to health insurance are discussed in the topic ACCESS TO HEALTH.

Table 6: Data on average family income by wages, number of families, people contributing to household income, use of health insurance, pension contribution of some kind, and whether they are participants in Bolsa Família.

Family Income	Number of families (N)	How many people contribute to income	Health insurance (N)	Pension (N)	Bolsa Familia program (N)
1 WAGE	1	1	0	0	0
2 WAGES	7	IN 3 HOUSES: 1 IN 4 HOUSES: 2	1	0	0
3 WAGES	5	IN 3 HOUSES: 2 IN 2 HOUSES: 3	5	5	0
4 WAGES	3	IN 3 HOUSES: 3 3M 1 LAR: 4	3	3	3
NOT REPORTED	2	4	2	2	2

ACCESS TO HEALTH

The vast majority of patients use SUS for some type of medical/hospital/rehabilitation assistance (15 families). Thirteen families are clients of Basic Health Units. The majority, due to financial limitations, does not use private services (n=10).

In the largest group, the one with income in the 2-wage bracket, only one family group uses health insurance; in the 3-4-wage group and those who reported no income, all enjoy this tool (n=11). The lowest income group does not have health insurance (n=7).

Table 7: Data on medical-hospital access for families with DS people at APAE-JN.

Variable (number of households that answered the item)	Use of SUS	Use of a private hospital	PHU	Health plan
YES	**15**	**8**	**13**	**11**
NO	**3**	**10**	**5**	**7**

Caption: PHU (Public Health Unity), UBS (pt-BR)

HOME INFRASTRUCTURE

Table 8.1: Household and infrastructure data

PROPERTY SITUATION	N	ELECTRICAL ENERGY		BASIC SANITATION	
OWN	13	YES	18	YES	17
RENTED	5	NO	0	NO	1
AVERAGE STAY IN THE PROPERTY (years)	10.0+11.97/ Max: 43, Min: 1	TOTAL	18	TOTAL	18

Table 8.2: Household and Infrastructure Data

TELEPHONE		WATER SUPPLY		SEPTIC TANK		INTERNET		CARS/MOTORCYCLES	
YES	7	YES	18	YES	9	YES	6	YES	3/5
NO	11	NO	0	NO	9	NO	12	NO	15/13
TOTAL	18	TOTAL	18	TOTAL	18	TOTAL	18	TOTAL	18/18

RELATIONSHIP BETWEEN FAMILY INCOME AND NEURODEVELOPMENT

The results on the age of the ND milestones in relation to family income are, at the outset, of complex analysis, since there is no standard defined in the literature or even models, formulas or patterns to be followed in this type of comparison. TABLE 9 correlates this information, and also shows the averages by ND group/item. For comparative purposes, we begin with an observational analysis of the results.

In the group with family income of 1 minimum wage, due to the low "n", it is difficult to conclude or abstract any conclusion. Besides the lower family income, the lower per capita income, with ¼ (one quarter) of a salary per person. However, the individual with DS presented ND with delay, mainly in what concerns speech and sphincter control, demonstrating the common difficulty of these people in reaching social milestones.

Individuals living in families with income of 2 salaries, with higher "n", had a high standard deviation and most of the informants did not know the age of the landmark, which impaired the results. This group did not show significant differences with the "1-wage" group in the means in relation to the items Age that stiffened the neck, Sat without support, and Walked without support. It showed better averages in the speech and sphincter control marks. Despite this, we observed that two DS patients have not yet reached the speech landmark, even though they were 13 and 15 years old; two patients also did not achieve daily sphincter control, these at the ages of 2 (expected and still within the standard) and 13.

Following the same trend as the "2-wage" group, the family groups with an average family income of 3 wages did not show significant differences with the first two groups in the means in relation to the items: Age stiffened neck, Sat without support, and Walked without support. However, they had better means in the speech and sphincter control marks. There are 2 patients with 5 years (60 months), who did not reach the speech and sphincter control milestones, which remains the pattern of the population studied

- in TABLE 1 the neurological profile of the population is presented. The mean age and standard deviation for the onset of speech is 30.0+48.77 months; while the sphincter control is 72.0+18.11 months.

The 4-family-wage group had the best set of means for ND in the study. This is less observed in the items Age firmed neck, Sat without support, and Walked without support, however more easily observed in the social interaction milestones (talking and sphincter control). Do better social conditions favor better ND? As already discussed, the low "n" of the study cannot reach this conclusion, but it does raise this hypothesis.

Table 9: Relationship of neurodevelopmental milestones with family income (in salaries).

	Age at which neck tightening occurred (months)	Sitting without support (months)	Walked without support (months)	Spoke (months)	Sphincter control (daytime) (months)
1 wage	10	10	25	192	96
AVERAGE	10m	10m	25m	192m	96m
2 wages	Doesn't remember/doesn't know	Don't remember/ Don't know	30	24	Doesn't remember/doesn't know
2 wages	5	8	30	Not Yet	72
2 wages	9	16	31	12	Not Yet
2 wages	Doesn't remember/doesn't know	Don't remember/ Don't know	30	24	Doesn't remember/doesn't know
2 wages	Doesn't remember/doesn't know	Don't remember/ Don't know	36	Don't remember/ Don't know	84
2 wages	Doesn't remember/doesn't know	Don't remember/ Don't know	30	36	Doesn't remember/doesn't know
2 wages	7	7	12	Not Yet	Not Yet
AVERAGE	7m*	10,3m**	28,4m	24m***	78m****
* 4 patients have reached the milestone, but respondents do not know the age of the milestone ** 3 patients have reached the milestone, but respondents do not know the age of the milestone *** 1 patient reached the milestone, but respondents do not know the age of the milestone; 2 did not reach the milestone (Ages: 13 and 14) **** 3 patients have reached the milestone, but respondents do not know the age of the milestone; 2 have not yet reached the milestone (Ages: 2 and 13 years)					
3 wages	42	42	60	54	48
3 wages	6	13	34	Not Yet	Not Yet
3 wages	12	36	60	60	72
3 wages	24	Don't remember/ Don't know	24	30	48
3 salaries	6	13	34	Not Yet	Not Yet
AVERAGE	18m	33,5m #	42,4m	48m ##	56m ###
# 1 patient has reached the milestone, but the respondents do not know the age of the milestone. ## 2 patients have not yet reached the milestone (both 5 years old) ### 2 patients have not yet reached the milestone (both 5 years old)					

4 wages	7	12	21	36	Not Yet
4 wages	6	12	23	24	Not Yet
4 wages	8	12	24	30	48
AVERAGE	7m	12m	22,6m	30m	48m [$]
[$] 2 patients did not reach the milestone (Ages: 6 and 7 years)					
Did not report	Don't remember/ Don't know	12	18	96	72
Did not report	4	8	22	11	48
AVERAGE	4m [!]	10m	20m	53,5m	60m
[!] 1 patients have reached the milestone, but respondents do not know the age of the milestone					

5 CONCLUSION

In the interior of Ceará, APAE- does a brilliant and inspiring work with all its special ones and the social limitations are clearly characteristic of the Brazilian Northeast, where no family income was found below the minimum wage in force (2015-2016), however reaching family income *per capita of* ¼ of a salary. We were able to characterize the population of the institution and develop a questionnaire as an instrument to observe and classify the neurological development profile (ND) and other information about individuals with DS and their families/socioeconomic conditions. When it comes to the ND the result follows the expected according to the literature, with significant delay of milestones, being more evident the delays in the development of speech and daytime social control of sphincters. As discussed, the N population and its stratification hinders the significance or not of the analyses comparing the socioeconomic profile and the NC, but many abstractions can be made. We observed a tendency for the family groups with higher income to have DS individuals reach the social milestones earlier - age when they started to talk and diurnal sphincter control.

Do better social conditions favor a better ND? It is not possible to conclude this, because these results reflect a certain population, and for more conclusions, studies with larger populations are needed, deepening the discussion on the subject.

REFERENCES

1- Frot M, Huffer WE, Sze CI, Badesch D, Cajade-Law AG, Kleinschmidt-DeMasters BK. **Cervical spine abnormalities in Down Syndrom**e. Clin Neuropathol 1999; 18: 250-9.

2. Antonarakis SE, Lyle R, Dermitzakis ET, Reymond A, Deutsch S. Chromosome 21 and down syndrome: from genomics to pathophysiology. **Nat Rev Genet**. 2004 Oct;5(10):725–738. [PubMed]

3- Kamalakar A, Harris JR, McKelvey KD, Suva LJ. **Aneuploidy and Skeletal Health.** ***Current osteoporosis reports*****.** 2014;12(3):376-382. doi:10.1007/s11914-014-0221-4.

4- Alvim, C.G, et al. A avaliação do desenvolvimento infantil: um desafio interdisciplinar. ***Rev. bras. educ. med***. [online]. 2012, vol.36, n.1, suppl.1 [cited 2014-01-09], pp. 51-56 . Available from: <http://www.scielo.br/scielo.php?

5- Castelão TB, Schiavo MR, Jurber GP. Sexualidade da pessoa com síndrome de Down. **Rev Saúde Pública** 2003; 37(1): 32-9.

6- Fonseca, Neumar Gianotti. **A influência da Família na Aprendizagem da Criança**. São Paulo: CEFAC, 1999.

7- Dessen, M. A. & Pereira-Silva, N. L. (2000). **Deficiência mental e família: uma análise da produção científic**a. Cadernos de Psicologia e Educação Paidéia, 10, 12-23.

8- Organização Pan-Americana da Saúde. **Manual para vigilância do desenvolvimento infantil no contexto da AIDPI**. Washington, D.C.: OPAS, 2005.

9- Moreira LMA, El-Hani CN, Gusmão FAF. A síndrome de Down e sua patogênese: considerações sobre o determinismo genético. **Rev Bras Psiquiatr**. 2000;22(2):96-9.

10 -Nakadonari EK, Soares AA. **Síndrome de Down: considerações gerais sobre a influência da idade materna avançada**. Arq Mudi. 2006;10(2):5-9.

11- Catão, MHCV; Rocha, SNS; Costa, RO. **Correlação da idade dos pais dos portadores de Síndrome de Down em instituições privadas de Campina Grande (PB**). Unimep. 24(1) 21-25. jan.-jun. 2014.

12- Domingos PAS, Rossato EM, Bellini A. **Levantamento do perfil social, demográfico e econômico de pacientes atendidos na clínica de odontologia do Centro Universitário de Araraquara - UNIARA**. 2014;17(1):37-50.

13- Barros M. M, Fabiana et al . Perfil socioeconômico dos usuários e motivo de procura de uma clínica de ensino. **Rev Cubana Estomatol**, Ciudad de La Habana , v. 53, n. 2, p. 17-23, jun. 2016.

CHAPTER 9

Extreme prematurity in a reference unit: morbidity, viability and mortality

10.56238/rsfohsv1-009

Kevan Guilherme Nóbrega Barbosa
Institutional Affiliation: Centro Universitário Cesmac
Email: kevanguilherme@gmail.com

Janaína da Silva Nogueira
Institutional Affiliation: Centro Universitário Cesmac
Email: jana-nog@hotmail.com

Vanessa de Carla Batista dos Santos
Institutional Affiliation: Centro Universitário Cesmac
Email: nessadecarlla@yahoo.com.br

Patricia Fabiane Monteiro Laranjeira
Institutional affiliation: Centro Universitário Cesmac
Email: pfmlaranjeira@hotmail.com

Ana Clara Monteiro Laranjeira
Universidade Estadual de Ciências da Saúde (UNCISAL)
Email: clarinha_ana_@hotmail.com

Gabriel Monteiro Amorim
Institutional Affiliation: Universidade Federal de Alagoas (UFAL)
Email: gabriel.amorim@famed.ufal.br

Rafael Monteiro Laranjeira
Universidade Federal de Alagoas (UFAL)
Email: rafael.gpcr@hotmail.com

ABSTRACT
Premature birth is a public health problem due to the high mortality rate associated and risk of severe disabilities throughout life. The objective was to evaluate the morbidity and mortality in a high-risk maternity hospital and knowing the threshold of viability. The sample was selected in four stages: identification, selection, stratification of preterm infants by gestational age and birth weight, and structured data collection. Neonates up to 31 weeks of gestational age who had a death outcome were evaluated from August 2015 to August 2020 through a retrospective survey based on the descriptive analysis of variables related to pregnancy, childbirth, and the newborn. Absolute and relative percentages were described for the categorical variables and calculated mean, median and standard deviation, minimum and maximum value for continuous quantitative variables. Most newborns had a small gestational age (56.3%), extremely low birth weight (39.8%), and presented with asphyxia (38.7%). The main morbidities were respiratory distress syndrome (100%) and sepsis (40.6%). The overall mortality rate was 55.9% from 26% at 31 weeks to 100% at 22 weeks; most deaths (56.3%) occurred between 22 and 27 weeks. Of the 266 deaths, 25 (9.3%) still occurred in the delivery room and 237 (89%) in the neonatal unit. The early mortality rate was 0.77 deaths per 1,000 live births, and the late mortality rate was 0.22 deaths per 1,000 live births. Viability's limit found was 28 weeks. Death, in addition to fetal characteristics, was influenced by a series of modifiable risk factors.

Keywords: Premature, Morbidity, Mortality, Fetal viability.

1 INTRODUCTION

Premature birth occurring before 37 weeks, represents a serious public health problem as a result of its high worldwide prevalence – about 30 million preterm births per year – being responsible for approximately one million child deaths. In Brazil, about 323,000 infants are born preterm annually, representing 11.5% of all births and **54% of the 35,839 infant deaths recorded (**Ambrósio et al., 2016; Al-Mouqdad et al., 2018; Aynalem et al., 2021).

Advances in neonatology and improvements in perinatal care have allowed the survival of newborns (NB) with increasingly lower gestational age (GA) and birth weight's (BW) thresholds, beside the emergence of new challenges such as the decision to start resuscitation in the delivery room, due to morbidities and medium and long-term outcomes. Prematurity consequences are more frequent at gestational ages below 32 weeks and become critical below 28 weeks (Apgar, 2015; Areia et al., 2018).

When considering low GA and BW, when newborns are too immature to survive, the provision of intensive care is unreasonable for those < 23 weeks and < 500 g. For newborns older than 25 weeks GA and with a BW > 500 g (grams), intensive care's measures initiation is considered justifiable, as most of these patients survive and at least 50% do so without major disability. For those born between 23 and 24 weeks of gestation with BW < 500 g, survival and morbidity are extremely uncertain; these infants lie in the so-called 'gray zone' of viability or periviability, in which post-delivery care involves extremely complex and multidisciplinary decision-making (Aziz et al., 2020; Bouzada et al., 2018; Brasil, 2014, 2020).

The different outcomes of prognosis and survival will depend on the structure, technology, organization, care practices and viability's threshold of each service. The most common complications include respiratory distress syndrome (RDS), periventricular/intraventricular hemorrhage (PVH/IVH), sepsis, necrotizing enterocolitis (NEC), bronchopulmonary dysplasia (BPD), retinopathy of prematurity (ROP), and neonatal death (Alleman et al., 2013; Aziz et al., 2020; Barfield, 2018; Barros et al., 2018; Bartman et al., 2015; Bittar, 2018).

Mortality outcomes among extremely preterm infants are related to several variables. In Brazil, death within the first six days of birth is closely related to perinatal events, socioeconomic and care factors, which are considered preventable by health service actions (Apgar, 2015; Areia et al., 2018).

Given the complexity of the factors involved in conditions of extreme prematurity, this research aimed to evaluate morbidity and mortality in a public reference high-risk maternity, in order to know the viability's limits.

2 METHODS

This is a retrospective and observational study of data from a public referral maternity hospital which provides medium- and high-complexity obstetric and neonatal care. Ethical approval was obtained (opinion number 4393441). The population consisted of all preterm infants with GA until 31 weeks, admitted to the institution between August 2015 and August 2020, who had a lethal outcome. Newborns with severe malformations (cardiac, pulmonary, cerebral, gastrointestinal), sufficient to cause greater morbidity, were excluded (Carvalho et al., 2019; Castro et al., 2016).

Sample selection was a four-stage process. The first stage consisted of a survey of all births and deaths that occurred before the 28th day of life during analysis' period. The second stage consisted of data collection from all corresponding Infant Death Investigation Forms. In the third stage, infants < 32 weeks GA were selected and classified as very preterm (≥ 28 to < 32 weeks) or extremely preterm (≥ 22 to < 28 weeks) (Castro et al., 2016; Chawanpaiboon et al., 2019). Infants were further stratified on the basis of weight/gestational age ratio as appropriate for gestational age (AGA), small for gestational age (SGA), or large for gestational age (LGA) (Chun et al., 2017).

During the fourth stage, collected data was based on the following variables: a) maternal/gestational characteristics – age, marital status, housing conditions, education, occupation, addictions, and complications; b) birth characteristics – birth place, antenatal corticosteroids, delivery way, gestational age, birth weight; c) neonatal characteristics – surfactant, morbidity, death cause, death timing (early vs. late), and neonatal viability.

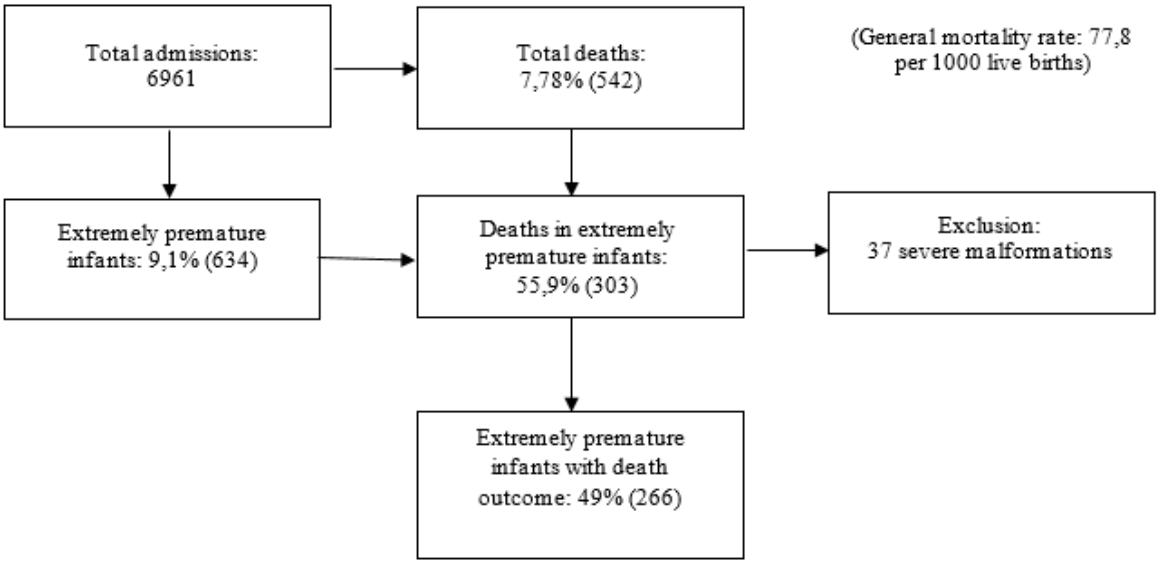
A descriptive analysis of all variables was carried out according to GA in weeks (from the 22 to 31). Categorical variables had absolute and relative frequencies described, and means, standard deviations, medians, and ranges (minimum–maximum) were described for continuous quantitative variables. Statistical analyses were carried out in SPSS Version 20.0 and Microsoft Excel 2016.

To analyze factors associated with the unfavorable outcome of preterm infants in this cohort, variables were evaluated according to the characteristics of each group and the chronology of related events, namely: maternal/gestational factors, childbirth-related factors, and neonatal factors.

3 RESULTS

In analyzed period, 6961 newborns were admitted to the reference maternity hospital, of which, 634 (9.1%) were extremely preterm infants. There were 542 deaths, 303 (55.9%) in premature infants with GA until 31 weeks. Of these, 37 neonates were excluded due to the presence of severe malformations. Over the 5-year period of interest, the analyzed sample comprised 266 participants **(Figure 1**).

Figure 1. Flowchart of admissions of preterm infants up to 31 weeks of gestational age and deaths at the Maternidade Escola Santa Monica, from August 2015 to August 2020.



Source: Research data (2020).

Figure 1 showed that the percentage of preterm infants up to 31 weeks corresponded to less than 10% of all births, representing more than 50% of neonatal deaths and significantly impacting institution's high neonatal mortality results.

The number of preterm births in the state from 2015 to 2020 was approximately 25,900, corresponding to a prematurity rate of approximately 10.7% (Cnattingius et al., 2020). There were 2,572 admissions of preterm infants at the maternity hospital, accounting for 37% of all live births (75.3% moderate and late preterm, 16.7% very preterm, and 7.8% extremely preterm).

3.1 MATERNAL/GESTATIONAL FACTORS

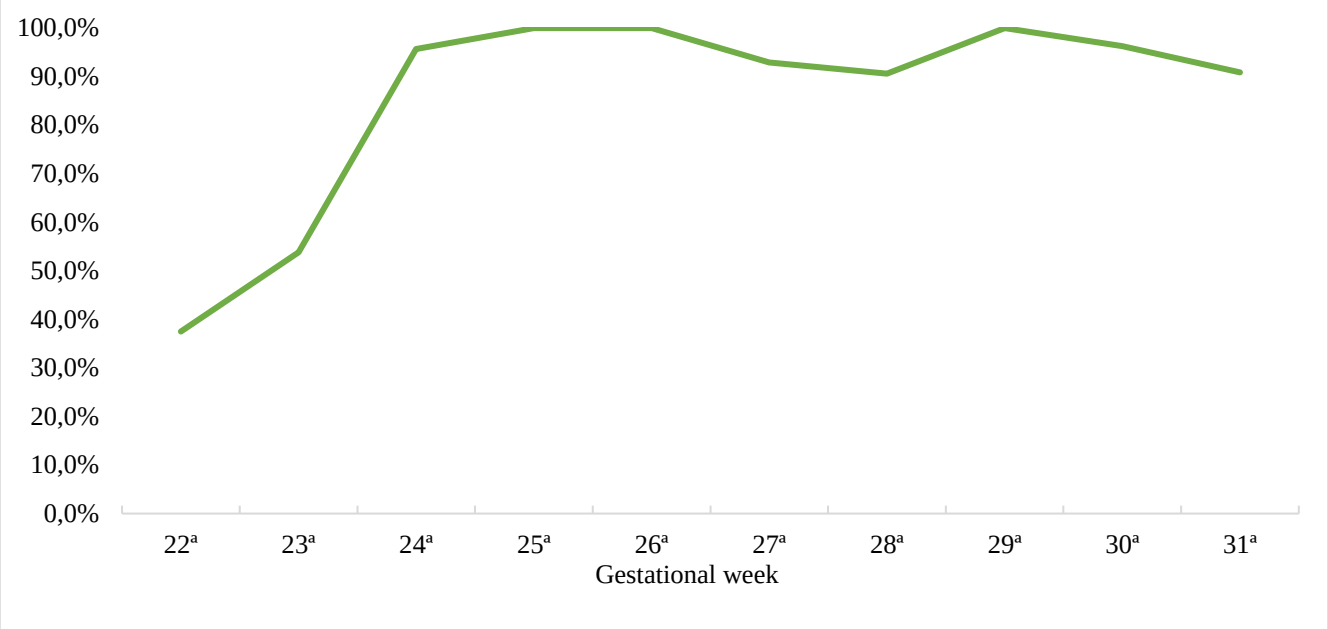
Regarding maternal characteristics, most of the mothers (66%) came from the state capital; 60.9% were between 20 and 34 years old; 54.1% were single; and 59.4% had less than 8 years of formal schooling. In 66.1% of records, there was no information regarding maternal addictions. Regarding marital status, 54.1% did not have a steady partner, most of them (76.7%) attended fewer than six antenatal visits, and 38% were diagnosed with antenatal infection. Among complications recorded during pregnancy, premature rupture of membranes (PROM) (35.6%), infections (27.8%), and hypertensive syndromes (26.8%) were the most prevalent, in decreasing order of frequency.

3.2 CHILDBIRTH-RELATED FACTORS

Vaginal deliveries accounted for 64.7% of all births, mainly at extremes of gestational age. Antenatal corticosteroids were used by only 32.7% of mothers, and there were no changes in this rate over the five-year study period. An overall lack of monitoring regarding the number of administered doses was observed, and there was no reference of this therapy in 24.4% of medical records. Among neonates who were transferred from other facilities (10%), all had been delivered vaginally and none had received corticosteroids before birth.

Regarding perinatal asphyxia, an Apgar score < 7 in the 5th minute of life was observed in 38% of newborns (n=103). The need for neonatal resuscitation was stratified by gestational age. 37.5% of preterm infants were resuscitated at 22 weeks; 53.8% at 23 weeks; 95.7% at 24 weeks; 100% between 25 and 26 weeks; and ranging from 92.9% at 27 to 90.2% at 31 weeks GA (**Graph 1**).

Graph 1. Need for neonatal resuscitation in the delivery room, stratified by gestational age in weeks, of extremely premature infants at the Maternidade Escola Santa Monica, from August 2015 to August 2020.



Source: Research data (2020).

In graph 1, we can see that more than 50% of preterm infants up to 23 weeks and 90 to 100% of those born between 24 and 31 weeks were resuscitated, which represents the high need for help to start the cardiorespiratory transition among the preterms of the study, for adequate adaptation to extrauterine life.

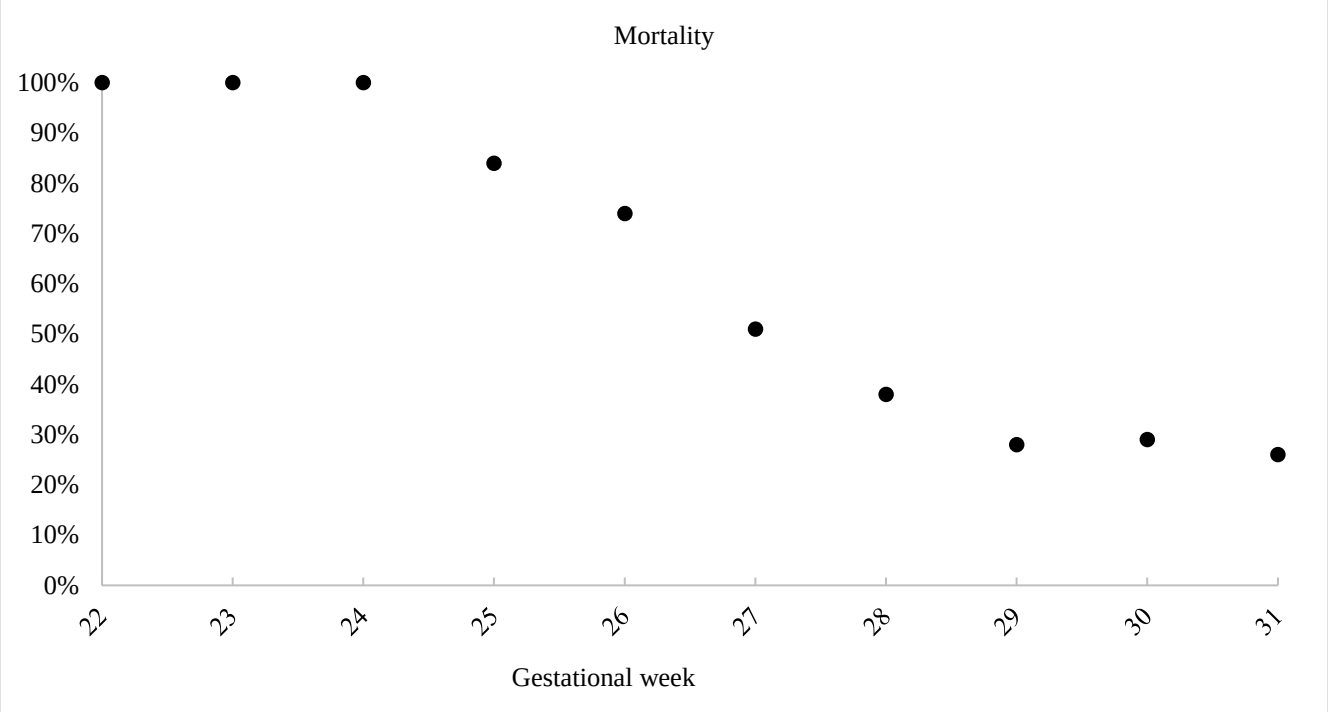
3.3 NEONATAL FACTORS

Regarding neonatal characteristics, 84% (n=224) of included infants were born at the study hospital, and more than half (56%) were male. Birth's distribution by GA range increased from 8 (3%) at 22 weeks to 38 (14.2%) at 25 weeks, and subsequently ranged from 36 (13.5%) at 28 weeks to 25 (9.3%) at 31 weeks. BW ranged from 315 g at 22 weeks to 1730 g at 30 weeks. The mean BW at 28 weeks was 879 g.

Regarding neonatal care, surfactant replacement therapy was offered to 84.8% (n=226) of preterm infants, specifically 9% (n=24) of those < 24 weeks; 36% (n=96) of those at 25 to 27 weeks; and 39.8% (n=106) for those born > 28 weeks GA. The most common early complication was respiratory distress syndrome, which occurred in 100% of newborns and was strongly related on GA at birth and was associated with death in the first week of life, followed by sepsis, which accounted for 40.6% of late mortality.

Among 266 deaths analyzed, 25 (9.3%) occurred in the delivery room and 237 (89%) in the NICU. Birth weight < 1,000g observed until the 26th week of GA carried a high mortality rate (45.4%). Lethality was inversely proportional to GA, with death occurring in 55.9% of very preterm infants; mortality ranged from 26% at 31 weeks to 100% at 22 weeks GA (**Graph 2**).

Graph 2. Mortality among extremely preterm infants, stratified by gestational age, from August 2015 to August 2020, Maternidade Escola Santa Mônica.



Source: Research data (2020).

Graph 2 shows that the highest mortality occurred in the lowest gestational age range, with 100% of death between 22 and 24 weeks, and that there was a gradual decrease from 25 to 31 weeks.

Analysis of death timing showed a predominance in the period of 1 to 6 days of life, with an early neonatal mortality rate of 77.1%; Considering these deaths, 31.6% occurred in the first 24 hours, with a higher prevalence among those younger than 24 weeks GA. On the other hand, late mortality occurred in 22.8% of preterm infants from 27 weeks GA age onwards. The early neonatal mortality rate was 0.77 deaths per 1,000 live births, while late neonatal mortality rate was 0.22 deaths per 1,000 live births.

The survival rate increased progressively with each additional week of GA, increasing from 0% between 22 and 24 weeks to 72% at 31 weeks GA. However, mortality was lower at the 30th week compared to the 31st week of GA, probably due to the influence of accuracy in determining GA.

Most of the deaths were observed in those born between 22 and 24 weeks of gestation. Most deaths (56.3%) occurred in premature infants born between 22 and 27 weeks, and only those born after 28 weeks had a survival rate over 50%. Viability's limit or threshold in the studied population was 28 weeks of gestational age. Thus, based on our findings of mortality rates according to each gestational age range, study sample neonates's prognosis can be categorized into three groups – extremely high risk, high risk and moderate risk. Regarding fetal viability, they were classified as: unviable, possibly viable with a high chance of severe sequelae and viable **(Table 1)**.

Table 1. Description of mortality rates by gestational age, risk categories and viability of extreme preterm infants at the Maternidade Escola Santa Monica, from August 2015 to August 2020.

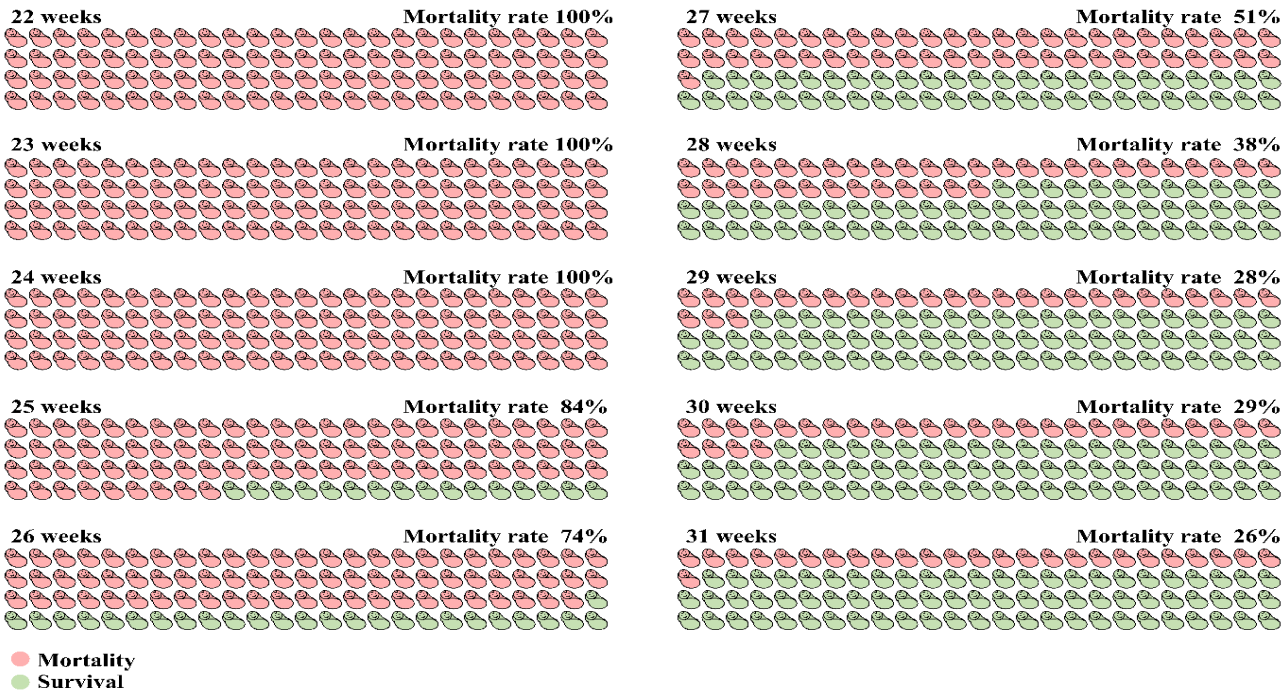
Gestational age	Mortality rate	Risk categorization	Viability
22ª	100%	**Extreme high risk** More than 90% chance of dying or surviving with severe disability	Not viable
23ª	100%		
24ª	100%		
25ª	84%	**High risk** 50 to 90% chance of dying or surviving with severe disability	Possible viable, but with high chances of serious sequels
26ª	74%		
27ª	51%		
28ª	38%	**Moderate risk** Less than 50% chance of dying or surviving with severe disability	Viable
29ª	29%		
30ª	28%		
31ª	26%		

Source: Research data (2020). Adapted from Mactier et al. (2020).

Table 1 shows that until 24th week of gestational age, newborns are at extreme high risk and do not survive hospital discharge, being considered unviable. Between 25 and 27 weeks, they still have significant mortality rates, being possibly viable, but at high risk of developing serious sequelae. Only at 28 weeks pregnancy, more than 50% manage to survive in hospital, with mortality moderate risk and less than 50% chance of serious sequelae, representing the found viability limit.

Despite the conditions associated with the high risk of morbidity and mortality in the analyzed sample, it's not possible to define individual prognosis of an extremely premature infant. In this way, the uncertainties must be shared with the parents for involvement with the team in the care of newborn's best interest. Thus, we can suggest graphic visual presentation of mortality and survival's information, to assist communication between health professionals and parents **(Figure 2)**.

Figure 2. Infographic for parents on the mortality results among extreme premature infants at Maternidade Escola Santa Monica, from August 2015 to August 2020.



Source: survey data (2020). Adapted from Guillen (2019).

Figure 2 shows illustrative content on mortality results in each gestational age group, aiming to inform and guide parents in the processes that involve very immature newborns' care.

4 DISCUSSION

The extreme prematurity rate of 16.7% was high compared to the total rate of 13.6% found in Brazil in 2019 (Aynalem et al., 2021). However, still much higher than those found in Europe and the United States, with 11.3% and 1.6% very preterm and 4.1% and 0.67% extremely preterm infants, respectively (Ambrósio et al., 2016; Cristina et al., 2021). This is probably explained at least in part by the fact that the study hospital is a statewide referral center for high-risk pregnancies, as well as by possible interference with estimates of preterm birth rate arising from differences in GA assessment methods, definitions of prematurity, and the quality of vital statistics (Ambrósio et al., 2016; Bartman et al., 2015).

Most mothers of preterm infants had low economic status, little education, and limited antenatal care; consequently, they were at greater risk of perinatal complications, which is consistent with preterm birth high rates, PROM, and concomitant infection observed (Cupen et al., 2017; Ellsbury et al., 2016). In addition, there was a high prevalence of hypertensive disorders of pregnancy (HDP), which can lead to intrauterine growth restriction (IUGR) and worse outcomes (Fenton & Kim, 2013), as shown in previous studies carried out in Mexico (Fiorenzano et al., 2019), Trinidad and Tobago (Gagliardi & Bellù, 2017), the United States (Gibelli, 2019), and China (Guimarães, 2019). These conditions highlight the need of investment on health networks to care for women during pregnancy and municipal health services quality improvement (Guimarães et al., 2017).

In terms of care practices, there was no improvement in the rate of mothers receiving antenatal corticosteroid therapy during the course of the study. This stands in contrast to what was observed at RBPN-affiliated centers, where the rate of antenatal corticosteroid use increased from 70% in 2011 to 85% in 2018, and in the Vermont Oxford Network (VON), where it rose from 86% in 2009 to 92% in 2016 (Bartman et al., 2015; Guillén et al., 2019). A meta-analysis of 30 studies found that antenatal corticosteroid therapy resulted in reductions in RDS (44%), need for mechanical ventilation (32%), sepsis (4%), NEC (50%), and perinatal death (28%) (Guinsburg et al., 2016).

The low 5-minute Apgar scores and high mortality observed during the study period were consistent with those reported by Bartman et al. (2004 to 2010) (Guinsburg et al., 2016) and Myrhaug et al. (2000 to 2017) (Guinsburg et al., 2021) in the U.S. and by Cnattingius et al. (1992 to 2016) (Helenius et al., 2018) in Sweden, who observed a greater association between low 5-minute Apgar scores and neonatal mortality in preterm infants with a GA of 23 to 28 weeks. Birth attendants training in neonatal resuscitation should thus be a priority measure to reduce neonatal mortality.

Neonatal resuscitation procedures were required by 92.9% of newborns at 27 weeks and 90.2% at 31 weeks (**Graph 1**). Thus, given the high possibility of interventions necessary at birth and the greater

risk of complications, additional resources need to be prepared to attend extreme preterm infant delivery, and it is essential to have adequate material and a team trained in resuscitation (Apgar, 2015).

At the same time, the beneficial impact of extremely preterm neonate resuscitation cannot be estimated in our sample, since 100% of infants with GA < 24 weeks died within the first 24 hours of extrauterine life. According to the neonatal viability guideline proposed by Seri et al., comfort measures should be offered to neonates under 23 weeks; resuscitation and initiation of ICU care are warranted for those over 25 weeks. For neonates in the "gray zone" (between 23 weeks and 24 weeks and 6 days), clinicians should consider the patient's condition at the time of delivery and involve the parents in decision-making, always with ongoing reassessment of the neonate's response to treatment (Hon et al., 2018).

This study population included preterm infants at the extreme threshold of viability, and more than half of all deaths (56.3%) occurred among those born at < 28 weeks GA **(Graph 1)**. Preterm infants in this category have different degrees of development, which can directly influence their chances of survival and risk of complications (Jung et al., 2019). As expected, each additional week of pregnancy resulted in increased survival.

The extremely low birth weight of sample's neonates also had a major influence on mortality rate (45.4%), which was far higher than that reported in the Lansky et al. (2014) cohort (30% mortality). This highlights the importance of low BW as an isolated determinant of neonatal mortality in Brazil.

Neonates transferred from outside hospitals, despite limited information on delivery and transport conditions, showed similar morbidity and mortality from those born in the study hospital, probably due to the predominance of risk factors specific to the analyzed population.

Regarding morbidities, the high incidence of respiratory distress syndrome stood out among the causes of early mortality, and reflects the importance of greater use of antenatal corticosteroids, both to reduce disease's severity and to optimize the effect of surfactant therapy (Leal et al., 2016).

As for neonatal care, surfactant was commonly offered to all preterm infants, regardless of gestational age. In this sense, it is important to avoid invasive procedures and unnecessary treatments, and it is essential to adopt preventive measures such as the use of prenatal steroids and CPAP as ventilatory support, with subsequent surfactant indication, according to preterm infant's clinical evolution (Leal et al., 2016).

Sepsis was one of the main factors limiting the survival of preterm infants in the study, similar to the study by Freitas et al. (2021), who observed a high incidence of infections in Brazilian's NICU and the need to implement effective preventive measures (Li et al., 2021). Unlike Stoll et al. (2020), in the USA, where progress in prevention measures reduced infection rates in newborns at 28 weeks from 20 to 8% and increased survival in this group from 43 to 49% (Mactier et al., 2020).

Regarding the 28-week viability limit, it is worth mentioning the difficulty in direct comparison with other studies, due to the methodological differences used or restricted analysis for certain subgroups

of GA or weight. Nor can we consider the regional and local inequalities related to obstetric and neonatal care of greater complexity in our country (Guimarães et al., 2017).

Regarding mortality, our results (55.9%) were comparable to those of prior Brazilian studies by Guinsburg et al. (53%) and Lima et al. (59.1%) (Guimarães et al., 2017; Manuck et al., 2016). However, they far exceeded those reported in other countries such as Portugal, China, and Australia, where mortality rates ranged from 21 to 37.5% (Barfield, 2018; Guimarães et al., 2017; Jung et al., 2019).

The underlying cause of death was difficult to determine in many cases. Among infants born at < 24 weeks, 100% of deaths were attributed to extreme prematurity and respiratory causes. This limitation is not exclusive to our study, as the cause of death in extreme prematurity is usually multifactorial (Lima et al., 2020). From the 25th week onwards, infectious causes represented 26.3% of deaths, reaching 60% in those born at 30 weeks, with sepsis as the leading late mortality cause.

The early mortality rate (77.1%) was higher than that of prior Brazilian reported by Carvalho et al. (2012 to 2017, 60%) and Guinsburg et al. (2012 to 2013, 53%), and extraordinarily high on comparison with other countries, such as Portugal (20.6%) (Guinsburg et al., 2016; Jung et al., 2019; Manuck et al., 2016). Actions aimed at improving care provided to pregnant women and childbirth, in addition to the use of evidence-based practices, are recommended prevention strategies to reduce these deaths (Guinsburg et al., 2016; Jung et al., 2019; Manuck et al., 2016).

Late mortality (22.8%), on the other hand, may have been related to increased NICU length of stay. However, Alleman et al. (2006 a 2009), point out that the differences in mortality between different units cannot be explained solely by neonatal characteristics diversity, but are also related to the use of survival predictive interventions, such as antenatal corticosteroids, maternal infections treatment, adequate assistance during childbirth, neonatal resuscitation, ventilatory support, nutrition, and hypothermia and infections prevention (Marques et al., 2019).

Present study limitations were secondary to incomplete data filling, since it was a retrospective evaluation. Additional research with death records and medical procedures joint investigation may help in this context, in addition to prospective development.

5 CONCLUSION

Through the methodology applied, it was possible to conclude that high mortality rate of 38.2% and viability limit of 28 weeks, in addition to fetal characteristics, such as extremely low gestational age (56.3%) and extremely low birth weight (39.8%), were influenced by a series of interventionable factors, such as asphyxia (38.7%), respiratory distress syndrome (100%) and sepsis (40.6%).

Presented results allow us to observe alert conditions for monitoring neonatal mortality, showing that there is space for improvement and highlighting the need of changes in the organization and provided care quality. New studies may help define perinatal strategies and interventions to improve the extremely preterm infants prognosis.

REFERENCES

Alleman, B. W., Bell, E. F., Li, L., Dagle, J. M., Smith, P. B., Ambalavanan, N., … Shriver, E. K. (2013). Individual and center-level factors affecting mortality among extremely low birth weight infants. *Pediatrics*, *132*(1): 175-184.

Al-Mouqdad, M. M., Aljobair, F., Alaklobi, F. A., Taha, M. Y., Abdelrahim, A., & Asfourd, S. S. (2018). The consequences of prolonged duration of antibiotics in premature infants with suspected sepsis in a large tertiary referral hospital: a retrospective cohort study. *International Journal of Pediatrics and Adolescent Medicine*, *5*(3), 110-115.

Ambrósio, C. R., Almeida, M. F. B., & Guinsburg, R. (2016). Opinions of Brazilian resuscitation instructors regarding resuscitation in the delivery room of extremely preterm newborns. *Jornal de Pediatria*, *92*(6), 609-615.

Ambrósio, C. R., Silva, C. H. M., & Melo, É. G. A. (2016). Ethical aspects of birth in the limit of viability. *Revista Médica de Minas Gerais*, *26*(4), 1-5.

Apgar, V. (2015). A proposal for a new method of evaluation of the newborn infant. *Anesthesia and Analgesia*, *120*(5), 1056-1059.

Areia, A. L., Almeida, M. F., Braga, A. J. C., Pereira, N. B., Macedo, C. V., Nogueira-Silva, C. (2018). Corticotherapy for fetal lung maturation. *Acta Obstétrica e Ginecológica Portuguesa*, *12*(4), 311-313.

Aynalem, Y. A., Shiferaw, W. S., Akalu, T. Y., Dargie, A., Assefa, H. K., & Habtewold, T. D. (2021). The Magnitude of Neonatal Mortality and Its Predictors in Ethiopia: A Systematic Review and Meta-Analysis. *International Journal of Pediatrics*, *2021*, 7478108.

Aziz, K., Lee, H. C., Escobedo, M. B., Hoover, A. V., Kamath-Rayne, B. D., Kapadia, V. S., … Zaichkin, J. (2020). Part 5: Neonatal Resuscitation: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Pediatrics*, *112*(24), 524-550.

Barfield, W. D. (2018). Public Health Implications of Very Preterm Birth. *Clinics in Perinatology*, *45*(3), 565-577.

Barros, F. C., Rabello Neto, D. L., Villar, J., Kennedy, S. H., Silveira, M. F., Diaz-Rossello, J. L., & Victora, C. G. (2018). Caesarean sections and the prevalence of preterm and early-term births in Brazil: Secondary analyses of national birth registration. *BMJ Open*, *8*(8), 1-9.

Bartman, T., Bapat, R., Martin, E. M., Shepherd, E. G., Nelin, L. D., & Reber, K. M. (2015). Apgar Score at 5 Minutes Is Associated with Mortality in Extremely Preterm Infants even after Transfer to an All Referral NICU. *American Journal of Perinatology*, *32*(13), 1268-1272.

Bittar, R. E. (2018). Parto pré-termo. *Revista de Medicina*, *97*(2), 195-207.

Bouzada, M. C. F., Reis, Z. S. N., Vieira, M. N. O., Corrêa, L. P., Oliveira, G. M., Penido, M. G., ... Romanelli, R. M. C. (2018). Response to newborn resuscitation procedures in the fifth minute of life in newborns Apgar ≤ 3 in the first minute. *Revista Médica de Minas Gerais*, *28*(6), 31-37.

Brasil. Datasus. (2020). *O número de nascimentos prematuros no estado de Alagoas 2015 a 2018*. Datasus.

Brasil. Ministério da Saúde. (2014). *Datasus*. Ministério da Saúde.

Carvalho, W. B., Matsushita, F. Y., & Krebs, V. L. J. (2019). Gray zone: Mortality profile of newborns at the limit of viability. *Revista da Associação Médica Brasileira*, *65*(9), 1128-1129.

Castro, E. C. M., Leite, Á. J. M., & Guinsburg, R. (2016). Mortalidade com 24 horas de vida de recém-nascidos pré-termo de muito baixo peso da Região Nordeste do Brasil. *Revista Paulista de Pediatria*, *34*(1), p. 106-113.

Chawanpaiboon, S., Vogel, J. P., Moller, A.-B., Lumbiganon, P., Petzold, M., Hogan, D., … Gülmezoglu, A. M. (2019). Global, regional, and national estimates of levels of preterm birth in 2014: a systematic review and modelling analysis. *The Lancet Global Health*, *7*(1), 37-46.

Chee, Y. Y., Wong, M. S., Wong, R. M., & Wong, K. Y. (2017). Neonatal outcomes of preterm or very-low-birth-weight infants over a decade from Queen Mary Hospital, Hong Kong: Comparison with the Vermont Oxford Network. *Hong Kong Medical Journal*, *23*(4), 381-386.

Chun, J., Sung, S. I., Ho, Y. H., Kim, J., Park, G. Y., Yoon, S. A., … Park, W. S. (2017). Prophylactic versus early rescue surfactant treatment in preterm infants born at less than 30 weeks gestation or with birth weight less than or equal 1,250 grams. *Journal of Korean Medical Science*, *32*(8), 1288-1294.

Cnattingius, S., Johansson, S., & Razaz, N. (2020). Apgar Score and Risk of Neonatal Death among Preterm Infants. *New England Journal of Medicine*, *383*(1), 49-57.

Cristina, N., Linard, C. F. B. M., Silva, F. R., Cândido, J. A. B., Silva, S. R., Vasconcelos, A. Á., & Pinto, F. J. M. (2021). Fatores associados à mortalidade neonatal de prematuros de muito baixo peso em Unidade de Terapia Intensiva. *Research, Society and Development*, *10*(1), 1-15.

Cupen, K., Barran, A., Singh, V., & Dialsingh, I. (2017). Risk Factors Associated with Preterm Neonatal Mortality: A Case Study Using Data from Mt. Hope Women's Hospital in Trinidad and Tobago. *Children*, *4*(12), 108.

Ellsbury, D. L., Clark, R. H., Ursprung, R., Handler, D. L., Dodd, E. D., & Spitzer, A. R. (2016). A multifaceted approach to improving outcomes in the NICU: The pediatrix 100 000 babies campaign. *Pediatrics*, *137*(4), e20150389.

Fenton, T. R., & Kim, J. H. (2013). A systematic review and meta-analysis to revise the Fenton growth chart for preterm infants. *BMC Pediatrics*, *13*(1), 1-13.

Fiorenzano, D. M., Leal, G. N., Sawamura, K. S. S., Lianza, A. C., Carvalho, W. B., & Krebs, V. L. J. (2019). Síndrome do desconforto respiratório: influência do manejo sobre o estado hemodinâmico de recém-nascidos pré-termo ≤ 32 semanas nas primeiras 24 horas de vida. *Revista Brasileira de Terapia Intensiva*, *31*(3), 312-317.

Freitas, F. T. M., Viegas, A. P. B., & Romero, G. A. S. (2021). Neonatal healthcare-associated infections in Brazil: systematic review and meta-analysis. *Archives of Public Health*, *6*(89), 1-10.

Gagliardi, L., & Bellù, R. (2017). Extreme prematurity outcomes: Have we really reached the limit? *Pediatrics*, *139*(3), 1-3.

Gibelli, M. A. B. (2019). Cuidados paliativos em recém-nascidos: quem são esses pacientes? In Sociedade Brasileira de Pediatria, *PRORN: Programa de Atualização em Neonatologia* (pp. 77-101). Sociedade Brasileira de Pediatria.

Guillén, Ú., Mackley, A., Laventhal, N., Kukora, S., Christ, L., Derrick, M., …, Kirpalani, H. (2019). Evaluating the Use of a Decision Aid for Parents Facing Extremely Premature Delivery: A Randomized Trial. *Journal of Pediatrics*, *209*, 52-60.

Guimarães, A. L. S. (2019). Análise das malformações congênitas a partir do relacionamento das bases de dados de nascidos vivos e óbitos infantis. *Revista Brasileira de Saúde Materno Infantil*, *19*(4), 925-933.

Guimarães, E. A. A., Vieira, C. S., Nunes, F. D. D., Januário, G. C., Oliveira, V. C., & Tibúrcio, J. D. (2017). Prevalência e fatores associados à prematuridade em Divinópolis, Minas Gerais, 2008-2011: análise do Sistema de Informações sobre Nascidos Vivos. *Epidemiologia e Serviços de Saúde*, *26*(1), 91-98.

Guinsburg, R., & Almeida, M. F. B. (2016). *Reanimação do Prematuro <34 semanas em sala de parto: Diretrizes 2016*. Sociedade Brasileira de Pediatria.

Guinsburg, R., & Almeida, M. F. B. (2021). *Reanimação do Prematuro <34 semanas em sala de parto: Versão 2016 com atualizações em maio de 2021*. Sociedade Brasileira de Pediatria.

Guinsburg, R., Almeida, M. F. B., Castro, J. S., Silveira, R. C., Caldas, J. P. S., Fiori, H. H., ... Rego, M. A. S. (2016). Death or survival with major morbidity in VLBW infants born at Brazilian Neonatal Research Network Centers. *Journal of Maternal-Fetal and Neonatal Medicine*, *29*(6), 1005-1009.

Helenius, K., Sjörs, G., Shah, P. S., Modi, N., Reichman, B., Morisaki, N., ... Lehtonen, L. (2018). Survival in very preterm infants: An international comparison of 10 national neonatal networks. *Obstetrical and Gynecological Survey*, *73*(4), 187-189.

Henriques, L. B., Alves, E. B., Vieira, F. M. S. B., Cardoso, B. B., D'Angeles, A. C. R., Cruz, O. G., ... Saraceni, V. (2019). Accuracy of gestational age assessment in Brazilian information system on live birth (SINASC): A population study. *Cadernos de Saude Publica*, *35*(3), 1-11.

Hon, K. L., Liu, S., Chow, J. C., Tsang, K. Y., Lam, H. S., So, K. W., … Wong, W. (2018). Mortality and morbidity of extremely low birth weight infants in Hong Kong, 2010-2017: A single-centre review. *Hong Kong Medical Journal*, *24*(5), 460-465.

Horbar, J. D., Edwards, E. M., Greenberg, L. T., Morrow, K. A., Soll, R. F., Buus-Frank, M. E., Buzas, J. S. (2017). Variation in performance of neonatal intensive care units in the United States. *JAMA Pediatrics*, *171*(3), 1-8.

Jung, Y. H., Jang, J., Kim, H.-S., Shin, S. H., Choi, C. W., Kim, E.-K., & Kim, B. I. (2019). Respiratory severity score as a predictive factor for severe bronchopulmonary dysplasia or death in extremely preterm infants. *BMC Pediatrics*, *19*(1), 1-8, 2019.

Lansky, S., Friche, A. A. L., Silva, A. A. M., Campos, D., Bittencourt, D. A. S., Carvalho, M. L., ... Cunha, A. J. L. A. (2014). Pesquisa Nascer no Brasil: perfil da mortalidade neonatal e avaliação da assistência à gestante e ao recém-nascido. *Cadernos de Saúde Pública*, *30*(1), 192-207.

Leal, M. C., Esteves-Pereira, A. P., Nakamura-Pereira, M., Torres, J. A., Theme-Filha, M., Domingues, R. M. S. M., ... Gama, S. G. (2016). Prevalence and risk factors related to preterm birth in Brazil. *Reproductive Health*, *13*(3), 164-174.

Lee, A. C. C., Blencowe, H., & Lawn, J. E. (2018). Small babies, big numbers: global estimates of preterm birth Preterm. *The Lancet Global Health*, *7*(1), e2-e3.

Leuthner, S. R. (2004). Palliative care of the infant with lethal anomalies. *Pediatric Clinics of North America*, *51*(3), 747-759.

Li, H.-X., Gao, C.-J., Cheng, S., Mao, Z.-L., & Wang, H.-Y. (2021). Risk factors for respiratory assistance in premature infants. *Experimental and Therapeutic Medicine*, *21*(3), 1-8.

Lima, R. G., Vieira, V. C., & Medeiros, D. S. (2020). Determinantes do óbito em prematuros de Unidades de Terapia Intensiva Neonatais no interior do Nordeste. *Revista Brasileira de Saúde Materno Infantil*, *20*(2), 545-554.

Mactier, H., Bates, S. E., Johnston, T., Lee-Davey, C., Marlow, N., Mulley, K., … Wilkinson, D. (2020). Perinatal management of extreme preterm birth before 27 weeks of gestation: A framework for practice. *Archives of Disease in Childhood: Fetal and Neonatal Edition*, *105*(3), 232-239.

Manuck, T., Rice, M. M., Bailit, J. L., Grobman, W. A., Reddy, U. M., Wapner, R. J., … Tolosa, J. E. (2016). Preterm Neonatal Morbidity and Mortality by Gestational Age: A Contemporary Cohor. *American Journal of Obstetrics and Gynecology*, *19*(6), 545-554.

Marques, B. R., Dinis, A. C., Rocha, G., Flôr-de-Lima, F., Matos, A. C., Henriques, C., Guimarães, H. (2019). Morbidity and mortality in preterm infants less than 29 weeks of gestational age. *Journal of Pediatric and Neonatal Individualized Medicine*, *8*(1), 1-9.

Mengistu, T. S., Schreiber, V., Flatley, C., Fox, J., & Kumar, S. (2021). Factors Associated with Increased Risk of Early Severe Neonatal Morbidity in Late Preterm and Early Term Infants. *Journal of Clinical Medicine*, *10*(6), 1319.

Moya, F. R., Mazela, J., Shore, P. M., Simonson, S. G., Segal, R., Simmons, P. D., & Finer, N. N. (2019). Prospective observational study of early respiratory management in preterm neonates less than 35 weeks of gestation. *BMC Pediatrics*, *19*(1), 1-10.

Myrhaug, H. T., Brurberg, K. G., Hov, L., & Markestad, T. (2019). Survival and Impairment of Extremely Premature Infants: A Meta-analysis. *Pediatrics*, *143*(2), e20180933.

Organização Mundial da Saúde. (2018). *Mortalidade infantil no mundo*. Organização Mundial da Saúde.

Papageorghiou, A. T. (2019). And now 2020…. *BJOG: An International Journal of Obstetrics and Gynaecology*, *126*(13), 1511-1512.

Peixoto, M. M. C. L., Araújo, A. B., Bueno, A. C., & Quintans, M. D. S. (2019). Avaliação da sobrevida de recém-nascidos pré-termo extremos em hospital universitário. *Revista de Pediatria SOPERJ*, *19*(1), 10-15.

Pinto, F., Fernandes, E., Virella, D., Abrantes, A., & Neto, M. T. (2019). Born Preterm: A Public Health Issue. *Portuguese Journal of Public Health*, *37*(1), 38-49.

Ratnasiri, A. W. G., Parry, S. S., Arief, V. N., DeLacy, I. H., Halliday, L. A., DiLibero, R. J., & Basford, K. E. (2018). Recent trends, risk factors, and disparities in low birth weight in California, 2005-2014: a retrospective study. *Maternal Health, Neonatology and Perinatology*, *4*(1), 1-13.

Razeq, A., Khader, Y. S., Batieha, A. M. (2017). The incidence, risk factors, and mortality of preterm neonates: A prospective study from Jordan (2012-2013). *Turk Jinekoloji ve Obstetrik Dernegi Dergisi*, *14*(1), 28-36.

Rede Brasileira de Pesquisas Neonatais. (2019). *Mortalidade em recém-nascidos de muito baixo peso nos 20 centros da RBPN: 2011-2018*. Rede Brasileira de Pesquisas Neonatais.

Reyes, J. C., Ramírez, R. O. P., Ramos, L. L., Ruiz, L. M. G., Vázquez, E. A. B., & Patino, V. R. (2018). Neonatal mortality and associated factors in newborn infants admitted to a Neonatal Care Unit. *Archivos Argentinos de Pediatría*, *116*(1), 42-48.

Roberts, D., Brown, J., Medley, N., & Dalziel, S. R. (2017). Antenatal corticosteroids for accelerating fetal lung maturation for women at risk of preterm birth. *The Cochrane Database of Systematic Reviews*, *3*(3), CD004454.

Rodrigo, F. G.-M., Recinos, A. L. D., Pérez, A. G.-A., Aloy, J. F., & Torres, M. V. (2015). Changes in perinatal care and outcomes in newborns at the limit of viability in Spain: The EPI-SEN study and the SEN1500 network of the Spanish neonatal society (Sociedad Española de Neonatología). *Neonatology*, *107*(2), 120-129.

Schneider, K., Metze, B., Bührer, C., Cuttini, M., & Garten, L. (2019). End-of-Life Decisions 20 Years after EURONIC: Neonatologists' Self-Reported Practices, Attitudes, and Treatment Choices in Germany, Switzerland, and Austria. *Journal of Pediatrics*, *207*, 154-160.

Seri, I., & Evans, J. (2008). Limits of viability: Definition of the gray zone. *Journal of Perinatology*, *28*, S4-S8.

Shane, A. L., Sánchez, P. J., & Stoll, B. J. (2017). Neonatal sepsis. *The Lancet*, *390*(10104), 1770-1780.

Stanak, M., & Hawlik, K. (2019). Decision-making at the limit of viability: The Austrian neonatal choice context. *BMC Pediatrics*, *19*(1), 1-10.

Stensvold, H. J., Klingenberg, C., Stoen, R., Dag Moster, D., Braekke, K., Guthe, H. J., … Ronnestad, A. E. (2017). Neonatal morbidity and 1-year survival of extremely preterm infants. *Pediatrics*, *139*(3), e20161821.

Stoll, B. J., Puopolo, K. M., Hansen, N. I., Sánchez, P. J., Bell, E. F., Carlo, W. A., ... Cotton, M. (2020). Early-Onset Neonatal Sepsis 2015 to 2017, the Rise of Escherichia coli, and the Need for Novel Prevention Strategies. *JAMA Pediatrics*, *174*(7), 1-12.

Sweet, D. G., Carnielli, V., Greisen, G., Hallman, M., Ozek, E., Pas, A. T., … Halliday, H. L. (2019). European Consensus Guidelines on the Management of Respiratory Distress Syndrome – 2019 Update. *Neonatology*, *115*(4), 432-450.

Tietzmann, M. R., Teichmann, P. V., Vilanova, C. S., Goldani, M. Z., & Silva, C. H. (2020). Risk Factors for Neonatal Mortality in Preterm Newborns in The Extreme South of Brazil. *Scientific Reports*, *10*(1), 1-7.

Veloso, F. C. S., Kassar, L. M. L., Oliveira, M. J. C., Lima, T. H. B., Bueno, N. B., Gurgel, R. Q., & Kassar, S. B. (2019). Analysis of neonatal mortality risk factors in Brazil: a systematic review and meta-analysis of observational studies. *Jornal de Pediatria*, *95*(5), 519-530.

Vilanova, C. S., Hirakata, V. N., Buriol, V. C. S., Nunes, M., Goldani, M. Z., & Silva, C. H. (2019). The relationship between the different low birth weight strata of newborns with infant mortality and the influence of the main health determinants in the extreme south of brazil. *Population Health Metrics*, *17*(1), 1-12.

Vogel, J. P., Chawanpaiboon, S., & Gülmezoglu, A. M. (2019). Reducing the global burden of disease in childhood. *The Lancet Global Health, 7*(4), e416.

Vogel, J. P., Chawanpaiboon, S., Moller, A.-B., Watananirun, K., Bonet, M., & Lumbiganon, P. (2018). The global epidemiology of preterm birth. *Best Practice and Research: Clinical Obstetrics and Gynaecology, 52*, 3-12.

Wang, M. L., Dorer, D. J., Fleming, M. P., & Catlin, E. A. (2004). Clinical outcomes of near-term infants. *Pediatrics, 114*(2), 372-376.

Wilkinson, D. J. C., & Stenson, B. (2015). Don't stop now? How long should resuscitation continue at birth in the absence of a detectable heartbeat? *Archives of disease in childhood. Fetal and Neonatal Edition, 100*(6), 476-478.

World Health Organization. (1969). *The Prevention of Perinatal Morbidity and Mortality*. World Health Organization.

Wyckoff, M. H., Wyllie, J., Aziz, K., Almeida, M. F., Fabres, J., Fawke, J. … Weiner, G. M. Neonatal Life Support: 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. *Circulation, 142*(16), 185-221.

Wyllie, J., Perlman, J. M., Kattwinkel, J., Wyckoff, M. H., Aziz, K., Guinsburg, R., … Velaphi, S. (2015). Part 7: Neonatal resuscitation. 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. *Resuscitation, 95*, 169-201.

Yeo, K. T., Safi, N., Wang, Y. A., Le Marsney, R., Schindler, T., Bolisetty, S., … Lui, K. (2017). Prediction of outcomes of extremely low gestational age newborns in Australia and New Zealand. *BMJ Paediatrics Open, 1*(1), 1-8.

CHAPTER 10

Clinical and epidemiological profile of individuals undergoing bariatric surgery

10.56238/rsfohsv1-010

Jogilmira Macêdo Silva Mendes
E-mail: miramacedomendes@hotmail.com

Francisco Lotufo Neto
E-mail: franciscolotufo@gmail.com

Ana Beatriz Alves Correia de Lima
E-mail: anabeatrizalvescdelima@gmail.com

Maria Cecilia Queiroga
E-mail: queirogamariacecilia@gmail.com

Emanuel Nildvan Rodrigues da Fonseca
E-mail: emanuelnrf975@gmail.com

Khivia Kiss da Silva Barbosa
E-mail: khiviakiss@yahoo.com.br

Rosângela Vidal de Negreiros
E-mail: rosangelavidaldenegreiros1@gmail.com

Gilvânia Smith da Nóbrega Morais
E-mail: gilvâniamorais.ufcg@gmail.com

Mabel Osório Rodrigues
E-mail: alexmabel@hotmail.com

Andreia Oliveira Barros de Sousa
E-mail: andreiabarros2@hotmail.com

ABSTRACT
Objective: The present study aimed to verify the clinical, epidemiological profile of patients undergoing bariatric surgery. Method: An exploratory and descriptive investigation was carried out with a quantitative approach, including individuals over 18 years of age who had experienced the postoperative period for more than 6 months. Results: it was verified as a result that there was a higher incidence of females (83.7%), with a complete third degree (76%) and with a preoperative BMI over 40 (69.38%). The most prevalent comorbidities were type 2 diabetes mellitus (92.30%) and dyslipidemia (92.06%). After surgery, most patients had a BMI between Ideal (25.51%) and Overweight (44.89%). Conclusion: Bariatric surgery was very effective for weight loss (84.25%); improvement or reduction of associated comorbidities, with an improvement percentage above 85% for all that were evaluated.

Keywords: Obesity, Bariatric surgery, comorbidities.

1 INTRODUCTION

Obesity is a chronic disease of multifactorial origin that, besides predisposing to the development of other diseases, can also interfere in the individual's quality of life (1, 2). Obesity can be classified into exogenous and endogenous. Exogenous obesity is influenced by external factors of behavioral, dietary, or environmental origin, such as diet, representing about 95% of the cases. The endogenous is related to genetic, neuropsychological, neuroendocrine, medication and metabolic components which represent approximately 5% of the cases (3).

Thus, several factors are causative of excess body fat, especially unregulated eating and a sedentary lifestyle. The methods for the treatment of obesity, recommended by medicine, consist of changes in lifestyle, which include diets and physical exercises, medication, and the use of surgical techniques (4, 5). Conventional treatments, however, have high failure rates and 5% of the patients regain weight within 2 years (6).

The surgery recommended for the treatment of the morbidly obese is called bariatric and is a type of surgical intervention that promotes food restriction through structural changes in the gastrointestinal tract. This class of procedure was initially developed for the exclusive treatment of obesity, but throughout

its history it has also gained importance in the control of cardiovascular risk factors refractory to clinical treatment (8).

Individuals with BMI over 40 kg/m are indicated for this procedure, who have not had success in previous clinical treatment, and those with BMI over 35, who have also had failure in clinical treatment and have severe comorbidities - such as difficult-to-control diabetes (9).

Improved quality of life may be an important benefit experienced by individuals after bariatric surgery, encompassing improvements such as general well-being, social life, work performance, and several other aspects (1, 22).

In this sense, considering that bariatric surgery is considered an effective treatment in weight control, in the positive prognosis of associated comorbidities and also in the quality of life of obese patients, the present study aimed to characterize the social, demographic and clinical profile of people who have undergone bariatric surgery and to evaluate the self-perception of the quality of life of individuals undergoing bariatric surgery through BAROS (Bariatric Analysis and Reporting Outcome System).

2 METHODOLOGY

This is an exploratory and descriptive research, with a quantitative approach whose data collection occurred through the application of a questionnaire, with the purpose of investigating socio-demographic and clinical data.

The sample consisted of 98 individuals undergoing bariatric surgery who met the following inclusion criteria: being over 18 years of age, having experienced the postoperative period for bariatric surgery for at least 6 months, and agreeing to participate freely in the research by signing the Informed Consent Form (ICF).

However, due to the pandemic of COVID-19, the data collection was structured online, with the instruments included in the Google Forms platform and disseminated on digital platforms. It was composed of two sections. Socio-demographic and clinical data, all participants' questions were answered individually. The collection began in November 2020, after approval by the Ethics Committee, under CAAE- 34261319.0.0000.5182 **.**

The data were submitted to descriptive and quantitative (univariate) analysis, using simple measures of absolute and relative frequency, as well as measures of central tendency such as mean and standard deviation, adopting population standard deviation (σ) OF 0.5, a tolerable absolute error of 0.1, and a confidence coefficient of 95%.

3 RESULTS AND DISCUSSION

The sociodemographic prevalence obtained in this research is similar to the results found by Araújo et. al., in whose study most participants were also women (81%) and the most prevalent age group was 30-

40 years (41.5%, n=83). Such factor may be associated with a higher prevalence of obesity itself in females (12), as well as with a greater exposure to psychologically stressful factors by individuals of this sex (13).

In addition, the most frequent level of education was also higher education (39.79% ,n= 39), followed by specialization (31.63%, n=31) and complete high school education (14.28%, n=14). Table 1 presents the level of education of the participants investigated.

Table 1. Distribution of data regarding the level of education, n= 98.

Education	Relative value	Absolute value
Middle school incomplete	0	0
Middle school complete	2	2,04
High school incomplete	4	4,08
High school complete	14	14,28
College degree incomplete	2	2,04
Undergraduate	39	39,79
Specialization	31	31,63
Master's Degree	3	3,06
PhD	3	3,06
Total	100%	98

Source: Survey Data, 2021.

From the preoperative anthropometric data obtained through the application of the questionnaire, it was calculated that approximately 69.38% (n=68) had a BMI over 40 (obesity grade 3) and 30.61% (n=30) between 35 and 39.9 (obesity grade 2).

In addition, the calculated mean BMI pre-surgical was 42.1 (standard deviation ± 5.25) and post-surgical, 27.7 (standard deviation ± 4.67)

To evaluate good outcome of surgery in the aspect of excess weight loss (%PEP), the formula was used: PEP = (reported preoperative weight - minimum reported weight) x 100/(reported preoperative weight - ideal weight) (14) of all patients individually, in which the ideal weight was considered as a BMI of 24.9 kg/m². To be considered satisfactory, the %PEP should be at least 50% (CASTANHA, 2018).

In the sample, the mean %EWL was 84.25%, with standard deviation ± 24.06, revealing surgical success regarding weight loss in the sample evaluated, a result that is consistent with the studies of COSTA, et. al. (2014) and Sanchez-Santos et. al. (2006), which reported, respectively, 81.7% and more than 50% loss of excess weight. Thus, it is clear that, in this sense, bariatric surgery has proven to be very effective.

It is noteworthy that the %EWL is indeed one of the success criteria for surgical treatment. However, it is expected that 10 to 20% of patients undergoing bariatric surgery present weight gain during follow-up (14), a parameter not evaluated in this research.

After the surgical intervention, with a minimum follow-up time of 6 months, the participants had their body mass indices distributed as follows (Table 2):

Table 2. Distribution of data regarding body mass index after surgery - BMI (n= 98)

BMI	Relative value	Absolute value
Ideal (18,6-24,9)	25,51%	25
Overweight (25-29,9)	44,89%	44
Obesity grade 1 (30-34.9)	19,38%	19
Obesity grade 2 (35-39.9)	6,12%	6
Obesity grade 3 (>40)	4,08%	4
Total	100%	98

Source: Survey Data, 2021.

Obesity is related to increased risk of developing other associated chronic diseases and higher mortality rates. According to the interviewees' data, most of them had one or more associated comorbidities in the preoperative period.

Table 3 - Distribution of data regarding the incidence of comorbidities and their improvement after surgery (n= 98)

Comorbidity	Pre-operative (n)	Pre-operative (%)	Post-operative (n)	Percentile of improvement after surgery
Dyslipidemias	63	64,28%	5	92,06%
Sleep Apnea	50	51,02%	4	92%
Systemic arterial hypertension	38	38,77%	7	81,57%
Diabetes mellitus type 2	26	26,53%	2	92,30%
Cardiovascular disease	15	15,30%	2	86,6%

Source: Survey Data, 2021.

The most frequent were dyslipidemia (64.28%), sleep apnea (51.02%) and hypertension (38.77%), followed by type 2 diabetes mellitus (26.53%) and cardiovascular diseases (15.30%). In most studies, SAH is the most prevalent comorbidity, unlike the results found in the present study, which had sleep apnea dyslipidemias preceding hypertension. Such an outcome may be related both to the failure to evaluate dyslipidemia alone as an obesity-associated comorbidity in other studies, and also to the increased prevalence of sleep apnea syndrome (OSAS) diagnosis in recent years (21).

With regard to the evolution of comorbidities after bariatric surgery, it can be seen that few patients remained with the disease that affected them, and the percentile of patients who improved after surgery was very significant, greater than 80% in all five conditions evaluated.

The improvement of these comorbidities reinforces the multisystemic character of obesity, a disease that, due to its inflammatory character and dysregulation in the production of regulatory hormones causes tissue damage in several systems and tissues, insulin resistance (and consequent DM2), besides the obstructive factor that excess weight causes in the airways, justifying the increased prevalence of OSAS.

In this context, it is worth noting that the main reason why patients seek surgical intervention in the treatment of obesity is exactly the control of medical problems that affect them (17, 23). Currently, for the treatment of hypertension and diabetes, the most appropriate technique is the Y-de-Roux bypass, and the bypass is the procedure that presents the best results with respect to quality of life in 8 years (18).

Furthermore, despite these statistics, it is critical to note that a prospective controlled study suggested that gradual weight gain may mitigate this improvement in comorbidities resulting from the initial weight loss (20).

4 CONCLUSION

The study pointed out that, of the 98 individuals evaluated, the predominant socio-demographic profile was female, with undergraduate and mean BMI of 42.1 kg/m². Bariatric surgery was very effective for weight loss (84.25%); improvement or reduction of associated comorbidities, with an improvement percentage above 85% for all those evaluated.

In view of the growing incidence of obesity, more studies on bariatric surgery and its repercussions are recommended, in order to improve the theme more and more and, also, giving special focus to the groups most prevalently submitted to this procedure.

REFERENCES

1. Guedes AC, Virgens AA, Nascimento CE, & Vieira MPB. Qualidade de vida em pacientes submetidos à cirurgia bariátrica do tipo derivação biliopancreática com preservação gástrica (DBPPG). *Rev Inst Ciênc Saúde*, 2009, *27*(3), 209-13. Disponível: <http://files.bvs.br/upload/S/0104-1894/2009/v27n3/a003.pdf>
2. Wu YK, Berry DC. Impact of weight stigma on physiological and psychological health outcomes for overweight and obese adults: A systematic review. J Adv Nurs. 2018 May;74(5):1030-1042. doi: 10.1111/jan.13511.
3. Crosato, E. M. & Marques, L. Z. (2005). Qualidade de vida em pacientes portadores de obesidade mórbida submetidos à gastroplastia vertical com banda com derivação em Y de Roux. Dissertação apresentada ao Mestrado em Saúde Coletiva da Universidade do Oeste de Santa Catarina-UNOESC.
4. Nissen, L.P.,Vieira, L.H., Bozza, L.F., Veiga, B.F.L.B.,Pereira, J.H., & Furlan, L.H.P. (2012). Intervenções para tratamento da obesidade: revisão sistemática. Revista Brasileira de Medicina de Família e Comunidade, 7(24), 184-190. doi:10.5712/rbmfc7(24)472
5. BIANCHINI, Josiane Ap Alves, *et. al.* (2012). Tratamento da Obesidade: Revisão de artigos sobre intervenções multiprofissionais no contexto brasileiro. Arq Ciênc Saúde 2012 abr-jun 19(2) 9-15, ISSN 1807-1325.
6. Segal A, Fandiño J. Indicações e contra-indicações para realização das operações bariátricas. RevBras Psiquiatr. 2002;24(Supl III):68-72.
7. Tonatto-Filho AJ, Gallotti FM, Chedid MF, Grezzana-Filho TJM, Garcia AMSV. Cirurgia bariátrica no sistema público de saúde brasileiro: o bom, o mau e o feio, ou um longo caminho a percorrer.Sinal amarelo! ABCD Arq Bras Cir Dig. 2019;32(4):e1470. DOI: /10.1590/0102-672020190001e1470
8. Sjöström, L., Peltonen, M., Jacobson, P., Ahlin, S., Andersson-Assarsson, J., Anveden, Å. & Carlsson, L. M. (2014). Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications. Jama, 311(22), 2297-2304.
9. Conz, Claudete Aparecida et al. Path taken by morbidly obese people in search of bariatric surgery in the public health system* * Paper extracted from doctoral dissertation “The Search for Bariatric Surgery: therapeutic itinerary experienced in the Public Health Service”, presented to Universidade de São Paulo, Escola de Enfermagem, São Paulo, SP, Brazil. . Revista Latino-Americana de Enfermagem [online]. 2020, v. 28 [Acessado 4 Outubro 2022] , e3294. Disponível em: <https://doi.org/10.1590/1518-8345.3579.3294>. Epub 15 Jul 2020. ISSN 1518-8345. https://doi.org/10.1590/1518-8345.3579.3294.
10. Berti, L.V., & Caravatto, P. P. P. (2012). Importância da obesidade no Brasil e no mundo. In: M.T.C. Diniz (Org.). Cirurgia bariátrica e metabólica: abordagem multidisciplinar. São Paulo: Atheneu.
11. Guedes AC, Virgens AA, Nascimento CE, & Vieira MPB. Qualidade de vida em pacientes submetidos à cirurgia bariátrica do tipo derivação biliopancreática com preservação gástrica (DBPPG). *Rev Inst Ciênc Saúde*, 2009, *27*(3), 209-13. Disponível: <http://files.bvs.br/upload/S/0104-1894/2009/v27n3/a003.pdf>
12. Hintze, L.J.; Bevilaqua, C.A.; Pimentel, E.B.; Nardo Junior, N. Cirurgia bariátrica no Brasil. Revista de Ciências Médicas. Campinas. Vol. 20. Num. 3-4. 2011. p. 87-98.
13. ARAÚJO, Gabriela Bisi et. al. Perfil clínico epidemiológico de pacientes submetidos à cirurgia bariátrica. 2018.

14. GARRONI, Lutieska F. et. al. Taxas de reganho ponderal em pacientes bariátricosacompanhados na Policlínica Piquet Carneiro. 2014.

15. CASTANHA, Cristiane Ramos, et. al. Avaliação da qualidade de vida, perda de peso e comorbidades de pacientes submetidos à cirurgia bariátrica. 2018.

16. SANCHEZ-SANTOS, et al. Longterm health-related quality of life following gastric bypass: Influence of depression. Obes Surg. 2006.

17. COSTA, R. C., et. al. Outcomes on quality of life, weight loss, and comorbidities after Roux-en-Y gastric bypass. 2014.

18. Munoz DJ, Lal M, Chen EY, Mansour M, Fischer S, Roehrig M et al. Why patients seek bariatric surgery: a qualitative and quantitative analysis of patient motivation. *Obes Surg* 2007; 17: 1487–1491. Disponível: <doi: 10.1007/s11695-008-9427-9>

19. Fiorani C, Coles SR, Kulendran M, McGlone ER, Reddy M, & Khan OA. Long-Term Quality of Life Outcomes After Laparoscopic Sleeve Gastrectomy and Roux-en-Y Gastric Bypass—a Comparative Study. *Obesity Surgery*, 2021, *31*(3), 1376-1380. Disponível: <https://doi.org/10.1007/s11695-020-05049-3>

20. SHAH, Meena; VINAYA, Simba e ABHIMANYU, Garg. REVIEW: Long-Term Impact of Bariatric Surgery on Body Weight, Comorbidities, and Nutritional Status. 2006

21. Lechner M, Breeze CE, Ohayon MM, Kotecha B. Snoring and breathing pauses during sleep: interview survey of a United Kingdom population sample reveals a significant increase in the rates of sleep apnoea and obesity over the last 20 years - data from the UK sleep survey. Sleep Med. 2019;54:250. Epub 2018 Oct 9.

22. MARCHETTI, GIULIA et al. The effect of Roux-en-Y gastric bypass in the treatment of hypertension and diabetes. Revista do Colégio Brasileiro de Cirurgiões [online]. 2020, v. 47 [Acessado 5 Setembro 2022] , e20202655. Disponível em: <https://doi.org/10.1590/0100-6991e-20202655>. Epub 23 Nov 2020. ISSN 1809-4546. https://doi.org/10.1590/0100-6991e-20202655.

23. Askari A, Dai D, Taylor C, Chapple C, Halai S, Patel K et al. Long-Term Outcomes and Quality of Life at More than 10 Years After Laparoscopic Roux-en-Y Gastric Bypass Using Bariatric Analysis and Reporting Outcome System (BAROS). *Obes Surg*. 2020 Oct;30(10):3968-3973. Disponível em:<doi: 10.1007/s11695-020-04765-0.

24. Silva CF, Cohen L, Sarmento LD, Rosa FM, Rosado EL, Carneiro JR, et al. Effects of long-term Rouxen-Y gastric bypass on body weight and clinical metabolic comorbidities in bariatric surgery service of a university hospital. ABCD Arq Bras Cir Dig. 2016;29(Suppl 1):20-3 Disponível: <https://doi.org/10.1590/0102-6720201600S10006>

CHAPTER 11

Music and gynecological consultation: a relaxation strategy

10.56238/rsfohsv1-011

Maria Eduarda Jucá da Paz Barbosa
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: mariaeduarda@edu.unifor.br

Gabriela Sá Leitão Gênova de Castro
Nurse by Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: gabrielaslgenova@gmail.com

Liana Maria Moreno Moreira
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: lianamoreno.unifor@gmail.com

Taynara Caetano da Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: taynaracae15@edu.unifor.br

Maria de Fatima Rodrigues da Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: fatimarsilva118@gmail.com

Maria Valcely Ferreira Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: mvalcely@gmail.com

Laisla Araujo da Silva Rodrigues
Nurse by Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: laislarodr@gmail.com

Debora Lia de Lima Castro
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: debora.lia16@gmail.com

Cleandro Matos da Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: cleandroo-aro@hotmail.com

Morganna Mendes Ferraro
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: morgannaferraro@gmail.com

ABSTRACT
Objective: To relate the experience of undergraduate nursing students in gynecological consultations with an application of musicalization as a physical and mental relaxation technique for performing the exam, in a basic health unit. Data synthesis: This is a descriptive study, of the experience report type that was supported by the theoretical references of health promotion through an integrative and complementary practice (PIC), music, as a form of rest in gynecological nursing consultations. The experience was carried out by nursing interns, in a Basic Health Unit (UBS), during the Internship in Collective Health discipline, in a peripheral neighborhood of the city of Fortaleza, Ceará, Brazil, during the following semester of 2021. Conclusion: A positive feedback proposal on the part, or that showed a wealth of musical experience in a moment of the patients and anxiety.

1 INTRODUCTION

Integrative and Complementary Practices (PIC) are characterized as a set of therapeutic practices and actions that seek new perspectives to change the mechanistic archetype used in health care, they focus on welcoming listening and developing the therapeutic bond[1] .

Such practices advocate integral care to the patient, paying attention to the body-mind-soul triad. In recent years, there has been a gradual interest in PIC in various segments of society, including health professionals, who have turned their attention to these practices[2] .

Thus, the PICs are characterized by groupings and therapeutic mechanisms that involve approaches that seek to encourage the natural mechanisms of disease prevention and health recovery through effective and safe technologies, with emphasis on attentive and welcoming listening, integration of the human being with the environment and society, and the development of the therapeutic bond[7] .

Among the PIC, music therapy aims to develop potentials and reconstitute the individual's functions to achieve a better quality of life. Thus, studies show the advantages of music, such as: stress reduction; maintenance of mental health; relief of physical and mental fatigue; relief of pain sensation and physical and mental relaxation of the individual[2] .

Music therapy used as treatment in patients can be used with the intention of relaxing, bringing joy or specific memories. In this context, the role of the nurse is to evaluate the most appropriate moment in the treatment for the application of music, assessing its effects, mainly because he/she is the professional who will be closest to the patient and will follow its evolution[3] .

An opportune moment to use such a strategy is during the gynecological exam, which is a test that is widely available in basic health units, painless, fast, free, and low cost; however, there is low demand for this exam, often due to taboos, fear of exposure, and prejudices that prevent women from seeking health services[4] .

According to data from the National Cancer Institute (INCA), in Brazil, the estimate in 2020 was 16,590 new cases of Cervical Cancer (CCU) and in 2019 the number of deaths from CCU was 6,596 women[5] . There are numerous reasons that prevent these women from performing the preventive exam and they can be minimized through humanized strategies to welcome and educate patients[4] , in order to achieve the purpose of health promotion and reduce the numbers of incidence and prevalence of CCU.

The expansion of the coverage of the exam can be achieved through the establishment of a bond, trust, and safety, and thus, the demand for it can increase, consequently decreasing mortality from the disease[4] . In this perspective, music shows itself as a strategy of relaxation, and its practice has been introduced in health care due to its numerous benefits. It is a strategy that provides comfort for those involved, reduces tension, anguish and fear, providing a more humanized and holistic care and assistance, strengthening the affective and social bonds .[6]

Thus, in this context, the objective of the present study was to report the experience of nursing students in gynecological consultations with the application of music as a technique of physical and mental relaxation for the exam, in a basic health unit.

2 DATA SYNTHESIS

This study is characterized as a descriptive experience report based on the theoretical frameworks of health promotion through an integrative and complementary practice (PIC), music as a form of relaxation in gynecological nursing consultations.

The experience was performed by nursing interns in a Basic Health Unit (BHU), during the discipline of Internship in Collective Health, in which students must immerse themselves in the routine of the BHU acting in nursing consultations, territorial visits and health education and vaccination campaigns. Among these activities, there are the gynecological nursing consultations, in which the student must apply the consultation script provided by the preceptors and, in addition, develop and apply interventions for the adversities found in the field of practice.

With this in mind, the application of music during gynecological consultations helps to promote health, interferes directly and indirectly in the well-being of individuals, allowing the levels of anxiety and stress to be relieved[8] , thus facilitating the technique and dynamism of the consultation, besides favoring the welcoming of patients.

The experience reported here occurred in a PHU in a peripheral neighborhood of the city of Fortaleza, Ceará, Brazil, during the second half of 2021. During the initial visits to the practice field, the community health agents (CHAs) presented the territory, showing what the main demands would be, among them: women's health and its aspects; it was a territory with high incidence of sexually transmitted infections (STI) and a high number of teenage pregnancies.

In view of these problems, during the semester, educational activities were carried out with themes of STI prevention and contraceptive methods. But, in addition, a way to welcome this female audience, demystify and break taboos regarding gynecological appointments and women's health, was through music.

During the consultations, which took place in pairs of undergraduate students, the script of the gynecological nursing consultation was applied and then the patient was asked to go to the bathroom, empty her bladder, and change clothes. In addition, any doubts the patient might have were clarified. At this moment, the students chose the songs that always dealt with themes referring to love, joy, hope, and life.

The patient was asked if she liked the song in question or if she preferred another track, and as soon as all the material was ready and the patient was prepared, the exams began. The music was placed specifically at the time of the gynecological exam, which is when most patients are afraid, nervous, and tense, which can cause the exam to take longer or be painful.

The undergraduate students asked the patients to relax and focus on the melody and lyrics of the song, thus providing them with physical and mental relaxation. After the end of the consultation, positive feedbacks were received, thus showing that the practice of music therapy as a tool for relaxation during gynecological consultations is effective in changing the perception that the gynecological exam is painful and uncomfortable.

Practice in the light of theory...

Currently, screening to diagnose precursor lesions and cervical cancer is performed through oncotic cytopathological examination (COSTA TML, et. al, 2019). It is essential to know the importance of the preventive exam in Primary Health Care (PHC), because through it, it is possible to detect early changes in the cervix (SERAVALLE K, et. al, 2015).

Although available in the Unified Health System (SUS), it is possible to identify a high number of women who are in the screening age group defined by the MS and do not perform the exam. Santos BLN, et al (2016), stated that most women do not go in search of the Pap exam due to factors related to shame, difficult access to the health unit and, essentially, fear of discovering diseases, among other personal factors.

Music is an artistic expression that has been used as a therapeutic tool in caring for people. It is part of a non-pharmacological therapy that contributes significantly to the relief of anxiety, stress, and the promotion of relaxation, besides being useful in cases of social isolation. Thus, it can help strengthen bonds between the patient and the professional, allowing the care environment to become more comfortable, favoring a mutual relationship of trust (DA SILVA et. al, 2021).

Music therapy is understood as a social tool, which generates psychological and physiological changes. It is still a tool little used in practice, however it is able to establish brain activities in different areas of the brain, and can be implemented with therapeutic aid, called as a method of humanization, for being a non-pharmacological practice that brings relief from emotional overload in patients, family members, and even in the professionals involved. (SILVA et. al, 2020).

3 CONCLUSION

The use of music during the gynecological exam presents itself as an opportunity for future nursing professionals to have a new look at the importance of welcoming women, humanizing moments such as this and intervening in the low adherence to cervical cancer preventive consultations. The experience provided positive feedback from patients, which showed the richness of the musical approach in a moment of tension and anxiety. Thus, the use of music proved to be an effective process and adjusted to the needs of the Unified Health System and thus, health professionals as a whole get to know one more support tool in their practice that values integrality in health and contemplates the body-mind-soul triad.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

FUNDING SOURCES

This study had no funding.

REFERENCES

1. Portal da Secretaria de Atenção Primária à Saúde [Internet]. Política Nacional de Práticas Integrativas e Complementares no SUS. [citado em 8º de abril de 2022]. Disponível em: https://aps.saude.gov.br/ape/pics
2. Rocha Britto, Flávia, de Oliveira Vieira, Larissa, Couto Assis, Wagner, Sales dos Santos, Eluzinete, Santos Duarte, Ana Cristina, Silva de Oliveira Boery, Rita Narriman, Novas formas de cuidado através das práticas integrativas no Sistema Único de Saúde. Revista Brasileira em Promoção da Saúde [Internet]. 2018;31(2):1-6.
3. Lopes JM. A musicalização enquanto ferramenta terapêutica na assistência de enfermagem: revisão narrativa. Brasília. Monografia [Graduação em Enfermagem] - Centro Universitário de Brasília; 2020.
4. Sousa Alencar M, Nogueira Mendes A, Da M, Carvalho S. Dificuldades enfrentadas para realização do exame ginecológico preventivo. Brazilian Journal of Surgery and Clinical Research -BJSCR BJSCR [Internet]. 2019;26(1):2317–4404.
5. Instituto Nacional de Câncer [Internet]. Câncer do Colo do Útero. [citado em 14º de abril de 2022]. Disponível em: https://www.inca.gov.br/tipos-de-cancer/cancer-do-colo-do-utero
6. Souza JB de, Martins EL, Xirello T, Urio Ângela, Barbosa S dos SP, Pitilin Érica de B. Interface entre a música e a promoção da saúde da mulher. Rev Bras Promoc Saúde [Internet]. 24º de janeiro de 2020 [citado 14º de abril de 2022];33. Disponível em: https://periodicos.unifor.br/RBPS/article/view/9466
7. Soares DP, Coelho AM, Silva LEA da, Silva R de JR da, Figueiredo CR de, Fernandes MC. Política nacional de práticas integrativas e complementares em saúde: discurso dos enfermeiros da atenção básica. R. Enferm. Cent. O. Min. [Internet]. 18º de novembro de 2019 [citado 17º de outubro de 2022];9. Disponível em: http://www.seer.ufsj.edu.br/recom/article/view/3265
8. Souza JB de, Rosa OM, Barbosa S dos SP, Pilger KC de P, Marquesini T de M, Martins EL. Promoção da saúde por meio da música em uma penitenciária feminina: relato de experiência. Rev Bras Promoc Saúde [Internet]. 14º de abril de 2021 [citado 17º de outubro de 2022];34. Disponível em: https://ojs.unifor.br/RBPS/article/view/11583

CHAPTER 12

Araguaia-TO: the grooming of workers who are victims of contemporary slavery

10.56238/rsfohsv1-012

Alberto Pereira Lopes
Associate Professor at Universidade Federal do Norte do Tocantins - UFNT
Degree course in Geography
E-mail: beto@uft.edu.br

ABSTRACT
Contemporary slavery in Brazil is present through the remnants of the modern slave labor of the 16th century, whose primary element was the accumulation of wealth. The passage from a system of captivity to free labor was not sufficient for the subjection of the worker to the landowners. The objective: to analyze the place regarding the recruitment of peasants who were victims of slave labor in the city of Araguaína-TO and the conditions elucidated in their location, such as the structure of the boarding houses and the integration of the landowners in the chain of contemporary slave labor practice. The methodology used: interview script with the boarding houses owners, workers, informal conversations, in addition to literature on the structure of the land in Brazil, conflicts in the countryside, agrarian reform, slave labor. Result: The worker is subjected to a situation created by the recruiter, who earns on top of the labor force based on obedience and subjection.

Keywords: Frontier, Araguaína, periphery, slave labor, debt

1 INTRODUCTION

The city of Araguaína-TO, located on the margin of the Belém-Brasília highway, is the place with the highest rates of entrance and exit of recruiters and recruited workers due to its geographical location, and it is connected to several states that are also part of the slave labor scenario. Its main source of income is based on services and on agriculture and cattle raising, the activity that has most used the degrading work that takes place inside private property, forming the chain of contemporary slave labor.

This city, located in the north of the state of Tocantins, is part of the country's new agricultural frontier, and has been the ideal place for the expansion of private property, in which the owners of the means of production have used the labor of workers who submit themselves to the atrocities of a work driven by fear and lack of freedom, in which the work on the agricultural farms of the region and neighboring states has stood out.

In this sense, the work makes an analysis of the place regarding the recruitment of peasants who are victims of slave labor in the city of Araguaína-TO, as well as contextualizes the capitalist expansion of production in the new frontier of the country and the conditions that are elucidated among the different groups present. In these, we focus on the relationship between workers who are victims of slavery and the so-called owners in the chain of the practice of contemporary slave labor.

The methodological tools are based on the literature that discusses conflicts, agrarian reform, land grabbing, slave labor, and the agrarian issue in Brazil, with several authors pointed out in the references. The research was done in the place of recruitment called "the little fair of Araguaína", 10 interviews were done, from these we interviewed 03 boarding house owners and 07 workers that were staying there, to build the thesis work.

The selection criterion was based on the moment we found the subjects in the place to do the interview, due to the nature of the research being quite dangerous, because we are dealing with something that, here in Tocantins, exists but is not assumed, that is, slave labor is not admitted to exist, however, as an example, part of the representatives of society are involved in such atrocities. We had an interview script that we followed and, according to the interviewee's answer, we created other questions in case there was no clarity. In addition to informal conversations with the population that frequents that location, because it is a place of commerce.

It is important to emphasize that this work took place during the time of data collection for the doctoral thesis between 2008 and 2015. The ethical care in relation to the research was judicious in not disclosing the people interviewed, due to the commitment to preserve their identities.

To understand the capitalist expansion in the region of the newest frontier, it is important to understand that the city of Araguaína, for being located on the margin of the Belém-Brasília highway, became a place of entry for a population contingent coming from various regions of Brazil, such as the Northeastern and Southeastern states, to open their businesses based on cattle breeding.

2 THE NEW FRONTIER: THE CONFINEMENT OF ENSLAVED WORKERS

The new frontier has been a repressive environment for those who are not part of the so-called civilized groups, because the dispossessed are the ones who will serve for the expansion of private property, through their labor force that deprives them of the right to their own freedom, besides using their labor to strengthen the accumulation of capital, without receiving the necessary value for their survival.

It is from the frontier that the worker goes in search of something lost, which is his dignity as a human being, and from there comes the hope of finding what is necessary to redeem the lost time of his life. But, in these nuances of meeting and missing each other, the frontier will be the place of ambition of groups that have installed their form of domination to seize those who only have the labor force as a means of production of their existence.

It is in the face of this conception that Martins emphasizes the frontier as the place of the different groups that constitute themselves in search of land as income, from the materialization of labor, acquired for the reproduction of capital in its contradictory form. Thus Martins states:

> The frontier is, above all, in what concerns the different groups of the so-called civilized that are located "on this side", a scenario of intolerance, ambition, and death. It is also the place of the elaboration of a residual conception of Hope, crossed by the millenarianism of the expectation of the advent of the new time, a time of redemption, justice, joy, and abundance. The time of the just. In the context of the respective conceptions of space and of man, the frontier is, in fact, the limit point of territories that are continuously redefined, disputed in different ways by different human groups. On the frontier the so-called civilized white man is relative and so is his emphasis on the material elements of life and the struggle for land.

Given this condition, land became captive to small workers and exclusive to the economic groups that have been present since the epoch of the then Brazilian Miracle in the 1970s, when tax incentives were destined for the bourgeoisie to expand its wealth in regions that were markedly backward.

In this way, on the frontier are found the squatters, the extractivists, the indigenous people, the small workers who are the victims of the capitalist reproduction of production imposed by the so-called civilized people, who hire the labor force of these subjects through recruiters to expand their properties according to their interests. And, based on these interests, the place becomes strange to those who are hired, through non-compliance with the agreements by the contracting party, leaving fear as a companion.

The fear of those who are confined in the properties is determinant in the context of resistance, this due to the threats from those who dominate them, such as cats, gunmen, and the property owners themselves. Figueira, arguing about this relationship of fear with confined workers, highlights that:

> On farms or at home, the ability to resist fear is also restricted to some circumstances. If the worker is accompanied by others, he feels protected. If they show, feigned or real courage, the frightened one experiences more security and is encouraged to resist; if the others are as weak or weaker than him, the frightened one becomes more insecure or, for this very reason, in order not to be in a worse situation, seeks strength, including religious strength, for resistance. The disposition to face fear manifests itself differently because people have different personal or social characteristics - education, social origin, shame, status, pressure or the support of family, friends, subordinates or superiors (FIGUEIRA, 2004, p. 156).

The fear is expressed by the workers when they flee because of the degrading forms of work, with exhausting working hours, restriction of freedom, poor quality food, precarious housing, etc. In this aspect, they say: "Hey guys, we only go because we have no other recourse, but we are afraid of going and not coming back. It's not easy to work far from your family. These farmers only think about themselves, and no one can say much. (Interview worker, May 2015)

The degrading forms of contemporary slave labor begin with the recruitment, based on false promises that take hundreds of peasants to the geographically isolated properties, where they will be imprisoned by armed gunmen, curtailing their freedom in an assault on human dignity.

Under human rights law, everyone is free and equal in rights; however, for the dominators, the only right is force and power, which are agglutinated with the expansion of property linked to degrading labor, committed to the assumption of progress and inexorable development. In this regard, according to the International Labor Organization - ILO, contemporary slave labor in Brazil:

> [...] results from the sum of degrading work and the deprivation of liberty. The worker is held to a debt, has his documents withheld, is taken to a geographically isolated location that prevents him from returning home or he cannot leave, prevented by armed security guards. In Brazil, the term used for this type of coercive recruitment and labor practice in remote areas is slave labor; all situations that fall under this term fall under the scope of the ILO conventions on forced labor. The term slave labor refers to degrading working conditions combined with the impossibility of leaving or escaping from the farms due to fraudulent debts or armed guards (Trabalho Escravo NO BRASIL DO SÉCULO XXI, 2007, p. 32).

However, what we have seen in this so-called modern and globalized society are reports of workers submitted to practices analogous to slave labor. This practice is like a weed that corrodes the dignity of so many workers, as this victim from the city of Araguaína presents: "*The way he treats us, we are treated like slaves there, he has a time to come in, but not to leave. (...) Until the day was over, you couldn't leave, you know, if you only worked in the morning until noon, the rest of the day was deducted from the float.*

The speech of this worker shows how debt slave labor happens, whose (labor) relations between workers and employer are subjected to a relationship of power, of domination, of the one who accumulates capital over the one who works for capital accumulation in non-capitalist forms of production relations. As Martins states:

> Capitalism engenders non-capitalist relations of production as a resource to guarantee its own expansion, as a way to guarantee the non-capitalist production of capital, in those places and in those sectors of the economy that are linked to the capitalist mode of production through commercial relations.(MARTINS, 1998, p. 21)

In this context, the relations that are constituted within the agricultural farms represent the exploitation of labor, in view of the activities that are performed by workers whose labor is not paid by those who hire them. However, what we have is an amplified relation of capital with non-capitalist modes of relations, that is, pre-capitalist relations that translate primitive accumulation.

These relations are configured in this modality and affect many Brazilians who are deprived of their rights and submit to practices analogous to slave labor. It is in the face of this conception that the worker meets the recruiter who hires him/her with false promises to work in farms isolated from urban agglomerations, thus becoming the victims of slave labor.

According to the Plan for the Eradication of Slave Labor in the State of Tocantins, this crime occurs due to four factors: debt servitude, the geographical isolation of the farms to which the workers are taken, the presence of armed guards, and, finally, the retention of documents. In a web of relationships that is shaped by fear and feeling, the courage to submit to the unknown, in the face of the need for survival, this is the only option in life.

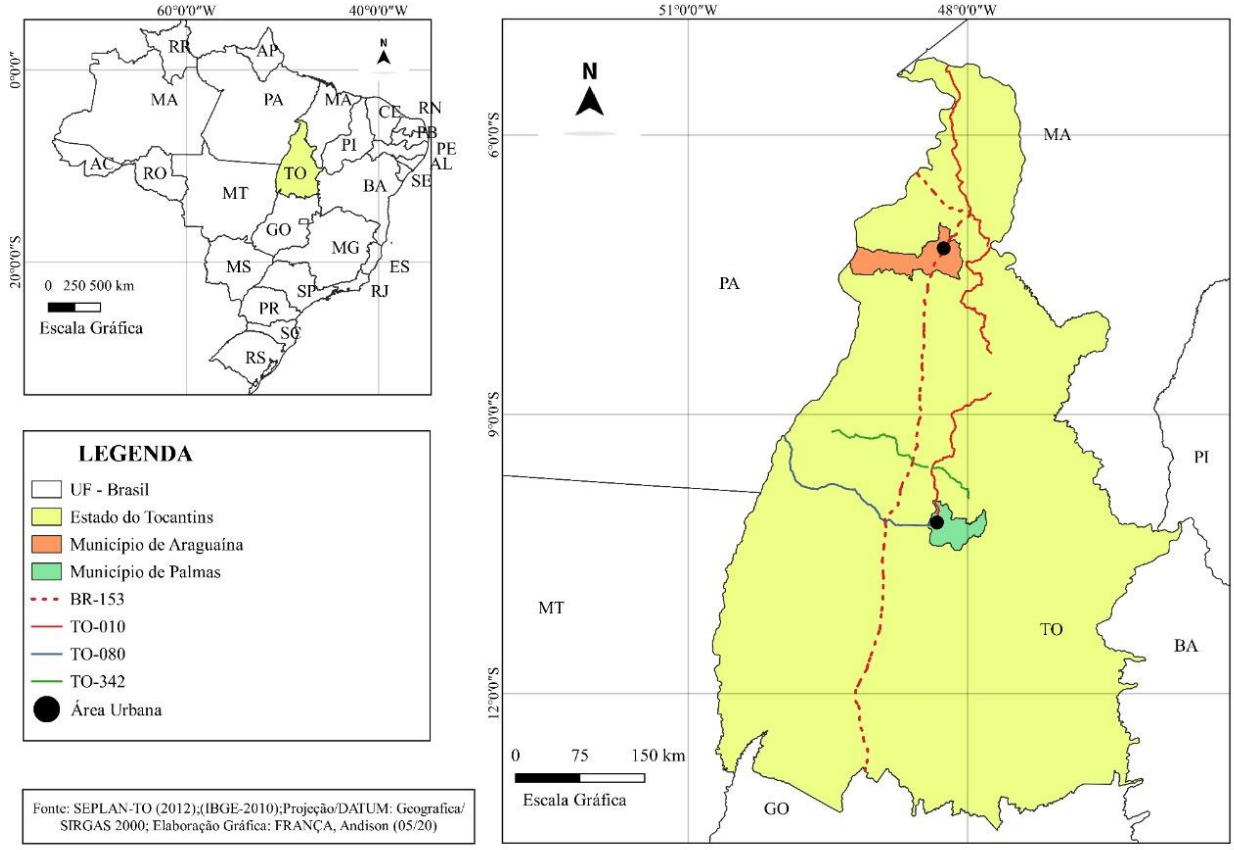
In this context, the flow of the current economic model in which, in a certain way, the rural areas are not the only resort of this slave process, because it only absorbs labor in certain seasons for specific services, makes the workers disposable objects. As for the man who left the countryside and went to the city, he is, most of the time, unemployed and unqualified. This is the profile of peasant workers, especially in the city of Araguaína-TO, who stay there, able to work without further requirements, becoming disposable and replaceable individuals, vulnerable to contemporary slave labor.

3 ARAGUAÍNA- TO: A STRATEGIC PLACE FOR RECRUITING WORKERS

The city of Araguaína is a propitious place for this relationship, due to its privileged geographic position, being on the margin of the Belém-Brasilia highway, its main axis that cuts in the north-south

direction. Besides this highway, other state highways cross the city, such as TO-164, which connects the towns of Araguanã and Xambioá, and other towns in the state of Pará; highway 230 that connects Araguaína to the town of Garimpinho; Highway 222, which connects Araguaína to Philadelphia and other cities in Maranhão, like Carolina, whose border is the Tocantins River; Highway 335 which connects to Couto Magalhães, Conceição do Araguaia and other cities in the southeast of Pará, besides other access ways like the airport and the rivers, according to Map 1.

Map 1: location of the city of Araguaína-TO



Caption: White: Brazil, Yellow: Tocantins state, Orange: Municipality of Araguaína, Green: Palmas City, Dashed: BR-153 Highway, Red line: TO-010 Highway, Blue line: TO-080 Highway, Green line: TO-342 Highway, Black: Urban area

The contemporary stigma of slavery is not the color, but the lack of freedom of men and women as stated by the ILO (International Labor Organization), a question that, in the city, is strengthened and finds a basis for continuity and maturation in socioeconomic relations, in which we will find a large contingent of social maladjustments, with victims of an unequal and unfair society. It is from the city that the chain of degrading work begins.

In this sense, one can see how vulnerable the city is to its access, which facilitates productive flows, immigration to Tocantins and neighboring states such as Pará and Maranhão. In this way, the city comes to represent a polarization over its area of influence, through the activities that are offered, such as commercial, administrative, financial, and social services.

The city exerts this economic power especially in the northern region of the state, where institutions linked to the land tenure issue are also present, such as INCRA (National Institute of Colonization and Agrarian Reform), the Rural Union linked to the CNA (National Confederation of Agriculture), the Rural Workers Union, linked to small workers, the CPT (Pastoral Land Commission), the CDHA (Araguaína Human Rights Center). As we can see, the city absorbs antagonistic forces in relation to the land issue, as Ajara points out:

> Hosting official agencies, such as INCRA, and private ones, such as the UDR, besides religious bodies involved in land tenure disputes in the extreme north of the state - Bico do Papagaio - Araguaína also catalyzes a strong ideological component of identification with the antagonistic forces present there, which end up manifesting themselves in the urban environment. The growing peripheralization of the city is, however, the spatial expression par excellence of the transformations that have occurred in the countryside. (AJARA, 1991, p.40)

Faced with this process of structural changes in the countryside, such as the expropriation of workers and the exclusion from some services, these workers sought refuge in the city in order to seek new horizons in the search for work for their own survival. In this way, the outskirts of the city have been a place of extreme importance for those expropriated from the countryside who, in some sectors, build their shacks of wood, straw or mud in a life of segregation, in which the supply of work is found more in sectors linked to civil construction activities such as houses or other buildings. Concerning this, Martins states

> Their families have faced difficulties produced by their precarious insertion in the market production and, above all, by the chronic deterioration of agricultural prices in relation to the prices of non-agricultural products. As a result, for many years they have been trying to free surplus arms and mouths during the off-season. It is usually young people, and sometimes their parents as well, who move to the big cities, almost always to work in heavy jobs, such as construction. Or they move to regions lacking in temporary agricultural labor - areas of large-scale farming, like sugarcane and coffee, where they become temporary laborers, the so-called bóias-frias or clandestine laborers; or to the pioneer zone, like the Midwest and Amazon, where they more easily enter into peonage relations and fall into slave labor. (MARTINS, 1999, p. 160)

This worker who came from the countryside, whose knowledge is focused on agriculture and cattle raising, becomes vulnerable to the practices of degrading work, for which they are enticed by the cat to work on the farms, in deforestation for the opening of new farms, in the planting of pasture for cattle, in the construction of fences or other activities. The practice of degrading work is the beginning of slave labor by debt, which immobilizes the worker in the search for his freedom, due to the fact that he finds himself trapped by a debt forged by the recruiter, besides his geographical isolation.

In this way, the worker is subjected to a situation created by the recruiter, who earns on top of the unpaid labor force, which is the debt itself employed at the moment of recruiting, such as: money for the family, work tools, lodging in a boarding house, tickets, besides the food that is also charged. It is a way for the worker to find himself trapped in a destiny that he couldn't imagine, based on obedience and subjection. To emphasize this issue, Martins points out that:

> In a culture like ours, still permeated by multiple forms and conceptions of obedience and subjection, there are evident cultural situations of servitude. These are relationships and situations that, from a formal and conceptual point of view, can be defined as bondage. But their presumed victim finds himself in them voluntarily for cultural reasons. (MARTINS, 1999, p. 163)

It is these cultural reasons carried by the workers at the moment of the incorporation of their debt to the employer that leads them to feel obliged to fulfill their commitments through the compulsory provision of labor, as a way to express their loyalty to the employer. This process of slave labor practices by debt begins at the moment of the recruitment of the labor force, usually recruited in distant places, going through the lodging in the city of origin and the transportation of the workers to the destination where they will provide their services.

In this sense, Araguaína is the entrance and exit point for many immigrants who seek boarding houses for their stay, in view of the logistics that offer lodging, food, drinks, and brothels. The place of recruitment is part of a chain that is formed for the practices of contemporary slave labor by debt, as we can mention the recruiter, the pawn, the boarding house, the employer, elements that are configured into a single link which is the overexploitation of one of the subjects, the worker who sells his labor force and who many times doesn't receive for this good, becoming a victim of atrocities.

In Figueira's (2004) observations, one can see these relations of dependence to which the peasant submits, due to his unequal condition in the capitalist system. In this aspect, Figueira points out that

> [...] some workers entangled and subjected to the network of progressive indebtedness, captive to debt, and sometimes to alcohol, already subjected to effective isolation, economic and geographical, enter into a cycle whose end can be tragic, of 'denial to life'. There is a kind of suicide in the life without perspective of the 'pedões dos trechos', in which humiliations and violence in successive farms are changed, practically in exchange for food (FIGUEIRA, 2004, p. 291). [Author's emphasis]

In this scenario, the city of Araguaína is part of this chain that will constitute contemporary slave labor, by means of its access and a whole process that conditions it, such as the "feirinha" (a marketplace for small pensions and small businesses) and the outskirts of the city that become a place for recruiting due to the extreme vulnerability and misery of these workers.

The fair was a strategic place for recruiting workers to be taken to the farms by the cats. These workers arrive from various states of the federation, such as Piauí, Ceará, Pernambuco, Maranhão, and Tocantins itself, which are large suppliers of labor.

The fair in Araguaína preserves its history of precariousness for those who live on the edge and gives continuity to those who need work, even if it is temporary and somewhat degrading, because what is at stake is the struggle for survival. The peonage is born because there are all the logistics that sustain them in a work dynamic based on the submission of the worker to those who own the means of production.

In this way, the feirinha has all the features necessary for recruitment to take place, through the dominion of the recruiter who has an effective connection with the owners of the boarding houses. The places where these workers settle down are simple, with everything from lodging to food. As previously

mentioned, the market is located on the margins of one of the busiest streets in Araguaína, Prefeito João de Sousa Lima, which has a strong commercial activity, such as supermarkets, clothing and shoe stores, perfume stores, electronics stores, among others.

In front of the market, there is Avenida Filadélfia, which gives access to BR 153 (Belém-Brasília) in its western direction, and in the eastern direction gives access to TO-222, which, in turn, reaches the cities of Babaçulândia and Filadélfia, the latter bordering Carolina-MA and connecting to BR 230. These are important road axes that integrate the city of Araguaína with other cities and other states.

Generally, the workers that are recruited at the feirinha come through these highways. In the other aspect, the boarding houses where the workers are hidden behind other activities, so as not to arouse the suspicion of the Federal Police agents. They are described as bar or commercial environments.

Therefore, fear is manifested in the very speech of the owner of the boarding house when asked about the hosting of workers on his premises. He, who is also part of the chain of degrading labor, talks about the workers and the cats in a way that pretends to be convincing:

> And it's all gone now. There was a little old restaurant, but it's all over. Even Helena is finished, there is no money and the people don't take any more. The Federal Government doesn't let us work anymore. They beat us up from there. One of these days they caught some on the road, in Piçarra. There is no way. There is no hotel, no place. Give food to those who take them? Farmers don't take them, the cat is over, it doesn't exist anymore... even the ones that used to live here went away to Pará. (Interviewee, May 2015)

The speech of one of the boarding house owners at the fair shows the revolt and the conviction that he is convincing those who listen to him. This is a strategy to keep the chain of degrading work, contained in slave labor, from being broken. He is austere when he speaks, but the reason for this is soon apparent: when asked about the presence of the Federal Police, he blames the institution for not being able to continue in his business. It is a way to distance himself and at the same time to defend himself from such responsibility that could affect him.

The Federal Police means, therefore, a hindrance in their activities, because their action brings inconvenience and damage. That is why the fear of telling the truth of the facts involves a chain, not just one isolated element, but a whole chain that is formed from the act of recruiting the worker to his or her stay in the city's boarding houses. It is a process that presupposes a relationship between the recruiters, the recruited, and the owners themselves.

The eradication of this practice in the states of the Brazilian federation, especially those in the newest agricultural frontier of the country (because they are the states where there are more victims of slave debt labor), depends on strong measures; those states involved must admit the existence of contemporary slave labor in order for there to be an action that will eradicate this inhumane act. However, Araguaína, economic center of the state of Tocantins, continues with its stereotype of easy recruiting of workers who are victims of the actions of the recruiters, the so-called "cats".

For a worker to become a victim of slave labor practices due to debt, it is enough for them to hear conversations about abundant work on farms, with a good salary, that they embark on the conversation and go to those places. Some go of their own free will, others are enticed by "cats" (contractors at the service of the ranchers), who transport these workers in pau-de-arara, pickup trucks, and buses. And to escape from the Highway Police, they pay for tickets up to a certain stretch and then are taken to boarding houses or small hotels in cities that are connected to the recruiters, as in the case of Araguaína, the main recruiting point in the northern region of the state of Tocantins, due, as already mentioned, to the highways that cross it, both federal and state.

To emphasize this issue, a study on slave labor in the 21st century organized by the ILO (International Labor Organization), confirms the ways in which workers are recruited by the cats. Thus it mentions:

> These cats recruit people in regions far away from the place of service or in boarding houses located in nearby cities. In the first approach, they show themselves to be pleasant, with good job opportunities. They offer work on farms, with a guaranteed salary, accommodation and food. To seduce the worker, they offer 'advances' for the family and a guarantee of free transportation to the place of work. (Slave Labor in 21st Century Brazil, 2007, p. 21)

Still within this concept of enticement by the cat, the study demonstrates the forms of transport by which the workers are taken to work on the farms:

> The transportation is done by buses in terrible conditions or by improvised trucks without any security. When they arrive at the place of service, they are surprised by situations completely different from those promised. To begin with, the cat informs them that they are already in debt. The down payment, transportation and food expenses during the trip have already been written down in a 'notebook' of debts that will remain in the cat's possession. In addition, the worker realizes that the cost of all the tools he needs for the job - scythes, machetes, chainsaws, among others - will also be written down in the debt notebook, as well as boots, gloves, hats, and clothes. Finally, expenses with improvised lodgings and precarious food will be written down, all at prices far above the commercial ones. (Slave Labor in 21st Century Brazil, 2007, p. 21)

In this way, the cat deceives the worker, who is deprived of any means to change this situation that has been established before him, and whose only solution is to obey the orders of the person responsible for hiring him. All that moment of hope of having a job with dignity reverts to a condition of tolerance, of pain and fear. The enticement and the recruitment in the city's boarding houses are moments of passage to insert him in the chain of contemporary slave labor.

In this aspect, contemporary slave labor practices differ from modern or colonial slave labor by the form of income from the land, in which the colonial slave constituted a capitalized income in the figure of the slave, while in the contemporary one the income is based on the strength of temporary work, on geographical isolation and on the conditions themselves that are underestimated, in addition to the violence that is established as a way to determine the domination of those who have power over the other.

Thus, the recruitment sites are crucial to group the workers that will serve the rancher who uses his intermediary to carry out the entire transaction process, and these go in search of workers in locations that are often far from the service offered. It is in these meetings and mismatches that the chain of slave labor is being built, in a composition of subjects that are decisive for this practice that has been very common in the newest agricultural frontier of the country, today the so-called MATOPIBA region (Maranhão, Tocantins, Piauí, and Bahia).

Encounters that come together in a dynamic for the reproduction of capital in which all subjects are integrated, while the mismatches constitute the differentiated relations of the entire production process, because social realities are different. Thus, capitalism in itself is contradictory and unequal because it integrates capitalist relations of production as well as non-capitalist relations of production of which there is no wage system, but which is fundamental for the accumulation of surplus value by the owners of the means of production. This conjuncture is described by Martins as follows

> The time of the reproduction of capital is the time of contradiction; not only contradiction of opposing interests, such as those of social classes, but mismatched temporalities and, therefore, social realities that develop at different rates, even if based on the same basic conditions. (MARTINS, 1997, p. 94)

In this sense, slave labor practices today constitute a process of primitive accumulation of capital, because there is a compromise of the worker's labor power beyond his own survival. In this way, the search for services in other locations and the enticement by cats demonstrate the expropriation of workers' livelihoods, to be overexploited.

In light of this issue, the result of these forms of labor relations is linked to the Brazilian agrarian structure, which emanates power, violence against human dignity, in which people are shamefully imprisoned in the condition analogous to slavery without rights, only duties to fulfill, having as their only tool their labor force, that is, in a modern form of submission of the worker, for subtraction of what is most essential and the only good that provides his existence. This is the web of relationships that unfolds, promoting the flow of the current economic model.

4 FINAL CONSIDERATIONS

In view of what was exposed in this paper, Araguaína gathers favorable conditions (cheap labor, poverty in its outskirts, etc.) which make it vulnerable to the contemporary slave system. Another peculiar characteristic of the municipality is the fact that it has the largest landowners of the Northern region as residents, which explains the formation of the large latifundia that came to life mainly with the construction of the Belém-Brasília Highway (153), which attracted dozens of families for the work of deforestation and pasture management. It was in this period that the medium and large farms were formed in the region, which predominate there.

The city of Araguaína has a structure set up to receive workers, popularly known as the "feirinha" (little fair)[1] . It is a place with two distinct functions: First, during the day there is the commerce of goods such as butcher shops, restaurants, clothing stores, cereal stores, and through which the population passes normally. Secondly, when night falls, the bars become more accentuated, and the merchandise on display are human beings, ranging from prostitution, to the enticement of slave labor that come together in this scheme.

According to some studies, the feirinha was the main point of recruitment of slave workers. Today this place no longer receives the same contingent of workers that it did years ago, and some establishments no longer operate. However, others will experience this camouflaged form of degrading relations. Thus, the place still simmers in the Araguaína nightlife, providing bars, prostitution and seduction of pedestrians. This scheme is already negotiated with the recruiter who pays these small debts incurred by the pedestrians, and these become his fetters that will make him captive of the system and, when work becomes unnecessary, they will be abandoned to their own fate.

Thus, these webs of relations established in the rural areas are mainly the result of the State's debt to society, due to the lack of coercive policies that restrict the power of the latifundium fomented by the economic development model itself. In order for these degrading forms of labor to be eradicated, public policies aimed at social and economic issues are necessary for the thousands of Brazilians without opportunities who live in the interior of this country in subhuman conditions.

The necessary conditions must be aimed at a life with dignity (professional qualification, education, health, leisure), justifying the demand for income distribution policies, which are directly reflected in the fight against slave labor, besides the inspection through the mobile group that has been intensified, together with non-governmental institutions acting with rigor such as, CPT, (Pastoral Land Commission) Human Rights Group and NGOs (Non-Governmental Organization), with their representatives engaged in eradicating this type of work that directly affects the condition of man as a social subject.

However, the slave labor practices that have been brought to justice are not a culture of a people, of a place. If this were the case, there would be no denunciations to public agencies by those who are alienated from their own rights, and have justice as a way to rescue these violated rights, whether by labor exploitation, or by threats or imprisonment due to the geographical isolation they find themselves in.

Poverty is the main driver of the crossing of geographical borders. In view of the idleness of the labor force and the unemployment that devastates a population that has always worked in rural areas, the workers feel obliged to move to the outskirts of the cities, making them vulnerable to enticement.

Thus, the city of Araguaína is a stronghold of workers who were expelled from the countryside, directly or indirectly, to settle in the outskirts with no profession other than that of a farmer. This is the

[1] The so-called "feirinha" in the city of Araguaína has been revitalized with new restaurant structures as well as small businesses run by the city government. The fair is no longer the main place for recruiters and recruited people, in face of such changes, but another function happens which is the one of drug users.

reason why these workers submit themselves to the exploitation of the farmers, because there is no alternative work. Besides, they are illiterate or semi illiterate, a condition that makes it harder and harder for them to find new professions. If Araguaína is a door of entry and exit of workers, it is because there is a place of safety for those who risk such measures to make the contract and take the workers to a destination. Thus, the hotels of the so-called feirinha open their doors to these special clients, at which point the debt is established and life becomes costly, because it is stolen from them.

Therefore, in face of this current issue, it is clear that a change needs to occur from the representatives of society in the National Congress, in order to eradicate this evil that is expanding throughout the Brazilian territory.

REFERENCES

AJARA, C. (Org). O Estado do Tocantins: reinterpretação de um espaço de fronteira. **Rev.Bras. Geografia**, Rio de janeiro,v. 53, n.5, p. 5-48, out/dez. 1991.

BARBOSA, Y. M. **As políticas territoriais e a criação do Estado do Tocantins.** 1999. 158p. Tese, (Doutorado em Geografia Humana) – Universidade de São Paulo, São Paulo, 199

BRASIL. **Direitos Humanos no Brasil 2004:** Relatório da rede social de justiça e direitos humanos. São Paulo, 2004.

BRASIL. **Plano do MDA/INCRA para a erradicação do trabalho escravo**.2. ed. (Rev.). Brasília, Ministério do Desenvolvimento Agrário, 2005.

BRASIL. **Código Penal; Código de Processo Penal; Constituição Federal**. São Paulo: RIDEEZ, 2003.

BRETON, B. Le. **Vidas roubadas**: a escravidão moderna na Amazônia brasileira. Tradução: Maysa Monte de Assis. São Paulo: Loyolas, 2002.

CPT (Comissão Pastoral da terra). **Trabalho escravo no Brasil contemporâneo**. Goiânia: Edições Loyola, 1999.

FIGUEIRA, R. R**. Pisando fora da própria sombra**: a escravidão por divida no Brasil contemporâneo. Rio de Janeiro: Civilização Brasileira, 2004.

GASPAR, J. G. **Araguaína e sua região**: saúde como reforço da polarização. 2002. 160f. Dissertação. (Mestrado em geografia), Centro de Filosofia e Ciências Humanas, Universidade Federal de Pernambuco, 2002.

MARTINS, J, de S. **O cativeiro da terra.** 7 ed. São Paulo: HUCITEC, 1998.

_____. **Fronteira:** a degradação do outro nos confins do humano. São Paulo: Hucitec, 1997.

_____. A escravidão nos dias de hoje e as ciladas da interpretação. (Reflexões sobre riscos da intervenção subinformada). In: CPT (Comissão Pastoral da terra). **Trabalho escravo no Brasil contemporâneo**. Goiânia: Edições Loyola, 1999.p.127-163.

OLIVEIRA, A. U. de. **Integrar para (não) entregar:** políticas públicas e Amazônia. Campinas: Papirus, 1988.

TRABALHO ESCRAVO NO BRASIL DO SÉCULO XXI. Coordenação do estudo Leonardo Sakamoto. Brasília: Organização Internacional do Trabalho, 2007. Disponível: www.cptnac.com.br Acesso em: maio, 2015.

ONG REPÓRTER BRASIL. Disponível: www. reporterbrasil.com.br acesso: jul. 2015.

CHAPTER 13

Noonan Syndrome: a case report

10.56238/rsfohsv1-013

Vinícius Moreira de Queiroga
Medical doctor at the Brasília University Center-UniCEUB
http://lattes.cnpq.br/1302923768387027
E-mail: vmqueiroga18@gmail.com

ABSTRACT
Introduction: Noonan Syndrome is an autosomal dominant disease, with an estimated incidence of 1/1000 to 1/2500 live births. The syndrome is often associated with heart defects and a large phenotypic variability. Case Report: Patient A.A.A., male, 3 years old and previous diagnosis of surgically corrected interatrial communication. In the first year of life, phenotypic changes were noted, such as eyelid ptosis, low-set ears, triangular face, shield- shaped chest, short neck and diagnosis of chronic sinusitis. Result and Discussion: The most common congenital anomaly of Noonan Syndrome is pulmonary valve stenosis (54% of cases), which is closely related to disease morbidity and mortality. Phenotypic characteristics may include hypertelorism, eyelid ptosis, webbed neck, short stature, among others. The disease has a wide clinical variability, and the differential diagnosis are Costello Syndrome and Turner Syndrome. The diagnosis confirmation is made through a clinical-genetic assessment. Conclusion: This article emphasizes the importance of knowledge regarding Noonan Syndrome so that complete clinical histories and detailed physical examinations are carried out in the face of clinical suspicion for the purpose of early diagnosis, multidisciplinary follow-up and improved prognosis.

Keywords: Syndrome, Pulmonary Valve Stenosis, Webbed Neck, Short Stature.

1 INTRODUCTION

Noonan Syndrome (SN) is a genetic disease that affects several systems leading to disorders of physical and intellectual development and that has an autosomal dominant inheritance pattern in most cases. Several genes have been identified as causative for SN: PTPN11, KRAS, SOS1, RAF1, and MEK1 (ZARAMELLA, 2021).

It is a relatively frequent syndrome, with an incidence of 1:1000 to 1:2500 live births, and which has no gender or ethnicity preference (DIAMANTINO, 2021).

The classic phenotypic triad of this pathology is represented by craniofacial anomalies with facial dysmorphisms, congenital heart disease and short stature (GARCIA *et al*., 2022). Among other important clinical characteristics we can highlight: short and winged neck, ears with low implantation, hypertelorism, superior pectus carinatum and inferior pectus excavatum. Besides a variable degree of intellectual disability, hearing loss, cryptorchidism (in males) and alteration in coagulation (SANTANA, 2020).

A complete physical and neurological examination is essential for diagnostic definition, and may be accompanied by molecular genetic testing to detect mutations and exclude other etiologies (SANTANA, 2020; ZARAMELLA, 2021).

The present study aims to describe a case of Noonan Syndrome, highlighting its epidemiology, clinical presentation, diagnosis, and treatment.

2 CASE REPORT

Patient A.A.A, male, 3 years old, born pre-term late normal delivery (36 weeks), with no prenatal complications and healthy parents. In the first days after birth, he started with significant dyspnea and required intensive support due to hyaline membrane disease.

In the ICU, a cardiac Doppler ultrasound was performed with a diagnosis of ASD (atrial septal defect), which was surgically corrected.

At 1 year of age, during a follow-up childcare visit, phenotypic alterations were noted, such as palpebral ptosis, low-set ears, triangular face, shielded thorax, short neck, and a diagnosis of chronic sinusitis with frequent episodes of coryza and dyspnea.

Patient was referred to a geneticist. Due to the phenotypic characteristics presented, a genetic study was requested and later confirmed the diagnosis of Noonan Syndrome.

3 RESULTS AND DISCUSSION

Noonan Syndrome has autosomal dominant inheritance, similar distribution between the sexes and a very variable phenotype (MALAQUIAS *et al*., 2008) . It is a clinically heterogeneous pathology established by short stature, hypertelorism, mild intellectual disability, facial dysmorphism and an extensive spectrum of congenital heart defects.

The main phenotypic characteristic of this syndrome is the presence of the winged neck (DIAMANTINO, 2021). With advancing age some features are modified, so in childhood and adolescence, the phenotypic characteristics are more attenuated (RODRIGUES *et al*., 2017).

At the moment, the diagnosis is clinical-genetic (DIAS *et al*., 2004) made through a simple and efficient system created by van der Burgt and collaborators in 1994 based on the scoring of major and minor criteria that considers the clinical variability present in Noonan Syndrome (MALAQUIAS *et al*., 2008).

When there is clinical suspicion of Noonan Syndrome, there is also the possibility of molecular diagnosis for confirmation (DIAMANTINO, 2021). About fourteen genes (PTPN11, SOS1, KRAS, NRAS, RAF1, BRAF, SHOC2, HRAS, MAP2K1, MAP2K2, CBL,

RlT1, RASA2 and A2ML1) have already been related to this syndrome. Studies suggest that the PTPN11 gene, responsible for encoding the SHP2 protein, appears in 50% of SN cases (SANTANA *et al*., 2020).

Molecular tests are important for the differential diagnosis of Noonan Syndrome from other syndromes such as Costello syndrome and Turner syndrome (SANTANA *et al*., 2020). Additionally, molecular diagnosis contributes to a more appropriate genetic counseling, besides providing information about risk of recurrence (DIAMANTINO, 2021).

Therefore, despite being a syndrome of difficult diagnosis due to its clinical variability (MALAQUIAS *et al*., 2008), it is essential to do its investigation properly, because the prognosis and management of cases are distinct and influence the quality of life and survival of the patient (RODRIGUES

et al., 2017)

As mentioned before, it is a syndrome with a wide variability of clinical manifestations, among them: short stature, bone alterations, dental malocclusion, low ear implantation, wide nasal base, *pterigium colli* (winged neck), pulmonary valve stenosis, lymphatic dysplasia, mental retardation, short neck, hepatosplenomegaly, hearing problems, altered coagulogram, cryptorchidism, dermatological alterations, renal and cardiac abnormalities (DIAS *et al*., 2004).

The most common congenital anomaly is heart defect (RODRIGUES *et al*., 2017). Pulmonary valve stenosis is the most common cardiac lesion in SN, being present in 54% of patients, followed by hypertrophic cardiomyopathy and atrial septal defects, both present in 18% of patients (MALAQUIAS *et al*., 2008).

As the major cause of morbimortality in this disease is caused by cardiac alterations, the greatest concern should be related to the cardiological aspects (DIAS *et al*., 2004). Thus, it is recommended that all patients undergo cardiological evaluation by a specialist at the time of diagnosis, in addition to the performance of chest radiography, ECG and echocardiogram (RODRIGUES *et al*., 2017).

Another extremely recurrent clinical manifestation is short stature, extremely focused on the beginning of puberty. The short stature is more expressive in women than in male patients (DIAMANTINO, 2021). Children with this syndrome are often referred to endocrinologists due to short stature and late puberty (RODRIGUES *et al*., 2017).

Short-term treatment with recombinant human GH (hrGH) is able to partially increase growth velocity, however, the decision to treat with hrGH should be individualized, since patients positive for mutation in the PTPN11 gene are partially resistant to GH and should be treated with higher doses of hrGH (MALAQUIAS *et al*., 2008).

Therefore, there is a need for attention from different clinics, such as cardiology, ophthalmology, pediatrics, hematology, and genetics when facing a diagnosis of Noonan syndrome (DIAS *et al*., 2004).

4 CONCLUSION

Noonan Syndrome has an estimated incidence of 1/1000 to 1/2500 live births; and, despite being the second syndrome with the greatest association with cardiac malformations, it is still frequently underdiagnosed

As clinical evaluation is one of the pillars for diagnosis, a complete clinical history and a thorough physical examination is necessary, since manifestations such as short stature, which affects about 70% to 83% of patients, and/or growth disturbance, together with several phenotypic alterations, can be extremely important in helping to start the early investigation of this syndrome.

With an early diagnosis, the interventions to improve the patient's quality of life become more effective, especially in the face of the cardiologic alterations that affect 62% to 90% of the patients; these are the ones that bring more concern both in relation to morbidity and mortality linked to this syndrome.

Thus, this article aims to highlight the need for more knowledge about this disease in order to enable an early diagnosis and approach to improve the prognosis and, consequently, the quality of life of the affected patient.

REFERENCES

CARDOSO, C. R. Malformações cardíacas e síndromes genéticas. **Arq Bras Cardiol.** v. 41, n. 3, p. 167-170, 1983.

DIAMANTINO, I. N. Síndrome de Noonan 1: um relato de caso. Monografia (Licenciatura em Biologia). **Pontifícia Universidade Católica de Goiás**, Goiânia, 2021.

DIAS, *et al.* Síndrome de Noonan: relato de caso. **Arq. Bras. Oftalmologia.** v. 67, n. 4, 2004.

GARCÍA, A. I. C.; *et al*. Síndrome de Noonan. **Rev. Sanitaria de Investigación**, v. 3, n. 1, 2022.

MALAQUIAS, A. C.; *et al.* Analysis of PtPn11 gene in idiopathic short stature children and noonan syndrome patients. **Clin Endocrinol (Oxf)**. 2008.

MALAQUIAS, A. C.; *et. al.* Síndrome de Noonan: do fenótipo à terapêutica com hormônio de crescimento. **Arq. Bras. Endocrinol Metab.** v. 52, n. 5, p. 800-808, 2008.

MENDEZ, H.M.; OPITZ, J.M. Noonan Syndrome: a review. **Am J Med Genet.** v. 21; p. 493-506; 1985.

NOONAN, J.A. Noonan syndrome and related disorders: alterations in growth and puberty. **Rev Endocr Metab Disord.** v. 7, p. 251-255, 2006.

NORA, J.J.; *et al.* The ullrich-noonan syndrome (turner phenotype). **Am J Dis Child**. v. 127, p. 48-55, 1974.

RODRIGUES, E. R.; *et al.* Síndrome de Noonan: case report. Sociedade Brasileira de Pediatria. **Res Ped**. v. 7, n. 1, p. 25-28, 2017.

SANTANA, I. M. P. Intervenção fisioterapêutica na Síndrome de Noonan: relato de caso. **Brazilian Journal of Health Review**, Curitiba, v. 3, n.6, p.19112-19122, 2020.

ZARAMELLA, B. P. Relato de Caso: Síndrome de Noonan. **Brazilian Journal of Health Review**, Curitiba, v. 4, n.5, p. 21909-21916, 2021.

CHAPTER 14

Bruns Syndrome

10.56238/rsfohsv1-014

Amanda Ribeiro Dias
Universidade de Rio Verde (UNIRV). Goianésia, Goiás, Brazil
E-mail: amandaribeiro-1@hotmail.com

Aline Cristina Peres Rodrigues
Universidade Federal de Goiás (UFG). Goiânia, Goiás, Brazil
E-mail: alineperes36@gmail.com

Anna Luísa Gomes
Universidade de Rio Verde (UNIRV). Goianésia, Goiás, Brazil
E-mail: analuisa.vittacare@gmail.com

Fabíola Oliveira Loba Peres de Freitas
University of Gurupi. Gurupi, Tocatins, Brazil
E-mail: fabiolalobofreitas@hotmail.com

ABSTRACT
Bruns syndrome is a rare manifestation of intraventricular neurocysticercosis (NCC). NCC is caused by the Tenia solium larvae through fecal-oral contamination and is characterized as one of the possible helminth infections of the central nervous system.

Keywords: Neurocysticercosis, Bruns' syndrome, Headache.

1 INTRODUCTION

Bruns syndrome is a rare manifestation of intraventricular neurocysticercosis (NCC). NCC is caused by the Tenia solium larvae through fecal-oral contamination and is characterized as one of the possible helminth infections of the central nervous system. The disease is more prevalent in low-income countries, where basic sanitation is precarious, and is one of the causes of seizures in the world.

2 OBJECTIVE

To carry out a literature review on Bruns Syndrome, thus allowing the compilation of important and up-to-date information on this subject, drawing attention to the need to identify the symptoms, even if nonspecific, for the correct management of the disease

3 METHODOLOGY

A bibliographic search on Bruns Syndrome was carried out, taking into consideration the information found in PubMed databases. We selected bibliographic sources published from 2002 to 2022 and written in Portuguese or English.

4 RESULTS

Bruns syndrome consists of recurrent episodes of intense headache, vomiting, and vertigo caused by abrupt head movements or by the Valsava maneuver. Such aggravations lead to periodic obstruction in the circulation of CSF and paroxysmal increases in intracranial pressure due to a mobile ventricular mass

causing non-communicating hydrocephalus. Diagnosis can be difficult, since the picture is nonspecific and depends on factors such as location of the lesions and host immune system.

5 CONCLUSION/CONSIDERATIONS

Because neurocysticercosis is a rare form of evolution, attention to the nonspecific symptoms is necessary, as cases may be misdiagnosed and evolve unfavorably.

REFERENCES

GARCIA, H. H.; BRUTTO, O. H. DEL. Neurocysticercosis : updated concepts about an old disease. Lancet Neurol, v. 4, p. 653–661, 2005.

GARCÍA, H. H.; EVANS, C. A. W.; NASH, T. E.; et al. Current Consensus Guidelines for Treatment of Neurocysticercosis. Clinical Microbiology Reviews, v. 15, n. 4, p. 747–756, 2002.

GARCIA, H.H.; NASH, T. E.; BRUTTO, O. H. D. Clinical symptoms, diagnosis, and treatment of neurocysticercosis. Lancet Neurol, v. 13, n. 12, p. 1202-1215, 2014. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6108081/. Acesso em: 23 jun 2022.

KIMURA-HAYAMA, E. T.; HIGUERA, J. A.; CORONA-CEDILLO, R.; et al. Neurocysticercosis : RadioGraphics, v. 30, p. 1705–1719, 2010.

KRASNIANSKI, M.; STOCK, K.; ZIERZ, S.; MÜLLER, T. Bruns syndrome caused by intraventricular tumor. European Journal Of Medical Research, v. 13, p. 170–181, 2008.

RODRIQUEZ, R. D.; CRESTANI, D. N. DA S.; SOARES, J. O. D.; et al. Bruns ' syndrome and racemose neurocysticercosis : a case report. Rev Soc Bras Med Trop, v. 45, n. 2, p. 269–271, 2012.

ROQUE, D.; HIPÓLITO-REIS, J.; DUARTE-BATISTA, P.; SANTOS, M. M. Fourth ventricle neurocysticercosis presenting with Bruns' syndrome: A case report. Surg Neurol Int, v. 12, p. 616, 2021. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8720477/. Acesso em: 23 jun 2022.

SHAHANI, L.; GARNES, N. D.; MEJIA, R. Intraventricular Taenia solium Cysts Presenting with Bruns Syndrome and Indications for Emergent Neurosurgery. Am J Trop Med Hyg, v. 92, n. 6, 2015, p.1261-1264. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4458835/. Acesso em: 23 jun 2022.

SILVA, G. G. DA; FERREIRA, N. P.; BRITZ, J. P. E. Bruns Syndrome Caused by Intraventricular Neurocysticercosis : Case Report and Literature Review. Arq Bras Neurocir, 2020.

SILVA, G. G.; FERREIRA, N. P.; BRITZ, J. P. E. Bruns Syndrome Caused by Intraventricular Neurocysticercosis: Case Report and Literature Review. Arquivos Brasileiros de Neurocirurgia, v. 39, n. 01, 2020, p.18-21. Disponível em: https://d-nb.info/120610368X/34. Acesso em: 23 jun 2022.

TRIVEDI, S.; DATTA, A.; TRIVEDI, S.; SHOBHANA, A.; PRADHAN, D.K; BHATTACHARYA, K.; BANERJEE, M. Bruns Syndrome – An Unusual Presentation. Neurol India, v. 68, 2020, p. 677-680. Disponível em: https://www.neurologyindia.com/article.asp?issn=0028-3886;year=2020;volume=68;issue=3;spage=677;epage=680;aulast=Trivedi#ref2. Acesso em: Acesso em: 23 jun 2022

CHAPTER 15

Imaginary and representation in amazonian literature: Inferno verde and the conditions for teaching regional literature

10.56238/rsfohsv1-015

Antonio Marcelo Tavares Birimba
Master in Teaching Humanities and Languages at Universidade Federal do Acre – UFAC

ABSTRACT
Therefore, readings and passages from several short stories from Alberto Rangel's Inferno de Verde were selected, demonstrating how the process of creating an imaginary develops within them through certain particularities. The main objective then becomes the pedagogical direction in the classroom of a classic text that tells us of a very different reality of survival for students in Amazonian cities today. As we try to make the student aware of the importance of traveling in time, through images, we will try to dive into the roots and origins of the riverside people; the basis of a good part of the existence of a universe always rich in creative suggestibility. The images recreated from the clash of cultures to form a new civilization in the Amazon of the beginning of the 20th century, characterized by means of the chaining disposition of the tales, will produce a new challenge to the teacher of Portuguese language and literature in order to awaken the interest of a student who is always recalcitrant as to the contact with the expressions of regional letters. This didactic-pedagogical relationship in the classroom gives rise to a sharing of mutable limits from side to side, provoked by images that will lead to very current discussions regarding the Amazon in the contemporary scenario.

Keywords: imaginary, civilization and jungle, teaching challenges

1 INTRODUCTION

IMAGINARY: A BACHELARDIAN PERSPECTIVE

The dreams that lived in a soul live on in his works...
Gaston Bachelard

The reading of the fictional literary text, in an attentive way, promotes the perception of a reading that involves the plot, with the characters, contextualizing space and time, while perceiving the construction of language point by point; in this case, through the Bachelardian perspective, it sensitizes the involvement of the attentive reader to dive into the empty spaces that are filled by the oneiric reverie of the imaginary. In this way, the sensibility that allows us to go through the abstraction of silence involves the pleasure and delight of diving into the poetic images, revealing the dialectical levels of distancing and approximation that an improved reading, through the perception of symbology, can bring about through the stages of gain in reading.

The enjoyment of literary reading also depends on the way the text is organized and structured; to escape from the hegemonic weaving of the referential function, this is the great initial challenge. The revealing apprehension of the literary text requires skills and knowledge to be developed by the readers in order to unveil the challenging repertoire of difficulties in the interpretative process. The correct path to be taken is closely linked to the teacher's qualification, who must seek new ways to redefine his methodology of knowledge, through the interpretation of the symbolic elements that make up the text, always as a challenge in the construction of the reading path and of the student-reader himself, in the classroom.

This relationship must be reciprocal, between teacher/student, school community, or between proponent/attentive reader, because the student needs to walk a path in the constant search to feed his self-knowledge and the deepest desire to continue finding in literature the food for his questions, through moments of identification of his past in order to understand his present, now, contaminated by re-significations or by his perplexities that may lead him to a future.

The systematic use of textbooks is nowadays perceived, in accordance with the experiences I have had during my teaching career, routinely in the classroom with public high school students, where they treat literature in a systematic way, as a simple playful artifact or illustrative of historical contexts, without exploring the true life that comes from the text, without exploring the very power of expression of language. Many of them bring aspects of regional literature as clippings, summarized and insignificant to the most sensitive learning. This didactic perspective is very far from offering symbolic and fictional elements as enriching instruments that elevate the soul, purify knowledge, in the sense of modifying conducts, behaviors, and making the individual re-signify his life and his being through attentive reading, or by providing new experiences through the text itself. For me, the act of reading is a way to revive the conditions of use of the literary text in a broader and more challenging sense.

Depending on the perceptive level of the attentive reader, the text, which does not sharpen the reverie, loses its abstract character and the ability to go beyond superficiality, creating immobilizing barriers of one's own imaginary, because it does not allow a vision in a sharper interpretative and provocative perspective of sensitive reality. This brings us to the big question that permeates the teaching challenge in the classroom at this beginning: would it be possible to work with a classic text for high school students to the point of provoking new interests between the elaborated language and the load of sensitive experiences that they already carry?

From the Bachelardian perspective, in accordance with the reality of the students and the reading experiences they bring with them, the idea is to go far beyond the books themselves and the written texts. In other words, the question posed would be to establish parameters to know how the reader has been prepared throughout his or her high school years. Even if these questions are not favorable to them, there is still time to resensitize them in High School itself, because they are subjects in formation, who bring a great internal potential from their intimate life because of their years of experience. Bachelard intermediates the explanation regarding the simplicity and ingenuity of the emergence of a poetic image, establishing a differentiation between soul and spirit. In his conception, creation proceeds from the feelings of the soul. He understands that resonance becomes the moment of ecstasy in the reception of the poetic image when it reaches the depths of our being.

Memory, in this case, is configured as the temporal theater, in which the space, or the scenery of memories, keeps the characters in their role. He warns that the house is the privileged receptacle of memories. To this end, he refers to the house's primary function as a protective space and explains that, in

the memories, reality and reverie merge. However, one realizes that the particularities of the spaces of the house relate to the refuges of memory and imagination.

> It is thanks to the house that a great number of our memories are stored; and when the house gets a little complicated it has a basement and an attic, corners and corridors, our memories have increasingly well-characterized refuges. To them we return all our lives in our daydreams. [...] Sometimes we believe we know ourselves in time, while we know only a series of fixations in the spaces of stability of being, of a being that does not want to pass through time; that in the past itself, when it goes in search of lost time, wants to "suspend" the flight of time. In its thousand alveoli, space retains compressed time. This is the function of space (BACHELARD, 1993, p. 199)

Thus, great images have both a history and a prehistory at the core of each subject. One never experiences the image in early childhood. Every great image has an unfathomable dreamlike background, and on it, the personal past puts particular colors. Only those who see a certain sensitive experience of life can contemplate and revere, in its essence, an image by discovering its roots beyond the factual history fixed in memory, which can be reworked. For the author, the attentive reader when in contact with a poem cannot visualize the image of the space lived by the author, but will relive his own space lived in the past, through the phenomenon of repercussion.

For Bachelard (1993, p. 200), "life begins well, because it begins protected, closed, sheltered inside the house however humble it may be; it encompasses the conscious and the unconscious, because this maternal space reigns inside the being and the being of the interior." According to the philosopher of the poetry of matter, in the realm of absolute imagination, we are young too late. For him, it is necessary to lose the earthly paradise to live it in the reality of its images, in the absolute sublimation[1] that transcends any passion. Poetry gives us the nostalgia of the expressions of youth, no doubt. It offers us images as we should have imagined them in the initial impulse, even in childhood.

Bachelard (1993) understands that space, images, and the sensitive are our interpretative key, the one that opens the investigation and guides us through the rooms, as it brings, concomitantly, intimacy and invites us, also, to leave the house and reach the immensity of space, or the sensitive forces of the landscape, like the air and the wind, or the sweet water of the singing stream, for example. All this trickery puts us in the condition of potential inhabitants in the poetic space. The word of a poet, for Bachelard, shakes deep layers in our being, and in this same vein we could say that the spaces he encounters shake the deep layers of his words, like a threshold of onirism, in which neither the place nor the poet are the same anymore: they become a being to which something has been added.

The trip, thus, is an invitation to daydream, an invitation to feel the aroma of other winds, the flavors or discomforts that are offered in the place. The house (tapiri) is the resting place of the caboclo. As it is also configured in the dwelling of the rubber tapper (the northeasterner in Rangel's prose) who infiltrates the forest, where the limit permeates the dimension between heaven and earth; the imagination imagines

[1] Superior capacity for self-knowledge in Bachelardian language.

and connects itself to the space and landscape, for it is an imaginary source, or a mythographic horizon in the articulated consciousness of images and the convergence between sensibility, memory, and imagination.

The spatiality is given from the body that evokes images through the reader's sensibility, which instigates the memorial dimension of space, constitutive of the being that inhabits it. The house is inside the being, just as the being is inside the house, for this is the essential feature of the intimate space that irrigates Bachelard's thought, since it is a spatiality generated from sensations and unknown feelings. Every house is a house of time and, in this way, every house is the house of poetry, which the thinker called a *happy space*.

For him, without the house, man would be a dispersed being: the images of the house exemplify his gregarious postulate in the world and are at the same time a becoming of expression and also a becoming of our being. Before being thrown into the world, man is placed in the cradle of the house. "We inhabit our living space according to the dialectics of life, as we root ourselves, day by day, in a corner of the world [...] the house is our corner of the world." (BACHELARD, 1993, p. 200)

The house is part of the poetry of being, of the poetry of space. In the house, we are poets, and from it, we have the most precious asset, since it shelters the daydream and protects the dreamer, and allows him to dream; it is the locus of daydreaming. We have the starting point through a deep reflection about the imagetic representativeness that the house represents: "... every corner of a house, every angle of a room, every reduced space where we like to hide, to talk to ourselves, is, for the imagination, a solitude, that is, the germ of a room, the germ of a house" (BACHELARD, 1993, p. 286)

To retire into one's corner seems to be a poor expression, but it gains strength, because the act of retiring evokes numerous images, which may come from an antiquity, or from a psychologically primitive sensibility. The song keeps us safe. It is the certainty of the place that is close to my immobility. An imaginary corner/apostment is built around our body, which gives us the feeling of being well hidden when we take refuge in a corner.

On the path of daydreaming of the immensity, the real product is the consciousness that expands. The immensity is in us. Trapped in a kind of expansion of being that life curbs, that prudence holds back, but that returns again to solitude. The immensity is the movement of the immobile man: "The forest, above all, with the mystery of its space indefinitely prolonged beyond the curtain of its trunks and leaves, a space veiled to the eye but transparent to action, is a true psychological transcendent. (BACHELARD, 1993, p. 317) The thinker here not only describes, he knows that his task is greater. The godly and fallow forest, closed and "encipoed," accumulates in itself its infinity. He refers to the symphony of an eternal wind that lodges in the movement of the treetops. The peace of the forest is for him a peace of the soul, a state of the soul.

In such reveries, which dominate man, and in his silence he meditates, some details are perceived to fade, or the glittering loses its shine, or the picturesque loses its color, or the hour no longer sounds, and then space loses its limit. We might name such reveries as reveries of the infinite through the images of the

deep forest. Here we confront the man who meditates before an endless universe. In this context, we would evoke a singular complex, where the pride of seeing is the core of the consciousness of the being who meditates, who contemplates.

One realizes that immensity is an inexhaustible poetic theme. The soul finds in the object the nest of immensity. When we become hypersensitive to the word *vast* we will see that it is an accession of blissful breadth. Here we differ the meaning of immensity from vast, though semantically it means a sense of greatness, the former would embrace the supreme synthesis; a strategic difference that exists between the discursive steps of the spirit and the powers of the soul; the lyric soul makes vast throws as syntheses; the soul then finds its synthetic being; it brings together the opposites. Immensity is an intensity of being, intensity of a being that reveals itself in a vast perspective of intimate immensity**.**

In the Bachelardian perspective, (BACHELARD, 2013, p. 13) "ontologically, water in its essence is pure. It symbolizes life and death. The human being, like the waters of the river, dies every instant. The literary image of water reveals an imaginary determinism."

But if we can convince our reader that beneath the surface images of water there is a series of deeper and deeper, more and more tenacious images, he will soon feel, in his own contemplations, a sympathy for this deepening; he will feel opening up, beneath the imagination of forms, the imagination of substances. He will recognize in water, in the substance of water, a kind of intimacy, an intimacy quite different from those which the depths of fire or stone suggest. It will recognize that water's material imagination is a particular kind of imagination. Strengthened by this knowledge of a depth in a material element, the reader will understand, at last, that water is also a kind of destiny, no longer just the vain destiny of fleeting images, the vain destiny of an unending dream, but an essential destiny that ceaselessly metamorphoses the substance of being. So the reader more sympathetically, more painfully, one of the characteristics of heraclitism. We do not bathe twice in the same river, because, already in its depth, the human being has the destiny of the flowing water.

> Water is really the transitional element. It is the essential metamorphosis between fire and earth. The being consecrated to water is a being in vertigo. It dies every minute, something of its substance constantly crumbles. Everyday death is the death of water. Water always flows, water always falls, it always ends in its horizontal death.... " (BACHELARD, 2013, p. 13)

As life is a dream within a dream, so the universe is a reflection within a reflection; the universe is an absolute image. The water is its limpidity, it is an inverted sky in which the stars acquire a new life. Thus, in this contemplation by the water, he forms a strange double concept of a star-island, liquid star prisoner of the lake, of a star that would be an island of the sky. Both the island and the lake are the junction points of the dream that, through them, changes register, changes matter. In this articulation, water takes on the sky. The dream gives water the sense of the most distant homeland, a celestial homeland. Thus, water, through its reflections, duplicates the world, duplicates things. It also duplicates the dreamer, not simply as a vain image, but involving him in a new oneiric experience.

The reader would feel, finally, physically, the invitation to a trip, because he would also be involved by a delicious sensation of strangeness. In front of the deep water, "[...] you choose your vision; you can see at will the immobile bottom or the current, the shore or the infinite; you have the ambiguous right to see and not to see; you have the right to live like a new race of laborious fairies, endowed with perfect taste, magnificent and thorough." (BACHELARD, 2018, p. 53)

We understand that water is the true material support of death, or, by a perfectly natural inversion in the psychology of the unconscious, thus the deep sense, for the material imagination marked by water, death is the universal hydra. In this context, still waters evoke the dead because dead waters are sleeping waters. From the bias of the psychology of the unconscious of matter, we understand that the dead, when they are among the living, are sleeping people. They are resting. After the funeral, they are absent persons, that is, they are more hidden, more covered, more asleep. They only awaken when our sleep, deeper than the memories, reencounters the missing, in the homeland of the night, in the contact with the phenomena. Some sleep in rivers, others in green creeks, others on the gray, slippery, stinking mud of swamps.

This is why water is the material of beautiful and faithful death. Only water can sleep while retaining its beauty; only water can die, motionless, while retaining its reflections. Reflecting the face of the dreamer faithful to the great memory, water gives all shadows and makes all memories revive. It is in this frenetic fruition of evocation that is born the kind of delegated and recurrent narcissism that gives beauty to everyone we once loved. Man relives his past in which every image is for him a memory of material sensation.

It is important to note that water carries within it so many essences. It is imbued with all colors, all tastes, all smells. It is understood, then, that the phenomenon of the dissolution of solids in water is one of the main phenomena of this naive chemistry that continues to be the chemistry of common sense and that, with a little bit of dreaming, is the chemistry of poets, of fictionalists sensitive to the flavor of the matter-phenomenon.

When we daydream about the combinations of imaginary elements, some mixtures of elements with water intervene in our refined sensibility: the successive union of water and fire, of water and night, above all, or of water and earth. In this way, we perceive the combination in which the reverie of form and matter suggests the most eloquent themes of the creative imagination.

When we examine the images suggested by alcohol, an inflammable and strange matter, when it covers itself in flames, to accept a phenomenon contrary to its own substance is to cause great strangeness. When alcohol burns on a party night, it seems that the matter has gone mad, it seems that the water that represents the feminine soul has lost its modesty and surrenders, deliriously, to its master, fire.

For Bachelard, "it is not surprising that certain souls cluster around this exceptional image of multiple impressions, contrary feelings, and that under this symbol a true complex is formed."

(BACHELARD, 2018, p. 100) This complex known in psychological studies as Hoffmann's complex[2] , the symbol of the punch[3] , appears in tales narrated by fantastic storytellers. Thus, it comprises all allegory of feelings that sometimes separate, mix, confuse. Vibrant images that recall the tender adventures of childhood, in the realm of imaginary fantasies. Copious fantasies of the northeastern immigrants who came in search of Eldorado in this Amazon region, which will be analyzed a *posteriori* through the imagetic impact of Rangelian imagery.

It is possible to understand that certain individuals make use of this artifice to explain the foolishness of their beliefs, which provoke the importance of their role in the unconscious. Thus, the author does not hesitate to say that "water that is kept for a long time becomes a spirituous liquor, lighter than other waters, and can almost be lit like brandy. [...] ...to those who scoff at this good bottle of aged water, this water which, like a good wine, attains the Bergsonian duration[4] " (BACHELARD, 2018, p. 101) It is worth noting that aguardente became a precious liquid in the lives of the northeastern migrants, who immersed themselves in this unknown region, and found in the effect of this drink the courage to face the unknown, the mysteries of the forest, and the dream of wealth.

In the Bachelardian perspective, water is a burned body, it is the culmination of vital experience. To such an imagination, water alone, isolated, pure water is nothing but an extinguished punch, a widow, a ruined substance. It will take a burning image to revive it, to make a flame dance again on its mirror, so that one can say: "...your image burns the water of the slender channel. [...] The water is a wet flame." (BACHELARD, 2018, p. 102)

At the heart of the contraries, we find the perfect marriage of reverie in which water puts out fire, woman puts out ardor. Thus, we can say that water and fire provide perhaps the only really substantial contradiction. If logically one evokes the other, sexually one desires the other. Like dreaming of greater genitors than water and fire. "Appearing among the waters, the blazing Agni[5] grows, rising above the churning flames and spreading its glory; heaven and earth are alarmed when the radiant Agni comes to birth. [...] Associated with the firmament in the firmament with the waters, he assumes an excellent and radiant form; the sage, support of all things, sweeps the rain fountain." (BACHELARD, 2018, p. 103) Very strong image that is glimpsed to the viewer's delight as they observe the infinite sea. The image of the sun with the river will give itself in an atmospheric fusion of less intensity, but does not lose its vibrant eloquence. The Juruá River expresses with all its vigor a great natural spectacle, when one sees in its fullness the magic of the sunrise or sunset on its banks.

[2] Exceptional image of multiple impressions, contrary feelings.
[3] It is the term used to define a wide variety of beverages, both alcoholic and non-alcoholic, most often containing fruit juice.
[4] Bergson, a French philosopher who considers intuition as a superior instinct capable of allowing knowledge from the character of time as merely spatial duration.
[5] He is a Hindu deity. The word agni is Sanskrit for "fire" (name), with the same origin as Latin ignis. In Hinduism, he is a deva, second in power and importance ascribed in Vedic mythology, only surpassed by Indra.

The image of the sun coming out of the sea is a dominant objective image. The sun is the Red Swan. In this sense, imagination necessarily moves from the cosmos to the microcosm. It alternately projects the small onto the large and vice versa. The sun is the magnificent husband of water. It is necessary that in the dimension of libation water "surrenders" to fire, that fire "takes" water. Metaphorically, the bodies are scorched on the nocturnal path, and everything around them drips with fire. This is how love, the principle of things, reigns:

> Night by the lake brings a specific fear, a kind of damp fear that penetrates the dreamer and makes him shiver. Alone the water would give clearer obsessions. Water in the night gives a penetrating fear. But when the night spread its mantle over the place, as over everything else, and the mystical wind came to murmur its music, then, oh! Then I always awoke to the terror of the isolated lake.(BACHELARD, 2018, p. 107)

If the fear near the lake at night is a special fear, it is certainly a fear that preserves a certain horizon. Which is different from fear in the forest, because the riverside man needs to face the mysteries of the night, on the banks of the rivers, in the ravines of the streams. The shadows on the water are, in a way, more mobile than the shadows on the land, where he needs to penetrate the forest to extract latex. These are images, among others, that we will analyze in the next chapter. The invitation is to remain attentive to the traps that the imagetic unconscious will provide you with. It is through the activity of water that the first reverie of the worker who kneads begins. Thus, it is not surprising that water is dreamed in an active ambivalence. There is no reverie without ambivalence, no ambivalence without reverie.

The sea is, for all men, one of the greatest challenges of imaginary penetration; one of the most constant maternal symbols. The sea sings a deep song for them. This deep song is the maternal voice, the voice of our mother. Because something of us, of our unconscious memories, finds a way to reincarnate. Since filial love is the first active principle of the projection of images, it is also the driving force of imagination, an inexhaustible force that takes hold of all images to place them in the maternal perspective. The adventure of the sea led men to penetrate the hinterlands of the Amazon, through its caudal rivers, also by means of an insatiable imaginary of symbols of origin:

> The more a feeling of love and sympathy is metaphorical, the more it needs to draw strength from the fundamental feeling. Under these conditions, to love an image is always to illustrate a love; to love an image is to find without knowing it a new metaphoric for an old love. To love the infinite universe is to give a material sense, an objective sense to the infinity of love for a mother. To love a lonely landscape, when we are abandoned by all, is to compensate a painful absence, is to remember the one who does not abandon... When we love a reality with all our soul, it is because that reality is already a soul, it is because that reality is a memory.(BACHELARD, 2018, p. 120)

Then we can go further in our search in the unconscious itself, for we must say that all water is a milk. More exactly, every happy drink is a mother's milk. Just like the dream of the northeasterner to extract from the veins of the rubber tree the milk of his dream, the enrichment of the arduous, daily trajectory.

The dream has a pivotal root that descends into the great infantile unconscious of primitive life. However, water is a milk when it is sung with fervor, when the feeling of adoration for the motherhood of the waters is passionate and sincere.

For Bachelard, there are dreamers of murky water who are amazed by the black water of the pit, water that shows veins in its substances, that causes, by itself, a whirlpool of mud. From this angle, one can see that it is the water that dreams and covers itself with nightmarish vegetation. It is important to point out that this oneiric vegetation is already caused by daydreaming in the contemplation of aquatic plants. In this context, for certain souls, the flora of the waters is a true exoticism, a temptation to dream of a somewhere, far from flowers, far from the sun, far from limpid life.

In many impure dreams, ancient reminiscences blossom in the water that shows itself heavily on the water itself, like the thick flattened hand of water lily[6] . Many impure dreams the sleeping man feels circulating in himself, around himself, black and muddy currents, Stiges[7] of heavy waves, laden with evil. And our heart is stirred by this dynamic of the black. And our sleeping gaze follows indefinitely, black after black, this becoming of blackness.

Bachelard is amazed at the Manichaeism of pure and impure water. For him, there is no balanced Manichaeism, because the scales tip more to the side of pure water. He examined in the folklore of water, as he was amazed by the few names of cursed springs: "The devil is rarely in connection with springs, and very few bear his name, while a great number of them are named after a saint and many after a fairy." (BACHELARD, 2018, p. 146)

Tears are sources of human waters that express feelings. In tearful reverie, we find the artificial tears, more external, less sad. They are not feminine tears. The tears of the fighting walker are not of the order of sorrows, they are of the order of anger, which highlight the anger of the storm.

The walker, who in his pure gait, like pure poetry, impresses greatly by the will to power. This can only happen in the discursive state. The great shy ones are great walkers; they win symbolic victories with each step; they compensate for their shyness with each stone. Away from cities, away from women, they seek the solitude of the summits:

> To the sea it nourished, to the green and skimpy Spot, my heart is bound more solidly than to anything else in the world; it lays bare for me a generous breast, intones for me the most solemn song of love, commands for me to spread to it more generously the brightness of its light, and makes sound for me the impetuous trumpet whose tones are so sweet to me.(BACHELARD, 2018, p. 171)

Thus, we can understand that water is the mistress of fluid language, of language without brusqueness[8] , of continued language, of language that slows the pace, of language that softens the heart. Expression that gives full meaning to the quality of a fluid and lively poetry, of a poetry that oozes from

[6] A genus of aquatic plants, of the nymphaea family, widely used as ornamentals in large water containers for their white, red, or yellow flowers; nymphaea.
[7] In Greek mythology, she is a nymph and also a hellish river in Hades dedicated to her.
[8] It means incoherent, strong, agitated, nervous.

the fountain. Such is the penetrating, the adventurer, who plunges into the forest, who investigates in search of an origin, a treasure, to open the symbolic doors of revelations kept for centuries immemorial.

Returning to the Bachelardian perspectives, remembering that, previously, some references were made in relation to fire regarding its combination with water; fire is, thus, a privileged phenomenon capable of imprinting many impressions. If everything that changes slowly is explained by life, everything that changes quickly is explained by fire. Fire is intimate and universal:

> He lives in our hearts. It lives in the sky. It rises from the depths of substance and offers itself as love. It descends again into matter and hides, latent, contained like hatred and revenge. Of all the phenomena, it is really the only one capable of receiving so clearly the two opposing values: good and evil. It shines in Paradise, scorches in Hell. It is sweetness and torture. It cooks and apocalypse. It is pleasure for the child sitting quietly by the fireplace; it punishes, however, any disobedience when one wants to play too closely with its flames. Fire is well-being and respect. It is a tutelary and terrible god, good and evil. It can contradict itself, so it is one of the principles of explanation a universal. (BACHELARD, 2012, p. 11)

In the study of daydreaming, specifically in relation to fire, the dream advances linearly, forgetting its path as it goes along. Daydreaming operates like a star. It returns to its center to emit new rays. The sweet well-conscious daydreaming. It is the most naturally centered. Daydreaming so well defined that it has become a truism to say that we like the fire of the wood burning in the fireplace. It is, then, the quiet, regular, subdued fire, where the wood burns in small flames. It is a dull and bright phenomenon, truly total: it speaks and flies, it sings.

Thus, we believe that not to indulge in reverie before the fire is to miss the truly human and first use of fire. In front of the fire, one must sit down; one must rest without sleeping; one must accept the objectively specific reverie: "Less abstract and less monotonous than the flowing water, faster even in growth and change than the bird in the nest watched each day in the bushes, fire suggests the desire to change, to hurry time, to bring life to its end, to its beyond. (BACHELARD, 2012, p. 25)

One realizes that daydreaming is really overwhelming and dramatic, it magnifies human destiny, it unites the small to the big, the fireplace to the volcano, the life of a wood to the life of a world. The destruction is more than a change, it is a renewal. This apparently exaggerated reverie represents a true complex in which love and respect for fire, the instinct to live and the instinct to die, are united:

> If the conquest of fire is, primitively, a sexual "conquest," we should not be surprised that fire has remained sexualized for so long and so vigorously. [...] Naturally, the various fires must bear the indelible mark of their individuality: "the common fire, the electric fire, the fire of matches, of volcanoes, of lightning, have essential, intrinsic differences, which it is natural to relate to a more internal principle than to accidents that modify the same igneous matter. (BACHELARD, 2012, p. 66)

In this way, the mark of man inconstantly manifests itself in things. What leans or rises in us becomes the sign of a life extinguished or lit, on the real plane. Poetic communion prepares the most tenacious errors for objective knowledge. Bachelard evokes the libidinous fire, which is made to burn by the friction of bodies, and adds that the prostration that follows the emission of the spermatic liquid suggests

to us that the loss of a very ardent, very active fluid has taken place at that moment. Sometimes, fire assumes the formal principle of individuality. Such a conceptualization is expressed in the alchemist's writing; fire is not exactly a body, but the masculine principle that informs feminine matter. This feminine matter is water:

> From the calorific point of view, the sexual distinction is clearly complementary. Feminine principle of things is a principle of surface and enclosure, a lap, a refuge, a tepidity. Masculine principle is a center principle, a center of power, active and sudden like spark and will. Feminine heat attacks things from the outside. The masculine fire attacks them from the inside, in the heart of the essence.(BACHELARD, 2012, p. 79)

According to the thinker, this intimate and masculine fire, the object of meditation of the isolated man, is, of course, the most potent fire. It is he who can open bodies. In this it is sometimes a manifest sexual act. Certainly, the reverie of fire related to sex is the most profound, because of its psychoanalytic complexity. It is one of the first to permeate the imagination of children, teenagers and adults. Unfortunately, there is still a certain taboo surrounded by prejudice, giving it a banal, pejorative and profane meaning. It is the most intimate element of human feeling. It will be analyzed in greater depth in the following chapter, in which the northeastern man feels the fire of passion in his solitary reverie in the forest wilderness. The fire that transforms rubber into pelas. The one that allows traffic. The black gold. Transformation of matter, transformation of man.

Bachelard (2019) still invites us to go through the trails of the literary imagination, highlighting the cave element with the possible images that multiply when awakening from daydreams. We can say that the cave belongs to the imagination of rest, to the dream of a protected rest, of a peaceful rest. It is a refuge in which one dreams endlessly:

> After a certain threshold of mystery and dread has passed, the dreamer who has entered the cave feels that he could live there. It only takes a few minutes of sojourn for the imagination to begin to arrange the house. He sees the place for the fireplace between two large stones, the nook for the bed of ferns, garland of lianas and flowers that decorates and hides the window against the blue sky. (BACHELARD, 2019, p. 143)

Sometimes it seems that it is the curtain of foliage that makes the cave. There are many symbols that represent it. Certainly, one realizes that the cave is the dwelling without a door, for when night comes, one closes the entrance to the cave to sleep in peace. In this context, the refuge of fear awakens the need for openness. We want to be protected, but we don't want to be trapped or closed inside the cave. One knows at the same time the values outside and those inside. The door is both an archetype and a concept: "...it totalizes unconscious and conscious securities. It materializes the guardian of the threshold, but all these profound symbols are currently buried in an unconscious inaccessible to the dreams of writers." (BACHELARD, 2019, p. 144)

Indeed, the act of dwelling unfailingly evokes the impression of being sheltered. Thus, the sweet soul of the lonely dreamer, in the cave, dreams of hidden loves. An ardent love cannot be dreamily city-

like; it must dream of a universal place. The cave entrance works the imagination of deep voices, the imagination of subterranean voices. All caves speak. When nature imitates the human, it imitates the imagined human. For the dreamer of the cave, it is more than a house, it is a being that answers our being by voice, by look, by breath. It is the tomb of the everyday being, the tomb from which one leaves, every morning, refreshed by the sleep of the earth.

The cave is a dwelling. Many immigrants from the Northeast of Brazil came to the Amazon and built here a new home, a rustic house, but, in their own way, cozy for their refuge, their dream of winning, of dominating nature. Perhaps not the ideal house, but the house to dream about, the house of rest. He, who came from far away, from another region, builds his home in the middle of the forest, on the banks of rivers, and dreams of one day being rich. Many times, his dreams are interrupted by a series of illnesses and misfortunes, and he returns to dream in the final dwelling: the sepulcher, the tomb, the cave, the house. It is the return to the motherland.

The fate of the immigrant was wrapped up in this perspective; mother earth receives the body with all the dreams. We will relate these dilemmas found in Alberto Rangel's narratives, in the book *Inferno Verde,* analyzing the elements that make up the imaginary, fruit of Gaston Bachelard's oneiric thought. The buried hero lives in the bowels of the earth, a slow life, asleep, but eternal.

The wick of the lamp that recalls its past, its historical legacy of its adventurous trajectory in search of the great Eldorado, the dream of wealth ingrained in the veins of the rubber tree to extract the latex; the white gold or the black gold, after being smoked, still remains lit. The seed of a new civilization is planted among the sapodas of the kapok trees and along the banks of rivers and streams, which served as caves for eternal rest to the subtle daydreams of the northeastern migrants to brave the lands of the "new world". The flame of desire that fed the dream of many northeasterners remains alive in the memory that manifests itself through Rangel's nervous language.

REFERENCES

BACHELARD, G. **A água e os sonhos**: **e**nsaio sobre a imaginação da matéria. Trad. Antonio de Pádua Danesi. São Paulo: Martins Fontes, 2018.

____. **A poética do devaneio**. Trad. Antônio de Pádua Danesi. São Paulo: Martins Fontes, 2018.

___. **A poética do espaço**. Trad. Antônio da Costa Leal e Lídia do Valle Santos Leal. São Paulo: Martins Fontes, 2018.

___. **A psicanálise do fogo.** Trad. Paulo Neves. São Paulo: Martins Fontes, 2012.

___. **A terra e os devaneios da vontade**. Ensaio sobre a imaginação das forças. Trad. Maria Ermantina de Almeida Prado Galvão. São Paulo: Martins Fontes, 2019.

___. **A terra e os devaneios do repouso**: ensaio sobre as imagens da intimidade. Trad. Paulo Neves. São Paulo: Martins Fontes, 2019.

___. **O ar e os sonhos**: ensaio sobre a imaginação do movimento. Trad. Antonio de Pádua Danesi. São Paulo: Martins Fontes, 1990.

RANGEL, A. **Inferno Verde**: cenas e cenários do Amazonas. Manaus: Valer, 2008.

CHAPTER 16

Physiotherapeutic interventions used to treat diastasis of the rectus abdominis muscles in women: an integrative review of the literature

10.56238/rsfohsv1-016

Daniely Leal da Costa
Instituto Esperança de Ensino Superior (IESPES), Santarém-Pará

Rafaela Fernandes da Mota
Instituto Esperança de Ensino Superior (IESPES), Santarém-Pará
E-mail: rafaelaafernandes98@gmail.com

Melina Laíse Nascimento do Santos
Instituto Esperança de Ensino Superior (IESPES), Santarém-Pará

Lijane Marques Ferreira
Instituto Esperança de Ensino Superior (IESPES), Santarém-Pará

ABSTRACT
Objective: To identify, in the scientific literature, the physical therapy interventions used for the treatment of rectus abdominis diastasis in women. Methods: A descriptive bibliographic search was carried out, of the integrative literature review type, using the electronic databases Virtual Health Library (VHL), PubMed, periodical CAPES and PEDro platform. Articles in Portuguese, English and Spanish were included in the study selection, in a timeless period, using the following descriptors: Diastasis and Physiotherapy, "Muscle diastasis" and "rectum of the abdomen", "Physical Therapy Modalities" and abdomen and Diastasis. Results: 501 articles were selected and 493 were excluded, eight articles made up the research sample. The researches presented the physical therapy interventions used for the treatment of rectus abdominis diastasis. Studies show that there are different types of physical therapy interventions, among them are exercises to strengthen the abdominal muscles, hypopressive exercises, postural exercises and electrotherapy. Final considerations: In the study, it was possible to observe that, in addition to reducing rectus abdominis diastasis, physical therapy also promotes more safety and quality of life for women. These benefits have a positive impact on both the physiological and psychological processes of this population.

Keywords: Diastasis, Physiotherapy, Rehabilitation.

1 INTRODUCTION

Abdominal rectus diastasis (ARD) is a condition in which abnormal separation of the muscles occurs as a result of the elongation of the linea alba. This alteration can cause aesthetic and biomechanical changes, resulting in pain and dissatisfaction with the body itself (JESSEN ML, et al., 2019). ARD is defined as the distancing of the muscular ventres of the abdominal challenge with a measurement greater than 2 centimeters (cm), presenting a proeminence during muscle contraction, often confused with abdominal hernia. The symptoms can be observed during actions such as tossing, laughing, defecating, exhaling and giving birth. The persistence of this condition involves alterations such as trunk instability, urinary incontinence, lumbosacral pain, intestinal constipation and aesthetic dissatisfaction (OLSSON A, et al., 2019).

The structure responsible for muscle attachment is a set of aponeuroses that form the linea alba and extend from the xiphoid process to the pubic symphysis (MICHALSKA A, et al., 2018). The combination of the gradual elongation of these structures with muscle weakness increases intra-abdominal pressure and aponeurosis loose, thus generating the diameter of the abdominal challenge (MOMMERS HHE, et al., 2017).

The anterior abdominal wall is made up of the rectus abdominis, external oblique, internal oblique and transverse abdominis muscles. They are symmetrically distributed on both sides of the linea alba. When activated, these muscles support and protect the viscera, contributing to the maintenance of lumbar vertebral alignment, pelvic stabilization and triaxial movement of the trunk (MICHALSKA A, et al., 2018). In addition, this structure has an important role in maintaining and protecting the contents of the abdominal cavity and contributing to evacuation, labor and respiration (BLOTTA RM, 2011).

The identification of ARD is made through the physical examination performed in dorsal decubitus, with the arms parallel to the body, with the arms and quadrilateral flexed, and feet resting on the stretcher. In this position, a flexion of the trunk is requested anteriorly, and the assessor palpates the midline of the abdomen, in order to identify muscle wasting (PINTO MB, et al., 2017). According to Michelowski ACS, et al. (2014), ARD can be observed in three different levels, being: Umbilical Diastasis (UD) representing 52% of the cases, Supraumbilical Diastasis (SUD) with 36% of the cases, and Infraumbilical Diastasis (IUD) corresponds to only 11% of the cases.

For Rett MT, et al. (2012) obesity, multiparity, multiple gestations, fetal macrossomia, polyhydramnios, flaccidity and weakness of the abdominal musculature, constipation and any other condition that may cause an increase in intra-abdominal pressure are also considered risk factors. In addition, the abdominal muscles have important stabilizing functions, so the weaker they are, the greater the joint instability and consequently the greater the back pain (SANTOS MD, et al., 2016).

According to Jessen ML, et al. (2019), physiotherapy is the first choice for the noninvasive treatment of ARD (VAZ LAJ, 2018). With techniques that provide strengthening of the abdominal musculature and pelvic back muscles, reduction and prevention of back pain, improve physical conditioning and self-esteem (FEITOSA GZ, et al., 2017).

Pitangui ACR, et al. (2016) consider that ARD may be related to the diagnosis of pelvic organ prolapse and urinary and fecal incontinence. Based on this assumption, early detection of this condition is extremely important for clinical practice, so that, based on the diagnosis, the physiotherapist can provide the most appropriate guidelines.

Therefore, it is necessary to analyze the physiotherapeutic approaches and resources described in the literature, in order to assist professionals in the appropriate choice for better treatment of ARD. Therefore, the aim of this study was to identify, in the scientific literature, the physiotherapeutic interventions used for the treatment of ARD in women.

2 METHODS

It is an integrative literature review, descriptive in nature, and qualitative in nature, as it includes observations, records, and subjective analysis of the data that will be collected during the evaluation (FONTELLES MJ, 2012). The integrative review aims to build a body of knowledge through evidence about interventions and/or experiences, providing more ordered and comprehensive information (ERCOLE

FF, et al., 2014). For the construction of this review, the steps of Whittemore cited in Gomes IEM, et al. (2019) were followed: identification of the topic and selection of the northern question; establishment of the criteria for the selection of the sample; definition of the information and categorization of the studies; evaluation of the studies included in the integrative review; interpretation of the results and presentation of the review.

The organization of the study strategy was carried out through the elements of the PICO strategy (P patient or condition, I intervention, C comparison and O result or outcome), which consists of elaborating the research question, facilitating the researcher's search, thus the northern question was: "What physiotherapeutic interventions are used for the treatment of ARD in women?" (SANTOS CMC, et al., 2007).

Table 1 - Components and elements of the PICO strategy.

Acronym	Description	Definition
P	Population of interest	Women with abdominal muscle diastases
I	Intervention	Physiotherapic interventions for muscle challenge diastase Abdominal
C	Comparison	Different ARD rehabilitation techniques
O	Result/Outcome	To identify the results obtained in the treatment of ARD.

Fonte: Costa DL, et al., 2021.

In order to locate a greater number of evidences for the choice of the descriptors used in the search, we consulted the Health Sciences Descriptors and the Medical Subject Headings (DeCS/MeSHMeSH). The selection of studies included articles in Portuguese, English and Spanish, in the timeless period, published in the online databases: Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Pubmed, Biblioteca Virtual em Saúde (BVS) e na Base de Dados de Evidência em Fisioterapia Physiotherapy Evidence Database (PEDro), using the search strategy in Portuguese and English: Diastase and Fisioterapia, "Diástase muscular" and "reto do abdome", "Modalidades de Fisioterapia" and abdome e Diastasis, as identified in Table 2. Studies that, after reading the title and abstract, did not agree with the objective of the review, paid articles, articles repeatedly indexed in databases, and studies from the fifty literature were excluded.

Table 2 - Search strategies used.

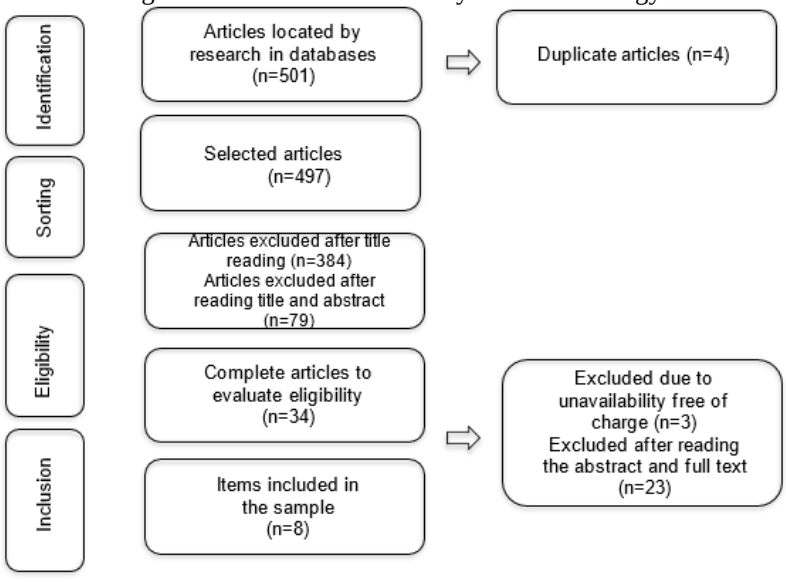
Dice bases	Search strategies
CAPES periodicals	Diastase and Physiotherapy Filters: Physiotherapy/ Postpartum Period/ Rehabilitation Publications: 14/ Samples: 2 Peer-reviewed journals Language (English and Portuguese)
Pubmed	(Diastasis) Free full text/ Randomized controlled trial Language (English and Portuguese) Publications: 378/ Samples: 2
BVS	"Diástase muscular" and "reto do abdome". Filters: Type of study (prevalence study; controlled clinical trial; diagnostic study; prognostic study; case report; observational study) Language (English and Portuguese) Publications: 16/ Samples: 3
BVS	"Modalities of Physical Therapy" and abdome. Language (English, Portuguese and Spanish) Publications: 81/ Samples: 0
PEDro	Diastasis Publications: 12/ Samples: 1
	Total Publications: 501 Total number of samples: 8

Fonte: Costa DL, et al., 2021.

3 RESULTS AND DISCUSSION

According to Figure 1, the search in the databases resulted in 501 articles found for analysis. After reading the title, abstract, full text, objectives and conclusion, 493 were excluded if they did not agree with the inclusion criteria and did not answer the research question, resulting in only 8 articles included in the sample.

Figure 1. Flow chart of the study selection strategy.



Fonte: Costa DL, et al., 2021.

After the search and application of the inclusion criteria, the works located were organized and systematized in a Microsoft Excel spreadsheet citing the type of study, objective, intervention developed and its benefit. Subsequently, studies were selected to compose the structure of the research, and then Table 3 was filled in with the following information extracted from the articles.

Table 3 - Characteristics of the database findings: type of study, objectives, intervention developed and the benefits of the intervention.

N°	Authors (Year)	Type of study	Target	Intervention developed	Benefits of the intervention
1	KIRK B e BURKE TE (2021)	Case study	Identify visceral manipulation (VM) and other techniques used to treat ARD.	Three patients received physiotherapy sessions consisting of visceral manipulation, the most common structure treated with MV was the jejunum, and included motility and mobility techniques, manual joint techniques, pelvic floor relaxation and diaphragmatic breathing. Patient 1 received seven sessions of physical therapy once every three to four weeks over 18 weeks; Patient 2 received 12 sessions of physical therapy over 36 weeks and Patient 3 received six sessions of physical therapy over 26 weeks. The first three sessions of each treatment were strictly MV.	Efficacy in the reduction of ARD measures, resulting in the improvement of two finger lengths above and below the umbilicus.
	POMPOLIM G, et al. (2021).	Randomized study	To verify if the physiotherapeutic intervention in the immediate puerperium contributes to the reduction of the diastasis.	Exercises in series: isometric contraction of the abdominal muscles and isotonic contraction of the abdominal oblique muscles by means of the anterior flexion movement combined with the rotation of the trunk. oblique abdominal muscles by means of anterior flexion movement combined with trunk rotation. The study was performed with 50 women, divided into control group and treatment group, both with 25 women.	Abdominal diameter reduction between the first and the last evaluation in both groups, characterizing the positive influence on the reduction of ARD and providing a faster recovery. It was verified that, in the treatment group, the decrease in supra-umbilical abdominal diameter was more pronounced, this difference being statistically significant ($p < 0.001$).
	KLEFENS SO, et al. (2013)	Case report	To verify the reduction of the abdominal perimeter by means of neuromuscular electrical stimulation in post-operative patients. gestation with ARD.	Ten sessions of EENM by medium frequency current were performed with Advice Master device, model Stim Cell - eight channels, two sessions per week, with a total stimulation time of 20 minutes each. The parameters used were carrier frequency of 2,500 Hz, modulated frequency of 100 Hz, cycle of 50%, rise time of 1 sec, ON of 6 sec, decay of 1 sec, and OFF of 6 sec, with intensity (mA) regulated according to the participant's sensitivity.	There was a 40% reduction of ARD, which demonstrates its effectiveness in cases of ARD and in the increase of tonus and muscle trophism.
	THABET AA, et al. (2019)	Randomized study	To identify the effectiveness of the program of deep central stability exercises in the dating of ARD and improvement quality of life.	Group 1- 20 women were subjected to a program to strengthen the stability of the deep core, in addition to the traditional program of abdominal exercises, 3 times a week, for a total duration of 8 weeks. Group 2- 20 women were subjected to the traditional program of abdominal exercises, 3 times a week for 8 weeks.	As a result of the use of the deep core stability exercise program, the inter-recentile separation showed a high statistically relevant reduction ($P<0.0001$), showing a statistically relevant improvement in relation to the quality of life in the study groups ($P<0.0001$).
5	KAMEL DM, et al. (2017).	Randomized study	To evaluate the effect of neuromuscular eletric eletric neuromuscular stimulation (ENOSS) on the recovery of abdominal muscle strength in post-natal women with ARD.	There was division into two equal groups, where the interventions occurred three times per week for 8 weeks. Group A received NMES with wave parameters were: pulse length (100-600μS) and pulse rate (1-500 pulse/s). and abdominal exercises; group B received only abdominal exercises.	Both groups showed significant improvement in all the defaults. Neuromuscular electrical stimulation helps to reduce ARD in post-natal women, if combined with abdominal exercises it can increase the effects.

Source: Costa DL, et al., 2021

Of the eight localized studies, only one showed visceral manipulation as an intervention. According to Kirk B and Burke TE (2021), this technique works through proprioceptors and mechanoreceptors to stimulate the body's mechanisms, with the aim of aiding its own repair. Bobowik PŻ e Dąbek A (2018) support a program performed in six weeks, divided into three stages with in postural exercises, active exercises associated with respiratory and educational training, focused on the correct positions that should be adopted and Kinesiotape applied once a week.

Three of the studies highlighted as intervention abdominal activation exercises performed in series and muscle strengthening through adequate muscle activation, associated with breathing exercises and postural reeducation (POMPOLIM G, et al., 2021; FRANCHI EF, et al., 2016; THABET AA, et al., 2019).

In addition, following the context of Franchi EF and Rahmeier L (2016), it is considered as a more adapted and complete version of the hypopressive exercises, the Low Pressure Fitness (LPF) technique, which according to evidence in clinical practice, works on the release of muscle fatigue, the principles of breathing, diaphragmatic aspiration, postural patterns and neurodynamic control with the objective of working the core muscles in synergy with the Pelvic Muscle Assistive Muscles (MAP), which can be an ally in the treatment of diastasis and secondary complications.

For Michelowski ACS, et al. (2014), kinesiotherapy should be performed after a careful evaluation, outlining objectives and strategies, being an exclusive conduct of the physiotherapist, in their study the treatment protocol was performed as follows: respiratory functional reeducation maneuvers, diaphragmatic stretching and thoracic unblocking until the visual perception of the abdominal respiratory pattern, weight exercises associated with the strengthening of the pelvic back muscles, followed by isometric and isotonic contractions of the abdominal muscles. It was possible to observe that, comparing before and after the application of the protocol, there was a statistically significant difference in the ARD measures.

For Michalska A, et al. (2018), in their study whose objective was to perform a review of physiotherapeutic methods, physiotherapy positively influences the reduction of the distance between the challenges, with an adequate program of strengthening of the transversus abdominis muscle and abdominal challenge, associated with postural training and manual mobilization of the tissues.

Another study also reported on the performance of exercises, however associated with electrostimulation. According to Camilo IR, et al. (2021), in their literature review, electrical stimulation associated or not with physical exercise protocol can strengthen the abdominal musculature and / or decrease the diameter. Neuromuscular electrical stimulation (NMES) stimulates the sensory and motor nerves, increasing muscle trophism (KLEFENS SO, et al., 2013). For Kamel DM, et al. (2017), muscle contraction caused by electrical stimulation can activate a higher proportion of muscle fibers than voluntary exercise.

Gadelha RSP and Souza AC (2017), in their literature review, highlight the satisfactory effects of the Russian current associated with radiofrequency. For the authors, the electrostimulation with the Russian

current has a rapid response in the improvement of muscle tone, reduces flaccidity, reduces the ARD and consequently the abdominal circumference measures, the radiofrequency that age by means of heat, causes the retraction of collagen and activation of fibroblasts leaving the skin firmer and more elastic and the tissue remodeled, improving muscle flaccidity.

Oliveira ICM and Cardoso MPC (2016) conducted an integrative review, which highlights that neuromuscular electrical stimulation (Russian current) promotes contraction in striated muscle, generating an increase in strength and hypertrophy. The technique works mainly when there is a decrease in muscle tonus, stimulating the striated muscle, increasing the capacity to generate strength and hypertrophy.

According to the data collected, it was concluded that neuromuscular electrostimulation has a beneficial response, improving the strength and tone of the muscles that are requested. In addition, the technique excludes the need for women to perform high intensity exercises, especially in the puerperal period or for those who do not feel like performing intense exercises (CAMILO IR, et al., 2020).

The study sought evidence regarding the interventions used in physiotherapy as a treatment for ARD in women. ARD is a common situation in the gestational and puerperal period, as a result of physiological and morphological changes in the female body. However, during life, women go through specific periods determined by hormonal, physical and psychological changes, which can lead to this condition, and can negatively influence the postural biomechanics, the support function of the pelvic and abdominal organs (NAGAMINE BP, et al., 2021). Physiotherapeutic action in the area of obstetrics and women's health can contribute positively, both in the development of strategies for prevention and treatment of diastasis and its complications (FEITOSA GZ, et al., 2017).

Although ARD is quite common in clinical practice, for the present study, as a limitation, there is a lack of studies that analyze the physical therapy interventions used for ARD rehabilitation, however, which does not nullify the effectiveness of physical therapy, since the studies found show progress in their results. The results did not include studies from the fifty literature (monographs, dissertations, theses and non-indexed articles), however, they agree with the findings, adding, in addition, resources such as functional bandage, pilates and postural exercises (BOTELHO RG, et al., 2015).

Thus, studies show that there are different types of physiotherapy interventions for the treatment of abdominal diastasis, however, the subject is still scarce in the databases, making necessary practical studies on the subject, and reinforces even more the importance of physiotherapy, and this integrative literature review (CAMILO IR, et al. ,2020).

4 FINAL CONSIDERATIONS

In addition to the reduction of the abdominal wall muscle diameter, physiotherapy also offers benefits by promoting greater safety during the performance of daily life activities and in the quality of life of women. These benefits positively affect both the physiological and psychological processes of this population. In this review, it was possible to identify that there are different interventions carried out in an

associated way in the treatment of the abdominal muscle challenge, and that present positive results, such as: Visceral Manipulation (VM), Active and Postural Exercises that activate the abdominal muscles, Electro-Stimulation, hypopressive exercises and Educational Instruction. However, it is also observed the scarcity of field studies referring to this subject, which indicates the need for more researches with methodological rigor for this object of study.

REFERENCES

1. BLOTTA RM. Colágenos Tipo I e III Da Linha Alba Em Mulheres Com Diástase De Músculos Retos Do Abdome. Dissertação (Mestrado em Medicina) - Universidade Federal do Rio Grande do Sul. Faculdade de Medicina. Programa de Pós-Graduação em Medicina: Ciências Cirúrgicas, Porto Alegre, 2011;65p.

2. BOBOWIK PZ, DABEK A. Physiotherapy in women with diastasis of the rectus abdominis muscles. Advances in Rehabilitation/Postepy Rehabilitacji, 2018; 32 (3): 11-17.

3. BOTELHO RG, OLIVEIRA CC. Literaturas branca e cinzenta: uma revisão conceitual. Ci.Inf., Brasília, DF, v.44 n.3, p.501-513, set./dez. 2015

4. CAMILO IR, et al. Estimulação elétrica neuromuscular na diástase, flacidez e trofismo da musculatura abdominal: uma revisão sistemática. Revista saude.com, 2020;16 (3): 1894-1900.

5. ERCOLE FF, et al. Revisão integrativa versus revisão sistemática. Revisra Mineira de Enfermagem, 2014; 18(1): 1-260.

6. FEITOSA GZ, et al. Intervenção Fisioterapêutica no tratamento da diástase abdominal pós-parto: uma revisão de literatura. Ciências Biológicas e de Saúde, 2017; 4(2): 239-250.

7. FONTELLES MJ. Bioestatística aplicada à pesquisa experimental. 1º ed. São Paulo:Editora Livraria da Física, 2012; 55-56p.

8. FRANCHI EF, et al. Efeitos da ginástica abdominal hipopressiva no puerpério imediato – Estudo de caso. Revista do Departamento de Educação Física e Saúde. Dissertação (Mestrado em Promoção da Saúde) - Universidade de Santa Cruz do Sul, 2016; 17(2): 108-112p.

9. GADELHA RSP. Tratamento da flacidez abdominal pós-parto utilizando as técnicas de radiofrequência e corrente russa. Monografia (Trabalho de conclusão de curso) - Centro Universitario de Brasília, Brasília, 2017;15 p.

10. GOMES IEM, et al. Benefícios da presença do acompanhante no processo de parto e nascimento: revisão integrativa.Revista de Enfermagem da UFSM, [S. l.], v. 9, p. e61, 2019

11. JESSEN ML, et al. Treatment Options for Abdominal Rectus Diastasis. Front Surg, 2019; 6: 65.

12. KAMEL DM, YOUSIF AM. Neuromuscular Electrical Stimulation and Strength Recovery of Postnatal Diastasis Recti Abdominis Muscles. Ann Rehabil Med, 2017; 41(3):465-474.

13. KIRK B; BURKE TE. O efeito da manipulação visceral na Diástase Recti Abdominis (DRA): Uma série de casos. Journal of Bodywork and Movement Therapies, 2021; v. 26, p. 471-480.

14. KLEFENS SO, et al. Uso da Estimulação Elétrica Neuromuscular no Manejo da Diástase de Reto Abdominal Pós-Gestacional: Relato de Caso. Revista UNIANDRADE, 2013; 14(3): 241-249.

15. MICHALSKA A, et al. Diastasis recti abdominis a review of treatment methods. Ginekologia Polska, 2018; 89(2): 97-101.

16. MICHELOWSKI ACS, et al. A eficácia da cinesioterapia na redução da diástase do músculo reto abdominal em puérperas de um hospital público em Feira de Santana - BA. Revista Brasileira de Saúde Funcional, 2014; 1(2): 05-16.

17. MOMMERS HHE, et al. The general surgeon's perspective of rectus diastasis. A systematic review of treatment options. Rev Surg Endosc, 2017; 31(12): 4934–4949.

18. NAGAMINE BP, et al. A importância do fortalecimento da musculatura do assoalho pélvico na saúde da mulher. Research, Society and Development, 2021; 10(2).

19. OLIVEIRA ICM, CARDOSO MPC. O uso da corrente russa na flacidez abdominal em mulheres no puerpério. Fisioterapia Ser, 2016; 11(4): 218-220.

20. OLSSON A, et al. Cohort study of the effect of surgical repair of symptomatic diastasis recti abdominis on abdominal trunk function and quality of life. BJS Open, 2019; 3(6): 750–758.

21. PINTO MB, et al. Efeito da bandagem elástica funcional em puérpera com diástase abdominal. Universidade São Francisco. Bragança Paulista, 2017.

22. PITANGUI ACR, et al. Análise da confiabilidade e concordância dos métodos paquímetro e polpas digitais na mensuração da diástase do músculo reto abdominal. ABCS health sci, 2016; 41(3): 150-155.

23. POMPOLIM G, et al. Atuação fisioterapêutica na redução da diástase abdominal no puerpério imediato. Universidade Federal do Estado do Rio de Janeiro. Escola de Enfermagem Alfredo Pinto.Revista Pesquisa, 2021; 13: 856-860.

24. RETT MT, et al. Diástase dos músculos retoabdominais no puerpério imediato de primíparas e multíparas após o parto vaginal. Fisioterapia Pesquisa, 2012; 19 (3): 236-241.

25. SANTOS CMC, et al. A estratégia pico para a construção da pergunta de pesquisa e busca de evidências. Revista Latino Americana, 2007; 15 (3): 508-511.

26. SANTOS MD, et al. A dimensão da diastase abdominal tem influência sobre a dor lombar durante a gestação? Revista dor, 2016; 17 (1) 43-45.

27. THABET AA, ALSHEHRI M A. Efficacy of deep core stability exercise program in postpartum women with diastasis recti abdominis: a randomised controlled trial. J Musculoskelet Neuronal Interact. 2019; 19(1): 62–68.

28. VAZ LAJ. Efeitos da ginástica abdominal hipopressiva no tratamento da incontinência urinária de esforço de mulheres: Estudo Clínco. Dissertação (Mestrado em Ciências da Saúde) – Universidade Federal de Uberlândia, Uberlândia, 2018;71p.

CHAPTER 17

Hospital management and organizational culture: a variable to understand the relationship between conflict and leadership

10.56238/rsfohsv1-017

Everton Souza Capelletto da Cunha
PhD candidate in Accounting and Administration at FUCAPE Business School; Master in Business Administration at FUCAPE Business School

Everson Fraga das Mercês
PhD candidate in Accounting and Administration at FUCAPE Business School; Master in Business Administration at FUCAPE Business School

Gabriela Birk Hansen
Doctoral student in Accounting and Administration at FUCAPE Business School; Master in Economics from the Pontifical Catholic University of Rio Grande do Sul - PUC-RS; Master in Management and Business from the University of Vale do Rio dos Sinos, UNISINOS

Paulo Joviniano Alvares dos Prazeres
Doctor in Law from the Catholic University of Pernambuco - UNICAP; Doctoral student in Accounting and Administration from FUCAPE Business School; Master in Law from the Faculty Damas da Instrução Cristã.

ABSTRACT
The study contextualizes the process of professionalization of hospital management and highlights the challenges for the leadership to deal with the dimension of the conflict between the medical, nursing and administrative subcultures. It is a descriptive research, regarding the ends, and field research, regarding the means, and the investigation instruments were: participant observation and interview. The sample involved 30 professionals from the organization. The data indicate that the conflicts between the sub-cultures are derived from the forms of work control, divergence of interests and the inequality of social treatment. In this sense, the performance of leadership must move from a command and control perspective to a more subjective one, such as building trusting relationships, mediation or even attributing meaning to the actions of those being led. The emphasis of the management process would be supported by the construction of alterity relationships between subjects, guided by processes of dialogue and negotiation.

Keywords: Management, Leadership, Hospital, Management.

1 INTRODUCTION

Health care has undergone significant changes in the sense of becoming more professional and seeking goals not previously desired, such as increasing profitability, which causes, directly and indirectly, changes in the general structure of a hospital.

According to Matos[i] , healthcare institutions, in an increasingly competitive environment, take on entrepreneurial contours, requiring, in such a context, professional management.

Some more conservative segments are still reluctant to assume the hospital as an integral part of companies in a more capitalist mold; however, these new work focuses are demonstrations of a paradigm break and concern with a new form of Quality Management, as defended by the main current authors in the area of Quality and Hospitality, such as Boeger[ii] , Taraboulsi[iii] and Dias[iv] .

Considering that the professionalization of the managerial processes of the hospital institutions is a necessity both from the efficiency and competitiveness points of view, it was elected as the focus of this study the leadership role in the treatment of the conflicts derived from the hospital's entrepreneurial process.

It is assumed that there is, in this type of organization, a duality in the management process guided by vectors that at times are placed in antagonistic positions.

On one side, the leadership of the body of specialists is found, composed of both physicians and nurses who are decision makers that involve the administrative dimension in the use of resources. However, these leaders tend to be guided by the logic of their professional training, and they hold power both because of their specific knowledge and because of the urgency and risk environment, and also because of the legitimacy in front of the team built by living together in limit situations.

On the other hand, there is the management body, which, dislocated from the medical daily routine, also occupies functions that involve adherence processes of the collaborators and actions of control and direction of the daily activities.

In this sense the organizational structure of hospitals harbor sub-cultures with peculiarities that demarcate fields of power that constitute challenges for the management process.

Van Maanen and Barley *apud* Hatch[v] define sub-culture as a sub-sector of the organization's members who regularly interact with each other, self-identify as a distinct group within the organization, and routinely guide their actions based on their collective understanding of what is best for the group.

The administrative process occurs in the tension between these two dimensions (sub-culture of technical experts - doctors, nurses, physical therapists, etc. - and administrative sub-culture). The professionalization of hospital management processes also coexists in this context, since, on the one hand, it does not abandon the health mission and the commitment to overcome limit situations involving the preservation of life and, on the other hand, it has to deal with the rationalization characteristic of management processes.

It is assumed that the performance of leaders in the administrative field of hospital institutions faces additional challenges when compared to other organizations, since they need to develop a process of adherence that overcomes the logic of the sub-cultures of specialists and, at the same time, gives meaning to actions that at first sight seem to be reduced to control.

The objective of this article is to characterize the dilemmas existing among the subcultures of specialties (medical, nursing, and administrative) in order to delimit the possibilities of leadership action in mediating the conflicts derived from this context.

2 THE HOSPITAL ORGANIZATION

The origins of the hospital system, in its contemporary profile, go back to the Middle Ages. According to Foucault[vi] , medicine, at this time, was not a hospital practice; as well as the hospital was not a medical institution, being until the XVIII century a place essentially to assist the poor.

The introduction of disciplinary mechanisms in the hospital space gave it an economic function by reducing public costs generated by the spread of epidemics. The medical performance, in such context, was the result of the transformation of the medical practice, which extends the plan of individualized care in residences to such institution.

However, this discipline gave rise to changes of a more profound character[6] . Until the middle of the 18th century, the power was held by the religious leadership, rarely lay people, destined to assure the hospital's daily life, as well as the "salvation and alimentary assistance of the interned people[6] . The physician was, therefore, under the administrative dependence of the religious staff, and could even be dismissed.

However, from the moment the hospital is conceived as an instrument of cure and the space distribution becomes a therapeutic instrument, the physician becomes the main responsible for the hospital organization[6] . In this reasoning, considering the food regimen, the ventilation, the rhythm of drinks and medications as curing factors and considering the physician as the main responsible for the control of these items, the physician becomes, directly and indirectly, economically responsible for the hospital viability.

This was the context of the time when hospitals were created, as it is known today, shaping the socio-economic relationships that are found in hospital institutions today.

The corporatization of the hospital, according to Graça[vii] , is the phase of the rupture, both conceptual and organizational, with the past of the medieval Christian hospital and the assistance hospital of the 19th Century.

Regarding the corporatization, Solè[viii] understands that this phenomenon occurs as a result of what he calls the corporatization of the world, which transforms the organizations (of social or philanthropic nature) into companies, guided by principles of profitability and competitiveness, becoming similar, in their values, to the companies linked to the world of production, constituting a universal model of human activity. In this sense, the transformation of the hospital as a social organization into a company results, besides the historical factors, from a wider process that involved the organizations.

Graça[7] explains that, after World War II, due to the weight of technological development, the hospital starts to be run as a company, modifying the whole technical work system that was accompanied by organizational changes, which can be expressed in the creation of areas that did not exist in this structure before, such as, for example, hospital engineering accompanied by quality management.

The contemporary hospital has abandoned the provision of care to assume the production of health care through the provision of services[7] . The hospital becomes part of the health care process as a subsystem of secondary care (e.g. cure and treatment) and tertiary care (rehabilitation and reintegration), in addition to being a place of teaching and biomedical research.

Because the hospital is considered an indispensable institution for the development of science and the training of human resources, as it enables the discovery of new scientific knowledge through research, Trevisan[ix] affirms the need for professional refinement in both care and management.

Gonçalves[x] , analyzing contemporary society, says that it is possible to notice the prominent place that hospitals have been occupying. The author says that they are complex organizations, which use sophisticated technology and need to have a dynamic reaction to the demands of an environment in constant

change. It is possible, through this passage, to establish the understanding of the importance of the role of leadership in this scenario of paradigms breaking and adaptation to new market needs.

3 THE CONTEXT OF LEADERSHIP

The world of work has undergone several transformations over the years and, consequently, these reflect the different management models used by organizations, as stated by Heloani[xi] , Morgan[xii] and Goulart[xiii] .

One can consider Max Weber[xiv] as a pioneer in the study of leadership styles. He differentiated the leader's behavior into three typologies: authoritarian, liberal, and democratic leadership. Weber[14] delimits the difference between these three styles, saying that autocratic leadership has its emphasis centered on the leader, who sets the guidelines to be followed and determines the techniques to be used, without any participation from the group. Democratic leadership, on the other hand, places its emphasis on both the leader and the subordinates, with the guidelines being debated and the techniques and processes being chosen by the group, assisted by the leader. On the other hand, liberal leadership places all its focus on the subordinates. According to Weber, in this case, there is complete freedom, on the part of the employees, to make decisions.

Several authors, such as Koontz *et al*[xv] , point out that leaders were important agents in the changes that took place in the work context, since they were responsible for disseminating management practices and managing the workforce.

According to the changes in the environment, Heifetz[xvi] visualizes an evolution in the concept of leadership applied to organizations. For decades, the term leadership referred to people who occupied management positions at the top of organizations. Contemporarily, the discussion distinguishes leadership from management, understanding that leaders can occupy positions in lower hierarchical levels.

From this perspective, management produces order and consistency through the development of short-term planning, organization, control, and problem solving; leadership produces change and movement in organizations through the creation of a vision, development of strategies, alignment of people as well as the responsibility to inspire and motivate the group[xvii,xviii] .

It is possible to highlight approaches related to leadership theories presented by the literature with differentiated approaches. Fleishman *et al.*[xix] highlight the existence of approximately 65 classification systems to synthesize the dimensions of leadership practice. In this context, the first difficulty encountered in defining a concept of leadership is located in the infinity of statements, facilitating confusion among different leadership styles and theories.

Yukl[18] points out different levels of the various leadership theories - individual process (theories focused on the leader like the trait theory); dyadic process (theories focused on the relationship between leader and led like the leader-leader exchange theory); and group process (theories focused on the group, understanding that the leader contributes to the group's effectiveness like the contingential theory).

There is a consensus that leadership is marked by a complex process of interrelationships between leader and followers, in which both influence the process and can determine the failure or success of this relationship[17] .

Jung and Avolio[xx] suggest that the complexity of the leadership process stems from the trust between those involved in the relationship.

For Davel and Machado[xxi] , the center of the relationship between leaders and followers is moved by power, cognition, and emotion. The balance of these factors is developed by leadership through the ordering of meanings of the organization's demands and the wishes of those involved, which should generate identification processes. In this sense, the process is not guided by authority, but primarily by negotiating the possible limits between individual desires and organizational goals, which generate consent and legitimize the leader's actions.

Zand[xxii] states that:

> Part of the leader's task is to work with people to identify and solve problems, but his access to the knowledge and creative thinking needed to solve problems will depend on how much people trust him. Trust and credibility modulate the leader's access to knowledge and cooperation.

In this way, captivating and conquering the trust of the followers is also a challenge, since this trust is based on the suitability of the relationship. In this sense, transparency and ethics are important factors, since dishonest individuals who seek only the satisfaction of individual interests do not support such a perspective[20,22] .

For Bergamini[xxiii] leadership has the role of attributing meanings to the actions developed by the followers, in this perspective the leader is an agent of cultural change. His ability to understand the organizational culture allows him to manage the meaning that is given to the actions of the organization by the followers. This process is derived from the leader's ability to establish harmony between the expectations of individual and group contributors and organizational demands. The difficulty of leadership performance would be linked to the organization's resistance to change its *status quo.*

In the hospital environment, the issue of leadership is quite complex, because the identification relations between employees, managers, and the organization are produced in various contexts.

At the level of daily performance, the physician occupies a prominent place and his function is not limited to the execution of medical procedures, but involves administrative actions over which he has autonomy given the nature of his function. This professional is exposed to situations in which consultation and authorization processes are not possible.

On the other hand, the administrative professionalization of hospitals has established a parallel line of conducting interpersonal relations, making administrative functions, previously limited to the execution of control procedures, assume a role of mediating relations.

In this context, we have two lines of leadership, which do not always act according to the same management logic. The medical sub-culture that performs activities according to what it deems correct for

the situation, and the administrative sub-culture that produces rules oriented to the professionalization process, in search of cost control, increased productivity, and the search for quality through the standardization of operations. It is in this context that the conflict between these two sub-cultures may arise: one defends greater freedom to act, foreseeing that situations cannot be catalogued and, therefore, not following protocols; while the other does not recognize the historical influence that the medical sub-culture exerts in the daily life of a hospital, trying to make them follow imposed rules without previously participating in the decisions.

However, these sub-cultures need to co-exist within the hospital environment and, in this way, in order to manage health institutions, Uribe Rivera[xxiv] , states that communication and negotiation are decisive instruments in contemporary management in search of governability of an organization with a high degree of complexity, such as a hospital.

Along this line of reasoning is Matus[xxv] , speaking about power in health organizations, saying that it is shared by several professional groups, reinforcing the need for constant improvement in communication and negotiation skills of the leaders.

Thus, he concludes that the negotiation is cooperative when the interests are distinct, however the objective is common, leading the professionals to a healthy dispute. However, the author says that when the interests are divergent and the negotiation is conflictive, the result is null.

It is understood, therefore, the vitality of the leaderships in the hospital context, once they (whether from the clinical, nursing or administrative staff) are the ones responsible for the good progress of the activities. Such harmony is a result of the healthy relationship among the players involved, considering that the mismatch between the language of each group can result in a confusing culture, generating little understanding of the organizational guidelines by the collaborators, leading to conflicts of interest and lack of alignment to the strategies proposed globally.

It is worth remembering that the hospital organization, in general, is still underdeveloped in this sense, with power struggles and mutual subtle provocations among the subcultures that supposedly act together in function of a greater objective, even due to the historical context.

4 ORGANIZATIONAL CULTURE : A VARIABLE TO UNDERSTAND THE RELATIONSHIP BETWEEN CONFLICT AND LEADERSHIP IN THE BRAZILIAN CONTEXT

The studies of organizational culture do not always consider the cultural singularities and somehow generalize concepts from other cultures, especially the North American to interpret the actions of the Brazilian organizational context. This process generates an analytical distortion, since it hierarchizes worldviews as better or worse, losing the understanding of the movement of each culture[xxvi] . In Brazil a number of studies propose a relational analysis between the traits of the Brazilian culture and the profile of the organizations .[xxvii,xxviii,xxix,xxx,xxxi]

Fleury[xxxii] highlights that the study of organizational culture is permeated by the understanding of power relations, the work process, and administrative practices, which constitute the symbolic fabric on which the interpersonal dimension is constituted.

In such a context, the study of Brazilian organizational culture must be grounded in our cultural reality, as an interpretative matrix.

About this Brazilian style of administration, Prates and Barros[27] develop a system of analysis that is based on the following axes:

> a) leaders and followers: presenting as a concentration of power on the part of the leaders and a strong paternalistic tendency, they generate in the dimension of the followers a lack of initiative, on the one hand, and a tendency to avoid conflicts, as a way of not developing a direct confrontation with the power relations, that articulated would attribute to the Brazilian followers great flexibility to deal with unforeseen and uncertain situations.
> b) institutional and personal: on one hand, the organizations are endowed with great institutionality, generating an excess of formal procedures, derived from a very centralizing authority relationship, and on the other, considering that culturally personal relationships are valued, such a situation would generate a personal loyalty to the person of the leader, which would bring problems in the moments of succession once the relationships are personal.

At the intersection of these two axes we would have impunity as the sustaining axis of apparently contradictory processes, which would generate the necessary flexibility for the execution of sanctions and the definition of policies.

Another author who conducted research on the influence of national traits on organizational culture was Hofstede. According to Hatch[5] he conducted a study in a multinational company in 40 countries, and specifically in relation to Brazil, he concluded that the Brazilian company analyzed is averse to risks, values personal relationships, has a rigid hierarchical structure, a negative view of competition, and prefers decisions by consensus.

Freitas[30] also conducted a study and defines as central traits verticalized hierarchy, personalism, rascality, sensualism, and adventurous spirit (aversion to routine work).

Although the authors have different emphases, given their perspective of analysis, it is possible to verify a certain general homogeneity in the traits of the Brazilian organizational culture.

Other authors, such as Miguelis[26] , criticize this static view of culture anchored in a 500-year historical version, however, even though we may agree that such traits are not fixed, since organizational culture is singular, we cannot disregard more general trends that certainly influence our worldview as a Brazilian population.

5 CONFLICT AND THE INTERFACES IN THE USE OF POWER

The theme of conflict was treated differently by the various management approaches. According to Motta[xxxiii] , the schools of administration can be divided into two approaches: the prescriptive and the explanatory. The first group includes the scientific administration and the humanistic approach, for which conflicts were non-existent, since both believed in a harmony of interests between employers and

employees. For the former, this harmony was natural, and for the latter, it could be achieved by a comprehensive and therapeutic management process that would eliminate individual behaviors.

The second group, in which the author includes Behaviorism and Structuralism, admit the existence of conflict, however, while the behavioral approach still seeks to resolve them through negotiation, the structuralists take it as inevitable and even desirable.

Therefore, it is the latter that include in the management agenda the dimension of conflict as an agent inherent to the organizational process, and consider it as an element that drives development.

Still, for Motta[33] this school of administration tried to identify the origins of conflicts, taking two authors as reference: Marx, for whom they are generated due to the absence of property of the means of production by the workers, and; Weber, who expands the dimension of property to control, that is, the conflicts would be generated due to a process of control exercised over the work, which would generate divergence of interests between the individual and the organization.

Therefore, after the structuralists, the reflection on this organizational theme became part of the administration theorists' concerns.

Robbins[xxxiv] , also, makes a retrospective of how conflicts have been treated in organizational theories, categorizing them into three views: the traditional one (conflict should be eliminated), the human relations one (conflict is a natural occurrence) and the interactionist one (a healthy level of conflict should be encouraged).

There is a consensus that conflicts are generated by diverging interests[12,33,34] , however, how the handling of this issue reflects on power relations is something we will dwell on a bit more.

Motta[xxxv] suggests that the treatment of conflicts is directly related to the forms of use of power. In such a perspective, the more hierarchical an organization is, the more the understanding of conflict will be articulated to its dysfunctional dimension and, therefore, subject to repression.

For the author[35] , admitting that the conflict has as its source the diversity of interests and the unequal distribution of resources, the positive confrontation of the issue could occur through participation processes.

> Participation is born as a tool for cooperation and conflict resolution. For those who admit that conflict stems from organizational and individual factors, participation is usually considered an effective form of solution, accommodation, or balance between divergent groups.

In this context, the political dimension of the organization is highlighted, and negotiation processes become part of its daily life. An expansion of the power sphere presupposes, according to the author, a more pluralistic perspective.

This approach is based on three premises: individuals are motivated and act according to self-interest; individual action is accompanied by coalition processes; and finally, that the ability to influence is directly linked to the struggle for control of processes[35] .

Therefore, the dimension of participation, from a pluralist perspective of power, is not taken in a naive way; rather, the organization is recognized as a field of forces and disputes that align or diverge

according to contexts and interests. Morgan[12] , also supported by the political perspective of organizations, characterizes conflicts by the diversity of interests, but makes a differentiation between them, which, in turn, would derive alternative forms of treatment.

The author suggests that the interests can be divided into three categories: task, linked to the work that is being performed; career, which includes personality, values, and individual preferences; and extra-wall, which articulates the dimensions of the position and the career. These categories do not develop in isolation, but articulate themselves from situations that highlight one or the other, producing a diversity of behaviors when facing the conflict.

The political metaphor, according to Morgan[12] , demonstrates how the organization deals with the relationships between interests, conflict and power, and therefore how coalitions are built to address this issue.

> In contrast to the view that organizations are interconnected, rational enterprises pursuing a common goal, the political metaphor encourages viewing organizations as networks of independent people with divergent interests who come together as a function of opportunity (...) Organizations are composed of coalitions, and coalition building is an important dimension of almost all organizational life.

In this perspective, power is directly related to the ability to face conflict, because it would be the ability to get a person to change his or her position in a given situation. Morgan[12] lists a diversity of power sources that could be used to face conflicts, such as formal authority; control of scarce resources; use of organizational structure, rules and regulations; control of the decision-making process; control of knowledge and information; control of boundaries; ability to deal with uncertainty; control of technology; interpersonal alliances, networks and control of the informal organization; control of counter-organizations; symbolism and management of meaning; gender and management of the relationship between the sexes; structural factors that define the stadium of action; the power one already has.

Morgan[12] , is also aligned with the perspective of dealing with conflicts from a pluralist perspective, that is, the recognition of the diversity of interests, purposes, and objectives present in the organization. In such a context, conflict is part of a power game, and the role of the manager is to make this game bring results to the organization. It's about maintaining an adequate level of conflict, which allows avoiding unproductivity, encouraging complacency and lethargy, while preventing it from reaching destructive and irreconcilable levels.

The author does not suggest a single path to face this issue, but proposes a diversity of positioning and style of the manager, defined from an analysis of the context and the behaviors existing in the organization in a specific situation.

The styles he proposes are: impeding, negotiating, competitive, accommodating, and collaborating. All these styles are in the context of pluralistic action, and the manager's skill lies precisely in his ability to recognize the latent areas of conflict and know how to deal with them.

Pagès *et al*[xxxvi] also recognizes the organization as a *locus* of conflicting interests.

> The organization and, if you like, a vast "intermediate zone" that interposes itself between the class contradictions, avoids or attenuates conflicts, absorbs them and integrates them into a unified social system, but is, nevertheless, constantly sustained and produced by them (...) All these phenomena do not mean the disappearance of the contradictions, nor even their attenuation. But rather the modification of the system of control of society and capitalist enterprises, its extension to new zones, in view of the changes in the productive system and in the conditions of struggle.

In such a context, the author suggests that the manager's role should be more focused on mediation, which, in such a situation, would have a conflict anticipation function.

In this case, it suggests that the treatment of this organizational problem would be linked to maintaining favorable conditions for the organizational agents, i.e., promoting well-being for employees, customer satisfaction, and good reputation.

The dialog with the authors seems to indicate that the dimension of conflict in organizations is still something to be deepened, however we could trace some trends.

The first is that conflict is part of the organizational dynamics, and, in one way or another, it has been faced by managers in an attempt to enhance its effects, whether for the subjects or for the organization.

The second one relates the conflict to a process of perception and contextualization, that is, it is not possible to define a model for dealing with this issue since different situations and different behaviors require particular ways of dealing with the issue.

And the last one is linked to the intimate relationship between conflicts and power, that is, to the same extent that part of the organizational conflicts are caused by an unequal distribution of power, this has been the fundamental instrument for its equation in the business context, demanding from managers a greater capacity for understanding and negotiating diversity.

Facing the complexity of this issue, we propose a look at an organization, in the sense of perceiving to what extent the organizational reality is aligned or not with the perspectives outlined here.

6 PARTICIPATION OF SUPERIORS AND SUBORDINATES AND PHYSICIANS IN THE MANAGEMENT PROCESS

About the participation in the management, it is clear that the work system is still centralized in the administration and especially in the presidency. From the supervisors to the coordinators, the feeling is that they have autonomy to solve situations that are within their routine; any eventuality that occurs, a higher level should be triggered. The medical part says they have autonomy to suggest changes, but they don't feel entitled to start a new routine without a member of the hospital's official body.

One of the hospital coordinators, characterizing his level of autonomy, explains that the supervisors also agree that there is autonomy restricted to routine activities, however, new initiatives are not yet encouraged.

As to the involvement of subordinates and superiors in the decision making process (of a problem-situation, of a new routine, etc.), it is verified that there is considerable variation from sector to sector. For example, in the nursing departments, where the hierarchy is more defined (because it does not depend on the organizational chart being divulged or not - there is a historical hierarchy and levels of knowledge - assistant, technician and nurse), the participation of subordinates is lower (this fact was pointed out by both supervisors and employees).

In the more administrative (operational) areas, the participation of subordinates in routines and decisions is greater.

Likewise is the participation of superiors within sectors: in nursing departments, the link between members is vertical, following the proposed hierarchy: coordinator - manager - supervisor - employee; a link that is more malleable in administrative departments.

Although the administrative sectors present a more optimistic view, some statements indicate that this issue is not yet part of the culture, and depends, to some extent, on the profile of those who hold the position:

From this perspective the nursing context is closer to the administrative one, as the involvement between those above and below the medical positions does not present direct communication.

With regard to the form of relationship and communication channels between supervisors and subordinates, it is understood that the nursing hierarchy was more rigid, which may be a result of a historical form of work and of the gradual escalation of knowledge. However, regarding the involvement between superiors and subordinates, both the administrative and nursing groups showed to be "plastered" and with not very flexible hierarchies.

In regards to the influence of the medical groups in administrative decisions, it was verified that this is understood informally. For example: if the administration establishes some routine that the medical staff doesn't agree with, they boycott the routine, not being part of it, not following what was proposed. In this way, they manage to get that routine revised.

Among physicians there is no consensus on this issue, because at the same time that some say they don't have autonomy, due to the precarious contract, since they are not employees of the hospital, but service providers, others say they feel at ease to make decisions, however, such conduct is not linked to management flexibility, but to a certain rebelliousness of the professional in relation to the rules:

The *status* that a doctor has in an institution of this nature allows attitudes like this, on the other hand, it is necessary to consider that this behavior, questioning the management, puts them in conflict with the rest of the team, there is an individual exposure, but mainly of the other team members who are co-responsible for the activity, susceptible to punishment, generating conflicts between the sub-cultures.

Participation occurs, therefore, through a process of pressure and not through spaces that favor dialogue. The role that the physician occupies in the dynamics of the hospital gives him/her power that allows this type of conduct.

One of the coordinators, when asked about the existence of influence from the medical groups in the definition of procedures that go against those already proposed by the administration, emphasized that each physician follows his or her own agenda, thus not importing the routine established by the hospital.

Faced with the difficulty of exerting power of influence over the doctors, the administration reconstructs routines to avoid constant non-compliance with procedures, however, as the dialogue channels do not work the limitations remain:

However this position is not consensual, because according to a nursing supervisor the physicians are not consulted before the elaboration of a new routine. :

This report demonstrates that in order to relativize the difficulty of exerting influence on the physician, the administrative sector delegates to the nursing department procedures that were initially the physicians' responsibility; however, they make it difficult for the nursing department to perform these activities, and somehow, they start monitoring the physicians to make the records.

A representative of the clinical staff, on the other hand, when asked about his attitudes when he receives the news of a new routine with which he does not agree, emphasizes that he tries to understand the reasons for the change in routine, going to the area supervisor, and if there is no understanding, he continues to do it in the same way as before.

Again we see that the autonomy of doctors is not related to management standards, but to pressure mechanisms that escape the control of the administrative area.

The medical class expresses concern with the problems faced by the bureaucratic dimension of the hospital. An example of this is the recurring testimonials from the administrative and nursing sectors about the lack of patience on the part of physicians in filling out the necessary documentation. When representatives of the medical class were asked about this assertion, the answers did not contradict what has already been exposed.

The precariousness of the bond, coupled with the physician's need to relate to more than one hospital, and yet, the culture of the profession that puts the physician in the role of deciding between life and death, situations in which the bureaucratic dimension makes no sense, leads physicians to take positions that exert pressure on the administrative structure that can easily be confused with autonomy.

In this context, a distant relationship is established between the medical staff and the administration. As a buffer against these conflicts, the nursing sector receives double pressure, from the doctors and from the administration, becoming prisoners of this lack of dialogue.

7 CONFLICT BETWEEN MEDICAL, NURSING AND ADMINISTRATIVE AREAS

Some people consider that there is a lot of conflict, others that there is no conflict at all. According to the answers received, when an administrative member witnesses some activity out of the routine performed by a medical member, for example, they try to solve the situation as it happens; some of them go directly to the doctor and others to their supervisors.

At the same time that some reports show rigidity, others demonstrate that people choose the intensity of this rigidity guided by personal relationships, as was previously seen, a characteristic present in the cultural profile of Brazilian organizations.

The nursing area, on the other hand, when it witnesses a physician taking an attitude out of the routine, proceeds according to its place in the hierarchy. For example, a nursing technician will usually put up with the doctor doing what she thinks is right, but will then report the case to her supervisor. If a nurse, who is responsible for a sector, sees something that is not routine, she herself will take action. If the physician continues to insist on acting out of the proposed behavior, it was observed that the situation is taken to higher levels, such as the Clinical Director and the Administration.

In the conflicts between the medical, nursing and administrative subcultures, each group takes attitudes guided by hierarchy, but primarily, when it comes to denouncing problems, they are guided by personal affinities. It is implied that there is a zone of action for each area, and as long as one does not present risks to the other, the other can proceed as it sees fit. In other words, as long as a doctor does not cause harm to the administration, he can set up his routine as he prefers. In the same way, if a doctor proceeds in a non-protocol manner, but does not interfere in the work of nursing, there will be no commotion.

In this way, conflicts do not exist openly, not least because of the co-dependence between the activities of each sub-group.

The administrative coordinators agree that differences and disagreements are not discussed.

The dissatisfaction and the desires for change are veiled and little discussed, since the contractualization between doctors and administrators is fragile. The physician is not an employee of the hospital, therefore, he/she is not interested in issues that are not his or her responsibility. In the same way, due to the lack of an employment relationship, the hospital stops demanding more participation and accountability, since this is how it has historically been done.

The difficulty that arises not only at the formal level of communication, but mainly at the cultural level, hinders the improvement of processes and, in turn, generates other conflicts with subordinate hierarchical levels that daily face the difficulties derived from this absence of discussion.

8 LEADERSHIP

When asked what they considered to be a leader, the most commonly used adjectives were: someone who helps, who listens, who collaborates in the routine, who commands well. When asked about what they considered to be a boss, the following adjectives stood out: someone who only commands, who enforces rules, who threatens, is decisive, authoritarian, very correct.

To better understand this dichotomy of roles, we asked ourselves: Can a boss be a leader, and vice versa? The answers found were dichotomous: some said that leader and boss are two different things, while others said yes.

Therefore, in the interviewees' understanding, leadership has a more affective and understanding role, while the boss is limited to command and control. Such interpretation indicates that possibly the hierarchical relationships are conflictive, and those who are in command positions are considered pejoratively as bosses.

On the other hand, it is also possible to indicate an expectant posture on the part of those who consider themselves subordinated, since they idealize in the leadership the total resolution of the problems. In this conception there is no co-responsibility for the resolution of problems, but a passive posture.

As for the leadership of the medical class, some believe that the physician is a leader even by the nature of his profession; others understand that one function in no way communicates with another.

Contradictorily to what has already been presented, this doctor states that he only takes the lead in processes when formal procedures do not exist, because otherwise he declares that he would follow the pre-defined norms.

Contrasting his professional colleague, a surgeon general, reports that the physician incorporates in his day-to-day professional life the role of a leader.

In this sense, it can be noticed that the understanding of the physician as a leader within the hospital organization depends on the posture of each physician before the type of responsibility that his/her profession assumes. Therefore, he/she goes through the same struggle as any other professional, that is, the exercise of leadership is linked to someone's desire to exercise it, and not to the formal power that is placed in the hands of the professional.

9 FINAL CONSIDERATIONS

As seen previously, the role of leadership has shifted from the command and control perspective to a more subjective one, what some authors call the construction of trust relationships[20,22] , others work with the concept of mediation[36] or even the attribution of meaning[21,23] . The meeting point between them concerns a relationship of alterity, between subjects, guided by dialog and negotiation processes.

The hospital dynamics revealed that the process of interrelations is produced by a complexity of agents who negotiate from different places of power, expertise, and organizational identity.

While the administrative and nursing subcultures have formalized ties with the organization and are therefore subject to formal authority relations, the medical subculture, given the precariousness of its contracting relationship, has an autonomy derived from the absence of the possibility of control.

On the other hand, between the administrative and nursing sub-cultures, the former is driven by the dynamics of administrative efficiency, with a relatively clear chain of command, while the latter lies between medical and administrative authority.

The administrative sub-culture has the responsibility to establish and follow control processes that need to respond to the efficiency of the activities, but at the same time, they must be adequate and

compatible with the cultural profile of the medical sub-culture, which only adopts the procedures it considers compatible with the exercise of its profession.

Besides this complex network, the administrative processes still have to take into account the characteristics of the Brazilian cultural profile, in two significant aspects: the spectator posture of part of the employees, the orientation of conduct by personal relationships, and also a vertical structure.

These factors together are enough basis to originate conflicts related to work control, divergence of interests, and unequal social treatment. It is also noteworthy that this scenario is the result of a historical construction in which the hospital organization migrated from a philanthropic profile, in which the administrative dimension was placed in a second plan, to a business profile, in this case associated with issues such as competitiveness.

The statements indicate that the reliability of relations both in the vertical and horizontal dimensions of the hierarchy are precarious. In view of this situation, the question arises as to how the performance of the leadership could mitigate this situation in order to establish more cooperative and supportive relationships capable of enhancing administrative procedures that would enable greater organizational efficiency.

The central role of leadership seems to be in establishing a process of change in the organizational culture. A first bias could be linked to the construction of identity between the organization's employees, regardless of the subculture to which they belong, and the organization. For this process to be possible, it would be necessary to align the sectorial desires of each sub-culture with the organizational objectives. This is not a process of "wearing the shirt", but primarily in the construction of significant actions in which each actor would perceive the importance of his role in the context of relationships with others, in a more systemic interaction than a hierarchical one.

Such a perspective could have as its fundamental basis the amplification of the processes of effective participation of the diverse agents through the improvement of spaces for communication and dialogue, capable of establishing processes of negotiated action in which the final product would not be interpreted as the result of pressure and power games, but in the possible advance that the moment in question was capable of producing.

The recognition of diversity is a central part of this process, for it will be up to the manager to translate the different demands among the sub-cultures so that all feel they belong to the process, minimizing possible apathy processes that make cultural changes difficult.

Such a process would offer bases for the reconstruction of hierarchical relations and the dynamics of the construction of technical and administrative procedures that affect management.

In this sense, an action of consensus building in the diverse and complex network of relationships of hospital organizations does not leave the current command power structure immune, since the process of negotiating differences will certainly lead to questioning the current hierarchy.

Complex thinking arises from the failure of the model based on the pillars of order and separability[xxxvii] . The diffusion of complex thinking seems to help in the understanding of the role of people in the construction of reality, considering that this paradigm incorporates the subjectivity[xxxviii] (SERVA, 1992). In this way, to understand the changes that have occurred in the practice of leadership, it is important to understand that the current scenario is much more complex, demanding the development of managerial competencies to face the constant changes.

The complexity of the hospital organization is a challenge for the management process, particularly concerning leadership. The theoretical framework of this field, offered by contemporary authors, seems to indicate possible ways to minimize the conflictive daily dynamics of this type of organization.

REFERENCES

[i] Matos, A. J. **Gestão de Custos Hospitalares.** São Paulo: STS, 2001.

[ii] Boeger, M. **Hotelaria Hospitalar.** São Paulo, 2002.

[iii] Taraboulsi, A. **Administração da Hotelaria Hospitalar.** São Paulo: 2003.

[iv] Dias, M. A. **O Novo Conceito na Hospedagem do Cliente.** *Revista Notícias Hospitalares*. nº 42, ano 4, set. 2003.

[v] Hatch, M. J. **Organization Theory**. New York, Oxford University Press, Inc. 1997.

[vi] Foucault, M. **Power and Knowledge**. Edited by C. Gordon. Brighton: Havester, 1979.

[vii] Graça, L. Evolução. do Sistema Hospitalar: Uma Perspectiva Sociológica**.** Conjunto de artigos sobre a História e Desenvolvimento da Saúde, 2000. Disponível em: <www.ensp.unl.pt/luisgraça>. Acesso em: dez. de 2021.

[viii] Solè, Andreu. **¿Qué es una empresa ? Construcción de un idealtipo transdisciplinario.** Work Paper. Paris, 2004.

[ix] Trevizan, M. A. **Enfermagem Hospitalar: Administração & Burocracia.** Brasília: Universidade de Brasília, 1988.

[x] Gonçalves, E. **Administração de Recursos Humanos nas Instituições de Saúde.** São Paulo: Pioneira, 1987.

[xi]Heloani, R. **Organização do trabalho e Administração**: uma abordagem multidisciplinar. São Paulo: Cortez, 1994.

[xii] Morgan, G. **Imagens da Organização**. São Paulo: Atlas, 1996.

[xiii] Goulart, I.B.; Guimarães, R.N. Cenários contemporâneos do mundo do trabalho: In: Goulart, I.B. (Org.) **Psicologia Organizacional e do trabalho**: teoria, pesquisa e temas correlatos. São Paulo: Casa do Psicólogo, 2002.

[xiv] Weber, M. **Economia Y Sociedad**. México, Fondo de Cultura Económica, 1992.

[xv] Koontz, O . O'Donnell, W. Weihrich, S. **Administração: fundamentos da teoria e da ciência.** 15ª ed. São Paulo: Pioneira, 1995.

[xvi] Heifetz, R. A. **Leadership without easy answers**. Harvard University Press, 1994.

[xvii] Northouse, P. G. **Leadership:** theory and practice. 3. ed. Thousand Oaks: Sage Publications, 2004.

[xviii] Yukl, G. **Leadership in organizations**. 4. ed. New Jersey: Prentice Hall, 1998.

[xix] Fleishman, E. A. *et al*. Taxonomic efforts in the description of leader behavior: a synthesis and functional interpretation. **Leadership Quarterly**, n. 2, v. 4, 1991.

[xx] Jung, D. I; Avolio, J. B. Opening the black box: an experimental investigation of the mediating effects of trust and value congruence on transformational and transactional leadership. **Journal of organizational behavior**, Dec. 2000.

[xxi] Davel, E.; Machado, H. V. **A Dinâmica entre Liderança e Identificação: Sobre a Influência Consentida nas Organizações Contemporâneas.** Revista de Administração Contemporânea, v. 5, n. 3, Set./Dez. 2001. p. 107-126.

[xxii] Zand, D. E. **The leadership trial**: knowledge, trust, and power. New York: Oxford Press, 1997.

[xxiii] Bergamini, C. W. Leadership: Sense Administration**. Revista de Administração de Empresas**, vol. 34, nº 3. São Paulo, 1994. p. 102 - 114.

[xxiv] Uribe Rivera, F. J. **Análise Estratégica em Saúde e Gestão pela Escuta.** Rio de Janeiro: Fiocruz, 2003.

[xxv] Matus, C. **Política, Planejamento e Governo.** Brasília: Instituto de Pesquisa Econômica Aplicada, 1993.

[xxvi] Miguelis, C.P. O estudo da cultura organizacional: as dificuldades estão no objeto ou nas formas de definir-lo? **Cadernos do EBAPE**. BR, vol. 1, n.2, December, 2003

[xxvii] Prates, M.A.S & Barros, B.T. O estilo brasileiro de administrar: sumário de um modelo de ação cultural brasileiro com base na gestão empresarial. In: MOTTA, F.P. E CALDAS, M. Cultura **Organizacional e Cultura Brasileira**, São Paulo, Atlas, 2006.

[xxviii] Motta, F.C.P . **Transformação organizacional: a teoria e a prática de inovar**. Rio de Janeiro: Qualitymark, 1997.

[xxix] Barbosa, L. **O jeitinho brasileiro**. Rio de Janeiro, Campus, 2005.

[xxx] Freitas, M.E. Cultura **Organizacional: identidade, sedução e carisma.** Rio de Janeiro, FGV, 1999.

[xxxi] Cavedon, N. R. **Antropologia para Administradores**. Porto Alegre, Editora UFRGS, 2003.

[xxxii] Fleury, M.T.L. O desvendar a cultura de uma organização uma discussão metodológica. In: Fleury, M.T.L. e Fisher, R.M. **Cultura e Poder nas Organizações**. São Paulo, Atlas, 1997.

[xxxiii]Motta, F.C.P. Teoria **Geral da Administração: uma introdução**. São Paulo: Pioneira, 1995.

[xxxiv] Robbins, S.P. **Comportamento Organizacional**. Rio de Janeiro: LTC, 1999.

[xxxv] Motta, P.R. **Gestão Contemporânea: a ciência e a arte de ser dirigente**. Rio de Janeiro: Record, 1999.

[xxxvi] Pagès, M. *et al*. **O Poder das Organizações**. São Paulo: Atlas, 1993.

SERVA, M. O paradigma da complexidade e a análise organizacional. **Revista de Administração de Empresas**, São Paulo, v. 32, n. 2, p. 26-35, abr./jun. 1992.

[xxxvii] Morin, G. **Os sete saberes necessários à educação do futuro**. 3. ed. São Paulo: Cortez, 2001.

[xxxviii] Serva, M. O paradigma da complexidade e a análise organizacional. **Revista de Administração de Empresas**, São Paulo, v. 32, n. 2, p. 26-35, apr./jun. 1992.

CHAPTER 18

Atrioventricular dyssynchrony in patients with pacemaker due to sinus node dysfunction and 1st degree AV block: Introduction to the Long PR Syndrome

10.56238/rsfohsv1-018

Andrés Di Leoni Ferrari

Eduardo Bartholomay

Fabio Michalsky Velho

Anibal Pires Borges

Matheus Bom Fraga

Luis Manuel Ley Domingues

José Carlos Pachón Mateos

ABSTRACT

BACKGROUND - Long PR intervals (1st degree AVB) and/or paced enlarged QRS can impair cardiac synchrony.

OBJECTIVES - To compare two cardiac pacing strategies for bradycardia associated with 1st degree AVB (binodal disease): (1) Long PR interval (PRi)- narrow intrinsic QRS, avoiding ventricular pacing but potentially causing AV dyssynchrony vs. (2) Optimized AV interval (iAVo)- wide paced QRS, potentially inducing ventricular dyssynchrony.

METHODOLOGY - Prospective cohort study in patients with DDD pacemaker due to sinus disease associated with 1st degree AVB (binodal disease). Diastolic filling time (DFT) was analyzed, demarcating 2 groups: Synchronic AV (SAV) and (Dyssynchronic AV (DAV). Clinical and echocardiographic follow-up was 1 year. P <0.05 was considered for statistical significance.

RESULTS - 43 patients (mean age 71 years; 51.2% female) were studied. Longer PRi associated worse baseline ventricular systolic function. DAV group (24/43) showed longer PRi (mean =283.5ms; p≤0.001) and reduced ventricular DFT (p =0.032). First degree AVB with PRi >263ms (RR =1.84; p=0.024; specificity =78.9%; 95% CI: 0.43-0.79) and DFT <40% cardiac cycle duration (RR= 0.99; p <0.001) were independent predictors of AV dyssynchrony. When PRi> 300ms, such dyssynchrony was not correctable by optimizing the AVi. SAV group (controls, n =19, mean PRi =252.4ms), despite maintaining AV synchrony, worsened mitral regurgitation (p =0.008) at follow-up.

CONCLUSIONS - Significantly different patients coexist in binodal disease: dyssynchronic AV and synchronic AV, determined by DFT and iPR length. We hypothesized the "long PR syndrome" in this scenario, resulting, *a priori*, when iPR> 263ms associates manifest impairment of diastolic ventricular filling (DFT <40% duration of the cardiac cycle).

Keywords: Artificial Cardiac Pacemaker, Diastolic dysfunction, First-degree Atrioventricular block, AV Conduction, Long PR interval

1 INTRODUCTION

Binodal disease is characterized by the association between sinus node disease (SVD) and atrioventricular block (AVB)[1] . When the NSD is treated with definitive dual chamber pacemaker (dPM) implantation and the manifestation of BAV is restricted to 1st degree BAV (PR interval >200ms), a question arises: what is the atrioventricular interval (iAV) of the dPM to be programmed to not stimulate the right ventricle (RV) and avoid myocardiopathy by artificial cardiac stimulation (ECA)?

Conventional ACE is characterized by apical implantation of the ventricular electrode, imposing antiphysiological electrical activation, similarly to what occurs in left bundle branch block (LBBB). The stimulated beat thus produces inter- and intraventricular dyssynchrony that is associated with worsening of systolic function, atrial fibrillation (AF), and heart failure (HF)[2] . To this end, MPd have algorithms and programming forms aimed at avoiding the RV ECA, prioritizing ventricular depolarization through the intrinsic conduction system and the narrow QRS, but, paradoxically, prolonged iPR are accepted, probably also antiphysiological . [1–4]

The therapeutic success of ACE varies according to the ability to recognize the potential benefits and to select, implant, and program an appropriate device. In this context, a lack of AV synchrony is suspected when on surface ECG one observes excessively prolonged iPR (1st degree BAV) associated with symptoms resulting from the loss of physiological coordination between atrial contraction and ventricular filling and systole. Mechanically, early and incomplete closure of the mitral valve occurs, often associated with the development of mitral regurgitation (MRit). Fundamentally, this AV uncoupling results in reduced duration of the left ventricular filling phase (*Diastolic Filling Time -DFT*), with a negative effect on preload and affecting systolic function and triggering or worsening presystolic RMit[5] .

2 OBJECTIVES

(a) To determine in which scenario there would be the greatest benefit (Fig.1): correcting AV dyssynchrony with ACE and stimulated QRS, or avoiding ACE and maintaining narrow QRS at the expense of long iPR and AV dyssynchrony? **(b)** To evaluate how unphysiological the AV sequence with long iPR caused by seeking to minimize RV ECA may be, by highlighting different groups in the binodal disease scenario: AV synchronous (SAV) and AV dyssynchronous (DAV) and **(c) to** determine up to which iPR value it would be beneficial to maintain long iPR-iAV aiming at narrow QRS, despite AV dyssynchrony and its hemodynamic consequences.

3 METHODS

Population

Patients with indication for implantation of dual-chamber DPM due to irreversible symptomatic bradycardia (HR<60 beats per minute - bpm) denoting DNS that, in the DDDR programming with algorithms for minimization of RV ECA enabled, showed iPR > 200ms (1st degree BAV), suggesting binodal involvement. We excluded those with reduced left ventricular ejection fraction (LVEF) (<50%), chronic or persistent AF in the last year, carriers of 2nd or 3rd degree AVB, prosthetic valves, unfavorable acoustic window on transthoracic echocardiography (preventing the measurements of the study) or QRS interval duration >130ms (in leads DI, DII and V1) intrinsic or after surgical placement of the RV lead (stimulated QRS). We also excluded patients who maintained paced QRS even after programming the maximum iAV of the MPd (absence of intrinsic rhythm), or with life expectancy less than 1 year.

Protocol

All patients implanted an *Accent* device *(Saint Jude Medical-Sylmar-CA*, USA), with positioning of the RV lead in high septal interventricular topography (parahissian?), confirmed by radiography in the anteroposterior and left lateral oblique profile projections, and of the atrial lead in the right atrial appendage. The MPd programming was according to individualized indications. For echocardiographic evaluation of AV dyssynchrony, at the moment of the exam, atrial pacing was programmed 10 bpm above the native

sinus HR. Thus, in intrinsic conduction regime (long iPR- narrow-QRS) the sequence Ap-Vs (stimulated atrium-ventricle detected) was observed, while in the presence of ECA DDD for optimal iAV (optimized iAV-stimulated-QRS) the sequence Ap-Vp (stimulated atrium-stimulated ventricle) was observed.

The following definitions were used:

- **1st degree AVB**: iPR greater than 200ms for HR <90bpm in leads D1, D2 and V1 of the conventional ECG[6] .
- **AV dyssynchrony (DAV)**: presence, at transthoracic echocardiography, of "E" and "A" waves of the transmitral flow fused, or when the sum of the "E" + "A" wave was <40% of the cardiac cycle (R-R interval). In these, we tried to correct the dyssynchrony by progressive decrease of iAV at 50/50ms intervals when iAV exceeded 200ms, or every 20/20ms when lower values. All patients remained 3 minutes in each new iAV programmed before repeating the echocardiographic measurements (recording the average of 5 measurements obtained in consecutive cardiac cycles) .[7]
- **Synchronous AV (SAV)**: when the best diastolic filling was seen under the native long iPR (visually separated "E" and "A" waves, and the sum of both exceeded 40% of the cardiac cycle (Figure 2)[1,7] .
- **Optimal AV interval (iAVo)**: during progressive reduction of iAV in the DAV group, we considered optimal the iAV that produced the best integral of the left ventricular outflow tract flow velocity (VTi), with the lowest RMit and that resulted in the highest LVEF. When there was no agreement among the 3 parameters, the iAVo was considered the one that simultaneously achieved the longest aggregate duration of "E" + "A" and the best VTi .[7,8]

Per protocol, the DAV patients were further divided into subgroups, separating them between those who would not be able to recover synchrony (uncorrected DAV) and those who became synchronous after intervention (optimization) of the iAV (corrected DAV). **Uncorrectable AV Dissynchronous (NCVD)** were those in which, despite progressive iAVo interval search, iAV was shortened to 120ms and at least one of the pre-specified conditions of AV synchronism was not verified. These cases, for follow-up purposes, were programmed at the value that demonstrated the best VTi. The others were considered **correctable AV dyssynchronous (CVAD)**.

Follow-up

The SAV group maintained long baseline intrinsic iPR-QRS by means of iAV positive hysteresis algorithm *(Ventricular Intrinsic Preference -VIP. Saint Jude Medical-Sylmar-CA*, USA*)*. The DAV group was programmed with the optimized iAV in which the best hemodynamic performance was obtained due to the restoration of AV synchrony (stimulated iAVo-QRS). In all cases at 3, 6, and 12 months (completing the predetermined 1-year follow-up), patients were reassessed by transthoracic echocardiography using

cardiac cavity diameters and LVEF measurement. After the 6th month of inclusion, all DAV patients returned to baseline iPR (*cross-over* to intrinsic long-QRS iPR) under *VIP* algorithm (Fig.3). The event recorder (holter) report from MPd was used to track the incidence of arrhythmias.

Statistical Analysis

For the pilot study we considered a prevalence of 50% of VAD for a relative risk (RR) of 5.0, with a significance level of 5% and a power of 80% for a two-tailed hypothesis test. Quantitative data were presented as mean ± standard deviation and categorical data by absolute and relative frequencies. The test applied to assess data normality was the Shapiro-Wilk test. Pearson's chi-square test or Fisher's exact test were applied to compare the groups for categorical variables. Student's *t* test for independent samples was proposed for comparison between groups for continuous variables with symmetrical distribution. For comparison of parameters over time, the generalized estimating equations (GEE) model was chosen to complete this analysis, and the Bonferroni test was applied to identify differences between groups. The association between increased iPR and decreased LVEF was performed by Pearson's correlation analysis. Poisson regression analysis was used to determine predictors of AV dyssynchrony. The criterion for variable entry into the multivariate model was based on literature and biological plausibility. To determine the best cutoff point for iPR to diagnose AV dyssynchrony, the *Receiver Operating Characteristic* (ROC) curve was used, prioritizing specificity results. AF event-free time analyses were calculated by the *Kaplan-Meier* method and compared by the *log-rank* test. A p value of <0.05 was considered an indicator of statistical significance. For the analyses, we used the SPSS v.17.0 program (*SPSS Inc.,Chicago,IL*).

4 RESULTS

The main characteristics of the study population are presented in Table 1. The research in its different phases is described in Figure 3. 19 patients were verified in the VAS group and 24 in the DAV group. The mean age was 71.5 years, with a slight female predominance (51.2%), higher in the VAS group (p= 0.08). The iPR value of 262.5ms (263ms) had the best discriminatory ability for the diagnosis of AV dyssynchrony in the study population (specificity: 78.9%, sensitivity: 58.3%; area under the ROC curve: 0.61; 95% CI: 0.43-0.79).

Table 1. Demographic and clinical characteristics of the study patients

Variables	Total Sample n=43	Synchronous (SAV) n=19	Dissynchronous (DAV) n=24	*p-value*
Age (years)	71,5±12,2	73,2±13,4	70,3±11,2	0,44
Sex				
Female	22 (51,2%)	13 (68,4%)	9 (37,5%)	0,088
Body Mass Index	26,3±3,4	25,3±3,6	27,1±	0,17
Pre-cardiopathy existing				0,26
Ischemic	10 (23,3%)	6 (31,6%)	4 (16,7%)	
Another	2 (4,7%)	0 (0,0%)	2 (8,3%)	
Absence of heart disease	31 (72,1%)	13 (68,4%)	18 (75,0%)	
Functional Class (NYHA)				
CF I	35 (23,3%)	17 (89,5%)	18 (75,0%)	0.27
CF II	8 (18,6%)	2(10,5%)	6 (25,0%)	
Medications				
β-Blocker	13 (30,2%)	5 (26,3%)	8 (33,3%)	0.87
Antiarrhythmics	4 (9,3%)	1 (5,3%)	3 (12,5%)	0.62
Others (diuretics, ASA, ARBs, thiazides)	21 (48,8%)	10 (52,6%)	11 (45,8%)	0.89

Age is presented as mean +/- standard deviation. The other variables in absolute numbers (N) and the corresponding %. SAV: AV Synchronous; AVD; AV Dissynchronous; FC; Functional Class; NYHA; New York Heart Association; iAV; AV interval.

The DAV group showed, as findings of great relevance for clinical repercussion, a longer iPR (mean 283.5ms +/- 61.2ms; p=0.032), associated with reduced diastolic filling time (DFT: 16% shorter; p<0.001) and a significant decrease in LVEF as the iPR lengthens (Figure 4). The subgroup not amenable to dyssynchrony correction (DAVNC) constituted the majority (13/24) within AV dyssynchrony and further showed significantly (p =0.001) greater involvement by reduced diastolic ventricular filling time (DFT).

There was no significant difference in the incidence of the other predefined outcomes between the groups (Table 3). For example, β-blockers, of habitual use in the study patient profile, are drugs that contribute to increased iPR. Despite the differences found associated with different levels of AV dyssynchrony and prolongation of iPR, there was no translation in outcomes associated with the use of these drugs.

Among the arrhythmic consequences of AV dyssynchrony, during follow-up there was a significant incidence of AF: 2/3 of the patients in the population had at least one documented episode, suggesting an association between long RIP and the occurrence of AF. Furthermore, a difference of 30 days (median SAV= 49 days vs. 79 days for DAV; *p*= 0.174) was observed between the groups until the first event.

Electronic arrhythmias played an important role (Table 2): *pacemaker mediated* tachycardia (PMT) as well as an even more prevalent "AV dyssynchrony arrhythmia (ADAV)". Excessively long iPR provides the appropriate setting for the development of functional atrial undetection. If the P wave of the next beat is too early, in addition to the electromechanical impairment of AV synchrony, an atrial stimulus (atrial pacing) may occur that reaches the atrial tissue in the period of repolarization and may trigger AF. With statistical and clinical significance specifically comparing those who developed AVAD *versus* those who did not, regardless of the group (SAV or DAV), patients who showed this peculiar electronic arrhythmia developed more sustained episodes of AF (p=0.039 *vs.* No AVAD).

Table 2 - Outcomes in the sample studied, by groups

Variables	Total Sample n=43	Synchronous (SAV) n=19	Dissynchronous (DAV) n=24	*p-value*
PMT	16 (37.2%)	9 (47,4%)	7 (29,2%)	0.36[a]
ADAV	8 (18,6%)	4 (21.1%)	4 (16.7%)	1.00[a]
Atrial Fibrillation	29 (67,4%)	15 (78,9%)	14 (58,3%)	0.27[a]
Symptoms of Pacemaker Syndrome	5 (11,6%)	3 (15,8%)	2 (8.3%)	0.64[a]
Hospitalizations	12 (27.9%)	5 (26,3%)	7 (29.9%)	1.00[a]

Values presented as absolute numbers(N) and the corresponding percentage (%). a: Fisher's exact test.
SAV: AV synchronous; AVD: AV dyssynchronous; AV: atrioventricular; PMT: pacemaker-mediated tachycardia: ADAV: atrioventricular dyssynchrony arrhythmia.

To better understand the differences in the context of AV dyssynchrony, the iPR was stratified into 3 levels. For the purposes of the study we considered: advanced augmentation if iPR exceeded 300ms, moderate between 262.5ms and 300ms, and mild augmentation 200ms to 262.4ms. Thus, the VAS group showed iPR predominantly in the mild increase range; the moderate increases grouped mostly patients with CVAD, and finally, in the range with increase considered advanced were mostly CNAD. Still, in this last subgroup there were 7 patients (16.3% of the sample) with more accentuated diastolic dysfunction and that, compared to the others, as expected, were more symptomatic (p=0.049).

Patients in the DAV group showed a trend toward increased LVEF under optimized iAV, despite the interposition of ACE (stimulated QRS). Even less expected, there was a further decrease in LVEF with return to baseline iPR during *cross-over* (Figure 5).

In the SAV group (long intrinsic iPR-QRS) the results suggest unfavorable evolution of mitral valve function, manifested as RMit. At baseline echocardiography, MRit was not present in 36.8% of these patients, and at the end of the annual follow-up, the absence of MRit was noted in only 15.4%.

Of greatest relevance to the study, iPR exceeding 263ms (RR 1.84; p=0.024) and reduced ventricular filling time (DFT <40% of cardiac cycle length) determined by the sum of the "E "+"A" waves of transmitral Doppler flow (RR 0.99; p<0.001) were the predictors associated with AV dyssynchrony (Table 3). Similarly, we found that for each 1-ms gain in diastolic filling duration (AV optimization), there was a 1% reduction in the probability of AV dyssynchrony. Tangentially, the findings suggest that men would be more prone to loss of AV synchrony in the presence of long iPR (RR 1.63; 95% CI 0.95-2.81; p=0.079).

Table 3 - Independent predictors of AV dyssynchrony by the long iPR.

Variables	RR (95% CI)	*p-value*
AV conduction disturbance		
iPR >263ms	1.84 (1.09-3.12)	**0.024**
Diastolic Dysfunction		
DFT (diastolic filling time) <40% cardiac cycle Sum of "E" and "A" wave duration transmitral flow	0.99 (0.98-0.99)	**<0.001**

5 DISCUSSION

It is well known that minimizing RV ECA with long iPR in pursuit of narrow QRS is efficient, has the ability to preserve ventricular mechanical synchrony, and at the same time prevent ECA-associated myocardiopathy[9-11] . The main finding of our study was to diagnose individuals with binodal disease who did not benefit from this strategy due to the resulting AV dyssynchrony. In this specific group of patients, when iPR exceeded 263ms there was an 84% increased risk of AV dyssynchrony. Thus, it is possible to state, in response to the proposed question: long iPR or stimulated QRS, that the maintenance of the "AV sequence" under prolonged iPR does not mean "AV synchrony", and does not always translate into mechanical, hemodynamic, or functional cardiac benefit.

It was proven that in those patients with AV dyssynchrony (AVD) there was a higher frequency of significantly longer iPR and, furthermore, that patients with long iPR and, at the same time, more severe AVD, showed significantly lower baseline systolic function. It is inferred from this that, as the duration of iPR increases, progressively moving away from values considered normal, the efficiency of the cardiac systolic pump decreases significantly (Fig 4) probably due to AV electromechanical dysfunction. Also in the DAV group, during follow-up with optimized iAV, there was a trend toward improvement in LVEF, a finding attributable to hemodynamic recovery by restoring AV synchrony despite the action of stimulated QRS. The favorable impact of AV synchrony restoration by iAV optimization was corroborated when, upon return to baseline iPR at the 6-month *cross-over,* there was again a drop in systolic function, a condition attributable to the resurgence of AV dyssynchrony.

Although historically regarded as benign, several recent publications associate 1st degree AVB with a worse prognosis, both in the general population and in individuals with cardiovascular disease[12–16] . Meta-analysis with 328,932 individuals confirmed that increased iPR duration is an independent risk factor for AF[17] . The *Framingham Heart Study* showed that 1st degree BAV carriers (long iPR) had higher all-cause mortality, double the risk of developing AF and triple the risk of needing MPd implantation, when compared to the general population[13] Each 20ms increase in iPR was associated with an adjusted hazard ratio of 1.11 for AF, 1.22 for MPd implantation and 1.08 for all-cause mortality . [18]

It can be stated, in summary, that ECA with MPd would solve the electrical and hemodynamic cardiac problem, but it does so at the expense of potential mechanical consequences for the heart, with clinical translation (AV dyssynchrony, HF, AF, and others)[1,19–21] . The current literature recommends, for patients with DNS who have preserved AV conduction 1:1, to associate strategies to minimize artificial ventricular pacing[22-26] . However, Healey et al, after analysis of more than 7,000 patients included in randomized studies, showed that atrial-based ECA (prioritizing the narrow QRS) constitutes favorable territory for the emergence of arrhythmias, especially AF, when compared to the DDDR mode[17] . Thus, despite the enthusiastic promotion of the benefits of different methods of reducing RV ACE as a whole, it can be seen that, when tested in specific clinical settings as in this study, the results of these resources tend to be at least debatable[9] . This raises questions about which mode of programming and operation is best for patients with MPd due to binodal disease . [1]

Our results suggest the need for revision of the Guidelines[27,28] regarding the indication of ECA of patients with DNS and 1st-degree BAV (binodal disease profile). Although there is little evidence that ECA improves survival in patients with isolated 1st degree AVB, it is proven that extreme iPR (as shown, the effects already occur from 263ms) can precipitate hemodynamic effects capable of causing symptoms and, demonstrably, as in this study, RMit. Early atrial systole would induce diastolic reversal of mitral flow (diastolic RMit) and the development of a ventricular-atrial pressure gradient, resulting in premature diastolic closure of the mitral valve. This "atriogenic" closure, still, may not be complete and the mitral valve may reopen if atrial contraction is not followed by a properly timed ventricular systole. This would serve to explain many of the clinical and functional symptoms and manifestations associated with AV dyssynchrony[8] . Therefore, some authors suggest some improvement both clinically and functionally in patients with iPR >300ms when undergoing dual-chamber MPd implantation and DDD operation under iAV optimization[12,29,30] .

In light of the results of our study, the arbitrary 300-ms limit established in the literature[12,27,28] as a cutoff point for the onset of the consequences of long iPR and indication for PMd implantation may be only a pragmatic simplification of a more complex pathophysiology. With relevant specificity (78.9%), it was demonstrated that iPR > 263ms would signal the beginning of the risk for the consequences of diastolic dysfunction by AV dyssynchrony. However, our findings show that, if the iPR exceeds 300 ms, in some

patients AV dyssynchrony is so severe that it can no longer be corrected by adjusting the echocardiographic iAVo (CNAD subgroup).

Associated with the diagnosis of AV dyssynchrony, we found a significant risk of incidence of clinical arrhythmias, predominantly AF, but also others mediated by MPd. In patients with binodal disease, atrial pacing may induce abnormal increase in AV conduction time by the long iPR configuring appropriate territory for the occurrence of "electronic" reentry arrhythmias[9] . PMT is the best known, but not the only one of this type. We observed another peculiar electronic arrhythmia called "AV dyssynchrony arrhythmia" (ADAV)[1,12,31] .

In this context, more apparent than the physiological role of HR modulation by the DPM is the alteration by the electronic mechanism and the long iPR capable of triggering ectopic activation that, depending on the moment and circumstances, can cause cardiac arrhythmias. MPd's contain a timing *software* that delimits the operating intervals, regulating the pacing function and at the same time processing the detected signals coming from the myocardium ("sense" function). A common strategy to address PMT is to lengthen the post-ventricular atrial refractory period (PVARP), and the main difference between ADAV and PMT is that in the coexistence of long iPR and extended PVARP, if high Fc occur, the P wave of the next beat will be "pushed" into the refractory period or will be trapped within another even earlier atrial canal interval (post-ventricular atrial *blanking*). This P wave, occurring in these intervals, will not be processed, considered electronically non-existent by the MPd. In these circumstances, unique to ADAV as an electronic arrhythmia, the MPd will administer an atrial stimulus that, if it occurs in the vulnerable period of repolarization of the atrial myocardium, increases the risk of triggering AF-type arrhythmias[31] . The observed difference of the medians (49 vs. 79 days) for the appearance of the first AF event demonstrates the importance of the effect of dyssynchrony correction in the DAV group (AV optimization) and reinforces the theory of the participation of mechanical alteration in the genesis of arrhythmic events[1] .

It is also pertinent to differentiate electronic events from pacemaker syndrome. Also by the long iPR, the closer the atrial systole to the ventricular systole of the previous beat ("P over T fusion", Fig 6), would produce the same clinical consequences as retrograde ventricular-atrial conduction, and similar manifestations to the classic pacemaker syndrome[32,33] . In the latter, however, AV dyssynchrony is purely systolic because the atrium and ventricle contract simultaneously, a situation commonly associated with the VVI mode in the presence of sinus rhythm[33] . Differently, our findings justify AV dyssynchrony as systolic-diastolic. Long PR intervals produce hemodynamic changes resulting from AV electromechanical uncoupling, where left and right ventricular filling is compromised because the atria contract before the opening of the AV valves that initiates ventricular diastole[1] .

Our research highlights the importance of considering the balance between AV dyssynchrony by long iPR (product of atrial pacing for chronotropic support, or together with the action of algorithms to reduce RV ACE) and intra/interventricular dyssynchrony by stimulated QRS. For all cases, the recommendation to optimize iAV must be weighed against the potential risk of inducing myocardiopathy

by ACE[1] . Hypothetically, the potential impairment by ACE could, in this protocol, have been attenuated by the fact that artificial ventricular activation is obtained from endocardial areas of the RV closer to the native (paraHissian) conduction system. In this study, the ventricular electrode lead was positioned in the highest portions of the interventricular septum, and this proximity probably allowed the eventual rapid nonselective capture of the physiological system, and taking advantage of the complex natural electrical distribution network provided ventricular activation closer to the intrinsic one (QRS duration<130ms)[34] . The favorable evolution of LVEF seen in the DAV group demonstrates the plausibility, in well-selected individuals, of correcting AV dyssynchrony without, when optimizing the iAV with QRS stimulation, producing a negative impact on the heart. This would be conditioned to the allocation of the ventricular electrode in a position whose artificial activation determines a QRS, although different from the native one, that approximates the natural sequence of cardiac depolarization[1,34-37] .

The premise of using the intrinsic conduction system itself, or as close to it as possible, opens more room for future studies, especially in relation to the revision of the Guidelines regarding the indication of PMd implantation in 1st degree AVB and the programming of devices in binodal disease. In this sense, there are new horizons in constant expansion, since with this strategy (physiological ECA) it is probably possible to maintain or restore AV synchrony under ventricular ECA - stimulated QRS and without the fear of potential injury resulting from the negative impact of artificial apical activation of the traditional RV[1,2,34,35] .

With evidence favorable to the results of physiological ECA strategies[34,35,37-40] (benefits that were not the objective of this study), it reinforces the notion that patients undergoing this methodology evolve with less RV remodeling, less structural cardiac damage and greater preservation of LVEF when compared to those under conventional ECA (apical)[34-39] . Under any hypothesis, it opens a favorable perspective to avoid that the specialist has to make the "choice" (Fig.1) between one dyssynchrony or another (AV by long iPR or inter/intraventricular by stimulated QRS).

A further explanation for the absence of the potential negative repercussion associated with the imposition of RV ECA in our sample would be in the substrate. Because these were patients without structural cardiac changes and with normal LVEF, they would initially be more impaired by the effects of AV dyssynchrony by long iPR than by stimulated QRS. Appropriate electromechanical timing resulting from iAV optimization would compensate, for a period (not determined in this study, but certainly greater than 1 year), the potential deleterious consequences of ventricular ECA. This observation is consistent with the subgroup results of the *MOde Selection Trial* (MOST)[41] . Sweeney et al. analyzed a subgroup of 1,339 patients with DNS, randomized to DDDR (707 patients) or VVIR (632 patients). After a mean follow-up of 33.1 months, it was shown that the incidence of these complications can be considered low in patients with preserved LVEF and no structural heart disease, as only 10% of patients developed HF attributed to ACE . [41]

Finally, from the global and in-depth analysis of the results obtained, considering especially the particularities of patients with AVD and determined by abbreviated diastolic filling (DFT<40% of the cardiac cycle), criteria to characterize what we would call "long PR syndrome" are put into perspective. This would show a homogeneous population that stands out for clinical and electromechanical AV worsening with repercussions on ventricular function determined by the permissive maintenance of antiphysiologic long RIP (>263ms)[1,2] . It would group, hemodynamically, the LVEF finding that worsens as the iPR is prolonged and that is corrected by optimizing iAV. From an electrocardiographic standpoint it associates long PR with a higher incidence of arrhythmias (electronic and AF), and structurally it exposes worsening of the RMit with time. Although inconsequential in the normal heart, diastolic RMit may contribute significantly in the comprehensive context of the long PR syndrome to the unfavorable hemodynamic circumstances present in patients with 1st degree AVB.

6 LIMITATIONS

This study, despite the statistical consistency of the findings, has the expected limitations for a small population, very selected (binodal disease, preserved LVEF, almost normal stimulated QRS, devices from a single manufacturer, etc.), not randomized and analyzed during a short follow-up period. Although the uniformity of criteria contributes to reduce measurement bias, the lack of a *core laboratory* for analysis of echocardiographic images is a limitation that may influence some of the statements extracted. At the same time, highlighting the complexity of the aspects involved, it is unknown whether the long native iPR or the stimulated iAVo change with position variations throughout the day or whether the condition of AV dyssynchrony could be modulated by other clinical situations, such as increased Fc during physical activity, a condition that was not included in the objectives of this study.

Finally, it is appropriate to register that the theory of the long PR syndrome, under the hypothesis of AV dyssynchrony, without sounding pretentious, aims to organize in a didactic way the new observations for clinical practice facilitating the understanding of a relevant subject.

7 CONCLUSIONS

There are patients with significantly distinct characteristics in the association of DNS and 1st degree BAV (binodal disease): AV dyssynchronous (AVD) and the synchronous ones (SAV). The differences are determined by the iPR duration when it exceeds 263ms (Fig 6) and by the insufficient diastolic filling time (DFT<40% of cardiac cycle) denoting diastolic dysfunction and AV dyssynchrony (Fig 2). It is still possible that, in this specific population, there is benefit from iAV optimization associated with the positive effect of forms of ACE from alternative more physiological sites (Hissian, parahissian or deep septal ventricular). However, AV dyssynchrony in binodal disease as a manifestation of a possible long PR syndrome still needs to be better studied and the existence confirmed by randomized clinical trials.

REFERENCES

1.Ferrari, ADL.; Pachon Mateos, J. C. Avaliação de dessincronia atrioventricular em portadores de marca-passo bicameral devido à doença do nó sinusal e bloqueio atrioventricular de primeiro grau. Tese. Instituto Dante Pazzanese de Cardiologia - Universidade de São Paulo. São Paulo, 2017.

2.Ferrari ADL, Borges AP, Albuquerque LC, Sussenbach CP, Rosa PR da, Piantá RM, et al. Cardiac pacing induced cardiomyopathy: mith or reality sustained by evidence? Rev Bras Cir Cardiovasc. 2014;29(3):402-13.

3.Sweeney MO, Prinzen FW. Ventricular pump function and pacing: physiological and clinical integration. Circ Arrhythm Electrophysiol. 2008;1(2):127–39.

4.van Geldorp IE, Vanagt WY, Prinzen FW, Delhaas T. Chronic ventricular pacing in children: toward prevention of pacing-induced heart disease. Heart Fail Rev. 2011;16(3):305–14.

5.Mele D, Luisi GA, Malagú M, et al. Echocardiographic evaluation of cardiac dyssynchrony: Does it still matter? Echocardiography. 2018;35:707–715.

6.Pastore CA, Pinho JA, Pinho C et al. III Diretrizes da Sociedade Brasileira de Cardiologia sobre Análise e Emissão de laudos Eletrocardiográficos. Arq Bras Cardiol. 2016;106(4 Supl. 1):1–23.

7.Júnior AP, Ribeiro BC, Augusto J, Meneghini M, Sincos IC, De Oliveira FF, et al. Otimização do marcapasso na ressincronização cardíaca: importância da ecocardiografia. Relampa. 2012;25(2):107–16.

8.Panidis IP, Ross J, Munley B, Nestico P, Mintz GS. Diastolic mitral regurgitation in patients with atrioventricular conduction abnormalities: A common finding by doppler echocardiography. J Am Coll Cardiol. 1986;7(4):768–74.

9.Ferrari ADL, Borges AP, Pachón Mateos JC, Piantá RM, Bonato G, Benedetti S. Características, benefícios e consequências dos algoritmos de minimização da estimulação do ventrículo direito por dispositivos de estimulação cardíaca. Relampa. 2015;28(2):59–70.

10.Sweeney MO, Ellenbogen K a, Tang ASL, Johnson J, Belk P, Sheldon T. Severe atrioventricular decoupling, uncoupling, and ventriculoatrial coupling during enhanced atrial pacing: incidence, mechanisms, and implications for minimizing right ventricular pacing in ICD patients. J Cardiovasc Electrophysiol. 2008;19(11):1175–80.

11.Siu C-W, Wang M, Zhang X-H, Lau C-P, Tse H-F. Analysis of ventricular performance as a function of pacing site and mode. Prog Cardiovasc Dis. 2008;51(2):171–82.

12.Barold SS, Herweg B. Conventional and biventricular pacing in patients with first-degree atrioventricular block. Europace. 2012 Oct; 14 (10):1414–9.

13.Cheng S, Keyes MJ, Larson MG, McCabe EL, Newton-Cheh C, Levy D, et al. Long-term outcomes in individuals with prolonged PR interval or first-degree atrioventricular block. JAMA. 2009;301(24):2571–7.

14.Uhm JS, SHim J, Wi J, Mun HS, Park JPSH, et al. First-degree atrioventricular block is associated with advanced atrioventricular. J Hypertens. 2014;32(5):1154

15.Crisel RK, Farzaneh-Far R, Na B, Whooley MA. First-degree atrioventricular block is associated with heart failure and death in persons with stable coronary artery disease: data from the Heart and Soul Study. Eur Heart J. 2011;32(15):1875–80.

16.Zeynalova S, Kornej S, Loeffler M, Tautenhahn S, Stoebe S, Thiery J, et. al. PR interval prolongation as intermediate phenotype for atrial fibrillation: Association with echocardiographic parameters and biomarkers (the LIFE-Adult-Study). Europace, March 2018. Vol 20, Suppl 1.

17.Healey JS, Toff WD, Lamas G a, Andersen HR, Thorpe KE, Ellenbogen K a, et al. Cardiovascular outcomes with atrial-based pacing compared with ventricular pacing: meta-analysis of randomized trials, using individual patient data. Circulation. 2006;114(1):11–7.

18.Cheng M, Lu X, Huang J, Zhang S, Gu D. Electrocardiographic PR prolongation and atrial fibrillation risk: a meta-analysis of prospective cohort studies. J Cardiovasc Electrophysiol. 2015 Jan;26(1):36-41.

19.Sweeney MO, Prinzen FW. A new paradigm for physiologic ventricular pacing. J Am Coll Cardiol. 2006;47(2):282–8.

20.Bogdan S, Glikson M. Physiological pacing: a moving target? Eur Heart J. 2015;36(3):141–2.

21.Padeletti L, Pontecorboli G, Michelucci A, Mond HG. AAIR or DDDR pacing for sick sinus syndrome: the physiologic conundrum. Europace. 2012;14(6):781–2.

22.Barold SS, Herweg B, Sweeney MO. Minimizing right ventricular pacing. Am J Cardiol. 2005;95(8):966–9.

23.Vardas PE, Simantirakis EN, Parthenakis FI, Chrysostomakis SI, Skalidis EI, Zuridakis EG. AAIR versus DDDR pacing in patients with impaired sinus node chronotropy: an echocardiographic and cardiopulmonary study. Pacing Clin Electrophysiol. 1997;20(7):1762–8.

24.Auricchio A, Ellenbogen KA. Reducing ventricular pacing frequency in patients with atrioventricular block. Circ Arrhythmia Electrophysiol. 2016;9(9):1–10.

25.Bode F, Wiegand U, Katus HA, Potratz J. Inhibition of ventricular stimulation in patients with dual chamber pacemakers and prolonged AV conduction. Pacing Clin Electrophysiol. 1999;22(10):1425–31.

26.Stockburger M, Boveda S, Moreno J, Da Costa A, Hatala R, Brachmann J, et al. Long-term clinical effects of ventricular pacing reduction with a changeover mode to minimize ventricular pacing in a general pacemaker population. Eur Heart J. 2015;36(3):151–7.

27.Kusumoto FM, Schoenfeld MH, Barrett C, et al. 2018 ACC/AHA/HRS Guideline on the Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines, and the Heart Rhythm Society. Circulation. 2019 Aug;140(8):e333-e381.

28.Brignole M, Auricchio A, Baron-Esquivias G, et al. 2013 ESC guidelines on cardiac pacing and resynchronization therapy. The Task Force on Cardiac Pacing and Resynchronization Therapy of the European Society of Cardiology (ESC). Developed in collaboration with the European Heart Rhythm Association (EHRA). Europace 2013;15: 1070–118.

29.Gillis AM, Pürerfellner H, Israel CW, Sunthorn H, Kacet S, Anelli-Monti M, et al. Reducing unnecessary right ventricular pacing with the managed ventricular pacing mode in patients with sinus node disease and AV block. Pacing Clin Electrophysiol. 2006;29(July):697–705.

30.Olshansky B, Day JD, Lerew DR, Brown S, Stolen KQ. Eliminating right ventricular pacing may not be best for patients requiring implantable cardioverter-defibrillators. Heart Rhythm. 2007;4(7):886–91.

31.Barold SS. Repetitive Reentrant and Non-Reentrant Ventriculoatrial Synchrony in Dual Chamber

Pacing.Clin. Cardiol 1991; 14,754-763.

32.Wilkoff BL, Love CJ, Byrd CL, et al, American Heart Association. 2015 HRS/EHRA/HRS/SOLAECE expert consensus statement on optimal implantable cardioverter-defibrillator programming and testing. Heart Rhythm 2016;13:e50–86.

33.Ledesma García C, García Calabozo R, Pastor Fuentes A. Selección del modo de estimulación en las bradiarritmias. Controversias sobre la indicación del modo AAI o el modo DDD en la enfermedad del nódulo sinusal y sobre la utilización del modo VDD en el bloqueo auriculoventricular. Rev Esp Cardiol Supl. 2007 Jan;7(7):69G–81G.

34.Reis GG, Ferrari A, Cabral GC, Gazzoni GF, Ley LM, Willes JCF, Ferreira FVC, Lodi LO.Advances in Physiological Cardiac Stimulation. J. Cardiac Arrythmias Jan - Mar, 2021, São Paulo, v34, 1, pp. 45-47.

35.Abdelrahman M, Subzposh FA, Beer Dominik et al. Clinical outcomes of His Bundle Pacing compared to Right Ventricular Pacing. JACC 2018;May 22;71(20):2319-2330.

36.Mani H, Shirayama T, Suzaki Y, Sakatani T, Sakamoto T, Yamamura M, et al. Clinical significance of preserving spontaneous QRS wave in the therapy of DDD pacing for sick sinus syndrome. Pacing Clin Electrophysiol. 2004 Sep;27(9):1212–6.

37.Scopin Luiz G., Pachon Mateos José C., Pachón Mateos Juan C., Albornoz Vargas Remy N. R dos SFE. Terapia de ressincronização cardíaca no tratamento da cardiomiopatia induzida por marca-passo. Relampa. 2015;28(4):175

38.Wouters PC, Venooy K, Cramer MJ, Prinzen FW, Meine M. Optimizing lead placement for pacing in dyssynchronous heart failure: the patient in the lead. Heart Rhythm 2021. *In press.* doi.org/10.1016/j.hrthm.2021.02.011

39.Zhuang L, Mao Y, Wu L, Niu W, Chen K. Effects of right ventricular septum or His-bundle pacing versus right ventricular apical pacing on cardiac function: A systematic review and meta-analysis of randomized controlled trials. Journal of International Medical Research 2018, Vol. 46(9) 3848–3860.

40.Ortega D, Logarzo E, Barja L, Paolucci A, Mangani N, Mazzetti E, Bonomini MP. Novel implant technique for septal pacing. A noninvasive approach to nonselective His bundle pacing. Journal of Electrocardiology 2020, Volume 63, 35-40.

41.Sweeney MO, Hellkamp AS, Ellenbogen K, Greenspon AJ, Freedman R, Lee KL, et al. Adverse effect of ventricular pacing on heart failure and atrial fibrillation among patients with normal baseline QRS duration in a clinical trial of pacemaker therapy for sinus node dysfunction. Circulation 2003; 107(23):2932–7.

ANEXOS

Fig. 1 - Long PR interval or stimulated QRS? The former can generate atrioventricular dyssynchrony and the latter intra- and interventricular dyssynchrony.

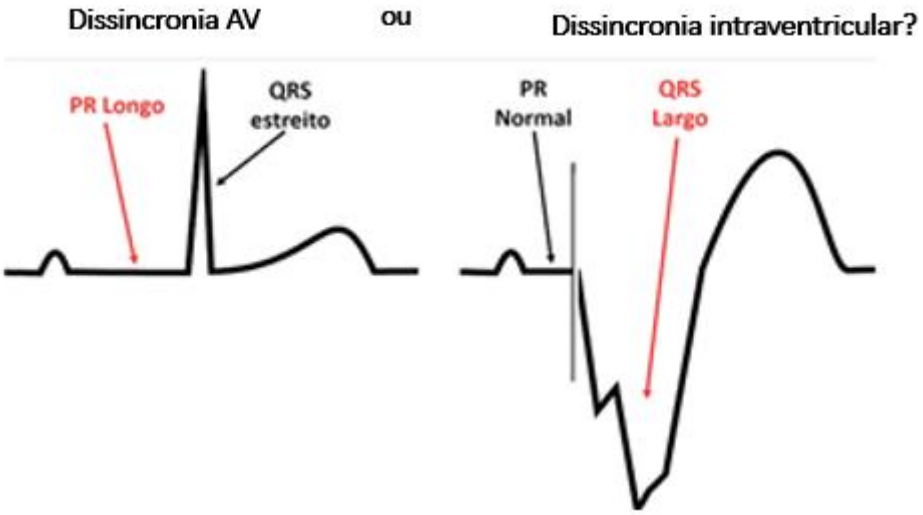


Fig. 2 - The optimal AV interval (iAVo) is defined as the period that allows the completion of the atrial contri-bution to diastolic filling (Diastolic Fllling Time - DFT - which should last at least 40% of the cardiac cycle). The iAVo results in the most favorable preload before ventricular contraction, with the minimum RMit.
To the Left: AV dyssynchrony (A), manifested by the observation of the "E" and "A" waves of the trans-Mitral flow fused and almost superimposed, determining that the sum of both waves results in a suboptimal ventricular diastolic filling time (DFT = 38%), not allowing the conclusion of the atrial contribution to diastolic filling. Right (B) optimal iAV (iAVo): the sum of both waves (E + A) reaches 52% of the cardiac cycle dura-tion), resulting in a favorable preload before ventricular contraction.1
DFT: diastolic filling time; DFTc: diastolic filling time corrected for cardiac cycle; ET: ventricular ejection time; E and A: Doppler transmitral flow waves.

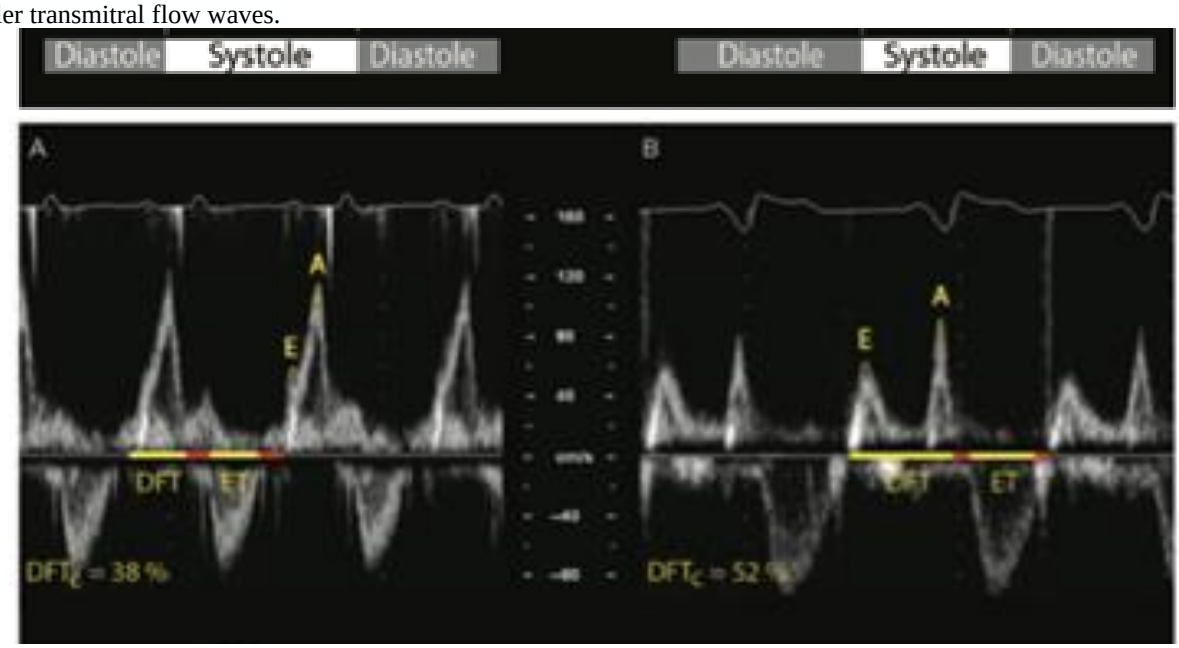


Fig. 3 - Study protocol. Recruitment, inclusion, follow-up and outcomes.

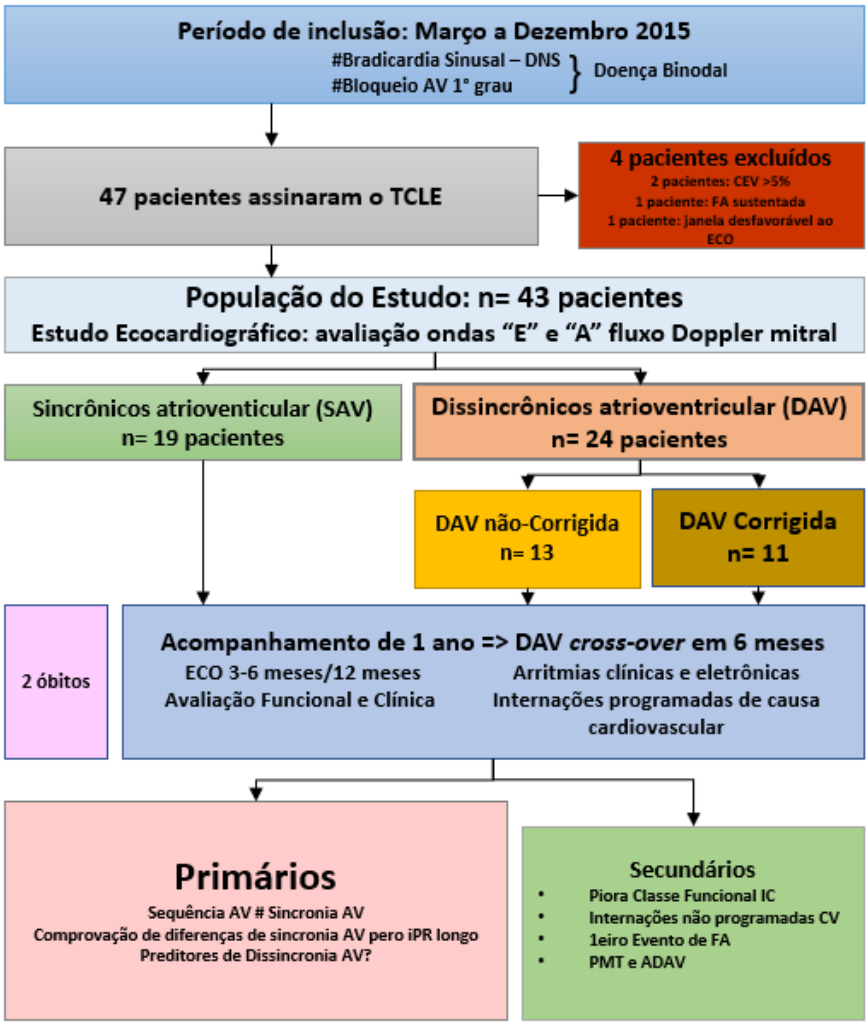


Fig. 4 - Association between increased RIP and decreased LVEF. It shows a significant worsening of systolic function in the dyssynchrony group (DAV) according to the longer duration of iPR.

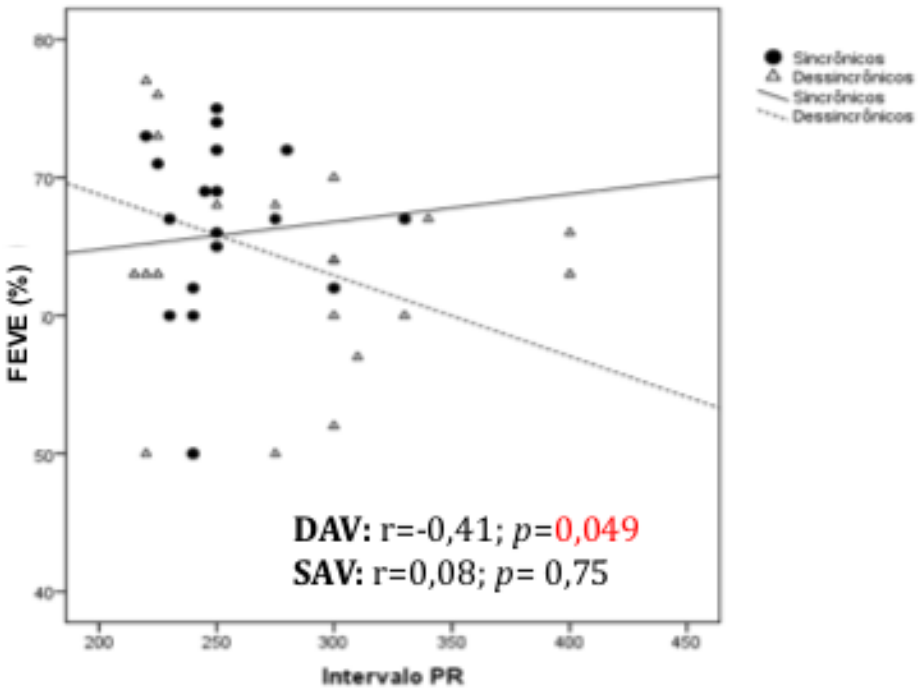


Fig. 5 - Evolution of LVEF during follow-up. Tendency to increase under the influence of optimal iAV (iAVo) and stimulated wide QRS in the DAV group

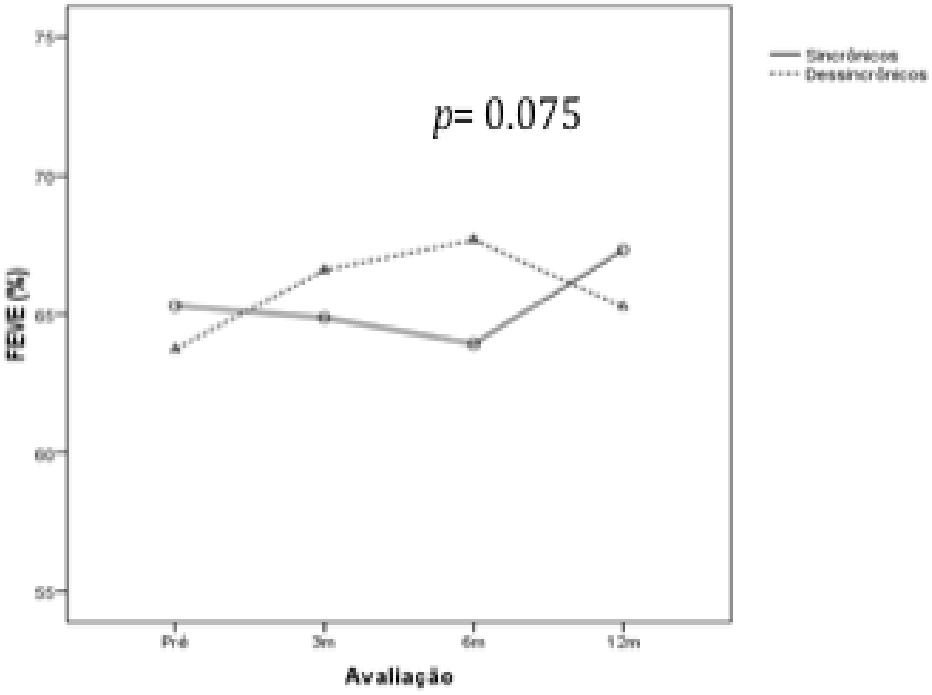
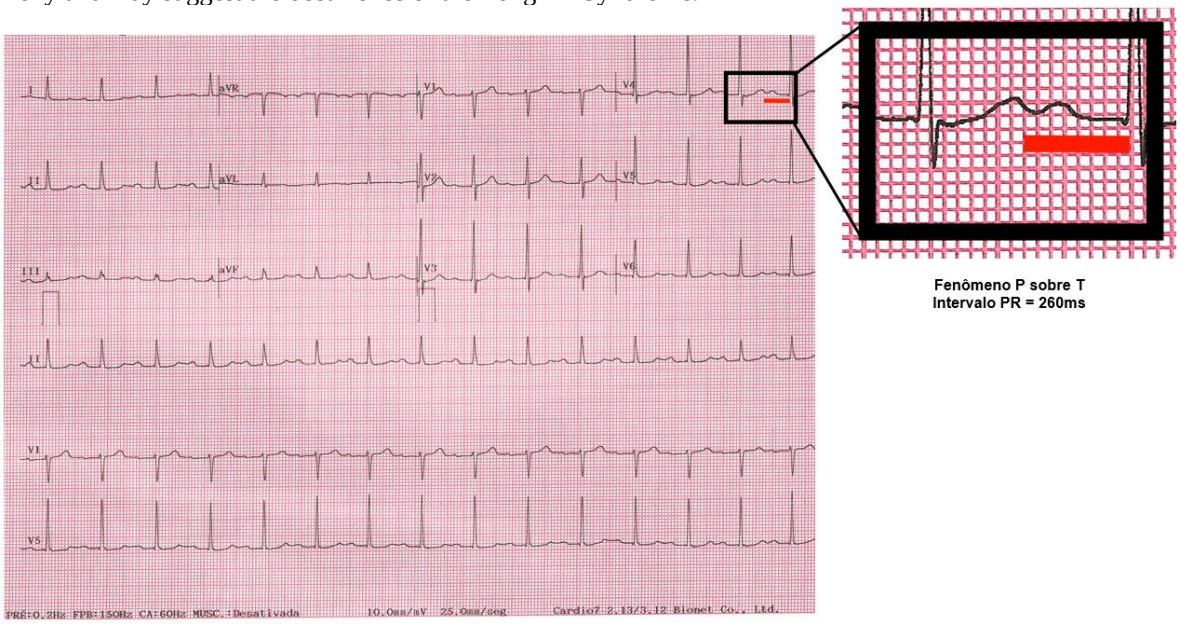


Fig 6: When the 263ms PR interval limit is exceeded, and the P over T phenomenon appears, there is a significant risk of AV dyssynchrony and may suggest the occurrence of the Long PR Syndrome.



CHAPTER 19

Methodologies for identification of food standards in brazilian adults: integrative review

10.56238/rsfohsv1-019

Rafaella Maria Monteiro Sampaio
Nutritionist. PhD in Collective Health (UECE). Fellow of the Research Productivity Program of Estácio do Ceará. Professor at the Christus University Center and Estácio do Ceará University Center

Gláucia Maria Torquato Luna
Nutritionist graduated at the Estácio do Ceará University Center

Thatiana Ramos Cavalcante
Nutritionist graduated at the Estácio do Ceará University Center

Francisco Eudes dos Santos
Nutritionist graduated at the Estácio do Ceará University Center

Yngrid Santana Flor
Nutritionist graduated at the Estácio do Ceará University Center

Iramaia Bruno Silva
Nutritionist. PhD in Biotechnology (UECE). Professor at the Christus University Center and the University of Fortaleza

ABSTRACT
Objective: Accomplish a bibliographic lifting about identification of food patterns in the adult population. Method: The data collection was performed through a bibliographic search in a computerized data base, being rescued 176 Scielo publications. Results: Only 8 articles have identified food patterns by means of *a priori* and *a posteriori* approach in Brazilian adults, being all of transverse type. Final Considerations: There are few Brazilian studies that investigated adults food patterns using methodologies of approach *a priori* and *a posteriori*, in the electronic data base used for the bibliographic search of the present study. Both demonstrating a need for strategies to improve the nutrition of adults.

Keywords: Food Consumption, Food Patterns, Adults.

1 INTRODUCTION

A balanced diet is a fundamental and indispensable requirement for the quality of life and longevity of populations. Diet is considered one of the modifiable risk or protective factors that can be discouraged or added to people's lives. Thus, changes in dietary profile result in changes in morbidity and mortality patterns.[1]

For a long time the relationship between dietary habits and health was analyzed only by taking into account the consumption of nutrients or isolated foods. However, the knowledge that foods and nutrients interact with each other and can demonstrate synergistic effects has led nutritional epidemiology to studies of dietary patterns.[2]

Dietary patterns can be defined as a general description of food and nutrient consumption, characterized with the usual eating habit.[3] In recent decades, the Brazilian population has undergone major changes in dietary patterns due to social, economic, demographic, and health changes, such as increased income, intensification of the urbanization process, greater participation of women in the labor market - leading to the growth in popularity of eating out, better access to a greater variety of foodstuffs, and scarcity of time in modern society.[4,5]

Changes in dietary pattern and lifestyle have reproduced a significant increase in the prevalence of overweight and obesity, becoming one of the main risk factors for Non-Transmissible Chronic Diseases

(NCD), especially in young adults. This information is confirmed by the Family Budget Survey (POF), which detected a 50% prevalence of overweight in the Brazilian adult population, low consumption of foods rich in fiber, such as fruits, vegetables, and legumes, and high consumption of foods rich in saturated fat, salt, and sugar. In addition, other recent results show that less than ¼ of the population has a recommended consumption of fruits and vegetables, which expresses the low quality of the Brazilian diet.[6]

For the identification of dietary pattern, two analytical approaches are usually employed: *a priori* and *a posteriori*, both of which require in-depth statistical handling of food consumption data. When foods are combined taking into consideration the association's prior health knowledge, according to the composition of an adequate diet or nutritional recommendations and guidelines, the pattern is said to have been defined *a priori*.[7]

The Healthy Eating Index and the Diet Quality Index are examples of a recommendation-based score for dietary pattern assessment. These indices, respectively, measure the degree to which an individual's diet conforms to the recommendations of the *US Department of Agriculture Food Guide Pyramid and* the recommendations of the *Committee on Diet and Health*.[2]

On the other hand, dietary patterns determined a *posteriori* are achieved by more robust statistical analyses, according to the correlations between the variables of food surveys, making it possible to obtain the dietary patterns of a given population, even if these do not portray a healthy diet. This provides a more comprehensive assessment of the diet and gives room for the promotion of better targeted preventive actions. Factor analysis and cluster analysis are the main methods used in the *a posteriori* approach.[7]

Therefore, this theme is extremely relevant because of the need to evaluate food intake as a form of prevention of diseases and illnesses resulting from an inadequate diet, thus aiming to promote healthy eating. In addition to contributing to the scope of research, because there are few Brazilian studies dedicated to the identification of dietary patterns in adults.

In this way, the objective was to carry out a bibliographic survey on the identification of eating patterns in the adult population, and to analyze and provide guidelines on methodological aspects for studies that intend to use this approach.

2 METHOD

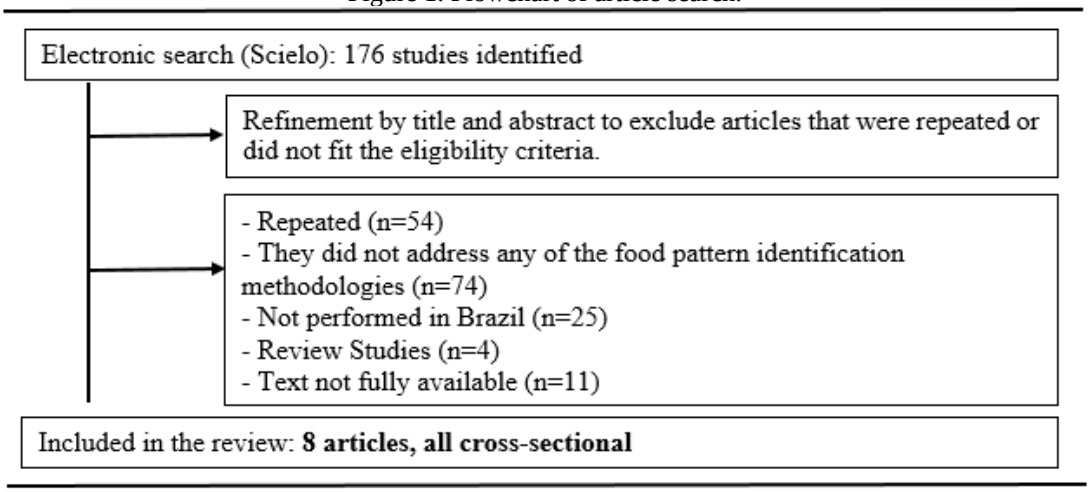
This study is based on a review of the knowledge available in the literature, where a bibliographic search was conducted in a computerized database, according to guidelines proposed by Mendes, Silveira and Galvão.[8] The search was conducted in the electronic database *Scientific Electronic Library Online* (Scielo), during the period from August to December 2017, with articles that investigated eating patterns through the *a priori* and *a posteriori* approaches, in Brazilian adults.

Articles published from 2010 to 2017, written in Portuguese, English or Spanish, were included. We excluded articles from research that were not conducted in Brazil and that were not available in full, since this fact made it difficult and/or impossible to extract relevant information for the investigation of

dietary patterns and possible outcomes.

The following descriptors were used in Portuguese and their corresponding in English: "food patterns", "food consumption" and "adults". After using these descriptors, 176 publications were retrieved. The inclusion and exclusion criteria were applied, as well as the suppression of duplicates (identical articles in the database), review articles and previous analysis of publications that did not meet the research objectives, thus retrieving a total of 8 articles (Figure 1). These were presented in tables.

Figure 1. Flowchart of article search.



3 RESULTS AND DISCUSSION

Chart 1 shows the methodological aspects of Brazilian studies that identified dietary patterns in adults, through the *a priori* approach. Among the analyzed studies, three articles used the 24-hour recall (R24h) as an instrument to collect dietary information and one article used the food frequency questionnaire (FFQ). The statistical analysis technique used was different in each study.

The study by Costa et al.[9] was the only one that addressed only one gender: physically active women. The mean score of the Diet Quality Index was 66.64 points, with 90.60% of the population presenting a diet in need of modification. These scores were obtained through ten components that characterize different aspects of a healthy diet (cereals, bread and roots; vegetables; fruits; milk and dairy products; meat and eggs; legumes; total fat; cholesterol; sodium, and diet variety). When making an association with nutritional status, the authors observed that in the vegetables component, obese women had a lower intake than non-obese women. Regarding age, the components vegetables, milk and dairy products, diet variety and the final score, higher scores were obtained among older adults.

In Cuiabá-MT, Loureiro et al.[10] different from Costa et al.[9] have investigated the diet quality of adults of both sexes through the Revised Diet Quality Index (IQD-R). The mean IQD-R was 75.2 points, with a statistically significant difference between genders. Women scored better for whole fruits and sodium, while men scored higher for oils, oilseeds, and fish fat. Individuals aged 30 years and older had higher scores for total IQD-R, whole fruit, saturated fat, and calories from solid fat, alcohol, and added

sugar. Therefore, participants with better diets were women, individuals aged 30 years or older, and participants whose head of household had higher education.

In the study by Ferrari et al.[11] the researchers analyzed not only the quality of diet, but also lifestyle (physical activity; food consumption; smoking; alcohol abuse and dependence, according to the respective recommendations). The prevalence of healthy lifestyle was 15.4% among adults, and was higher among females. Among those with an unhealthy lifestyle, 32.2% did not meet the recommendation for a healthy diet. Despite taking into account different variables, food consumption was the main responsible for the unhealthy lifestyle.

Table 1. Methodological aspects of studies that identified dietary patterns by a *priori* approach in adults in Brazil.

Author/Year	Costa et al. [9]	Loureiro et al.[10]	Ferrari et al.[11]	Assumption et al.[12]
Local	Aracajú (SE)	Cuiabá (MT)	São Paulo (SP)	Campinas (SP)
Delineation	Transversal	Transversal	Transversal	Transversal
Sample	169 women	195 adults of both sexes	582 adults of both sexes	949 adults of both sexes
Goal	To evaluate the quality of the diet of physically active women according to age and nutritional status	Analyze the quality of the diet and identify associated factors	Analyze Lifestyle	To evaluate the differences in the overall indicator and the components of IQD-R, as well as the factors associated with IQD-R
Inquiry	R24h	QFA	R24h	R24h
Statistical Analysis	Descriptive and Variance	Estimation of prevalence ratios: Poisson Regression	Chi-square test for heterogeneity and 95%CI	Simple Linear Regression and Multiple Linear Regression
Results	66.64 points was the average IQD, with 90.60% of the population in need of dietary modifications	75.2 points was the average IQD with a significant difference between genders	15.4% was the prevalence of Healthy Lifestyle among adults, being higher among females	The global IQD-R reached 52.7 points, being higher among women

IQD-R: Revised Dietary Quality Index; 95%CI: 95% Confidence Interval; FFQ: Food Frequency Questionnaire; R24h: 24-hour recall.

Assumpção et al.[12] conducted a research that presented the largest sample among the studies analyzed in this review using the *a priori* approach, reaching 949 adults. [10]The global IQD-R reached 52.7 points, being higher in women. This gender showed higher scores in the fruits, vegetables and milk components; among males, the score was higher only for the meat and eggs component. As for the associated factors, important differences were observed between genders. It was evident that in men, the best indices were seen in those 40 years or older and in those who did nothing to lose weight. In women, advancing age, physical activity during leisure time, not smoking, living with less than three people in the household, and the presence of chronic disease were associated with better diet quality.

Chart 2 presents the methodological aspects of the Brazilian studies that identified dietary patterns in adults, through the *a posteriori* approach. Among the studies analyzed, three articles used the QFA as a

food survey instrument and one article used the R24h. Factor analysis was the exploratory approach technique used in all studies.

In Pelotas-RS, Canuto et al.[13] conducted a study on the identification of eating patterns through the *a posteriori* approach, this study addressed a considerable sample, thus, in this review, it was the article that had the largest sample, adding 1968 adults of both sexes, the authors outlined as statistical technique the focused principal component analysis (FPCA) to investigate eating patterns, focusing on socioeconomic characteristics. Two food patterns were identified: a "Western" pattern consisting of white bread; beans; hot dogs; mayonnaise; cheeses; soda/refrigerant; French fries; eggs; sweets/desserts; hamburgers; ham and ice cream, showing an inverse relationship with age, income directly associated with intake of cheeses; sweets/desserts and ham, and a direct relationship with education. The intake of white bread was inversely associated with income, i.e., the higher the income level, the less frequent the intake of this food among adults. And the other type of pattern called "prudent or healthy" composed of fruits, green salads, and other vegetables, showing a direct association with age, income, and education.

Table 2. Methodological aspects of studies that identified dietary patterns by a *posteriori* approach in adults in Brazil.

Author/Year	Canuto et al.[13]	Gimeno et al.[14]	Vilela et al.[15]	Castro et al.[16]
Local	Pelotas (RS)	Ribeirão Preto (SP)	Cuiabá (MT)	São Paulo (SP)
Delineation	Transversal	Transversal	Transversal	Transversal
Sample	1968 adults of both sexes	930 adults of both sexes	208 adults of both sexes	1102 adults of both sexes
Goal	Introduce focused principal component analysis to provide information on dietary patterns	To describe and identify factors associated with food consumption patterns	Identify eating patterns and analyze the association with abdominal adiposity	Investigate the effects of factor rotation methods on the interpretability and validity of food standards
Inquiry	QFA	QFA	QFA	R24h
Statistical Analysis	Focused principal component analysis	Factor Analysis by Principal Components	Factor Analysis by Principal Components	Exploratory Factor Analysis
Results	Western Standard and Prudent or Healthy Standard	Obesogenic Pattern; Healthy; Mixed and Popular	Western Standard; Regional Traditional and Prudent or Healthy	Traditional Regional Pattern and Mixed Pattern

FFQ: Food Frequency Questionnaire; R24h: 24-hour recall.

Gimeno et al.[14] found a greater number of dietary patterns, totaling four: "obesogenic" pattern represented by sugar; sweets and soft drinks, associated with higher practice of physical activity, higher education and age < 40 years; "healthy" pattern composed of vegetables; fruits and skimmed dairy products, related to female sex, individuals without overweight, older adults, central obesity, higher practice of physical activity and better socioeconomic conditions; mixed" pattern defined by habitual ingestion of fried foods; fish and root vegetables were associated with non-overweight individuals, females and younger adults; and "popular" pattern consisting of beans, cereals and vegetable fat, associated with the absence of hypercholesterolemia and lower family income. Together, the four patterns explained 34% of the total variability.

Three patterns were obtained in the research by Vilela et al. [15]These were named as follows: the "Western" pattern explained 14.9% of the variation; the "prudent or healthy" pattern explained 9.6% of the variation, which were similar to those found in the study by Canuto et al.[13] and the "traditional regional" pattern explained 10.5% of the variation. This included mainly rice; beans; refined grains and tubers; regional dishes; meat and eggs; coffee and sugar. The authors also associated the patterns found with abdominal adiposity, the "Western" pattern was positively associated with waist circumference (WC) and waist-to-hip ratio (WHR), while the "traditional regional" pattern was also associated with WHR and WC, only in women. No statistically significant relationship was found between the "prudent or healthy" pattern and the anthropometric indicators of abdominal fat.

Castro et al.[16] identified two food patterns, the first food pattern "factor 1" composed of the traditional foods consumed by the Brazilian population, a composition similar to one of the patterns found by Vilela et al.[15] . The second food pattern "factor 2" included salad dressing; leafy vegetables; leafless vegetables; spices; whole breads; white cheese; fruits and fruit juices, considered a "mixed" pattern, similar denomination to one of the patterns identified by Gimeno et al.[14] . Among the food groups evaluated by this study, salad dressing, rice, beans, leafy vegetables, and leafless vegetables were those with the highest percentage of variance, that is, with the highest communalities.

4 CONCLUDING REMARKS

There are few Brazilian studies that have investigated the dietary patterns of adults using a *priori* and *a posteriori* approach methodologies, in the electronic database used for the literature search of the present study.

Both studies concentrated in large urban centers, which points to the need for further exploration of this research in Brazil due to its continental dimensions and regional specificities. In addition, these studies demonstrated a need to develop strategies to improve the eating habits of adults.

It is noteworthy that the investigation of dietary patterns through exploratory statistical analysis represents a fundamental step in nutritional epidemiology, because they are robust techniques that make it possible to know the food consumption of a given population in a broader way. Moreover, a thorough statistical handling also allows obtaining information on food consumption pattern based on the existence of knowledge about relationships between food, nutrients, and diseases.

A limitation elucidated in this research was the fact that only one database was used. Thus, it is suggested that future studies use at least three databases in order to have a greater variety of articles, making it possible to make inferences through strong scientific evidence.

Therefore, research in which dietary patterns are identified is essential to be well designed, ensuring that the most appropriate dietary survey is chosen, with a sizeable sample size and the use of statistical analyses that best guide the researcher's inherent decisions.

REFERENCES

1. Schneider BC; Duro SMS; Assunção MCF. Consumo de carnes por adultos do sul do Brasil: um estudo de base populacional. Ciênc Saúde Coletiva. 2014; 19(8):3583-3592.

2. Carvalho CA; et al. Metodologias de identificação de padrões alimentares a posteriori em crianças brasileiras: revisão sistemática. Ciênc Saúde Coletiva. 2016; 21(1):143-154.

3. Perozzo G; et al. Associação dos padrões alimentares com obesidade geral e abdominal em mulheres residentes no Sul do Brasil. Cad Saúde Pública. 2008; 24(10):2427-2439.

4. Meléndez GV; et al. Tendências da frequência do consumo de feijão por meio de inquérito telefônico nas capitais brasileiras, 2006 a 2009. Ciênc Saúde Coletiva. 2012; 17(12):3363-3370.

5. Bezerra IN; et al. Consumo de alimentos fora do domicílio no Brasil. Rev Saúde Pública. 2013; 47(1):200-211.

6. Azevedo ECC; et al. Padrão alimentar de risco para as doenças crônicas não transmissíveis e sua associação com a gordura corporal–uma revisão sistemática. Ciênc Saúde Coletiva. 2014; 19(5):1447-1458.

7. Nobre LN; Lamounier JA; Franceschini SCC. Preschool children dietary patterns and associated factors. J Pediatr. 2012; 88(2):129-136.

8. Mendes KDS; Silveira RCCP; Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Texto Contexto Enferm. 2008; 17(4):758-764.

9. Costa D; et al. Índice de qualidade da dieta de mulheres usuárias de um programa de atividade física regular" Academia da Cidade", Aracajú, SE. Rev Nutr. 2012; 25(6):731-741.

10. Loureiro AS; et al. Diet quality in a sample of adults from Cuiabá (MT), Brazil: association with sociodemographic factors. Rev Nutr. 2013; 26(4):431-441.

11. Ferrari TK; et al. Estilo de vida saudável em São Paulo, Brasil. Cad Saúde Públ. 2017; 33(1):1-12.

12. Assumpção D; et al. Diferenças entre homens e mulheres na qualidade da dieta: estudo de base populacional em Campinas, São Paulo. Ciênc Saúde Coletiva. 2017; 22(2):347-358.

13. Canuto R.; et al. Focused Principal Component Analysis: a graphical method for exploring dietary patterns. Cad Saúde Pública. 2010; 26(11):2149-2156.

14. Gimeno SGA; et al. Padrões de consumo de alimentos e fatores associados em adultos de Ribeirão Preto, São Paulo, Brasil: Projeto OBEDIARP. Cad Saúde Pública. 2011; 27(3):533-545.

15. Vilela AAF; et al. Dietary patterns associated with anthropometric indicators of abdominal fat in adults. Cad Saúde Pública. 2014; 30(3):502-510.

16. Castro MA; et al. Empirically derived dietary patterns: interpretability and construct validity according to different factor rotation methods. Cad Saúde Pública. 2015; 31(2):298-310.

CHAPTER 20

Evaluation of the stability of anodic thin films on titanium in physiological environment

10.56238/rsfohsv1-020

Daniela Tiepo Gomes
Biomedical Engineer – Universidade Franciscana
E-mail: danielatiepo@gmail.com

Luis Otavio de Sousa Bulhões
Physicochemist, PhD
Universidade Federal de São Carlos - UFCAR
E-mail: losbulhoes@gmail.com

ABSTRACT
The chemical stability of titanium coated with thin films formed from the application of constant potentials in 1 M oxalic acid solution was evaluated in Ringer's solution. The film formed at 60 V passivates the titanium after 800 s. Resting potential measurements indicate that the film formed at 60 V gives more stability to the titanium. The corrosion currents obtained in potentiodynamic measurements for the anodized titanium at 20 and 60 V correspond to 1.69x10-8 A/cm2 and 1.2x10-9 A/cm2 respectively, indicating greater stability for the film formed at 60 V.

Keywords: tanium oxide, Corrosion, Barrier film, Electrochemistry.

1 INTRODUCTION

According to a survey by the Brazilian Association of the Medical, Dental and Hospital Industry, in Brazil, about 800,000 implants and 2.4 million dental prosthesis components are placed per year in the country. With the perspective that by 2020 the number of implants will increase to five million (ABIMO, 2014). In this context, titanium (Ti) biomaterials are widely used to produce medical components, such as prostheses, plates and screws or dental implants (PEDEFERRI, 2015).

The formation of a protective layer of titanium dioxide (TiO_2) on the surface of the material prevents direct contact between the implant and its medium (FADL-ALLAH; QUAHTANY; EL-SHENAWY, 2013), characterizing the good biocompatibility of these components. However, this oxide film presents nanometric character and may be unstable under the action of body fluids. In this sense, the anodic treatment is a surface modification technique that can favor biocompatibility (PEREIRA et al., 2014).

This work is justified due to the main problems that occur in prosthetic joints, such as wear and tear with the consequent release of debris, as well as corrosion and ionic release during the prolonged use of these devices. This debris can lead to tissue inflammation, bacterial attack, osteolysis, and consequently loosening of the implants. Thus, in recent years, several types of surface coatings have been developed with direct application on medical prostheses.

The aim of the work was to evaluate the chemical stability, in a biological medium, of titanium oxides grown on titanium metal at different potential conditions using a 1M Oxalic Acid solution. The oxide films were grown at controlled potential at room temperature.

2 REVIEW OF THE LITERATURE

In general, biomaterials are materials that can replace parts of the human body without causing rejection processes (PINHO, 2016). To be considered ideal, a biomaterial should promote fast, passable and controlled healing of the host tissues (RAMOS, 2015). For Luz (2013) the performance of biomaterials is related to its biocompatibility, which is the ability of a material to act with an appropriate response at the site of implantation, and with its biofunctionality, i.e., the transfer of mechanical load between bone/implant and wear. For a good biocompatibility it is necessary to minimize corrosion processes (TARGINO, 2017).

Pure titanium and titanium alloys are the most widely used biomaterials in the manufacture of surgical implants, due to their excellent mechanical properties, biocompatibility and corrosion resistance (FADL-ALLAH; QUAHTANY; EL-SHENAWY, 2013). However, a slow and continuous oxidation process naturally occurs, involving the aqueous body fluid, which has dissolved oxygen, causing the release of toxic metal ions into body tissues and organs, causing implants to weaken (TARGINO, 2017).

The TiO_2 film has a high corrosion resistance in various test solutions such as artificial saliva, Ringer's solution, 0.9% NaCl solution or saline, however, it can degrade in the oral cavity in the presence of corrosive substances such as fluorides, lactic acid, carbamide peroxide (urea peroxide) and hydrogen peroxide. The breakdown of the titanium passive film leads to localized corrosion failure, such as intergranular attack, corrosion or corrosion fatigue (SOUZA et al., 2015).

For Healy and Ducheyne (1992) the thickness and stability of the oxide layer formed on the implant surface play an important role in the relationship of the implant as biomaterial, because corrosion and ion release are undesirable, and may impair osseointegration. Characteristics such as topography, wettability, surface charge, and surface chemical composition, in contact with bone tissue, define the speed and quality of osseointegration.

Buser (1999) points out that these properties provide bone-implant interactions, such as ionic adsorption, protein absorption, communication between cells and implant surface, and signaling for differentiation of these cells, leading to the union of the biomaterial with the bone. Surface treatment techniques have been proposed in order to create a biochemical union capable of accelerating the initial phases of bone neoformation on the implant (SILVA, 2016).

Therefore, the structure, composition and morphological characteristics on the surface of the biomaterial, which are in direct contact with body fluids and tissues, are responsible for determining the biological response of the host tissues. Modifying the surface of the metallic material, aiming to form a passivated oxide film with high stability, is one alternative. The modification of the titanium surface through the formation of TiO_2 nanotubes by the anodization process has been shown to be an effective procedure to stimulate cell adhesion and direct proliferation of pre-osteoblastic cells (TARGINO, 2017).

In anodizing, the anions of the solution are adsorbed onto the oxide layer being formed (BESSAUER, 2011). In anodization, the surface of a metal is transformed into an oxide layer by passing electric current. The formation of the inner layer of the TiO_2 film at high anodic potentials occurs by the

migration of O ions$_2^-$ /OH$^-$ toward the metal/film interface. On the other hand, Ti ions^{4+} originating from the Ti substrate migrate to the film/electrolyte interface forming the innermost layer of the anodic film (VAZ, 2007).

According to Fatichi (2017) the anodizing process, based on oxireduction reactions, consists of an electrochemical cell containing a positive electrode (anode - metal to be anodized) and a negative electrode (cathode - material inert to the electrochemical medium that will be taken as reference), immersed in an acid solution. A potential difference is applied between the electrodes, resulting in the formation of an electric field between them, which will be responsible for the dissolution of the metal and the formation of the oxide layer on its surface.

The kinetics of the process can be studied using the cyclic voltammetry technique at different potential sweep rates. The peak current during the anodic process that is associated with ion transport through the growing film can give important information about the ohmic resistance of the film and the characteristics of the charge carriers (GENTIL, 1992).

Electrochemically treated titanium surfaces develop specific topographies, reflecting differences in the passivation/dissolution velocities of the material (BESSAUER, 2011). Therefore, it is important to investigate the properties of a surface passivation oxide film taking into consideration its formation and resulting thickness exert on the final structure of the film formed.

3. METHODOLOGY

3.1 SAMPLE PREPARATION

Commercially pure titanium (Ti) plates (99% m/m) with dimensions of 1 x 10 x 35 mm were used, mechanically polished with 220, 400 and 600 grain size sandpaper, respectively. After polishing, the samples were washed with distilled water and placed for 15 min in an ultrasonic bath in acetone.

3.2 OXIDATION OF TITANIUM SAMPLES

The Ti sheets underwent two anodization processes in an electrolytic solution of 1 M oxalic acid for 30 minutes, with the application of potentials of 20 V (TiO_2 A) and 60 V (TiO_2 B) , using an electrochemical cell with two electrodes, the anode being a titanium sheet and the cathode a steel sheet.

The processes were carried out at 30 °C and the current as a function of time was measured with the aid of an ammeter. The anodized material was immersed in deionized water for 24 hours to remove the remaining ions. Afterwards, the anodized material was submitted to a heat treatment in a muffle furnace, with a heating rate of 30 ºC/ min up to 150 ºC, and kept at this temperature for 2 h. This thermal treatment aims to improve the mechanical properties, the adhesion of the film to the Ti substrate and modification of the phases of Ti oxides, with the decrease of the amount of water in the film.

3.3 ELECTROCHEMICAL ANALYSIS

To perform the electrochemical analyses, a three-electrode cell was used. The working electrode was the anodized Ti plate, with the reference electrode being silver/silver chloride in 3 M potassium chloride (Ag/AgCl, 3M KCl) and a platinum counter electrode. The electrochemical tests were performed immediately after immersion of the sample in Ringer's solution (8.61 g/L NaCl; 0.30 g/L KCl; 0.49 g/L $NaHCO_3$ 0.01 g/L), which simulates the aggressiveness of the physiological fluid, keeping the pH constant at 6.8.

Cyclic voltammetry, potentiodynamic polarization curves, and chronopotentiometry tests were performed in the presence and absence of oxygen, with the aid of a Metrohn Autolab 84140 potentiostat.

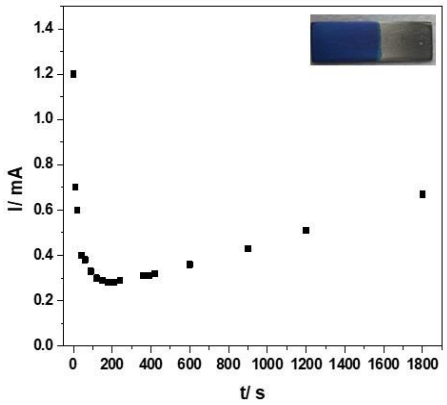
The polarization curve measurements were performed in the range of -0.25 V to 3.0 V, with a scanning speed of 2.0 mV s^{-1} , in Ringer's solution, in order to study the influence of the medium on the corrosion rate. This methodology allows obtaining the corrosion current (I_0) at the equilibrium potential (E_0), using the Tafel extrapolations (GENTIL, 1996).

The cyclic voltammetry assays made it possible to study the behavior of the current as a function of time, for the applied potential. The oxidation and reduction peaks were studied at a scan rate of 0.1V/s, 0.05V/s, and 0.01V/s, with a potential range of -0.25 V to 3.0 V.

4 RESULTS AND DISCUSSIONS

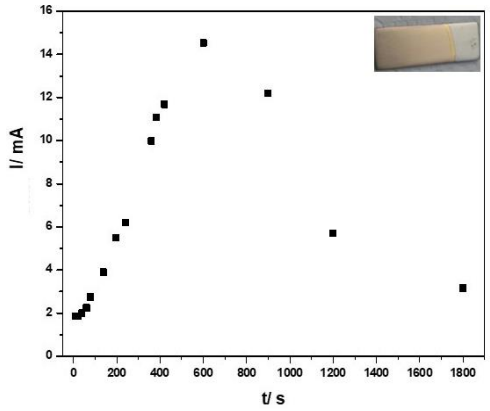
Figures 1 and 2 present the graphs of current as a function of time for the samples submitted to 20 V and 60 V during the process of anodization in 1 M oxalic acid, respectively. It is observed that the anodization current for the oxide of the sample named TiO_2 B was more positive, therefore, the passivation capacity of the film formed should be higher, and the higher the charge value, the greater the thickness of the oxide. The color changes observed in the samples are due to light interference on the oxide layer with nanometer thicknesses formed at constant potential on the titanium surface (GOMES et al., 1991).

Figure 1: Current behavior as a function of time for the titanium sample anodized at 20 V potential (TiO_2 A). In the highlight on the right and above the anodized sample.



Source: The author (2018).

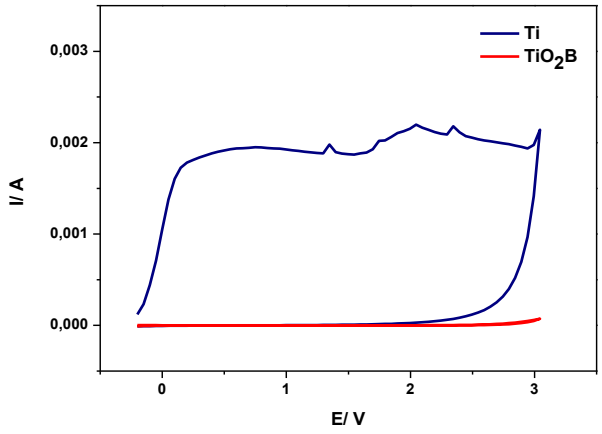
Figure 2: Current behavior as a function of time for the titanium sample anodized at 60 V potential (TiO_2 B). In the highlight on the right and above the anodized sample.



Source: The author (2018).

Figure 3 presents the cyclic voltammograms of polished titanium and anodized titanium samples at a potential of 60 V immersed in Ringer's solution, obtained at 30°C with potential sweep between -0.25 V to 3 V with potential sweep speed of 0.1V/s. It is observed that the metallic titanium (Ti) sample is very reactive to the medium, because the current reaches high values in a wide range of polarization (0 V to 3 V) to then enter in the passivation process. On the other hand, the anodized titanium sample (TiO_2 B) maintains current values close to zero during the whole polarization interval, showing the protective character of the passivated titanium oxide film formed on the sample surface, being more chemically stable.

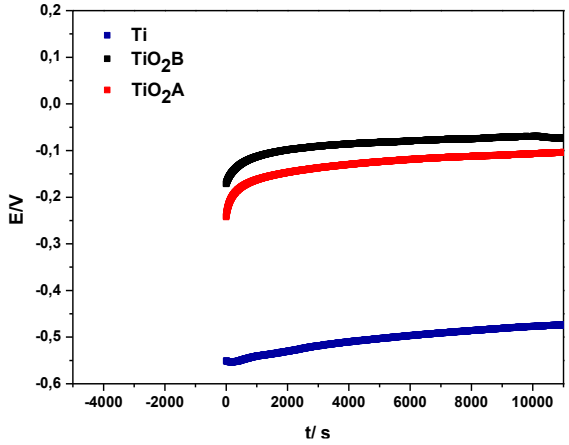
Figure 3: Cyclic voltammograms in Ringer's solution, with a potential sweep rate of 0.1V/s in the presence of oxygen



Source: The author (2018).

The equilibrium potential (E_0) for titanium metal (Ti), anodized titanium at 20 V (TiO_2 A) and anodized titanium at 60 V (TiO_2 B) samples are shown in Figure 4. It is observed that for pure titanium (Ti) the potential value is more negative, compared with the samples TiO_2 A and TiO_2 B. This evidences that when film formation occurs on the metal the potential values tend to be more positive. Where the film formed on sample TiO_2 B has a greater protective capacity, being less susceptible to oxidation, by presenting a more positive E value .0

Figure 4: Equilibrium potential of titanium metal, oxides A and B in Ringer's solution for 11,000 s in the presence of oxygen.



Source: The author (2018).

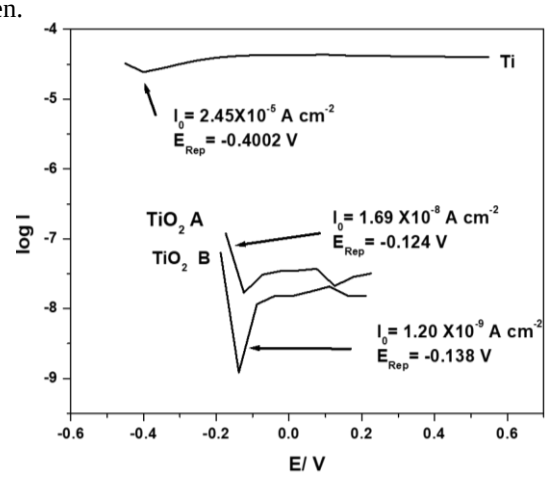
Figure 5 shows a comparison between the polarization curves for the titanium metal (Ti) and the anodized titanium samples at a potential of 60 V (TiO_2 B) immersed in Ringer's solution, maintaining pH around 6.8 at a temperature of 30°C, with a potential sweep rate of 0.02 V s^{-1} . These curves are obtained around the equilibrium potential value of the sample. In the oxide film TiO_2 B , the branch of the cathodic reaction is in the most negative values and that of the anodic reaction is in the region of most positive values, thus, at the point common to these two reactions the equilibrium potential is obtained (E_0) with a corrosion current (I_0). It can be seen that the values of corrosion current of the oxide samples in relation to the metallic Ti sample vary in decades. It is evident that the TiO film$_2$ B with I_0 at a value of $1.2x10^{-9}$ A/cm^2 has a higher barrier protection character, than the TiO film$_2$ A with I_0 at a value of $1.69x10^{-8}$ A/cm^2 .

Table 1 presents the values of I_0 and E_0 in Ringer's solution, for the samples of Ti metal, Ti anodized at 20 V (TiO_2 A) and Ti anodized at 60 V (TiO_2 B) in solution containing 1 M oxalic acid. The corrosion current for anodized titanium decreases by three decades with respect to polished titanium, indicating the effectiveness of the anodic film in protecting the surface of titanium in physiological medium.

Table 1: Electrochemical parameters obtained from the polarization curves for the metallic Ti and anodized Ti samples at different potentials.

Sample	E_0 (V)	I_0 (A cm^{-2})
Ti	-0.40002	$2.45x10^{-5}$
TiO_2 A	-0.124	$1.69x10^{-8}$
TiO_2 B	-0.138	$1.2x10^{-9}$

Figure 5: Polarization curves of titanium metal, oxides A and B in Ringer's solution at pH 6.8 obtained at 30°C, with a scan rate of 0.02 V s^{-1} in the presence of oxygen.



Source: The author (2018).

5 CONCLUSION

The results of this work describe the formation and electrochemical response of thin films formed at controlled potential on commercially pure titanium in aqueous solution containing 1 M oxalic acid. The oxides were formed at 20 V and 60 V for 30 min and showed high chemical stability observed by the tendency of the equilibrium potential to shift to more positive potentials. The corrosion current under polarization is one thousand times lower for the oxide formed at 20 V and ten thousand times lower for the oxide formed with 60 V application compared to that observed for polished titanium. These results show that oxide thin films act in increasing the stability of the metal in physiological solutions, with the potential to become an implant coating.

REFERENCES

ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA DE ARTIGOS E EQUIPAMENTOS MÉDICOS ODONTOLÓGICOS, HOSPITALARES E DE LABORATÓRIOS. **Censo da Odontologia**, 2014.

BESSAUER, L.H. **Desenvolvimento e caracterização de nanotubos de TiO_2 em implantes de titânio**. 2011. Dissertação (Mestrado) - Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, 2011.

BUSER, D. et al. Interface shear strength of titanium implants with a sandblasted and acid-etched surface: A biomechanical study in the maxilla of miniature pigs. **Journal Of Biomedical Materials Research**, v. 45, n. 2, p.75-83, maio 1999. Wiley. http://dx.doi.org/10.1002/(sici)1097-4636(199905)45:23.0.co;2-p.

FADL-ALLAH, S. A.; QUAHTANY, M.; EL-SHENAWY, N. S. "Surface Modification of Titanium Plate with Anodic Oxidation and Its Application in Bone Growth," **Journal of Biomaterials and Nanobiotechnology**, v. 4, n. 1, p. 74-83, Jan, 2013. 10.4236/jbnb.2013.41010.

FATICHI, A. Z. **Caracterização de ligas ti-35nb-xzr com superfícies nanotubulares para aplicações biomédicas**. 2017. 109 f. Dissertação (Mestrado) - Curso de Engenharia Mecânica, Faculdade de Engenharia Mecânica, Universidade Estadual de Campinas, Campinas, 2017.

GENTIL, V. **Corrosão**. 3. ed. Rio de Janeiro: Livros Técnicos e Científicos, 1996.

HEALY, K; DUCHEYNE, P. Hydration and preferential molecular adsorption on titanium in vitro. **Biomaterials**, v. 13, n. 8, p.553-561, 1992. Elsevier BV. http://dx.doi.org/10.1016/0142-9612(92)90108-z.

LUZ, A. R. **Caracterizações de superfícies de titânio modificadas anodicamente para aplicação biomédica**. 2013. 121 f. Dissertação (Mestrado) - Curso de Engenharia e Ciência dos Materiais, Programa de Pós-graduação em Engenharia e Ciência dos Materiais, Universidade Federal do Paraná, Curitiba, 2013.

PEDEFERRI, M. Titanium Anodic Oxidation: A Powerful Technique for Tailoring Surfaces Properties for Biomedical Applications. **Tms 2015 144th Annual Meeting & Exhibition**, p.515-520, 2015. http://dx.doi.org/10.1007/978-3-319-48127-2_65.

PEREIRA, B. L. et al. Titanium bioactivity surfaces obtained by chemical/electrochemical treatments. **Matéria**, Rio de Janeiro, v. 19, n. 1, p. 16-23, Mar. 2014. http://dx.doi.org/10.1590/S1517-70762014000100004.

PINHO, R. P. P. **Aplicações do quitosano como biomaterial**. 2016. 53 f. Dissertação (Mestrado) - Curso de Ciências Farmacêuticas, Faculdade de Ciências da Saúde, Universidade Fernando Pessoa, Porto, 2016.

RAMOS, I. Y. O. **Produção, caracterização e avaliação da resposta celular de recobrimentos de zinco-hidroxiapatita sobre a superfície de titânio para aplicações sobre implantes**. 2015. 104 f. Dissertação (Mestrado) - Curso de Engenharia Metalúrgica e de Materiais, Programa de Pós-graduação em Engenharia Metalúrgica e de Materiais, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2015.

RENZ, R. P. **Avaliação dos parâmetros do processo de anodização na formação de nanotubos de tio2 e suas implicações na morfologia e na adesão ao substrato de titânio**. 2015. 104 f. Tese (Doutorado) - Curso de Engenharia e Tecnologia de Materiais, Programa de Pós-graduação em Engenharia e Tecnologia de Materiais, Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, 2015.

SILVA, F. L. et al. Tratamento de superfície em implantes dentários: uma revisão de literatura. **Revista da Faculdade de Odontologia - Upf**, Passo Fundo, v. 21, n. 1, p.136-142, 18 out. 2016. http://dx.doi.org/10.5335/rfo.v21i1.5256.

SOUZA, J. C. M. et al. Wear and Corrosion Interactions on Titanium in Oral Environment: Literature Review. **Journal Of Bio And Tribo - Corrosion**, [s.l.], v. 1, n. 2, p.1-13, 8 abr. 2015. http://dx.doi.org/10.1007/s40735-015-0013-0.

TARGINO, J. **Desenvolvimento de superfícies nanoestruturadas em titânio e ligas de titânio-zircônio**. 2017. 75 f. Dissertação (Mestrado) - Curso de Ciência e Tecnologia de Materiais, Pós-graduação em Ciência e Tecnologia de Materiais, Universidade Estadual Paulista Júlio de Mesquita Filho, Bauru, 2017.

VAZ, A. P. **Morfologia dos revestimentos de titânio**. 2007. 95 f. Dissertação (Mestrado) - Curso de Engenharia Mecânica, Programa de Pós-graduação em Engenharia Mecânica, Universidade Federal do Paraná, Curitiba, 2007.

WILLIANS, D. F. Biofunctionality and Biocompatibility. Materials Science and Technology – A Coprehensive Treatment – **Medical and Dental Materials**, 1 ed., chapter 1, Weinheim, VCH, 1992.

CHAPTER 21

Monkeypox in Brazil: epidemiological updates and perspectives

10.56238/rsfohsv1-021

Angélica Aparecida Almeida
Medical School, Faculdade Dinâmica do Vale do Piranga (FADIP), Ponte Nova, (MG), Brazil

Bruna Ramos Neves
Medical School, Faculdade Dinâmica do Vale do Piranga (FADIP), Ponte Nova, (MG), Brazil

Matheus Felipe Cordeiro Souza de Almeida
Medical School, Faculdade Dinâmica do Vale do Piranga (FADIP), Ponte Nova, (MG), Brazil

Gabriel Ferreira Lopes
Medical School, Faculdade Dinâmica do Vale do Piranga (FADIP), Ponte Nova, (MG), Brazil

Monkeypox or monkeypox (MV) is a rare zoonosis caused by the monkeypox virus that belongs to the Orthopoxvirus genus in the Poxviridae family1,4,5 , and in the year 2022 has caused several cases and deaths worldwide, including Brazil. On July 23, 2022, the World Health Organization (WHO) decreed the disease as a global public health emergency1,2,4 . Thus, the objective was to describe historical data, epidemiology, and perspectives of the disease in Brazil. A search for articles on the Pubmed/Medline and Scielo platforms using the descriptor "monkeypox" and data on the situation in Brazil on the site of the Ministry of Health was carried out. MV was discovered in 1958, when it triggered two outbreaks of a disease similar to human smallpox in monkeys kept for research purposes. The first human case was recorded in 1970 in the Democratic Republic of Congo, during a period of intensified efforts to eliminate smallpox1,4,5 . Transmission to humans can occur through direct contact with an infected animal/human or contact with contaminated materials or droplets exhaled by an infected human/animal. Symptoms include fever, headache and muscle pain, swollen lymph nodes, chills and exhaustion, single or multiple skin lesions, first on the face and then to other parts of the body, including the genital organs3,5 . The diagnosis is made through laboratory analysis of vesicular material or crust of the lesion, in the entire municipal health network, such as Basic Health Units (UBSs), emergency rooms and emergency care3,4,5 . The incubation period of the virus is usually 6 to 13 days, but can vary from 5 to 21 days2,3,,5 . In the 2022 outbreak, the major concern relates to the reporting of outbreaks of the disease in non-endemic areas4 . Between May 13 and June 2, 2022, 780 confirmed cases of the disease were reported worldwide in 27 regions where this virus does not normally circulate. In recent years, the case fatality rate has been about 3 to 6%5 . Cases and deaths continue to be reported in endemic countries, but are related to immunosuppression in non-endemic countries, as was the case of death reported in Brazil1,5 . According to the World Health Organization and the U.S. Centers for Disease Control and Prevention (CDC), the data on infection during pregnancy are limited at this time6 . For, the researches that have been done have not been able to inform in a concrete way how lethal the disease can be for this part of the society, for example, if pregnant women are more susceptible to the virus or if the infection is more severe in pregnancy. Associated with this, transmission

of the virus can occur through the placenta from the mother to the fetus, which can lead to congenital smallpox, or during close contact at the time of and after birth. However, virus can lead to different complications, such as even the death of the baby5,6 . Therefore, it is extremely important that women during their prenatal period avoid close contact with anyone diagnosed with the disease, and when there is suspicion of exposure, medical attention should be sought for testing and implementation of necessary care. In Brazil, by July 30, 2022, 1,342 cases had been confirmed, with a higher concentration in the Southeast Region. Of the total number of confirmed cases, 96.5% are male and are concentrated in the 30 to 34 age group (29.0%), followed by the 25 to 29 age group (20.0%), with a median of 33 years. Three (3) cases were confirmed in children under 10 years of age, with one case being epidemiologically linked to a confirmed case and the others are under investigation1,2,4 . According to the World Health Organization (WHO), the case fatality rate can reach 11% in the general population and has been higher among young children5 . We conclude that it is extremely important to prevent this infectious disease, such as not sharing potentially contaminated items, like bed linen, clothes, towels, dish towels, glasses, or cutlery, avoiding contact with infected people and performing personal hand hygiene with soap and water or alcohol gel, and the use of a protective mask covering the nose and mouth is recommended. Associated with this, one should avoid contact with infected animals, including pets at home; in general, any mammal can be infected with MPXV. The confirmed patient should remain in isolation until the rash has fully resolved, that is, until all scabs have fallen off and a new layer of intact skin has formed. By the way, it is recognized that the State is still today the biggest promoter of mass prevention practices, making this act a public health policy strategy, with the aim of preventing infectious diseases. Moreover, it is necessary the constant encouragement of the entire population regarding the various precautions of prevention and isolation in a correct way when the disease is suspected, in order to minimize transmission risks and greater risks to public health.

Keywords: monkeypox, infectious diseases, public health, zoonoses

REFERENCES

1. Menezes YR, Miranda AB. Severe disseminated clinical presentation of monkeypox virus infection in an immunosuppressed patient: first death report in Brazil. Rev Soc Bras Med Trop. 2022 Aug 29;55:e0392. doi: 10.1590/0037-8682-0392-2022. PMID: 36037315; PMCID: PMC9425919.

2. Cimerman S, Chebabo A, Cunha CAD, Barbosa AN, Rodríguez-Morales AJ. Human monkeypox preparedness in Latin America - Are we ready for the next viral zoonotic disease outbreak after COVID-19? Braz J Infect Dis. 2022 May-Jun;26(3):102372. doi: 10.1016/j.bjid.2022.102372. Epub 2022 Jun 3. PMID: 35679976; PMCID: PMC9163019

3. Lima EL, Barra LAC, Borges LMS, Medeiros LA, Tomishige MYS, Santos LSLA, Silva AJDD, Rodrigues CCM, Azevedo LCF, Villas-Boas LS, Silva CAMD, Coletti TM, Manuli ER, Claro IM, Romano CM, Ramundo MS, Moutinho T, Sabino EC, Lindoso JAL, Figueiredo-Mello C. First case report of monkeypox in Brazil: clinical manifestations and differential diagnosis with sexually transmitted infections. Rev Inst Med Trop Sao Paulo. 2022 Sep 5;64:e54. doi: 10.1590/S1678-9946202264054. PMID: 36074449.

4. Ministério da Saúde. MONKEYPOX - MPX: itens atualizados - Situação epidemiológica, Definição de caso, Diagnóstico laboratorial - Alerta Epidemiológico - Número 9 30/07/2022 / MONKEYPOX - MPX: updated items - Epidemiological situation, Case definition, Laboratory diagnosis - Epidemiological Alert - Number 9 - 07/30/2022. https://saude.sp.gov.br/wp-content/uploads/2022/08/Alerta-Epidemioloegico-n.9-MonkeypoxESP_30_JULHO.pdf

5. Sociedade Brasileira de Primatologia. Informativo - Tema: Varíola dos Macacos. Acesso em: 15 de setembro de 2022. Disponível em: https://www.sbprimatologia.org.br

6. Ministério da Saúde (Brasil). Secretaria de Atenção Primária à Saúde. Departamento de Saúde Materno Infantil. Coordenação-Geral de Saúde Perinatal e Aleitamento Materno. NOTA TÉCNICA Nº 46/2022-CGPAM/DSMI/SAPS/MS.Brasília, DF; 01 Agosto de 2022 Disponível em: https://egestorab.saude.gov.br/image/?file=20220801_O_SEIMS-0028381567-NotaTecnicagraviadsmonkeypoxfinal_1567282545601784855.pdf.

CHAPTER 22

Violence against women in Porto Velho, from 2016 to 2021

10.56238/rsfohsv1-022

Katia Fernanda Alves Moreira
Institution to which it is affiliated: Universidade Federal de Rondônia - UNIR
PhD in Public Health Nursing - EERP/USP; Professor of the Nursing Course at the Federal University of Rondônia (UNIR); Coordinator of the Professional Master in Family Health - ProfSaúde; Tutor of the Multiprofessional Residency in Family Health at UNIR
E-mail: katiaunir@gmail.com

Daiana Evangelista Rodrigues Fernandes
Department of Nursing, Federal University of Rondônia
PhD in Nursing from the Federal University of Goiás; coordinator of the Multiprofessional Residency in Family Health and professor of the Professional Master's in Family Health
E-mail: daiana.rodrigues@unir.br

Itaci Alves Ferreira Silva
Department of Health Surveillance/SEMUSA/Porto Velho - Rondônia
Degree in Dentistry from Camilo Castelo Branco University- São Paulo; Qualification Course in Preceptorship from UNIR; Coordinator of Violence Surveillance/Epidemiological Division/Department of Health Surveillance/SEMUSA/PVH
E-mail: itaci.ferreira@gmail.com

Gleyciane Souza Oliveira
Universidade Federal de Rondônia - UNIR
Nursing Course student at the Federal University of Rondônia (UNIR);
E-mail: gleycisouza061@gmail.com

Mayra Heloise Pereira
Institution to which it is linked: Universidade Federal de Rondônia - UNIR
Nursing Course student at the Federal University of Rondônia (UNIR);
E-mail: mayratheo02@gmail.com

Jandra Cibele Rodrigues de Abrantes Pereira Leite
Professor of medicine at the Federal University of Rondonia - UNIR
PhD in Nursing EEANUFRJ; Professor of the Department of Medicine of the Federal University of Rondonia ; Professor of the Professional Master's Degree in Family Health and Tutor of the Multiprofessional Residency in Family Health
E-mail: jandra.cibele@unir.br

Tathiane Souza de Oliveira
Institution to which it is affiliated: Universidade Federal de Rondônia - UNIR
Nurse, graduated from the Federal University of Rondônia (UNIR); Master's student of the Professional Master's Degree in Family Health - ProfSaúde - UNIR
E-mail: tathiane.souza@gmail.com

Cleson Oliveira de Moura
Federal University of Rondônia. Adjunct Professor at the Department of Medicine
PhD in Nursing, Federal University of Rio de Janeiro. Professor and tutor of the Multiprofessional Residency in Family Health/UNIR. Permanent Professor of the Professional Master in Family Health - PROFSAÚDE/UNIR - ABRASCO. Researcher at the Center for Study and Research in Collective Health - CEPESCO. Surgeon-Dentist of the Family Health Strategy
E-mail: cleson@unir.br

ABSTRACT
Objective: To analyze the panorama and characteristics of gender violence against women in Porto Velho, based on notifications of secondary information for monitoring the phenomenon, from 2016 to 2021. Material and methods: Quantitative, descriptive, ecological, time series study, built from official data from the Information System for Diseases and Notification (SINAN), extracted from the electronic platform of the Department of Health Surveillance of the Secretariat Municipal Health of Porto Velho-RO (SEMUSA). Spreadsheets were prepared with the research variables, the results were expressed in tables built in the MICROSOFT EXCEL OFFICE 365 software, version 2205. Results: 1863 cases of violence against women were registered in the Information System of Notifiable Diseases (Sinan). There was a predominance in the age group from 10 to 19 years and greater cases with the non-white population, most victims attended elementary school, single women suffered violence more often, physical violence appears as the largest type of violence. The most used means of aggression was the corporal force and the most predominant place of occurrence was the residence. Conclusion: The problem of violence against women is a topic that remains relevant today. It is observed that this is an area of research that needs more and more studies and investments, in order to analyze the factors that contribute to violence against women and thus inhibit them.

Keywords: Violence Against Women, Domestic Violence, Intimate Partner Violence.

1 INTRODUCTION

Violence against women has existed since the dawn of humanity, is one of the main forms of violation of their dignity, can be understood as any action or gender conduct that causes death or inflicts physical, sexual or psychological harm or suffering to women in the public or private sphere (FANGER; SANTIAGO; AUDI, 2019).

In 2015, in the Sustainable Development Goal, the specific target (5.2) and indicators on "the elimination of all forms of Violence against women (VAW) and girls" was included, aiming at promoting gender equality and women's empowerment. In 2016, the World Health Assembly endorsed a global action plan to strengthen the role of the health system in addressing violence, particularly against women and children, highlighting the responsibilities of governments (WHO, 2016).

Worldwide, Brazil ranks seventh in violence against women (VISENTIN et al., 2015). According to the atlas of violence, Brazil has a rate of 4.8 homicides per 100,000 women, which represents an average of 13 homicides per day (IPEA, 2019). In this perspective, violence against women can be considered a serious public health problem, not only because of its epidemiological data, but also because it is considered the main reason for female morbidity and mortality. (SANTOS et al., 2020).

Rates of intimate partner violence (IPV) varied widely across surveys, but generally aligned with WHO estimates of 37% physical and/or sexual IPV against women who have ever had partners (GARCÍA-MORENO et al., 2013). Of pregnant women, 2 to 14% reported violence during any pregnancy in a global review documented in 2010 (DEVRIES et al., 2010).

The cases of feminicide grew 22.2% between March and April of the year 2020, in 12 states of the country, in relation to the year 2019, and public records still confirm a drop in the opening of police reports. In the state of São Paulo, the number of homicides of women increased 44.9% in March 2020, compared to the same period in 2019 and women who were already living in a situation of domestic violence without a safe place were forced to stay longer at home with their aggressor, often in precarious housing, with their children, without social interaction, thus reducing the chances of reporting or the fear of making the report of the partner (SANTOS et al., 2020).

Facing the dimension of the problem of domestic violence, both in terms of the high number of women affected and the psychological, social, and economic consequences, on August 7, 2006, the law number 11.340, Maria da Penha Law, was enacted, which emerged in order to create mechanisms to curb domestic and family violence against women on the elimination of all forms of discrimination against women, as well as to prevent, punish, and eradicate violence against women (SANTOS et al., 2016).

As of 2011, the notification of violence became part of the list of compulsory notification, universalizing the notification for all public and private health services. Thus, the individual notification form of violence became the instrument used to notify any suspected or confirmed case of domestic/intrafamily violence against women and other specific population groups (BRAZIL, 2016).

Considering the need for surveillance of cases of violence against women and aiming to repress this type of crime, this study aims to identify the profile of women in situations of violence, as well as to recognize who their main aggressors are and the characteristics of aggression, being of utmost importance, since these data subsidize the development and implementation of public policies to control this grievance.

1.2 OBJECTIVE

1.2.1 General

Analyze the panorama and characteristics of gender-based violence against women in Porto Velho, based on the notifications of secondary information for monitoring the phenomenon, in the period from 2016 to 2021.

1.2.2 Specific

- Describe the sociodemographic characteristics of women in situations of violence;
- Profile the cases of violence against women;
- Describe aspects of the likely perpetrator of the assault.

1.3 JUSTIFICATION

In the years from 2012 to 2016, the main notifications of cases of violence in Porto Velho-RO were female victims, leading to public health damages, such as physical and psychological problems (SEMUSA, 2018). Worldwide, one in three women have suffered physical and/or sexual violence, so it is necessary to develop scientific studies that analyze this problem in order to combat it. Since this violence generates several health problems, such as feminicide, suicide, and non-fatal consequences such as psychological and physical damage, which results in direct costs to health, social welfare, and criminal justice. In addition, most studies have targeted high-income countries and focused too much on risk factors at the expense of studying more protective factors (PAHO, 2015).

Moreover, many health professionals are unaware of their role regarding violence against women and do not feel qualified to deal with this type of cause (BORBUREMA et al., 2017)This makes the victim not receive the necessary support from the health care networks, and the problem is perpetuated. Therefore, this research aims to contribute for the family health teams (FHS) to be trained and implement actions in their territory in order to minimize the observed violence, as well as to find coping strategies and adequate notification.

2 MATERIAL AND METHODS

This is a quantitative, descriptive, ecological, time-series study (2016 to 2021) on violence against women in the municipality of Porto Velho-RO, built from official data from the Sistema de Informação de

Agravos e Notificação (SINAN), extracted from the electronic platform of the Department of Health Surveillance of the Municipal Health Secretariat of Porto velho-RO (SEMUSA).

2.1 SCENARIO OF THE STUDY

The capital of Rondônia, the municipality of Porto Velho, is located in the northern region of the country, its estimated population for 2020 is 539,354 inhabitants, and it has a Human Development Index (HDI) of 0.736 (IBGE 2020).

2.2 STUDY POPULATION

The notified cases of violence against women in the municipality of Porto Velho between 2016 and 2021 were considered. Inclusion criteria were: notification of cases from 10 years old, when she is already considered an adolescent, covering the urban and rural areas of the municipality. Notification forms whose age is less than 10 years old, and who are not residents of the municipality were excluded.

The age of 10 years was defined based on the Ministry of Health's National Policy for Comprehensive Care of Women's Health (BRASIL, 2014) and the WHO's delimitation of the adolescent stage: 10 to 19 years (WHO, 1965).

2.3 DATA COLLECTION

The Interpersonal or Self-Provoked Violence Notification/Investigation Form. This form contains fields on general data of the notification (type of notification, date of notification, State, municipality of notification, health unit, date of occurrence of violence), individual notification (user's name, date of birth, age, sex, pregnant woman, race/color, education, SUS card number, mother's name), victim's residence data, occurrence data, typology of violence, sexual violence, consequences of violence, injuries resulting from violence, data on the probable perpetrator of the aggression, referrals, and final classification of the case.

The Ministry of Health has as guidelines for notification in SINAN the suspected or confirmed cases of domestic/intrafamily violence (physical, psychological/moral, financial/economic, neglect/abandonment), sexual, self-inflicted, human trafficking, slave labor, child labor, torture, legal intervention against women and men of all ages. In the case of extrafamily/community violence, only violence against children, adolescents, women, elderly people, people with disabilities, person with mental disorders, indigenous people and population identified as lesbian, gay, bisexual and transgender (LGBT) (BRASIL, 2016) will be objects of notification.

The form must be filled out by health services and other notifying sources. Data are entered in the net version (SINAN NET) at the municipal level and transferred to the state and federal levels to compose the database. In 2014, the notification form was renamed interpersonal/self-inflicted notification.

2.3.1 Variables

The variables included in the study were from the notification form for suspected or confirmed cases of domestic/intrafamily violence from SINAN, related to the battered woman, the act of aggression, and the probable perpetrator of the aggression. Below are the independent variables analyzed in this study.

The variables were grouped into sociodemographic characteristics, which included age group, race, education, and marital status; Characteristics of violence reported against women, which included types of violence, means of aggression, place of occurrence, shift of occurrence, repeat violence; Characteristics of the likely perpetrator, which included sex of the likely perpetrator, number of aggressors, relationship to the person served, life cycle, and suspected alcohol use.

2.4 DATA ANALYSIS

The variables analyzed were the sociodemographic characteristics of the women (education, skin color, and marital status), the reported violence (type of violence, means of aggression, place of occurrence, shift of occurrence, and repeat violence), and the probable perpetrator of the aggression (gender, number of people involved, life cycle, relationship with the victim, and suspected alcohol use), and the absolute and relative frequencies were calculated.

With the data extracted from SINAN, spreadsheets were prepared with the research variables, and the results were expressed in tables built in the software MICROSOFT EXCEL OFFICE 365, version 2205.

2.5 LIMITATIONS

The use of secondary data from the SINAN forms has some limitations. The system is an important tool for evaluating and monitoring reported domestic violence, however the quality of the record of some variables can be compromised due to the presence of inconsistencies resulting from divergence between the criteria determined in the guidelines and the one adopted by health professionals when filling (DELZIOVO et al., 2018).

The existence of blank fields or ignored information decreases the completeness of the forms. It is still important to consider that secondary data, as in the case of SINAN, there are under-recordings and under-reporting that can influence the result.

2.6 RESEARCH ETHICS

Although this is a study with secondary data without identification of the subjects, the work plan is linked to the subproject "Health care in Porto Velho", which is part of the matrix research project called "Studies about morbidities in Rondônia: assistance, training and education under discussion", approved by the CEP/UNIR under opinion number 2.548.115.

3 RESULTS

In the period from 2016 to 2021, among residents of the municipality of Porto Velho-RO, 1863 cases of violence against women were registered in the Notification Aggravities Information System (Sinan).

Table 1 presents the sociodemographic profile of the women who suffered violence in the municipality and in the time period studied.

It can be seen that the largest number of cases, with regard to the age of the victims, had a predominance in the age group of 10 to 19 years, whose percentages ranged between 45.5% in 2016 and 47.4% in 2021, with percentage oscillations in the other years , with 2017 having the highest percentage of 56%. It is noted that the age with the lowest rate of violence against women is the elderly, with the highest percentage with 2.7% in 2016. As for color/race, there was a greater predominance of cases with the non-white population, cases that stay above 75% in all years studied, the highest in 2016 with 80.6%. There was a greater number of cases in the population with only elementary school education. As for marital status, the number of single women who have suffered violence happens more frequently ranging from 42.5% to 59.3% among the years of study, with 2019 being the highest percentage.

Table 1 - Numerical and percentage values of cases of violence against women from 2016 to 2021 in the municipality of Porto Velho-RO, according to the variables age groups, race, education and marital status

	2016		2017		2018		2019		2020		2021	
	N	%	N	%	N	%	N	%	N	%	N	%
Age Group												
10 a 19	136	45,5	192	56,0	174	50,6	219	52,8	113	48,7	109	47,4
20 a 24	33	11,0	37	10,8	53	15,4	58	14,0	34	14,7	39	17,0
25 a 59	122	40,8	110	32,1	110	32,0	134	32,3	83	35,8	77	33,5
60 years and +	8	2,7	4	1,2	7	2,0	4	1,0	2	0,9	5	2,2
Race												
White	55	18,4	69	20,1	81	23,5	100	24,1	52	22,4	46	20,0
No White	241	80,6	270	78,7	261	75,9	313	75,4	180	77,6	182	79,1
Ignored	3	1,0	4	1,2	2	0,6	2	0,5	-	-	2	0,9
Education												
No study	4	1,3	4	1,2	4	1,2	2	0,5	-	-	3	1,3
Elementary School	115	38,5	148	43,1	119	34,6	176	42,4	97	41,8	78	33,9
High School	54	18,1	70	20,4	76	22,1	97	23,4	43	18,5	51	22,2
Higher Education	16	5,4	13	3,8	20	5,8	30	7,2	10	4,3	17	7,4
Ignored	110	36,8	108	31,5	125	36,3	110	26,5	82	35,3	81	35,2
Marital status												
Single	127	42,5	188	54,8	190	55,2	246	59,3	119	51,3	124	53,9
Married/Consensual Union	77	25,8	71	20,7	89	25,9	94	22,7	47	20,3	41	17,8
Widow	4	1,3	2	0,6	5	1,5	4	1,0	3	1,3	2	0,9
Separated	17	5,7	17	5,0	13	3,8	11	2,7	8	3,4	8	3,5
Not applicable	38	12,7	31	9,0	21	6,1	30	7,2	12	5,2	26	11,3
Ignored	36	12,0	34	9,9	26	7,6	30	7,2	43	18,5	29	12,6

Source: Information System of Diseases and Notification - SINAM

Table 2 presents the type of violence, means of aggression, place of occurrence, shift of occurrence, and repeat violence. Physical violence appears as the largest type of violence, falling below for self-harm (23.8%) and sexual violence (23.6%) in the year 2020. The most used means of aggression was corporal

force, with higher percentages in 2016 (43%) and 2017 (33.4). It is noted that the most predominant place of occurrence was the residence when percentage above 65% in all years, with the highest rate in 2019 (77.1%) and 2020 (75%). It was identified that the shift of occurrence was an underreported variable , as there was a high percentage of ignored data, thus hindering the analysis. In the variable "repeat violence" categorized as "yes" and "no", there was a higher percentage of "yes", only in 2018 the highest rate of "no" (70.9%) repeat occurrences.

Table 2 - Characteristics of violence against women, from 2016 to 2021 in the municipality of Porto Velho-RO, 2022

	2016		2017		2018		2019		2020		2021	
	N	%	N	%	N	%	N	%	N	%	N	%
Type of violence												
Self-inflicted injury	26	5,8	95	16,2	100	18,1	158	22,1	88	23,8	72	17,9
Physical Violence	172	38,7	187	31,9	158	28,6	178	24,9	77	20,9	101	25,1
Psychological violence	72	16,2	63	10,7	64	11,6	75	10,5	35	9,5	61	15,1
Torture	12	2,7	16	2,7	7	1,3	19	2,7	6	1,6	9	2,2
Sexual Violence	121	27,2	127	21,6	122	22,1	130	18,2	87	23,6	96	23,8
Financial Violence	5	1,1	4	0,7	3	0,5	5	0,7	2	0,5	2	0,5
Negligence	11	2,5	11	1,9	7	1,3	4	0,6	2	0,5	1	0,2
Other violence*	26	5,8	84	14,3	91	16,5	147	20,5	72	19,5	61	15,1
Means of aggression												
Body strength	150	43,0	135	33,4	106	27,2	128	29,4	67	31,2	76	31,1
Hanging	17	4,9	19	4,7	24	6,2	19	4,4	12	5,6	15	6,1
Blunt object	9	2,6	23	5,7	18	4,6	29	6,7	5	2,3	13	5,3
Sharps	35	10,0	84	20,8	72	18,5	95	21,8	58	27,0	46	18,9
Substance/Hot object	4	1,1	1	0,2	1	0,3	2	0,5	-	-	3	1,2
Poisoning	14	4,0	37	9,2	57	14,7	67	15,4	45	20,9	39	16,0
Firearm	15	4,3	12	3,0	12	3,1	16	3,7	6	2,8	7	2,9
Threat	70	20,1	54	13,4	60	15,4	57	13,1	22	10,2	41	16,8
Other	35	10,0	39	9,7	39	10,0	23	5,3	-	-	4	1,6
Place of occurrence												
Residence	203	67,9	247	72,0	253	73,5	320	77,1	174	75	171	74,3
Other Locations	68	22,7	76	22,2	74	21,5	85	20,5	50	21,6	36	15,7
Ignored	28	9,4	20	5,8	17	4,9	10	2,4	8	3,4	23	10,0
Shift of occurrence												
Night/early morning	97	32,4	82	23,9	76	22,1	153	36,9	66	28,4	65	28,3
Morning/Afternoon	87	29,1	86	25,1	100	29,1	104	25,1	53	22,8	40	17,4
Empty	115	38,5	175	51,0	168	48,8	158	38,1	113	48,7	125	54,3
Repeat Violence												
Yes	124	53,7	167	60,1	100	29,1	220	60,6	118	58,7	119	63,3
No	107	46,3	111	39,9	244	70,9	143	39,4	83	41,3	69	36,7

* Includes child labor, legal intervention and human trafficking
Source: Information System of Diseases and Notification - SINAM

Table 3 presents the sex of the aggressor, highlighting that the predominance is of males, greater than 50% in the years studied, but in 2020 the female sex represents a higher percentage (58.5%). As for the number of aggressors, it was noted that there was a higher frequency with one aggressor, with a total of 1,553 (87.4%) in the years studied. Moreover, the life cycle of the probable perpetrator of the violence has as the highest percentage the adult person with higher frequency in 2016 (46.3%) and 2020 (45.5 %). The

relationship of the probable perpetrator of the violence has variable incidences in the years, with the intimate partner as the main perpetrator of violence in the first three years studied, while in the last three years the percentage is higher as the person him/herself is the perpetrator. Another piece of data that was harmed by incompleteness was the variable "suspected alcohol use", with many data ignored, thus harming the analysis.

Table 3 -Characteristics of the probable perpetrator of aggression against women in the period from 2016 to 2021 in the municipality of Porto Velho-RO, 2022

	2016		2017		2018		2019		2020		2021	
	N	%	N	%	N	%	N	%	N	%	N	%
Sex of the offender												
Female	36	13,2	105	31,9	105	31,8	163	40,6	134	58,5	80	36,0
Male	227	83,5	213	64,7	217	65,8	233	58,1	94	41,0	135	60,8
Both	9	3,3	11	3,3	8	2,4	5	1,2	1	0,4	7	3,2
Number of offenders												
A	214	79,0	276	84,7	294	89,4	364	90,8	207	91,6	198	88,4
Two or more	57	21,0	50	15,3	35	10,6	37	9,2	19	8,4	26	11,6
Life cycle of the probable perpetrator of the violence												
Child	2	0,9	2	0,7	5	1,7	3	0,9	-	-	1	0,5
Teenager	40	17,6	110	38,1	95	32,5	127	36,4	66	34,9	57	30,5
Young	76	33,5	78	27,0	72	24,7	74	21,2	35	18,5	41	21,9
Adult person	105	46,3	96	33,2	114	39,0	138	39,5	86	45,5	81	43,3
Elderly person	4	1,8	3	1,0	6	2,1	7	2,0	2	1,1	7	3,7
Abuser/woman bond												
Intimate partner*	109	35,7	93	27,2	95	26,5	108	26,0	48	21,0	68	29,4
Family relationship**	42	13,8	39	11,4	38	10,6	35	8,4	19	8,3	19	8,2
Own person	19	6,2	89	26,0	96	26,7	143	34,4	84	36,7	69	29,9
Known	58	19,0	55	16,1	54	15,0	54	13,0	25	10,9	31	13,4
Unknown	54	17,7	50	14,6	50	13,9	49	11,8	41	17,9	34	14,7
Other****	23	7,5	16	4,7	26	7,2	27	6,5	12	5,2	10	4,3
Suspicion of alcohol use												
Yes	87	46,3	85	33,9	65	30,5	92	32,1	53	33,3	63	41,4
No	101	53,7	166	66,1	148	69,5	195	67,9	106	66,7	89	58,6

* Includes spouse/ex-spouse and boyfriend/ex-boyfriend
** Includes father, mother, stepfather, son and brother
*** Includes caregiver, employer/chief, person with institutional relationship, police officer
Source: Information System of Agraves and Notification - SINAM

4 DISCUSSION

There has been a decrease in the number of cases over the years, however, this data may not mean that the cases of violence have decreased, but that the access of the victims to the services specialized in Violence Against Women (VCM) may have been impaired due to the COVID-19 pandemic, which led to the isolation of these women at home (BARROS WENES VIEIRA et al., 2021)A study conducted on domestic violence in the context of social isolation by the covid-19 pandemic, presents opposite data

regarding the notifications recorded by Ligue 180, another means of reporting cases of violence, having in April 2020 an increase of 37.58% compared to the same period in 2019 (SOUZA; FARIAS, 2022)

The age range differs from the study conducted in the same state (Rondônia) with data between the years 2007 to 2015, where the predominance of violence was with the age of young adult women (19 to 39 years) (ALVES et al., 2018)This is explained by the fact that school-age girls suffer more violence in affective/family relationships and sexual violence. (TERRIBELE; MUNHOZ, 2021).

The study found in cases of violence that most victims have low education, some authors consider that the less schooling, the less qualified the woman will be professionally, thus generating more unemployment, making women financially dependent on the partner, which is a hindering factor for termination (LEITE et al., 2021).

When analyzing this study the predominance of violence is in non-black women, matching a study conducted in the period from 2016 to 2018 that shows that violence in white women was lower than that of non-white women, which can be explained by the social and cultural contexts in which these women are inserted (MONTEIRO; ROMIO; DREZETT, 2021).

Most report being single, which may indicate that without a marriage bond or dependency, it is easier to report. A literature review study points out that many women believe that the violence is their own fault, with the pressure from society to maintain the marriage and the fear of threats from the intimate partner, women opt for silence (BARAGATTI et al., 2019). Evaluating the characteristics of violence against women, it was noted that the same woman may have suffered more than one abuse simultaneously, indicating that the aggressions often do not occur in isolation, but associated with other types. Physical violence and the means of aggression bodily force was the most suffered by women in this study, which can be explained by the fact that this means is more physically visible and leads women to health care (LAWRENZ et al., 2019)A study conducted with women at the Reference Center for Women's Care indicated that the emotional suffering of women who are in violence leads them to seek psychological support, but professionals do not know how to deal with this problem and medicate to "calm" the suffering (SOARES; LOPES, 2018).

The place that presented itself most in the study was the residence with percentages above 65% in all years, which becomes worrisome, many cases are poorly followed up by the woman's fear of making the complaint (KASSIM et al., 2020)As for the shift of violence, the data could not be analyzed because the cases marked as "ignored" were greater than the description of these cases. The repetition of violence is highly present in the cases, which can be justified by the fact that the procedures registered in the police stations do not have the proper continuity, both by the woman's request and by the delay of the judicial system, thus transmitting the feeling of impunity to the possible author of the violence. (LIMA, 2019).

As for the profile of the likely perpetrator of violence it was reported that it happened more by men, highlighting more the prevalence of an author in reported cases, the cases caused by intimate partner were the largest in the first trienniums, studies indicate that this is justified by the perpetuation of violence,

patriarchy and machismo (DE MOURA et al., 2020) However, it is noted an increase in the next years that the person him/herself would be the author of the violence, which can be explained by the low notification of cases of violence against the intimate partner due to the isolation of COVID-19 and by the increase in the rate of self-harm caused by the person him/herself. Regarding the use of alcohol by the possible aggressor it was not possible to establish good statistics, because the number of ignored was higher (data not shown).

5 CONSIDERATIONS

Therefore, with this study it is concluded that the problem of violence against women is an issue that remains relevant today, since more and more women are affected by it. In the State of Rondônia in the period from 2016 to 2021, among residents of the municipality of Porto Velho-RO, 1863 cases of violence against women were recorded in the Notification Agraves Information System (Sinan). The age of the victims, had a predominance in the age group of 10 to 19 years , being the year 2017 with the highest percentage (56%), as for the color/race, there was a greater predominance of cases with the non-white population, these cases staying above 75% in all the years studied, most victims attended only elementary school, the number of single women who suffered violence happened more frequently. Observing the profile of violence, physical violence appears as the greatest type of violence, the most used means of aggression was bodily force. It is noted that the most predominant place of occurrence was the residence, the shift of occurrence was an underreported variable. Analyzing the characteristics of the probable perpetrator of the aggression, the predominance is male, the relationship of the probable perpetrator of the violence has variable incidences in the years, being in the first three years studied the intimate partner as the main perpetrator of violence, in the last three years the percentage is higher as being the person himself the perpetrator

Thus, it is observed that this is an area of research that needs more and more studies and investments, in order to analyze the factors that contribute to violence against women, and consequently inhibit them. It is of utmost importance to expand and strengthen the points of attention and to qualify the professionals who work in assisting the cases of violence against women.

REFERENCES

ALVES BARBOSA DE OLIVEIRA, C. et al. Perfil da vítima e características da violência contra a mulher no estado de Rondônia - Brasil. **Revista Cuidarte**, v. 10, n. 1, 20 dez. 2018.

BARAGATTI, D. Y. et al. Rota crítica de mulheres em situação de violência: revisão integrativa. **Revista Panamericana de Salud Pública**, v. 43, p. 1, 8 abr. 2019.

BARROS WENES VIEIRA, M. et al. NOVAS FORMAS DE DENUNCIAR CASOS DE VIOLÊNCIA DOMÉSTICA DURANTE A QUARENTENA PROPICIADA PELO COVID-19. **HOLOS**, v. 3, p. 1–11, 6 ago. 2021.

BORBUREMA, T. L. R. et al. Violência contra mulher em contexto de vulnerabilidade social na Atenção Primária: registro de violência em prontuários. **Revista brasileira de medicina de família e comunidade**, v. 12, n. 39, p. 1–13, 2017.

BRASIL. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Política nacional de atenção integral à saúde da mulher: princípios e diretrizes. Plano de ação 2004 - 2007. Brasília: Ministério da Saúde; 2004. Disponível em: <https://conselho.saude.gov.br/ultimas_noticias/2007/politica_mulher.pdf> Acesso: 22 abr 2022

_____. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância de Doenças e Agravos Não Transmissíveis e Promoção da Saúde.**Viva:** instrutivo notificação de violência interpessoal e autoprovocada. 2. ed. – Brasília: Ministério da Saúde, 2016.

_____, M. DA SAÚDE. S. DE V. EM SAÚDE. D. DE V. DE D. E A. N. T. E P. DA S. **Viva: instrutivo notificação de violência interpessoal e autoprovocada [recurso eletrônico]**Ministério da Saúde, , 2016.

DELZIOVO, C.R.; BOLSONI, C.C.; LINDNER, S.R.; COELHO, E.B.S. Qualidade dos registros de violência sexual contra a mulher no Sistema de Informação de Agravos de Notificação (SINAN) em Santa Catarina, 2008-2013. **Epidemiologia e Serviços de Saúde**, v. 27, n. 1, p. 1–12, 2018. Disponível em: https://www.scielo.br/j/ress/a/kj545QSF6Cgy98ddCGmmcTL/?format=pdf&lang=pt Acesso: 09 fev 2022.

DE MOURA, J. Q. et al. Homens Autores de Violência contra Mulher: Um Estudo Descritivo. **Contextos Clínicos**, v. 13, n. 1, p. 174–197, 23 jul. 2020.

DEVRIES, K. M. et al. Intimate partner violence during pregnancy: analysis of prevalence data from 19 countries. **Reproductive Health Matters**, v. 18, n. 36, p. 158–170, 2010.

FANGER, V. C.; SANTIAGO, S. M.; AUDI, C. A. F. Fatores associados à violência contra mulher na vida pregressa de mulheres encarceradas. **Revista Mineira de Enfermagem**, v. 23, n. 0, p. 1–7, 2019.

GARCÍA-MORENO, C. et al. **Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence**. Geneva, Switzerland: World Health Organization, 2013.

IPEA, I. DE P. E. A. **Atlas da violência 2019**. Brasília: Rio de Janeiro: São Paulo: IPEA/ Fórum Brasileiro de Segurança Pública, 2019.

KASSIM, M. N. et al. CARACTERIZAÇÃO SOCIODEMOGRÁFICA DAS NOTIFICAÇÕES DE VIOLÊNCIA INTERPESSOAL EM MULHERES EM IDADE FÉRTIL EM UM HOSPITAL DE ENSINO NO PARANÁ. **Revista de Epidemiologia e Controle de Infecção**, v. 10, n. 4, 4 out. 2020.

LAWRENZ, P. et al. Violência contra Mulher: Notificações dos Profissionais da Saúde no Rio Grande do Sul. **Psicologia: Teoria e Pesquisa**, v. 34, 16 maio 2019.

LEITE, F. M. C. et al. Associação entre a violência e as características socioeconômicas e reprodutivas da mulher. **Cadernos Saúde Coletiva**, v. 29, n. 2, p. 279–289, out. 2021.

LIMA, E. F. T. PERCEPÇÃO DAS MULHERES SOBRE A EFETIVIDADE DA LEI 11.340/06 – LEI MARIA DA PENHA: UMA REVISÃO DE LITERATURA. **Gênero & Direito**, v. 8, n. 1, 25 abr. 2019.

MONTEIRO, M. F. G.; ROMIO, J. A. F.; DREZETT, J. Is there race/color differential on femicide in Brazil? The inequality of mortality rates for violent causes among white and black women. **Journal of Human Growth and Development**, v. 31, n. 2, p. 358–366, 3 ago. 2021.

OMS, O. M. DA S. **INSPIRE: seven strategies for ending violence against children.**São Paulo: OMS/USP, , 2016.

ORGANIZACION MUNDIAL DE LA SALUD (OMS). Problemas de salud de la adolescência [Internet]. Genebra: Organização Mundial da Saúde; 1965. Disponível em: <https://apps.who.int/iris/bitstream/handle/10665/38485/WHO_TRS_308_spa.pdf?> Acesso 19 mai 2022

SANTOS, L. S. E. et al. **Impactos da pandemia de COVID-19 na violência contra a mulher: reflexões a partir da teoria da motivação humana de Abraham Maslow**. [s.l: s.n.]. Disponível em: <https://preprints.scielo.org/index.php/scielo/preprint/view/915/version/969>. Acesso em: 27 maio. 2021.

SANTOS, M. C. et al. Violência contra a Mulher no Brasil: algumas reflexões sobre a implementação da Lei Maria da Penha. **Caderno de Graduação - Ciências Humanas e Sociais - UNIT - ALAGOAS**, v. 3, n. 3, p. 37–37, 2016.

SOARES, J. DOS S. F.; LOPES, M. J. M. Experiências de mulheres em situação de violência em busca de atenção no setor saúde e na rede intersetorial. **Interface - Comunicação, Saúde, Educação**, v. 22, p. 789–800, 21 maio 2018.

SOUZA, L. DE J.; FARIAS, R. DE C. P. Violência doméstica no contexto de isolamento social pela pandemia de covid-19. **Serviço Social & Sociedade**, p. 213–232, 6 maio 2022.

TERRIBELE, F. B. P.; MUNHOZ, T. N. Violência contra escolares no Brasil: Pesquisa Nacional da Saúde do Escolar (PeNSE, 2015). **Ciência & Saúde Coletiva**, v. 26, p. 241–254, 25 jan. 2021.

VISENTIN, F. et al. Women's primary care nursing in situations of gender violence. **Investigación y Educación en Enfermería**, v. 33, n. 3, p. 556–64, 2015.

CHAPTER 23

Table, an imagetic representation in the construction of scientific knowledge

10.56238/rsfohsv1-023

Nelson Barrelo Junior
UFF/FE
E-mail: nbarrelo@gmail.com

Josias Rogerio Paiva
CEV Mater et Magistra
E-mail: josiaspaiva@gmail.com

Anna Maria Pessoa de Carvalho
USP/FE/FaPEF
E-mail: ampdcarv@usp.br

ABSTRACT
In this paper some references are presented that value imagery records, in the form of a table. The use of multiple representations is the proposition that aspects of scientific literacy - proportionality and the process of argumentation - are promoted when students appropriate forms of expression used in the construction of scientific knowledge. The modes of interactions with this tool of representation and organization of ideas are highlighted here: the ergotic movements, the deictic gestures and iconic gestures; the forms of verbal language, everyday or scientific; and the directing of visual attention to some specific aspects present in the simulation used about the photoelectric effect, which was part of an investigative teaching sequence, for the introduction of modern physics, taught to a class of students in the third grade of high school, in the Public Education System of the State of São Paulo.

Keywords: Framework, Representations, Knowledge Construction.

1 INTRODUCTION

When considering the constructions of meaning made by students, Lemke (2002) states that we do not know from where students select information, whether from visual aspects, from the speech of a speaker in class, or from the association of the class with remote experiences. What is certain is that in class, there is a collection of information, organization, and the formulation of a model that may correspond to the phenomenon discussed in class. Often in lectures, due to didactic demands, there is a reduction of the properties present in the phenomenon in order to emphasize a single aspect.

The episodes reported here are part of the data analyzed in a class, in which third grade high school students from the São Paulo State Public School System interacted with a simulation of the photoelectric effect, changing the wavelength and classifying whether the photoelectric effect occurred. These students also observed other pictorial and numerical parameters linked to the phenomenon and here we highlight the considerations associated with the use of a table to organize the data extracted in the interactions that occurred in the class.

2 MATHEMATICAL REPRESENTATIONS

Mathematical representations are found in some physics education publications, employed in the construction and communication of science. Tweney (2011) sought to expose the cognitive basis on the way of reasoning and considerations made by Maxwell in constructing his equations. The author pondered that Maxwell departed from Faraday's imagery representations, and that there is a mathematical nature to these representations.

> For Maxwell, his equations of electrodynamics reflect an underlying theory that was very similar to Faraday's. In the present paper, I examine the sense in which this is true, and the implications this has for the pedagogy of science teaching. [...] In its social, cultural, and contextual, cognitive-historical richness opens up new perspectives on the reality of science and on how scientists actually acquire their skills (TWENEY, 2011, p. 688).

This author describes three uses of mathematics in physics: 1) calculation: when you plug in specific values from one set of variables to calculate the value of another; 2) derivation: this is used when you want to derive one expression from another; 3) representation: in a way, this is the most important, according to Maxwell. To do physics, according to the author, instead of "pure mathematics", one had to be able to realize that once something was expressed mathematically, it makes a difference in how one can think. Maxwell made it convincingly clear that mathematics must be used in a way that reflects the physical theory being represented (TWENWY, 2011, p. 691).

A form of mathematical representation of great applicability in the sciences, and especially in physics, are tables. Perini (2005) states that scientists use visual representations, including tables, to defend their arguments. For the author, figures, tables or other forms of visual representations are not mere illustrations, redundant expressions next to a text, but play a key role in conferring force and power of persuasion to the argument, being used as support in the placement of hypotheses or as support for evidence.

The author addresses two situations to explain her conception. The first is a table and the second is an image of a micrograph. As for the visual organization arranged in a table, Perini (2005) elucidates that inferences about the relationships between characteristics of a set of values are facilitated by the visual format, including higher order relationships; that the spatial form is essential for support and pictorial representations to provide hypotheses. And, as for micrographs, the author expresses the relevance of knowing the process of their construction.

> The table presents the data in a format that does not require an additional evaluation step to relate the data to the hypothesis. The tabular format pre-classifies the data into ordered sets using spatial relationships to represent relationships between sets of experimental values [...] Relationships within and between these sets can then be assessed using the relevant spatial relationships [...] (PERINI, 2005, p. 923)

3 THE ORGANIZATION OF SIMULATION-RELATED DATA

Below are described some shifts extracted from the students' statements during the interaction with the simulation and with the teacher. In the first part is the sequence in which occurs the suggestion to record the data in the form of a table; in the second, is the effective engagement of students in the work proposal and the interactions teacher - student - applet. This data was collected in two classes. In the first, the students used only one computer, one group at a time. Later, they returned to the computer room and each group had a computer at their disposal.

When the first group of students sat down next to the computer and started using the simulation, the teacher instructed how to record the data. In the T.54 turn, the teacher asked about the data to be collected: "What are you going to write on the sheet? This question allowed the students to explore the magnitudes

expressed in the applet and also the relationships between them. However, the orientation was categorical and restricted the students' actions. The students were not expected to elaborate answers. With deictic gestures during his orientation explanation, the teacher pointed from where the students would extract the data and indicated where the students should register them.

One group of students would use the computer and give up their places to the next group. As the groups took turns using the computer, the directions given by the teacher changed. After being asked by the students in the first group to evaluate the initial notes, from turns T.91 to T.94, the teacher asked the students to construct a table to organize the data.

Table 1: Teacher's suggestion for students to make a table

TIME SHIFT	SPEAKS
91 17:56h	A5: Teacher,
92 18:07h	Q: Speak up, what's up?
93 18:08h	A3: Teacher, can we put it like this, indicating what happens between one color and another? Like here, the ultraviolet, let's say we have [...] of nano... nano what? Nano, nano... the value [...] that. Then, we put in the case, [...] from one length to another is, is, transmits...
94 18:33h	Q: You can. One suggestion I would give, so, for you to organize yourselves better, maybe it's worth making a little table. So, oh, color of light, one column, color of light, in the other for wavelength, and the last one what is the result? The result is whether it ejected electrons or did not eject electrons.

The group followed in this analysis started their actions with the simulation from the T.245 turn. This shift marks the moment when they sat down in front of the computer and the teacher started to replace some orientations, having done so from turn T.245 to turn T.255. This orientation occurs with verbal language accompanied by deictic gestures directing the students' gaze to the sections they were referring to, both in the answer sheet (T.254) and in the image produced by the simulator (T.255). Lemke (2002a) elaborates on how students intertextualize incoming information to construct meaning by mapping the directionality of a student's gaze to construct meaning. In these shifts, the data demonstrates action on the part of the teacher who seeks to direct students' visual attention to where to look for the relevant information to effect the activity.

In the verbal language used by the teacher, there are some terms that, although they seem to be part of everyday language, are referring to scientific concepts. In turn T.254, the word "infrared", and in turn T.255, the term "length", which refers to the wavelength, a specific term of the wave model. However, the context makes it possible to understand the term employed. Incompleteness is an event present in the use of language in communication, which also occurs in the classroom, including with the teacher (LEMKE, 1998). For the teacher, the length could only refer to the wavelength, in the context of ondulatory, electromagnetic waves, the agenda of the work at that moment. However, this certainty, of the field in which one is acting, may not be so evident to the students. No matter how much one seeks to simplify

speech, or how much pressure there is to organize the activity developed in class, affecting the teacher's performance, care should be taken with the correct use of scientific terms. It is the teacher's role to promote a leap in the quality of the students' language, the use of terms that are scientifically coherent with the phenomena being studied, and, therefore, this cannot be neglected.

Below is recorded, in the form of a table, the data reported verbally between shifts T.254 and T.318, during the recording of the table about the activity. The record does not show all the shifts, because not all of them have information that would be in the students' table. In the table, there are the teacher's questions about what they should observe, the records dictated and recorded by students during the development of the activity, the turns in which the quotes appeared and the author of the quote.

Table 2: Transcription of the data observed by the students

What color? (T.254)		... what is the length...? (T.255)		... and what is the result? (T.255)	
T.254	Infrared (P)	T.257	850 (A12)	T.259	Does not start (A12)
T.266	Blue (A11)				
T.267	Blue (A12)				
T.276	Red A13	T.276	764 (A13)		
T.280	Orange (A13)	T.283	681 nm (A13)		
T.287	Yellow (A13)				
T.288	Yellow (A11)	T.289	585 (A13)		
T.289	Green (A13)			T.296	From when did you start going out? (P)
				T.297	The green one. (A14)
T.304	Blue (P)				
T.305	Darker Blue (A12)				
T.307	Violet (P)				
T.313	Ultraviolet (P)			T.314	They get faster (A13)
T.317	At UV maximum (P)			T.318	Of the hour

It is relevant to note that reading the information in the applet was engaging for the students. At least four of these contributed in this register, as did the teacher who was closely following the students' interaction with the simulation. The information that constituted the logs represents 34% of this episode, in 22 of the 64 shifts between T.254 and T.318. In the rest, doubts, reading and data confirmations, guidance on ways to proceed, and guidance on the unit employed appeared. Next, we restructured the students' view of their table from the stated data, omitting the recording of the shifts and the people who were speaking.

Table 1 : Data declared by the students

Color	Wavelength	Result
Infrared	850	Does not start
Blue		
Blue		
Red	764	
Orange	681 nm	
Yellow		
Yellow	585	
Green		From when did it start to come out?
		From green
Blue		
Darker Blue		
Violet		
Ultraviolet		They get faster
In the ultraviolet maximum		Of the hour

The suggestion to organize the data in the form of a table represents a common praxis in the routine of someone who records multiple data of a phenomenon, although usual in the scientific sphere, in school it is something of an experienced person. The students could come up with an order of recording that resembled a table. They called the teacher to evaluate their form of register in turns T.91 to T.94, who, in turn, suggested the construction of the table. The methodology employed by the teacher could be teaching by investigation, regarding the aspect of records of experimental data, if he provoked and promoted different forms of record exploring peculiarities and advantages of the different modes of visual representation.

As the data were dictated for recording in the table, the visual effect corresponding to the tuning of the frequencies referring to each radiation in the spectrum, which would be the expected result if it pulls electrons out, was not stated. The teacher interacted with the students in the first records for the construction and organization of the table. He started with the question, "What color?" in turn T.254, but then guided on the information to be recorded "infrared". He asks first about the corresponding wavelength to which student A12 answers: "850"; and, then inquired about the observed result A12 also answers: does not start.

The meanings were now expressed in this visual form, a line in a table. The student A12 actively participated in this construction, demonstrating understanding of the procedure for the sequence of the developed activity, while the others followed attentively this construction. However, the reading of this line and the others has an important aspect in the construction of meanings related to the photoelectric effect, and it could not go unnoticed that, when ultraviolet radiation is incident, with a wavelength corresponding to eight hundred and fifty nanometers, the incident photons do not have enough energy to be absorbed by the electrons and promote their ejection.

In turn T.309, the teacher asked a question directing a specific way of reading a table. It was visible that by changing the position in the spectrum, a color in the visible spectrum changed, and a number

corresponding to the wavelength appeared in the applet. However, there was no other visible event. The initial frequencies of the spectrum did not have enough energy to eject electrons. Thus, the students no longer stated the expected result: "it does not eject electrons," according to the language they had been using in class. In turn T.296, the teacher interacted again with the group, questioning from what moment the ejection of electrons started. This necessary intervention demonstrates an experienced reading of the table, a possible correspondence of the column of results with one of the initial columns, which demarcated the color and wavelength (PERINI, 2005).

The intervention is characteristic of inquiry teaching. The teacher did not read the table, stating to the students, but asked the students to do it and its relation. However, compared to the number of other forms of interventions made by the teacher, this isolated occurrence does not allow us to consider that in this activity the teaching was occurring in an investigative way.

Recording in a table format enables the visual connection between the data. In turn T.309, the teacher continued to make interventions in order to provide the perception of relationships among the data recorded in the table.

Box 3: Reading the table

SHIFT TIME	TALK	ACTIONS	CLASSIFICATION
309 26:22	Q: - What's happening from one number to the next?	Q: points to the table with your finger running through the values from top to bottom.	Q: Dictic gestures Q: Everyday verbal language T: Attention to notes

In the table, the second column is the only one with numerical data. The teacher's question does not need any complement, but, instantaneously to the question, the teacher, with deictic gestures, points out a sense to which he referred in his question. So he specifies the sense in which he expects the answer, and this is an overdirection of the activity. The students did not need much time to realize that the values were decreasing, T.310: "it is going down". The teacher reinforced the students' answer and extended his questioning by relating the wavelength to the observed colors, respectively the second column to the first. In turn T.313, students are asked to notice what happened as the data taken approached ultraviolet radiation.

Students responded succinctly, "It gets faster." (T.314). The expression refers to the speed of the electrons ejected from the metal plate. The students, at this stage, are already interacting with the simulation and also with the content, that despite the incompleteness of the language in the question, "But notice what happens inside," they understood that the mention referred to the electrons, so they know what details to observe to get their answers. The teacher evaluates the students' answer as "Perfect" and asks them to perform a simulation with the shortest possible wavelength in the applet (T.311), and the students' response to the visual effect was, in turn T.318: "Da hora." This expression signals a new relationship of these

students with the content studied; it will not be just any person who will find good, "da hora",1 the representation, a drawing simulating electrons moving in an ampoule.

The end of the participation of this group in class occurs with the placement of questions proposed by the teacher and the student A13, questions that were left for reflection, without answers even hypothetically posed. The first question posed by the teacher in turn T.320: "Why does some colors of light pull electrons and others do not, if everything is light? Next, the teacher ended the activity by drawing the students' attention to the historical moment in which scientists worked on this question.

4 CONCLUSION

The dialogic character of the class does not exclude the role of mathematics in the construction of scientific knowledge. No expressions were constructed for the properties related to the studied phenomenon, but other skills were explored when employing the tables, which were created to promote interrelationships between magnitudes expressed in rows and columns (PERINI, 2005). Some of which are associated with the use of ways of reading these imagetic representations (PAIVA, 2010; 2015).

Another important highlight in the interactions described in the organization of the table was the search for the appropriate language to describe items related to the phenomenon, such as the wavelength units (CARVALHO, 2007). The administration of time for the effectiveness of the class, as well as the profile demonstrated by the teacher, although favoring the implementation of the activity, did not provide the search for the constant of proportionality, the Planck constant, or the work function associated with the material, even though the applet has sections that allow this direction.

In Tweney (2011), the uses of mathematics in physics, calculus, derivation, and representation are presented, and in his paper, he testifies that the counting of field lines performed by Faraday was mathematical in character. For high school students, calculus and derivation are not part of their fields of study. However, the evidence of mathematical representations in the data of this research aligns with the considerations of Perini (2005), who highlights the visual aspects of tables and other imagetic representations in the construction of arguments, and the considerations of Sasseron and Carvalho (2008), who, when structuring the identifiers of Scientific Literacy, specified one of them as proportional reasoning.

With a diversity of languages, a conception that is close to the mental model is externalized, because no language is capable of expressing the whole thought. Therefore, we make two considerations: 1) When using multiple languages, the tendency is that communication becomes more complete than when using a single language; 2) Although mathematical representations are discussed in this section, it should be noted that among the processes of materializing the model or representations, there is attention to other visual representations that, like any other language modality, will have aspects that are coherent and clearly identified and others that are related to representational limits. However, it is salutary for the student, the

[1] Slang means something good.

understanding and ability to construct, interact and use in the processes of argumentation, different representational forms, exemplified here as a table.

REFERENCES

BARRELO JÚNIOR, N. **Argumentação no discurso oral e escrito de alunos do ensino médio em uma sequência didática de física moderna**. 2010. 112 f. Dissertação (Mestrado em Educação) – Faculdade de Educação, Universidade de São Paulo, São Paulo, 2010.

CARVALHO, A. M. P. Habilidades de professores para promover a enculturação científica. **Revista Contexto e Educação**, v. 22, n. 77, p. 25-49, 2007.

LEMKE, J. L. Analysing verbal data: principles, methods, and problems. In: TOBIN, K.; FRASER, B. (Eds.). **International handbook of science education**. Dordrecht: Kluwer Academic, 1998.

LEMKE, J. L. **Aprender a hablar ciencia**. Barcelona: Paidós, 1997.

LEMKE, J. L. Typological and topological meaning in diagnostic discourse. **Discourse processes**, Philadelphia, v. 27, n. 2, p. 173-85, 1999.

LEMKE, J. L. Mathematics in the middle: measure, picture, gesture, sign, and word. In: ANDERSON, M.; SAENZ-LUDLOW, A.; ZELLWEGER, S.; CIFARELLI, V. (Eds.). **Educational perspectives on mathematics as semiosis**: from thinking to interpreting to knowing. Ottawa: Legas Publishing, 2002a.

LEMKE, J. L. Ensenar todos los lenguajes de la ciencia: palabras, símbolos, imágenes, y acciones. In: BENLLOCH, M. (Ed.). **La educación en ciencias**. Barcelona: Paidós, 2002b.

PAIVA, J. R. Representações pictóricas no ensino de física moderna: uma construção dos alunos. 2010. Dissertação (Mestrado em Educação) Universidade de São Paulo. São Paulo, 2010.

PAIVA, J. R. **Múltiplas Representações na Construção do Conhecimento Científico Escolar**. 2015. Tese (Doutoramento em Educação) – Unidade, Universidade de São Paulo. São Paulo, 2015.

SASSERON, L. H.; CARVALHO, A. M. P. Almejando a alfabetização científica no ensino fundamental: a proposição e a procura de indicadores do processo. **Investigações em ensino de ciências**, v. 13, n. 3, p. 333-352, 2008.

TWENEY, R. D. Representing the electromagnetic field: How Maxwell's mathematics empowered Faraday's field theory. **Science & Education**, v. 20, n. 7-8, p. 687-700, 2011.

Simulação do efeito fotoelétrico. Disponível em: <http://www.sc.ehu.es/sbweb/fisica/cuantica/fotoelectrico/fotoelectrico.htm> Acesso em: 04/05/2014.

CHAPTER 24

Abortion: gender and health issues

10.56238/rsfohsv1-024

Erika Branco
Erika Branco is a lawyer and editorial director of JC Magazine

Fabíola Sucasas Negrão Covas
Master's candidate in Human Rights at the University of São Paulo Law School. Promotora de Justiça Coordenadora do Núcleo de Gênero do Ministério Público de São Paulo e Membra Auxiliar do Conselho Nacional do Ministério Público
E-mail: fabiolasucasas@mpsp.mp.br

ABSTRACT
In the year 2022, Brazil was once again destined to reflect and discuss the topic of legal abortion, impelling jurists to respond or take a technical position on the rights achieved and the threats of setbacks to women's sexual and reproductive health rights.

1 INTRODUCTION

In the year 2022, Brazil was once again destined to reflect and discuss the topic of legal abortion, impelling jurists to respond or take a technical position on the rights achieved and the threats of setbacks to women's sexual and reproductive health rights.

The case of the 11-year-old girl from Santa Catarina, who was waiting for the right to terminate her pregnancy and was asked if she could "wait a little longer" by the judge in the process[1] , drew attention, if not - once again - by the moral and religious biases that permeate the theme, but mainly by the unveiling of a reality of institutional violence in the relationship between rape, pregnancy resulting from it, the right to abortion and the dignity of women.

The fact of Santa Catarina came to light at the same time that the Ministry of Health edited, in June 2022, the Manual "Technical Attention for Prevention, Evaluation and Conduct in Cases of Abortion"[2] . Under the justification of fulfilling its role of standardizing the care provided to the population, it had the intention, in its own words, to "support professionals and health services regarding the updated approaches on reception and qualified care based on the best scientific evidence and the most reliable statistics on the subject, always taking into account the defense of maternal and fetal life and the maximum respect for the legislation in force in the country"[3] . In one of its passages, it attributes to any abortion the practice of a crime.

Even if the document wants to instill the idea of little relevance to the topic and refer that the crime would be ruled out in advance due to the limited time of pregnancy and the impossibility of waiting for any

[1] As reported by the Portal "Intercept Brasil", available at https://theintercept.com/2022/06/20/video-juiza-sc-menina-11-anos-estupro-aborto/. Accessed on July 17, 2022.
[2] MINISTRY OF HEALTH, Secretariat of Primary Health Care. Department of Programmatic and Strategic Actions. Women's Health Coordination. **"Atenção técnica para prevenção, avaliação e conduta nos casos de abortamento".** Printing: 1st revised edition - 2022 - electronic version. Prepared by: Lana de Lourdes Aguiar Lima Patrícia Santos Marcal and Raphael Câmara Medeiros Parente. Technical revision: Dressiane Zanardi Pereira and Iracema Correia Veloso. Available at: https://bvsms.saude.gov.br/bvs/publicacoes/atencao_prevencao_avaliacao_conduta_abortamento_1edrev.pdf. Accessed July 10, 2022.
[3] Cf. page 05, supra.

investigation on the existence or not of the crime, it was enough to generate a climate of legal uncertainty and mobilize institutions to take a position, such as the Public Ministry of São Paulo, which issued a Positioning Note:

> "The Manual notes that the issue has apparent little relevance, but in reality seeks to reinforce the penal character of the norm and instill between the lines the persistence of criminal conduct that eventually legitimizes the adoption of intimidating and persecutory measures to the pregnant woman. " [4]

In the same period a fact involving the actress Klara Castanho came to light, whose rights to privacy and confidentiality were violated by the disclosure of her pregnancy and the delivery of her child for adoption. The actress ended up releasing a letter revealing that the pregnancy was the result of sexual violence and explained that she did not register the crime with the police because she felt ashamed and that she followed all the legal procedures for the exercise of her rights.

The stories brought here reveal not only the exposure and individual experiences of revictimization of women who have been sexually violated, but a structure that fails and hurts enshrined gender rights, exposing the moats of the system in denying or neglecting dignified sexual and reproductive health care for girls and women.

2 ABORTION LEGISLATION

The right to interrupt pregnancy is an exception in Brazilian law. As a rule, abortion is not allowed, because the right to life is a constitutionally provided guarantee; the exceptions combine other rights also constitutionally provided, such as the pregnant woman's own right to life or the right to her dignity, her health, and her sexual and reproductive rights.

These exceptions are called "legal abortion", in which the legislator itself recognized the practice of the fact as licit in certain situations, ruling out the incidence of the conduct in the criminal type.

The criminal lawyer Julio Fabbrinni Mirabete calls attention to the fact that these exceptions are true **excluding causes of criminality**[5] and not causes of absence of guilt or punishability, as may mistakenly be understood.

There are three hypotheses of legal abortion: "necessary" (or "therapeutic") abortion, indicated in situations in which it is the only means of saving the life of the pregnant woman; "sentimental", "ethical" or "humanitarian" abortion, a doctrinal figure by which the interruption of pregnancy (abortion) is authorized when it results from rape; and "eugenic", or "engineering", "eugenic" or "pious" abortion, allowed in cases of anencephaly of the fetus.

---

[4] **NOTE ON POSITIONING: SENTIMENTAL ABORTION (OR HUMANITARY OR ETHICAL ABORTION)**", published in the Commented Criminal Bulletin CAOCRIM No. 188, June 2022. Disponível em: https://www.mpsp.mp.br/documents/20122/5193653/NOTA+NU%CC%81CLEO+DE+GE%CC%82NERO.pdf/c153e93e-4d95-eaaa-4ec3-9f789a2db01f?t=1656769208216. Accessed July 10, 2022.

[5] MIRABETE, Julio Fabbrini. Manual de direito penal, volume 2 : Parte especial, arts. 121 a 234-B do CP / Julio Fabbrini Mirabete, Renato N. Fabbrini. - 27. Ed. revised and updated until January 5, 2010 - São Paulo, Atlas 2010.

The figures of "necessary" and "sentimental" abortion are rights enshrined since 1940 by providing them, the Penal Code, as causes excluding criminality; the "eugenic" abortion, in turn, since 2012, by decision of the Federal Supreme Court in the records of the Action of Noncompliance of Fundamental Precept n. 54 (ADPF 54).

Lia Zanotta Machado, professor of anthropology at the University of Brasília (UnB), when resuming the history about the conquest of this right in Brazil[6] , remembers the fact that, in 1830, when the Criminal Code of the Empire was in force, the religious understanding about abortion as condemnable was adhered to, and the crime of performing abortion on others was typified; the conduct of self-abortion was not considered a crime. The Brazilian Penal Code of 1890 criminalized not only who provoked or assisted abortion, but also the woman who committed it. The abortion performed by the woman in "defense of honor" or derived from "puerperal madness" was liable to absolution or mitigation of punishment.

In 1940, when the Penal Code came into force, "necessary" and "sentimental" abortion was not criminalized, but other forms of induced abortion, such as "miserable" or "social economic" abortion, done for reasons of financial hardship or large offspring, and "honoris causa abortion", done to safeguard honor in the case of an adulterine pregnancy or other moral reasons.

Other terms exist in medical doctrine, such as "spontaneous" or "natural" abortion, which is designated in cases of health problems of the pregnant woman; and "accidental", which is designated in cases of falls, accidents, etc.

The "induced" abortion is the abortion criminalized by the Code, which provides for the crimes of self-abortion and consent in abortion (art. 124 of the CP), abortion without consent of the pregnant woman (art. 125 of the CP) and abortion with consent of the pregnant woman (art. 126 of the CP).

The World Health Organization (WHO) defines "abortion" clinically as the termination of pregnancy up to the 22nd week, with the product of conception weighing less than 500 grams .[7]

There is also talk of "unsafe abortion", which is the one practiced in precarious or inadequate sanitary conditions and/or when performed by untrained people, a reality that proves one of the faces of the maternal mortality rates in the country.

In this vein, Drezett and Pedroso argue that, "each year, about 20 million unsafe abortions are performed worldwide," resulting in the fact that "up to 25% of maternal mortality is a direct result of unsafe abortion, needlessly leading to the death of almost 67,000 women each year."[8] .

---

[6] MACHADO, Lia Zanotta *in* Abortion as a right and abortion as a crime: the neoconservative backlash. Cadernos pagu (50), 2017. Disponível em: http://dx.doi.org/10.1590/18094449201700500004. Accessed July 10, 2022.

[7] World Health Organization, "The prevention and management of unsafe abortion. Report of a Technical Working Group". Geneva:WHO.1992

[8] DREZETT, Jefferson and PEDROSO, Daniela. Abortion and sexual violence. *Cienc. Cult.* [online]. 2012, vol.64, n.2 [cited 2022-07-16], pp.35-38. Available at: http://cienciaecultura.bvs.br/scielo.php?script=sci_arttext&pid=S0009-67252012000200015&lng=en&nrm=iso.
Accessed July 10, 2022.

This is one of the arguments that puts in check the discussion about the total release of abortion, prioritizing the value of the problem as a public health issue. It is also one of the points contained in the review vote of Minister Luís Roberto Barroso, of the Federal Supreme Court, in the records of Habeas Corpus (HC) n. 124.306, from Rio de Janeiro.

The HC was filed by patients arrested for alleged practice of the crimes described in articles 126 (abortion) and 288 (gang formation) of the Penal Code. At the beginning, they were granted provisional release, but their imprisonment was reinstated in a second level of appeal filed by the Public Prosecutor's Office of Rio de Janeiro, leading to the filing of a habeas corpus petition with the Superior Court of Justice, which agreed with the legality of their imprisonment. At the Federal Supreme Court, Justice Luís Roberto Barroso granted the order.

The decision held unconstitutional the criminalization of the voluntary interruption of pregnancy performed in the first trimester[9] for offending several fundamental rights of women and for not sufficiently observing the principle of proportionality. In his words, the Justice pondered that:

> "In the case under examination, since the Penal Code dates from 1940 - well before the Constitution, which dates from 1988 - and the case law of the STF does not allow the declaration of unconstitutionality of a law that predates the Constitution, the hypothesis is one of non-reception (i.e. partial revocation or, more technically, derogation) of the provisions of the Penal Code. As a consequence, due to the non-incidence of the criminal type imputed to the patients and co-defendants to the voluntary interruption of pregnancy performed in the first three months, there is founded doubt about the very existence of the crime, which rules out the presence of the indispensable assumption for the decree of preventive detention, in the terms of the final part of the caput of art. 312 of the CPP. [10]"

Even though the case was limited to a concrete situation, it is a precedent that guarantees breath to the expansion of the legal hypotheses of abortion in conformity with the Constitution[11] .

In recent decades, more than sixty countries around the world have loosened prohibitions on the authorization of abortion. Part of this reform has granted access to the procedure in certain situations, such as Brazil (to save the life of the pregnant woman, in case of rape and fetal anencephaly); another part of the reform has overturned absolute prohibitions on abortion in favor of the value of women's right to reproductive autonomy.

Alongside the fight for absolute decriminalization, the right to **legal abortion** is recognized as a fundamental human right protected by the Brazilian legal system, and that must be guided by a safe procedure and obey other rights, such as the right to privacy, to non-discrimination, to respect, and to the prohibition of cruel, inhuman, and degrading treatment.

---

[9] The Justice justified the criterion in the review vote, based on a regime adopted in several countries (such as Germany, Belgium, France, Uruguay and Mexico City), under the argument that, "during this period, the cerebral cortex - which allows the fetus to develop feelings and rationality - has not yet been formed, nor is there any potential for life outside the mother's womb.

[10] BRAZIL. STF. Min. Barroso, HC 124.306/RJ. 2016, p. 13-27.

[11] It is worth noting that a decision is pending in the Supreme Court on ADPF 442, reported by Min. Rosa Weber, on the decriminalization of abortion up to the third month of pregnancy.

3 AMERICAN JURISPRUDENCE AND ITS INFLUENCE IN BRAZIL

> With sorrow-for this Court, but more, for the many millions of American women who have today lost a fundamental constitutional protection-we dissent .[12]

The reality of American jurisprudence regarding the release of abortion was referenced in the decision of Justice Barroso in 2016 in the case of HC 124.306/RJ. The "Roe v. Wade" case before the U.S. Supreme Court was highlighted, whose conclusion pondered that the State's interest in protecting prenatal life did not outweigh the woman's fundamental right to have an abortion.

On June 24, 2022, however, the U.S. Supreme Court overturned the case, abandoning nearly fifty years of precedent, and removed the constitutional right to abortion, a decision given in the case of "Dobbs v. Jackson Women's Health Organization." In it, the Mississippi ban on abortion starting at fifteen weeks of pregnancy was challenged; in the end, the Supreme Court not only upheld the ban in the state, but also removed the previously recognized constitutional right to abortion.

The restrictive rule in the State of Mississippi happened in 2018, influencing other states to follow the same stance, a move that made Mississippi itself later decide to restrict even further, banning the procedure from six weeks of pregnancy. It wasn't long before tensions escalated before the U.S. Court, and the State of Mississippi took advantage of the climate to urge the court to go further with a request to overturn the "Roe and Casey" case.

The final decision was a majority decision, and the dissenting vote, cast by Stephen Breyer, Sonia Sotomayor, and Elena Kagan, even pointed to the relevance of the "Roe and Casey" precedent in the history of extending gender equality in the country, deeply regretting the majority's decision[13] .

The Center for Reproductive Rights, a global human rights organization of lawyers and advocates fighting to ensure reproductive rights in the United States, warned that abortion policies and reproductive rights remain in the hands of individual states, but they fear that half of the U.S. states will adopt an increasingly restrictive and/or prohibitive stance, forcing people to travel across state lines or, for those unable to move, to carry a pregnancy to term, triggering a public health emergency.

The Center also announced that "since the Supreme Court decision, abortion services have ceased in many states, such as Alabama, Arkansas, Oklahoma, Mississippi, Missouri, and South Dakota, banning abortion. In several other states, abortion care is not being provided due to the absence of a clear legal status on whether it is allowed."[14] .

---

[12] Stephen Breyer, Sonia Sotomayor and Elena Kagan, justices for the dissenting vote in the case "Dobbs v. Jackson Women's Health Organization" judged by the US Supreme Court. Translation: "With regret - to this Court - and not only - for the thousands of American women who lost a fundamental constitutional right today, we dissent". Cf. fls. 207 of the decision, available at : https://www.supremecourt.gov/opinions/21pdf/19-1392_6j37.pdf. Accessed July 15, 2022.

[13] Cf. pp. 193/194 of the decision, available at : https://www.supremecourt.gov/opinions/21pdf/19-1392_6j37.pdf. Accessed July 15, 2022. over their reproductive decisions. Nothing since Casey - no changed law, no changed fact - has undermined that promise."

[14]Translation. The article was published on the Center for Reproductive Rights website. Available at: https://reproductiverights.org/state-abortion-bans-lawsuits-post-roe/. Accessed July 15, 2022.

Gabriela Rondon, researcher and lawyer at Anis Bioethics Institute[15] , attributes the decision to a movement and a global political project called "anti-abortion crusade", which has persisted for several decades and exists to leverage not only this flag, but others of similar agendas under the appeal of speeches based on the defense of life and the traditional family. She is attentive to the fact that the American Court, being recognized as a model for the exportation of its ideas, is capable of influencing Brazilian legal thought, believing, on the other hand, that given the historical advance of women's rights that has taken root with more concreteness in Latin America, this condition will not be sufficient to shake the security of conquests already sedimented.

It is not ignored, however, that the political and ideological tensions that divide the country amidst the so-called "usual agendas" are symptoms also experienced in Brazil. Under the title of "moral crusade", sociologist Miskolci attributes the origins of the current conflicts around gender studies to a political alliance with religious leaders that occurred in 2010, which focused on not changing the legislation on abortion, followed, afterwards, by a retaliatory front after the Supreme Court's decision in 2011 that recognized the constitutionality of homo-affective union.

Miskolci is attentive to the appeal of the discourse of moral protagonism regarding the gender agenda - and which has taken the agenda of political leaderships in the years of 2017 - as harmful and of a distorted character to the advances of academic research on the very topic of gender equality[16] , despite being a right provided for in the Federal Constitution of 1988 and in international treaties embraced by the country.

It is also not excluded that the decision issued by the American Court may be used as grounds for restricting rights in the conduction of legislative proposals, technical standards and other instruments that should guide the issue; likewise within the Brazilian Justice system in actions that have the subject in their causes of action or request, such as the ADPF 442, reported by Minister Rosa Weber, on the decriminalization of abortion until the third month of pregnancy, pending trial.

4 RAPE AS A CAUSE OF PREGNANCY

Article 7, item III, of Law 11.Article 7, item III of Law 11.340/06 (Maria da Penha Law) defines sexual violence as "any conduct that coerces a woman to participate in, maintain, or participate in unwanted sexual relations, through intimidation, threat, coercion, or the use of force; induces her to commercialize or use, in any way, her sexuality, prevents her from using any contraceptive method, or forces her into marriage, pregnancy, abortion or prostitution, through coercion, blackmail, bribery or manipulation; or limits or annuls the exercise of her sexual and reproductive rights".

---

[15] Cf. "Breakfast" podcast program on the topic aired on June 27, 2022. Available at: https://open.spotify.com/episode/6zKoIujrj85XkmZWes2WCP. Accessed July 09, 2022.

[16] MISKOLCI, Richard. **Moral battles: identity politics in the public-media sphere** / Richard Miskolci - 1st ed. - Belo Horizonte : Autêntica, 2021 - Cadernos da Diversidade / coordination Karla Deslandes - p. 19/22) .

Rape is a form of sexual violence, whose definitions in the Penal Code are inserted in its articles 213 and 217-A: rape proper and rape of vulnerable people. Other forms, such as collective rape or corrective rape are also inserted in the main connotation.

The theme gains relevance for the guarantee of legal abortion, because, as we said, the Penal Code does not criminalize abortion in the case of pregnancy resulting from rape (Article 128, item II, of the Penal Code).

The Penal Code of 1940 understood that the crime of rape protected customs, sexual morality and public decency. The sexual dignity of the victim was not included in this universe. Until the 2005 reform, it also foresaw the marriage of the victim to the author of the sexual crime as an extinctive cause of punishment, in the understanding that the marriage served to "wash the honor" of the victim and her family to the detriment of her own freedom. In other words, the rapist who married the victim was free from criminal prosecution, ceased to be a criminal and became a husband and head of the conjugal society; the woman, in turn, ceased to be a victim of sexual violence and became a wife.

The agent who committed rape against his wife was also not punished, since marriage presumed consent to the sexual act. The "marital debt" was the guarantee that justified the legitimization and naturalization of violence, since it was considered the right and the duty of the spouses to perform sexual acts against each other, in the name of the duties of "mutual assistance" and "living together in the conjugal home" provided in the Civil Code.

If not for offending the Federal Constitution and violating the dignity of women, this provision has been repealed.

The rape of a vulnerable person is another form of sexual violence provided as a crime in the criminal law, in which the dissent to the sexual act is presumed by the legislator. This means that any sexual act committed against a person under the age of fourteen is considered rape. Despite this, the reality of Brazilian daily life and culture shows that the social imaginary still permeates the naturalization of the sexual act involving girls as if they were, in reality, "mini-women".

The relationship between early pregnancy and child marriage, for example, are reciprocal cause and consequence and a way to naturalize domestic sexual violence and prevent the exercise of the right to legal abortion. According to the World Bank, there are about 554,000 marriages of girls between 10 and 17 years of age per year in Brazil, of which more than 65,000 are between the ages of 10 and 14. In most cases, these are girls who marry or unite with more experienced, better-off and older men, an average difference of 5 to 8 years. Among the reasons already mapped are: poverty, the "washing" of the family honor by the loss of virginity or pregnancy .[17]

[17] COVAS, Fabíola Sucasas Negrão; SANTIAGO, Viviana. **Maria da Penha Law and Child Marriage, a not so distant reality**. Published in the newspaper O Estado de São Paulo, blog Fausto Macedo, on September 24, 2019. Available at: https://politica.estadao.com.br/blogs/fausto-macedo/lei-maria-da-penha-e-o-casamento-infantil-uma-realidade-nao-tao-distante/. Accessed on: 10 July 2022.

The 2019 Public Safety Yearbook found that 66,041 cases of sexual violence were reported in 2018: 81.8% female, 53.8% aged up to 13, 50.9% black and 48.5% white, and that four girls aged up to 13 are raped per hour in Brazil.

Technical Note from IPEA[18] estimates that each year in Brazil 0.26% of the population suffers sexual violence, "which indicates that there are annually 527 thousand attempted or completed rapes in the country, of which 10% are reported to the police.

The research also found that sexual violence, in most cases, happens inside the home and against girls: 70% are children and adolescents and 50% are younger than 13 years old. In relation to the profile of the aggressor, it was found that 92.55% of the aggressors are male and, of the child aggressors, 24.1% are the parents or step-parents themselves, and 32.2% are friends or acquaintances of the victim.

The same Technical Note contains another devastating fact, that in 50% of the cases there is a history of previous rapes, that is, recurrent rapes. The document is attentive to the fact that the consequences of this violence for the victim are extremely damaging to her psychological health, traumatic, and affect precisely the period in which she is in the process of forming her self-esteem.

Vulnerable rape can also occur against someone who, due to infirmity or mental deficiency, does not have the necessary discernment to commit the act or who, for any other reason, cannot offer resistance**.**

This type of rape does not take into account sexual violence committed with violence or serious threat, but circumstances that affect the victim's conditions to evaluate the act and have conditions to critically weigh consciously a decision about it. The aggressor exploits and takes advantage of this situation to commit the crime, since it is easier for him to guarantee the execution of the act without the victim resisting or opposing the practice of violence**.**

For no other reason, rape is conceived as an abusive manifestation of power, a form of domination based on gender markers. It is not an expression of a brutalized or unbridled type of sexuality - or practiced by the social imaginary of the aggressor designed as a "monster" -, but a conduct related to a culture that objectifies the female bodies, which characterizes them as servile, pathologized and destined to enjoyment and reproduction; and, of the male bodies, the exercise of self-affirmation and the authority of virility.

The researcher Lia Zanotta Machado, in her reflections on abortion as a right and as a crime, pays attention to circumstances such as "family and conjugal values that focus on authority and unequal power of men and women, and of sexuality (heterosexuality and compulsory procreation because sacred)"[19] , in the secular dichotomy that converges with the path of decriminalization of the interruption of pregnancy.

[18] Nota Técnica. n. 11/2014. **Estupro no Brasil:** Uma radiografia segundo os dados da Saúde. Available at: http://repositorio.ipea.gov.br/bitstream/11058/5780/1/NT_n11_Estupro-Brasil-radiografia_Diest_2014-mar.pdf.Acesso on: 16 July 2022.

[19] MACHADO, Lia Zanotta *in* Abortion as a right and abortion as a crime: the neoconservative backlash. Cadernos pagu (50), 2017. Disponível em: http://dx.doi.org/10.1590/18094449201700500004. Accessed July 10, 2022.

It is symptomatic that in the cases of rape in Brazil that result in pregnancy, estimated to be 7.1% of the total or 15% in cases where there was vaginal penetration and age range between 14 and 17 years[20] , **the number of procedures for termination of pregnancy does not meet the same proportion.**

It is estimated that in 2017, 1,636 legal abortions were performed[21] and that among teenage victims or children who became pregnant as a consequence of rape, only between 5.0% and 5.6% had an abortion provided by law.

Pedroso and Drezett point out that problems such as lack of information, access to services that perform this procedure, or even the refusal of health services are some of the serious obstacles that prevent the exercise of the right. Citing the study by Jorge Andalaft Neto et al called "Profile of care to sexual violence in Brazil", they point out that "among more than 700 Brazilian municipalities, it is found that almost 40% of municipal health departments do not even know if they have a service prepared to perform abortion in situations of sexual violence" and that the "other 30% simply state that they do not perform the procedure, indifferent as to the consequences for the woman"[22] .

Instituto Ampara, which offers a specialized course for abortion and post-abortion care[23] , cites the following barriers to abortion care in Brazil : [24]

- The geographical isolation and lack of services in every state.
- Not all existing services are active.
- Many services discourage people who seek them from terminating a pregnancy.
- Many services, contrary to the law, require an occurrence report to perform the service.
- Many people do not have access to the information that they can seek help in an abortion care service provided by law.
- Many women do not report that they have experienced sexual violence, especially when the perpetrator is an intimate partner.
- The veracity of rape is often questioned by health professionals and women are re-victimized when seeking a service that is their right.
- Professionals refuse to perform the abortion, making use of the so-called conscientious objection (a concept that will be studied later).
- Primary health care professionals are unaware of a person's rights when facing an unwanted pregnancy and to which services to refer.
- Many people experience institutional violence in services, such as neglect, late attendance, repeated questioning, social discrimination, and racism.
- Many services do not have a specific assistance team.
- Most services impose a gestational limit for the procedure.

---

[20] Nota Técnica. n. 11/2014. **Estupro no Brasil:** Uma radiografia segundo os dados da Saúde. Available at: http://repositorio.ipea.gov.br/bitstream/11058/5780/1/NT_n11_Estupro-Brasil-radiografia_Diest_2014-mar.pdf. Accessed on: 16 July 2022.

[21] Cf. report published at https://agenciapatriciagalvao.org.br/mulheres-de-olho/dsr/aborto-no-brasil-como-os-numeros-sobre-abortos-legais-e-clandestinos-contribuem-no-debate-da-descriminalizacao/. Accessed July 15, 2022.

[22] DREZETT, Jefferson and PEDROSO, Daniela. Abortion and sexual violence. *Cienc. Cult.* [online]. 2012, vol.64, n.2 [cited 2022-07-16], pp.35-38. Available at: http://cienciaecultura.bvs.br/scielo.php?script=sci_arttext&pid=S0009-67252012000200015&lng=en&nrm=iso.
Accessed July 10, 2022.

[23] The initiative was developed by the Intersectorial Forum of Brazilian Services for Abortion Provided by Law, composed by the Curumim Group, the Feminist Health Network, ANIS Bioethics and Human Rights Institute, Portal Catarinas, and the organization Bloco A - with support from the Federal Council of Psychology (CFP).

[24] DINIZ, D.; MEDEIROS, M.; MADEIRO, A. Pesquisa Nacional do Aborto 2016. Ciência e Saúde Coletiva, Rio de Janeiro, v. 22, n. 2, p. 653-660, feb. 2017. Available at: https://www.scielo.br/j/csc/a/8LRYdgSMzMW4SDDQ65zzFHx/abstract/?lang=pt. Accessed on: 17 July 2022.

Law No. 12,845, dated August 1, 2013, establishes a series of obligations for hospitals when providing care to victims of sexual violence. The law, known as the "Next Minute Law", establishes that care must occur in **all hospitals that are part of the SUS network, free of charge, emergency, comprehensive and multidisciplinary, and that it must pay attention to the treatment of physical and psychological injuries resulting from sexual violence**.

Such services include: diagnosis and treatment of physical injuries to the genital tract and other affected areas; immediate medical, psychological and social support; facilitation of the registration of the occurrence and referral to the forensic medicine body and specialized police stations with information that may be useful in identifying the aggressor and proving sexual violence; pregnancy prophylaxis; prophylaxis of Sexually Transmitted Diseases - STDs; collection of material for HIV testing for subsequent follow-up and therapy; and provision of information to victims about their legal rights and about all available health services.

Once again here we bring Pedroso and Drezzett, who alert to the need to pay attention to the pertinent legal dictates: to guarantee the woman's right to be informed about the alternatives to pregnancy and the possibilities of care in the health services; to provide the woman with information about the legal possibility of terminating the pregnancy; that she be informed that she also has the right to maintain the pregnancy until the end, receiving and orientation about the alternatives after the birth, with the choice between keeping the future child inserted in the family, or proceed with the mechanisms of donation[25] .

5 HEALTH ASPECTS

In order to approach the implications on women's health, it is necessary, first, to bring up the way the legal doctrine classifies the exclusions of illegality that appear in our Penal Code [13]: a) *Therapeutic abortion*, which is practiced when it is the only resource to avoid the death of the pregnant woman; b) *Sentimental abortion*, in case of pregnancy resulting from rape; c) *Eugenic abortion*, performed whenever the birth of a child with serious malformations is scientifically confirmed, being anencephaly the most frequent reason.

According to data published by the Patrícia Galvão Institute [10], currently 63 countries maintain the legalized practice of abortion, most of them for reasons very similar to those found in Brazilian legislation. However, it is worth mentioning a recent legal change of great impact: in the United States, after almost 50 years, abortion is no longer a constitutional right. In June this year, the Supreme Court decided that the practice is prohibited after the 15th week of gestation, even in case of rape, leaving each state free to adopt its own rules.

[25] DREZETT, Jefferson and PEDROSO, Daniela. Abortion and sexual violence. *Cienc. Cult.* [online]. 2012, vol.64, n.2 [cited 2022-07-16], pp.35-38. Available at: http://cienciaecultura.bvs.br/scielo.php?script=sci_arttext&pid=S0009-67252012000200015&lng=en&nrm=iso. Accessed July 10, 2022.

According to data from the World Health Organization (WHO) [1], 39 thousand women die and millions are hospitalized each year as a result of unsafe abortions. A study by British researchers, published in the Lancet journal [4], analyzed the numbers of these occurrences in 166 countries. In the period 2015 to 2019, about 121 million unwanted pregnancies were recorded per year, which corresponds to a global rate of 64 pregnancies per group of 1,000 women aged 15-49. Of this total, 61% ended in abortion, something around 73 million occurrences per year.

Also in the same survey, in the time interval between 1990 and 2019, the abortion rate decreased by 43% in places where the procedure is widely legal, excluding China and India. On the other hand, there was a 12% increase in the rate in countries that restrict access.

The WHO considers the inability to have safe, timely and respectful access to abortion a serious public health problem and a violation of human rights. One of the Organization's reports reveals that from 2010 to 2014, about 45% of the 55 million abortions recorded in the period, worldwide, were performed under unsafe conditions, 97% in developing countries. The socioeconomic differences are striking: while in developed countries approximately 30 deaths per 100,000 unsafe abortions are recorded, in developing countries deaths rise to 220.

In Brazil, more than one million induced abortions occur every year. According to data from the Brazilian Institute of Geography and Statistics (IBGE) [15], while among white women the rate is three deaths caused by abortion for every 100 thousand live births, among black women this number rises to five. For those who have completed up to elementary school, the rate is 8.5, almost double the general average of 4.5. The rate of induced abortion among black women is 3.5%, double the percentage among white women (1.7%). In general, these are women up to 19 years old, black, and who already have one or more children.

According to data from DataSUS [2], a platform of the Unified Health System, of the Ministry of Health, in the first half of 2020, the number of women attended by SUS as a result of unsafe abortions was 79 times higher than the number of pregnancy terminations provided by law. More than 80 thousand curettage and/or aspirations were performed from January to June, procedures that are much more frequent in cases of clandestine abortions, because they were not performed thoroughly. Data from the Ministry of Health, collected between 2008 and 2017 show an estimated 250 thousand hospitalizations per year in SUS related to induced abortion. In 2017 alone, the cost of these hospitalizations was approximately R$50 million.

It should be noted that the risks to women's health are not limited to the physical aspect, but also to the emotional consequences of abortion, whether legal, illicit or even not performed. Some studies point out that after abortion, women are more likely to develop depression or post-traumatic stress disorder, especially those who report physical, emotional violence or sexual abuse.

The publication "Humane abortion care: technical standard" [3], published by the Ministry of Health in 2005, calls attention to the need to observe the social repercussions in personal and family life and in the

labor market for women who find themselves in this situation. And it warns about "immediate physical complications, such as hemorrhages, infections, organ perforations, and infertility [that] add to subjective upheavals, as one experiences the burden of an undeniably difficult choice in a context of guilt and penalization of abortion."

In 2021, WHO released an update to its Consolidated Guideline on Abortion Care [5], according to which there are three pillars that support an enabling environment for providing quality comprehensive abortion care: 1) respect for human rights, which includes having an enabling policy and legal context; 2) availability and accessibility of information; and 3) a well-functioning and supportive health care system that is affordable for all people.

The Federal Council of Medicine (CFM) remains alert and, continuously, makes transparent its position on the issue. In a note of clarification published on June 30th of this year [14], as a consequence of the recent facts about the episode of rape and pregnancy of a child in Santa Catarina, the organ issued its opinion about the legal criteria for the interruption of pregnancy in the cases foreseen by the Brazilian legislation.

A series of reviews conducted in 2021 by WHO concluded that regulations restricting abortion in favor of fertility affect women's education, their participation in the labor market, and the contributions they can make to population growth. The legal status of abortion can also have consequences for children's education and their ability to enter the labor market later in life. For example, it has been observed that one of the benefits of legalizing abortion is that, thanks to the fact that it reduces the number of unwanted pregnancies and thus increases the possibility that births are also wanted, fathers and mothers invest more in their children, particularly in the schooling of girls.

When a woman does not receive safe, accessible, timely, and respectful abortion care and is stigmatized for doing so, her physical and mental well-being can be affected for a lifetime. The inability to receive quality abortion care violates several human rights of women and girls, such as the right to life, the right to enjoy the highest attainable standard of physical and mental health, the right to benefit from scientific progress and its implementation, the right to decide freely and responsibly the number of children and spacing between births, and the right not to suffer torture or cruel, inhuman or degrading treatment or punishment.

REFERENCES

1. Aborto. Site da Organização Mundial da Saúde. Disponível em: https://www.who.int/es/news-room/fact-sheets/detail/abortion
2. ACAYABA, Cíntia e FIGUEIREDO, Patricia. SUS fez 80,9 mil procedimentos após abortos malsucedidos e 1.024 interrupções de gravidez previstas em lei no 1º semestre de 2020. Portal G1. Disponível em: https://g1.globo.com/sp/sao-paulo/noticia/2020/08/20/sus-fez-809-mil-procedimentos-apos-abortos-malsucedidos-e-1024-interrupcoes-de-gravidez-previstas-em-lei-no-1o-semestre-de-2020.ghtml
3. Atenção humanizada ao abortamento: norma técnica. Ministério da Saúde. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/atencao_humanizada_abortamento.pdf
4. BEARAK, Jonathan et al. Unintended pregnancy and abortion by income, region, and the legal status of abortion: estimates from a comprehensive model for 1990–2019. Disponível em: https://www.thelancet.com/action/showPdf?pii=S2214-109X%2820%2930315-6
5. BRASIL. Ministério da Saúde. Atenção Humanizada ao Abortamento. 2005.
6. BRASIL. STF. Min. Barroso, HC 124.306/RJ. 2016.
7. CERQUEIRA, Daniel Ricardo de Castro; e COELHO, Danilo Santa Cruz. Estupro no Brasil: uma radiografia segundo os dados da Saúde. Instituto de Pesquisa Econômica Aplicada (Ipea) – 2014. fls. 14 e 15. Disponível em: http://repositorio.ipea.gov.br/bitstream/11058/5780/1/NT_n11_Estupro-Brasil-radiografia_Diest_2014-mar.pdf. Acesso em 18 de julho de 2022.
8. COVAS, Fabíola Sucasas Negrão; SANTIAGO, Viviana. Lei Maria da Penha e Casamento Infantil, uma realidade não tão distante. Publicado no jornal O Estado de São Paulo, blog Fausto Macedo, em 24 de setembro de 2019. Disponível em: https://politica.estadao.com.br/blogs/fausto-macedo/lei-maria-da-penha-e-o-casamento-infantil-uma-realidade-nao-tao-distante/. Acesso em: 10 de março de 2021.
9. Diretriz sobre cuidados no aborto: resumo. Site da Organização Mundial da Saúde. Disponível em: https://www.who.int/pt/publications/i/item/9789240045163
10. DREZETT, Jefferson and PEDROSO, Daniela. Aborto e violência sexual. *Cienc. Cult.* [online]. 2012, vol.64, n.2 [cited 2022-07-16], pp.35-38. Available from: <http://cienciaecultura.bvs.br/scielo.php?script=sci_arttext&pid=S0009-67252012000200015&lng=en&nrm=iso>. ISSN 0009-6725. http://dx.doi.org/10.21800/S0009-67252012000200015. Acesso em 10 de julho de 2022.
11. FORTUNA, Deborah e VINHAL, Gabriela. Especialistas tratam aborto como questão de saúde pública. Site do jornal Correio Braziliense. Disponível em: https://www.correiobraziliense.com.br/app/noticia/brasil/2018/08/05/interna-brasil,699288/especialistas-tratam-aborto-como-questao-de-saude-publica.shtml
12. KORTSMIT, Katherine et al. Abortion Surveillance — United States, 2019. *Surveillance* Summaries / November 26, 2021 / 70(9);1–29. Disponível em: https://www.cdc.gov/mmwr/volumes/70/ss/ss7009a1.htm
13. MACHADO, Lia Zanotta *in* O aborto como direito e o aborto como crime: o retrocesso neoconservador. Cadernos pagu (50), 2017. Disponível em: http://dx.doi.org/10.1590/18094449201700500004. Acesso em 10 de julho de 2022.
14. MINISTÉRIO DA SAÚDE, Secretaria de Atenção Primária à Saúde. Departamento de Ações Programáticas e Estratégicas. Coordenação de Saúde das Mulheres. **"Atenção técnica para prevenção, avaliação e conduta nos casos de abortamento".** Tiragem: 1ª edição revisada –

2022 – versão eletrônica. Elaboração: Lana de Lourdes Aguiar Lima Patrícia Santos Marcal e Raphael Câmara Medeiros Parente. Revisão técnica: Dressiane Zanardi Pereira e Iracema Correia Veloso. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/atencao_prevencao_avaliacao_conduta_abortamento_1edrev.pdf. Acesso em 10 de julho de 2022.

15. MINISTÉRIO PÚBLICO DE SÃO PAULO. **"NOTA DE POSICIONAMENTO: ABORTO SENTIMENTAL (OU HUMANITÁRIO OU ÉTICO)"**, publicada no Boletim Criminal Comentado CAOCRIM n º. 188, de junho de 2022. Disponível em: https://www.mpsp.mp.br/documents/20122/5193653/NOTA+NU%CC%81CLEO+DE+GE%CC%82NERO.pdf/c153e93e-4d95-eaaa-4ec3-9f789a2db01f?t=1656769208216. Acesso em 10 de julho de 2022.
16. MIRABETE, Julio Fabbrini. Manual de direito penal, volume 2 : Parte especial, arts. 121 a 234-B do CP / Julio Fabbrini Mirabete, Renato N. Fabbrini. – 27. Ed. Rev. E atual. até 5 de janeiro de 2010 – São Paulo, Atlas 2010.
17. MISKOLCI, Richard. Desejos digitais (p. 49). Autêntica Editora. Edição do Kindle.
18. MORAIS, Lorena Ribeiro. A legislação sobre o aborto e seu impacto na saúde da mulher. Disponível em https://www2.senado.leg.br/bdsf/bitstream/handle/id/131831/legisla%C3%A7%C3%A3o_aborto_impacto.pdf?sequence=6
19. Nota Técnica. n. 11/2014. **Estupro no Brasil:** Uma radiografia segundo os dados da Saúde. Disponível em: http://repositorio.ipea.gov.br/bitstream/11058/5780/1/NT_n11_Estupro-Brasil-radiografia_Diest_2014-mar.pdf. Acesso em: 16 de julho 2022.
20. NOMURA, Roseli M. Y et al. Depressão, aspectos emocionais e sociais na vivência do aborto: comparação entre duas capitais Brasileiras. Disponível em: https://www.scielo.br/j/ramb/a/FNfxfTmM7MHq8GM6mdBNDHB/?lang=pt#:~:text=Alguns%20estudos%20apontam%20que%2C%20ap%C3%B3s,emocional%20ou%20abuso%20sexual8.
21. Os 15 primeiros países que legalizaram o aborto. Site do Instituto Patrícia Galvão. Disponível em: https://agenciapatriciagalvao.org.br/mulheres-de-olho/os-15-primeiros-paises-que-legalizaram-o-aborto/
22. PAULUZE, Thaiza. No Brasil, aborto vitima mais mulheres negras do que brancas. Site da Folha de S. Paulo. Disponível em: https://www1.folha.uol.com.br/cotidiano/2020/11/no-brasil-aborto-vitima-mais-mulheres-negras-do-que-brancas.shtml
23. PEDROSO, Daniela. Aborto e Saúde Mental. Disponível em: http://cienciaecultura.bvs.br/scielo.php?script=sci_arttext&pid=S0009-67252012000200016
24. SILVA, Denis Manoel. Quais são as espécies de aborto e quais são permitidas no ordenamento jurídico brasileiro? Disponível em: https://lfg.jusbrasil.com.br/noticias/2087146/quais-sao-as-especies-de-aborto-e-quais-sao-permitidas-no-ordenamento-juridico-brasileiro-denis-manoel-da-silva
25. Site do Conselho Federal de Medicina. Disponível em: https://portal.cfm.org.br/noticias/cfm-esclarece-criterios-legais-para-a-interrupcao-da-gestacao/
26. Site VadeMecum Brasil. Disponível em: https://vademecumbrasil.com.br/palavra/aborto-terapeutico
27. World Health Organization. "The prevention and management of unsafe abortion. Report of a Technical Working Group". Geneva:WHO. 1992.

CHAPTER 25

Lifestyle components and their relationship to depression: a review of the literature

10.56238/rsfohsv1-025

Eduarda Eugenia Dias de Jesus
Universidade da Região de Joinville - Univille
E-mail: eduardaeugenia3@gmail.com

Kamila Pereira Olivio
Universidade da Região de Joinville - Univille
E-mail: kamilapereiraolivio27@gmail.com

Leticia Gabriela Moraes
Universidade da Região de Joinville - Univille
E-mail: leticiagabrielamoraes@gmail.com

Thais da Silva Santana
Universidade da Região de Joinville - Univille
E-mail: thais.santtanna2608@gmail.com

Maria Julia Doin Vieira
Universidade da Região de Joinville - Univille
E-mail: majudoinvieira@gmail.com

Maria Paula Woelfer
Universidade da Região de Joinville - Univille
E-mail: mpaulawoelfer@hotmail.com

Gabriel Cavalheiro Lessack
Universidade da Região de Joinville - Univille
E-mail: gilgen_gabriel@hotmail.com

Guilherme Westphal Preuss
Universidade da Região de Joinville - Univille
E-mail: guilhermewpreuss@gmail.com

Fabricio Faitarone Brasilino
Universidade da Região de Joinville - Univille
E-mail: fabriciofaitarone@univille.br

Pedro Jorge Cortes Morales
Universidade da Região de Joinville - Univille
E-mail: pedromorall@gmail.com

ABSTRACT
Introduction: The factors about modernity, related to lifestyle, are damaging health in general and increasing the prevalence of depression, which has increased even more in the last three decades. Objective: To investigate the lifestyle components (nutrition, physical activity, social relationships, sleep, and environment) that can be inserted, in practice, as auxiliary tools in the therapeutic resource of patients with symptoms of depression. Methodology: The study was composed of a literature review and used the following platforms: *PubMed*, EBSCO, *Cochrane Library* and *Google Scholar*, where the articles published in any language were captured, regardless of the year published, but descriptors in English and Portuguese were used. Results: The following components were separated into topics: 1) Nutrition and its relation to depression, 2) Relationship as a primordial element in the treatment of depression, 3) Physical activity to reduce depression, 4) Sleep duration and its effect on depression, and 5) Environmental issues that stimulate depression. Conclusion: If the components are carefully cared for, they can contribute to the reduction of depression. On the other hand, according to the contemporary world, the components may not have their due attention, critically increasing the disease.

Keywords: Depression, Lifestyle, Health.

1 INTRODUCTION

Depressive disorder is one of the leading causes of disability worldwide (WHO, 2017). According to the *Global Health Data Exchange* sense, in 2019, 280 million people were living with depression. It is known to be a psychiatric disorder influenced by environmental and genetic factors, therefore, to understand the pathophysiology and possible treatments for this disease, some hypotheses have been coined over time, based on the symptomatology of depression (PERITO, FORTUNATO, 2012).

Depression can be understood as preoccupation with the past. Scientifically, it is associated with a chronic low-grade inflammatory response, generating increased oxidative stress, which contribute to neuroprogression in the disorder (BERK *et al*., 2013). Depression is studied as a syndrome of stress and emotion dysregulation, involving impaired structural integrity of the limbic-frontal networks (GUJRAL *et*

al., 2017). Sources of inflammation (such as an unhealthy lifestyle) may play a role in other psychiatric disorders, such as bipolar disorder, schizophrenia, autism, and post-traumatic stress disorder (BERK *et al*., 2013).

The factors about modernity, such as physical inactivity, consumption of processed foods, lack of empathy from the population, environmental population, overuse of electronic devices, inadequate sleep, among other lifestyle-related aspects, are damaging health in general and, consequently, increasing the prevalence of depression, of which has increased even more in the last three decades (SARRIS *et al*., 2014). These facts corroborate with the findings of Zhu *et al*. (2019), who found higher depression scores in patients with unhealthy lifestyle behaviors ($p<0.001$).

Thus, it is notable that a healthy lifestyle can be beneficial for mental health, in which it promotes psychological well-being and reduces mental problems, as a way to prevent mental disorders (VELTEN *et al*., 2018). The study by Null and Pennesi (2017) investigated 500 adult participants diagnosed with depression, of which they achieved improvements in the level of the illness through a 12-month intervention that includes diet, daily exercise, and mindfulness techniques.

Many of these factors can potentially be modified, but receive little consideration in the contemporary treatment of depression, where medication and psychological intervention remain the first-line treatments. Therefore, studies exploring lifestyle modification (SARRIS *et al*., 2014) are needed as a way to facilitate the public health system.

The findings show that depression is a major global public health problem, being the leading cause of disability worldwide, and its early treatment is essential to minimize the severe negative individual and social impacts of this disease.

Given this contextualization, the present review aimed to investigate the lifestyle components (nutrition, physical activity, social relationship, sleep, and environment) that can be inserted, in practice, as auxiliary tools in the therapeutic resource of patients with symptoms of depression.

2 METHODOLOGY

The study was composed of a literature review and used the following platforms: *PubMed,* EBSCO, *Cochrane Library,* and *Google Scholar* where the articles published in any language were captured, regardless of the year published.

The descriptors that guided the selection of material were in Portuguese: "Nutrition and Depression", "Eating and Depression", "Depression and Lifestyle", "Depression", "Relationship and Depression", "Family and Friends and Depression", "Physical Activity and Depression", "Exercise and Depression", "Sleep and Depression", and "Environment and Depression". As well as in English: *"Nutrition and Depression", "Eating and Depression", "Depression and Lifestyle", "Depression", "Relationship and Depression", "Family and Friends and Depression", "Physical Activity and Depression", "Exercise and Depression" , "Sleep and Depression"* and *"Environment and Depression"*.

As inclusion criteria, we accepted articles and websites of organizations/societies that presented the full text and addressed only the population with depression. The articles that presented only the abstract and those that were not related to the theme of the present research were excluded.

3 RESULT AND DISCUSSION

The present review had the purpose of investigating the lifestyle components that can be inserted, in practice, as auxiliary tools in the therapeutic resource for patients with symptoms of depression. In light of this, these components were separated into topics.

- ***Nutrition and its relation to depression:***

Food is intrinsically linked to the health of the human being, whether in the metabolic functions and their interaction with the body - generating beneficial or harmful reactions for survival - or in its emotional aspect, which is noted in eating behavior. As observed, breastfeeding, besides subsidizing the performance of physiological functions to the newborn, also strengthens the emotional bonds with the mother, indicating that the act of feeding has a complex connection with emotion (SILVA, COSTA; GIUGLIANI, 2016).

In 1950, due to studies in neurobiology, the monoamine hypothesis was revealed, which suggests a dysfunction of a certain group of neurotransmitters, including the biogenic amines serotonin, dopamine, noradrenalin, and epinephrine in the synaptic cleft, which act mainly in the regulation of psychomotor action, sleep, appetite, and mood. They are formed from the essential amino acids tryptophan and histidine - these must be ingested in the diet, while glycine and tyrosine can be formed from valine and threonine. According to this theory, the first antidepressant drugs were launched, which aim to increase the availability of these neurotransmitters in the synaptic cleft. Currently, other factors that lead the individual to the depressive state are being studied, taking into account the endocrine system and environmental factors, as well as the deficiency of macronutrients and micronutrients in the body (PERITO; FORTUNATO, 2012; SEZINI; GIL, 2017).

A new current of work is the research on the correlation of the gut-brain axis, where theserotonin hormone acts in intestinal motility and secretion, besides acting in the conduction of information to the central nervous system. Other studies also show that the difficulty in absorbing nutrients corroborates to changes in behavior and mood, and can be influenced by poor diet, which provides a low availability of nutrients and, other times, pathogenic for the body, damaging the intestinal microbiota - set of microorganisms that reside in the human intestine - and, consequently, immunity and the production of serotonin and dopamine release, hormones linked to pleasure and well-being (VEDOVATO *et al*, 2015; SARAIVA, CARVALHO; LANDIM, 2019; SILVEIRA; FIGUEIREDO, 2021).

Poor diet is a characteristic of harmful eating behavior, which is influenced by emotional and physiological state. Garcia *et al.* (2018), demonstrates in their study that foods rich in saturated fats and carbohydrates are widely consumed in parallel with the onset of symptoms related to depressive disorder,

because of the feeling of immediate pleasure that these nutrients have on the central nervous system. These choices can lead to episodes of binge eating and increased consumption of processed products and sugary drinks, potentiating the depressive condition (AGUIAR, CATARINA; ALMEIDA, 2022).

Patients with depressive symptoms are at risk of adopting other addictions, such as the use or abuse of alcohol and other psychoactive drugs. Beneton, Schmitt, and Andretta (2021), observed in their study conducted at a university in Rio Grande do Sul, that college students in health-related courses - these have higher stress levels than students in other areas - used alcohol more than other substances, or used it in association with other drugs (BENETON, SCHMITT; ANDRETTA, 2021).

Since ethanol is a Central Nervous System (CNS) depressant, it affects the conduction of neurotransmitters such as serotonin, which increases during the acute effect of alcohol, and decreases during abstinence. This physiological chemical alteration has a cyclical and dangerous effect: for individuals who already suffer from depression, there is a worsening in well-being and physical health, but it can also be the cause of a psychiatric disorder, because it causes chemical dependence (SILVEIRA; FIGUEIREDO, 2021; GUEDES *et al*., 2020).

To improve quality of life and decrease depressive symptoms, nutritional therapy emerges as a great ally in a multidisciplinary team, because besides having no side effects, it can correct some deficiency of nutrients that aggravate or cause depressive conditions. Some of the most significant nutrients associated with this therapy include:

1) The action of the mineral Magnesium, present in avocado, okra, banana, almond and walnuts, etc., which interacts with the binding of dopamine and serotonin receptors (AGUIAR, CATARINA; ALMEIDA, 2022; SEZINI; GIL, 2014).
2) The mineral zinc is involved in protein synthesis and other regulatory functions, acting in the immune system and in the survival of CNS cells, being an antidepressant agent (AGUIAR, CATARINA; ALMEIDA, 2022; SEZINI; GIL, 2014).
3) The essential amino acid Tryptophan, helps synthesize serotonin, melatonin, and niacin, and is found in foods such as bananas, brown rice, beans, beef, and fish (AGUIAR, CATARINA; ALMEIDA, 2022; SEZINI; GIL, 2014).
4) Omega 3 and Omega 6 fatty acids, are already well established in the nutritional treatment against depression, because they regulate the inflammatory process, which, if exacerbated, causes a worsening in neurotransmitters and the CNS. Recommended supplementation has been shown to improve mood in treatment with depressive patients, but is also present in nuts, vegetable oils and fish (AGUIAR, CATARINA; ALMEIDA, 2022; SEZINI; GIL, 2014).
5) Vitamin B6, B9 and B12, found in vegetables, fruits, etc., participate in the biosynthesis of CNS neurotransmitters and in the metabolism of homocysteine, which in high concentration in the blood increases the oxidation of free radicals (AGUIAR, CATARINA; ALMEIDA, 2022; SEZINI; GIL, 2014).

6) Vitamin C, in the context of treatment against depression, can act by increasing the availability of the neurotransmitter noradrenaline. It is produced by means of the sun's rays, however, it also originates from fish such as Salmon and Mackerel, as well as egg yolk (AGUIAR, CATARINA; ALMEIDA, 2022; SEZINI; GIL, 2014).

- ***Relationship as a primary element in the treatment of depression:***

All human beings have an intrinsic biological predisposition to form relationships. Aristotle already defined the most complex unfoldings of human relationships, such as friendship, an austerity that has a direct relationship with virtue and happiness. As a virtue, friendship arouses benevolence, reciprocity, and the good will (ARISTOTELES, 1999), essential factors for an integral social well-being, much more than just transiting and interacting with individuals in the environment.

Thus, an imbalance in these relationships can cause depressive symptoms in the individual or intensify them. A proof of this is that major depressive disorder occurs more frequently in people without close interpersonal relationships and in those who are divorced or separated (SADOCK, SADOCK; RUIZ, 2017). According to Gariépy, Honkaniemi, and Quesnel-Vallee (2016), family and friend support represents a highly consistent protective factor against depression in adults compared to the instrumental group. Marital and family support to assist with obligations can be particularly important for mental health (PETTIT *et al*., 2011).

Some individuals with depression withdraw from family and friends, besides reporting reduced energy, poor performance in personal projects and anhedonia (MARSHALL; HARPER-JAQUES, 2008). This social reclusion is grounded in the lack of stimulus to develop new social relationships or preserve existing ones, besides increasing the individual's sense of social isolation and attesting to the negative points of the depressed person (MARSHALL; HARPER-JAQUES, 2008). The environment, in which these depressed people live, affects and is affected by them, creating a vicious cycle that is difficult to be broken, and that can potentially lead to depressive symptoms in others who live in this environment (SOTTO-MAYOR; PICCINI, 2005).

Evidence of this is the increased prevalence of neuropsychiatric disorders during the COVID-19 pandemic, particularly in adolescents, who had difficulty processing the need for social isolation (JONES, MITRA; BHUIYAN, 2021). Studies show that levels of social support are closely related to the incidence of depression and anxiety, that low levels of social support are more likely to trigger symptoms of depression and anxiety when individuals are exposed to stress, and that social support can be a valuable predictor of mental health status (KOSTEN, 1988).

The studies by Sotto-Mayor and Piccini (2005) also point to marital conflict, which was considered the main mechanism of transmission of emotional problems among families. Not only conflict can lead to depressive feelings in the family, but also poor affective relationships, as O'Hara (1997) reports "a poor marital relationship can precede maternal depression". Despite all the changes that have occurred over time,

the traditionally established roles within a relationship still tend to dominate couples' lives in such a way that they would be completely intertwined with patterns of depression (PAPP, 2000).

In this sense, psychotherapy acts as a form of treatment that uses communication and a systematized relationship between the therapist and the patient so that the latter is able to identify, understand, and mean his conflicts, in addition to correcting the distortions of thoughts that surround him by improving interpersonal relationships (MELLO, 2004). Interpersonal psychotherapy (IPTp) is recommended in practice guidelines as one of the two psychological treatments of choice for depression, the other being cognitive-behavioral therapy (CBT), although there is, according to current evidence, no superiority of one over the other (CUIJPERS *et al.* , 2016). This same meta-analysis by Cuijpers (2016) demonstrated that the combined treatment of interpersonal therapy (IPTp) and pharmacotherapy is superior to pharmacotherapy alone.

- ***Physical activity for depression reduction:***

Although there are known effective pharmaceutical treatments for depression, less than half of the world (less than 10% in many countries) receives it (WHO, 2017). Barriers to effective treatment include lack of resources as well as lack of trained professionals. With this, physical activity has shown promise as an effective non-pharmacological treatment for depression.

The prescription of physical activity is currently recommended as an important strategy for the treatment of depression. Researchers have observed the association between low adherence to physical exercise and a higher possibility of depressive symptoms physical activity and significantly more intense depressive symptoms, sedentarism or reduction of physical activity and a higher propensity to develop depressive symptoms and lower occurrence of depression among physically active individuals and athletes (GUIMARÃES; CALDAS, 2006).

For patients with mild depression, physical exercise is recommended as a first intervention by the APA as long as there is no medical contraindication. Exercises can be associated with other treatments, such as psychotherapy and/or drug treatment in particular, when symptoms do not improve after a few weeks with this first intervention (CARVALHO *et al.* , 2020).

The production of endorphins can be stimulated or in some way physically forced, through the practice of exercises where it causes a physical stress that causes its release, thus obtaining total interaction with the mind and body. The body produces endorphins, and there are many receptors for this substance in the brain. These receptors serve precisely for a specific substance to work in the cells, through its fixation. In exhaustive physical exercises, for example, there is a large production of endorphins, which is why many people end up addicted to gyms (PÓVOA, 2000).

Nowadays, with an increasingly sedentary society and high rates of psychological disorders, the practice of physical activity should be taken into account, since it has several benefits that enable a healthier life, this attitude ends up inducing endorphins acting in their physical and mental development, leading to really satisfactory benefits in the entire population that makes use of this leisure tool inserted by healthy physical activity (CRUZ *et al*., 2013).

- ***Sleep duration and its effect on depression:***

While we sleep, our brain is very busy processing all the information we acquire throughout the day (ACOSTA, 2019). For this reason, care should be taken with sleep hours, since sub-optimal sleep causes cognitive decline (BLACKMAN *et al*., 2021).

Thus, it is seen, that the short duration (sleeping less than seven hours) and long duration (sleeping more than nine hours) of sleep was significantly associated with increased risk of depression in adults (ZHAI, ZHANG; ZHANG, 2015). To this end, it becomes urgent to invest in interventions to analyze the sleep of patients with depression, since sleep disorders (nightmares and insomnia) are closely related to suicidal behavior (WANG, CHENG; XU, 2019).

Of all the psychiatric disorders associated with insomnia, depression is the most common. It is estimated that 90% of patients with depression complain about their sleep quality (TSUNO, BESSET; RITCHIE, 2005), as well as, most depressed patients suffer from sleep abnormalities, which are one of the critical symptoms of depression (WANG et al., 2015).

Dysregulated sleep in adolescence increases the risk of depression in adulthood, which in turn increases the risk of decreased sleep (ROBERTS; DUONG, 2014). In addition, adolescents who use social media more (both during the day and at night) experience poorer sleep quality, lower self-esteem, and higher levels of anxiety and depression (WOODS; SCOTT, 2016).

Quality sleep is fundamental for motivation and disposition during the day, contributing to learning, mood, behavior, immune responses, metabolism, digestive process, and many other physiological and psychological functions (JESUS; MORALES, 2022).

- ***Environmental issues that stimulate depression:***

The environment and mental health have a great relationship. Affective, cognitive, and physiological improvements have been found among groups who walked in a natural environment compared to an urban environment (BRATMAN et al., 2019). However, not only can the environment improve mental health, but the lack of it, in the face of urbanization or pollution, can lead to depression (SARRIS *et al*., 2014).

Nowadays air pollution is a major threat to the environment; several substances are accumulating excessively in the atmosphere, such as particulate matter, which can stimulate oxidative stress and

generalized inflammation in the central nervous system, thereby increasing the likelihood of developing depression (GŁADKA, RYMASZEWSKA; ZATOŃSKI, 2018).

About 55% of the world population currently lives in urbanized areas, and projections show that this number is expected to grow in the coming years, so there is concern about possible damage from these habits (SAMPSON, ETTMAN; GALEA, 2020). the urban environment is rich in noise pollution, air pollution and lack of green areas, so this environment can contribute to the development of depression (VAN DEN BOSCH; MEYER-LINDENBERG, 2019).

Therefore, experiencing nature can lead to significantly improved mental health, such as nature hikes and trails that have been associated with reduced stress and better sleep quality, which are major risk factors for developing depression (BRATMAN et al., 2019).

4 CONCLUSION

It can be concluded that the components presented in this article, if taken care of with attention can contribute to the decrease of depression; on the other hand, according to the world's contemporaneity, the components may not have their due attention, increasing, critically, the disease.

REFERENCES

ACOSTA, M. T. Sueño, memoria y aprendizaje. Medicina, v. 79, Suppl 3, p. 29–32, 2019.

AGUIAR, I. P.; CATARINA, V. S.; ALMEIDA, S. G. DE. O comportamento alimentar e os desdobramentos da depressão. **Research, Society and Development**, v. 11, n. 9, p. e2411931434–e2411931434, 2 jul. 2022.

ARISTÓTELES. Ética a Nicômaco. Trad. Mário da Gama Kury. 3 ed. Brasília: Editora Universidade de Brasília, 1999.

BACKES, M.; CÉSAR AUGUSTO PICCININI. Relacionamento conjugal e depressão materna. Psico, v. 36, n. 2, p. 1, 2022.

BENETON, E. R.; SCHMITT, M.; ANDRETTA, I. Sintomas de depressão, ansiedade e estresse e uso de drogas em universitários da área da saúde. **Revista da SPAGESP**, v. 22, n. 1, p. 145–159, 2021.

BERK, M., *et al*. So depression is an inflammatory disease, but where does the inflammation come from?. **BMC medicin**e, v. 11, p. 200, 2013.

BLACKMAN, J., et al. Pharmacological and non-pharmacological interventions to enhance sleep in mild cognitive impairment and mild Alzheimer's disease: A systematic review. Journal of sleep research, v. 30, n. 4, 2021.

BRATMAN, G. N. *et al*. Nature and mental health: An ecosystem service perspective. Science Advances, v. 5, n. 7, jul. 2019.

CARVALHO, T. *et al*. Diretriz Brasileira de Reabilitação Cardiovascular – 2020. **Arq Bras Cardiol**. v. 114, n. 5, p. 943-987, 2020.

CRUZ, J. L. *et al*. Benefícios da endorfina através da atividade física no combate a depressão e ansiedade. **EFDeportes.com**, Revista Digital. Buenos Aires, Año 18, Nº 179, Abril de 2013.

CUIJPERS, P., *et al*. Interpersonal Psychotherapy for Mental Health Problems: A Comprehensive Meta-Analysis. **The American journal of psychiatry**, v. *173*, n. 7, p. 680–687, 2016.

GARCIA JR., C. A. S.; FERRACIOLI, J. A.; ZAJANKAUSKAS, A. E.; DIAS, N. C. Depressão em médicos da Estratégia de Saúde da Família no município de Itajaí/SC. **Revista Brasileira de Medicina de Família e Comunidade**, Rio de Janeiro, v. 13, n. 40, p. 1–12, 2018.

GARIEPY, G., HONKANIEMI, H., QUESNEL-VALLEE, A.. Social support and protection from depression: Systematic review of current findings in Western countries. **The British Journal of Psychiatry**, v. 209, n. 4, p. 284-293, 2016.

GŁADKA, A.; RYMASZEWSKA, J.; ZATOŃSKI, T. Impact of air pollution on depression and suicide. **International Journal of Occupational Medicine and Environmental Health**, v. *31*, n. 6, p. 711–721. 2018.

Global Health Data Exchange. Global Burden of Disease Study 2019 (GBD 2019) Data Resources. 2019. Disponível em: https://ghdx.healthdata.org/gbd-2019. Acesso em: 24 de agosto de 2022.

GUEDES, G. et al. A influência do álcool no aparecimento de depressão e de ansiedade: uma revisão integrativa. [s.l: s.n.]. **Anais IV CONBRACIS**, 2020.

GUIMARÃES, J. M. N.; CALDAS, C. P. A influência da atividade física nos quadros depressivos de pessoas idosas: uma revisão sistemática. **Rev Bras Epidemiol**, 9(4): 481-92, 2006.

GUJRAL, S., *et al*. Exercise effects on depression: Possible neural mechanisms. General hospital psychiatry, v. 49, p. 2–10, 2017.

JESUS, E. E. D.; MORALES, P. J. C. **Movimento e Saúde: aliados à ciência**. Editora Design. 1ª edição, 2022, p. 132.

JONES, E., MITRA, A. K.; BHUIYAN, A. R.. Impact of COVID-19 on Mental Health in Adolescents: A Systematic Review. **International journal of environmental research and public health**, v. 18, n. 5, p.2470, 2021.

KOSTEN, T.. The symptomatic and prognostic implications of psychiatric diagnosis in treated substance abusers. **NIDA Research Monograph**, v. 81, p. 416- 421, 1988.

MARSHALL A.J., HARPER-JAQUES, S. Depression and Family Relationships: Ideas for Healing. **Journal of Family Nursing**, v. 14, n. 1, p. 56-73, 2008.

MELLO, M. F. de. Terapia Interpessoal: um modelo breve e focal. **Brazilian Journal of Psychiatry**, v. 26, n. 2 , p. 124-130, 2004.

NULL, G.; PENNESI, L. Diet and lifestyle intervention on chronic moderate to severe depression and anxiety and other chronic conditions. **Complementary therapies in clinical practice**, v. 29, p. 189–193, 2017.

O'HARA, M. (1997). The nature of postpartum depression. In L. Murray & P. Cooper (Eds.). **Postpartum depression and child development**. New York: Guilford, p. 3-31, 1997.

PAPP, P. **Casais em perigo: novas diretrizes para terapeutas**. Porto Alegre: Artmed, 2002.

PERITO, M. E. S.; FORTUNATO, J. J. Marcadores Biológicos da Depressão:: Uma Revisão Sobre a Expressão de Fatores Neurotróficos. Revista Neurociências, [S. l.], v. 20, n. 4, p. 597–603, 2012.

PETTIT, J.W., *et al.* Developmental relations between perceived social support and depressive symptoms through emerging adulthood: blood is thicker than water. **J Fam Psychol**. v. 25, n. 1, p. 127-36, 2011.

PÓVOA, H. A chave da longevidade - 1ªED. 2000.

ROBERTS, R. E.; DUONG, H. T.. The prospective association between sleep deprivation and depression among adolescents. **Sleep**, v. 37, n. 2, p. 239–244, 2014.

SADOCK, B. J.; SADOCK, V. A.; RUIZ, P. Compêndio de Psiquiatria: ciência do comportamento e psiquiatria clínica. 11. ed. Porto Alegre: Artmed, 2017. 1490 p.

SAMPSON, L.; ETTMAN, C.; GALEA, S. Urbanization, urbanicity, and depression. Current Opinion in Psychiatry, p. 1, jan. 2020.

SARAIVA, F. R. DE S.; CARVALHO, L. M. F. DE; LANDIM, L. A. DOS S. R. Depressão e disbiose. **Nutrição Brasil**, v. 18, n. 3, p. 175–181, 2019.

SARRIS, J., *et al.* Lifestyle medicine for depression. **BMC psychiatry**, v. 14, p. 107, 2014.

SEZINI, A. M.; GIL, C. S. G. DO C. Nutrientes e Depressão. Vita et Sanitas, v. 8, n. 1, p. 39–57, 2014.

SILVA, G. A., COSTA, K. A., GIUGLIANI, E. R. Infant feeding: beyond the nutritional aspects. **J Pediatr (Rio J)**, v. 92, n. 3, p. 2-7, 2016.

SILVEIRA, M. M. S. da .; FIGUEIREDO, E. F. G. . Importance of healthy eating in the treatment of depression in children. **Research, Society and Development**, [S. l.], v. 10, n. 16, 2021.

SOTTO-MAYOR, I. M. B.; PICCINI, C. A. Relacionamento conjugal e depressão materna. **PSICO**, Porto Alegre, PUCRS, v. 36, n. 2, pp. 135-148, maio/ago. 2005.

TSUNO, N., BESSET, A.; RITCHIE, K. Sleep and depression. **The Journal of clinical psychiatry**, v. 66, n. 10, p. 1254–1269, 2005.

VAN DEN BOSCH, M.; MEYER-LINDENBERG, A. Environmental Exposures and Depression: Biological Mechanisms and Epidemiological Evidence. Annual Review of Public Health, v. 40, n. 1, p. 239–259, abr. 2019.

VEDOVATO, K. *et al*. O eixo intestino-cérebro e o papel da serotonina. **Arquivos de Ciências da Saúde da UNIPAR**, v. 18, n. 1, 9 jul. 2015.

VELTEN, J., *et al*. Lifestyle choices and mental health: a longitudinal survey with German and Chinese students. **BMC public health**, v. 18, n. 1, p. 632, 2018.

WANG, X., CHENG, S.; XU, H.. Systematic review and meta-analysis of the relationship between sleep disorders and suicidal behaviour in patients with depression. **BMC psychiatry, v.** 19, n. 1, p. 303, 2019.

WANG, Y. Q., *et al*.. The Neurobiological Mechanisms and Treatments of REM Sleep Disturbances in Depression. **Current neuropharmacology**, v. 13, n. 4, p. 543–553, 2015.

WHO - World Health Organization. Depressão. 2017. Disponível em: https://www.who.int/news-room/fact-sheets/detail/depression. Acesso em: 24 de agosto de 2022.

WOODS, H. C.; SCOTT, H. Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. **Journal of adolescence**, v. 51, p. 41–49, 2016.

ZHAI, L., ZHANG, H., ZHANG, D. Sleep duration and depression among adults: a meta-analysis of prospective studies. **Depression and anxiety,** v. 32, n. 9, p. 664–670, 2015.

ZHU, Y., *et al.* Association of Depression and Unhealthy Lifestyle Behaviors in Chinese Patients With Acute Coronary Syndromes. **Journal of cardiopulmonary rehabilitation and prevention**, v. 39, n. 6, p. 1–5, 2019.

CHAPTER 26

Amenities and contributions of point of care technology in the hospital environment

10.56238/rsfohsv1-026

Marlene Simões e Silva
Enfermeira Assistencial
Mestranda em Gestão de Cuidados da Saúde
Instituição: Must University
E-mail: enfermeiramarlene12@gmail.com

Liene de Fátima Carvalho
Enfermeira Assistencial
Especialização em Enfermagem de Urgência e Emergência
Instituição: Faculdade Venda Nova do Imigrante – FAVENI
E-mail: lienebrasil@hotmail.com

Hilma Keylla de Amorim
Enfermeira Assistencial
Especialização em Enfermagem do Trabalho e Saúde Coletiva
Instituição: Fundação de Ensino Superior de Olinda – FUNESO/UNESF
E-mail: hilmaamorim30@gmail.com

Pablo Raphael de Freitas
Enfermeiro
Especialização Urgência, Emergência, Trauma e Terapia Intensiva
Instituição: Faculdade de Ciências Médicas de Minas Gerais
E-mail: pabloraphael_freitas@hotmail.com

Milena Vaz Sampaio Santos
Enfermeira Assistencial
Instituição: Universidade Federal da Bahia – UFBA
E-mail: milena.sampaio@ebserh.gov.br

Carolina Costa Pinto
Enfermeira Assistencial
MBA em Gestão Hospitalar
Instituição: Centro Universitário Una
E-mail: enfa.carol1979@gmail.com

Juliane Guerra Golfetto
Enfermeira Assistencial
Mestrado Profissional em Pesquisa Clínica
Instituição: Hospital das Clínicas de Porto Alegre - HCPA
E-mail: juliane.golfetto@ebserh.gov.br

Hirlla Karla de Amorim
Farmacêutica
Especialização em Farmacologia Clínica
Instituição: Universidade Federal de Pernambuco – UFPE
E-mail: hirlla20@hotmail.com

Emanoel Rodrigo Melo dos Santos
Farmacêutico
Mestrando do Programa de Pós-graduação em Assistência Farmacêutica
Instituição: Instituto de Ciências da Saúde da Universidade Federal do Pará
E-mail: emanoel.santos@ebserh.gov.br

Rita de Cássia Almeida Sales
Enfermeira Assistencial
Especialização em Auditoria de Sistemas de Saúde
Instituição: Universidade Estácio de Sá
Especialização em Terapia Intensiva
Instituição: Instituto de Ensino Superior Santa Cecília
Especialização em Enfermagem em Nefrologia
Instituição: Universidade Federal de São Paulo
E-mail: rita.nefro@hotmail.com

ABSTRACT
This study aimed to highlight the advantages and contributions brought by the point care exams, pointing out the current consensus on this theme. A literature review was carried out, which will be elaborated through data collection carried out from secondary sources, through a bibliographic survey. The search for primary documents was carried out through the Scielo database, the Virtual Health Library (VHL), and PubMed. As inclusion criteria, the period from 2011 to 2021 was delimited, accepting full publications or only their published abstracts. Only articles published in Portuguese and English were accepted, without exception. The descriptors to be used were, namely: Point of care; Technology; Diagnosis. Through the bibliographical survey carried out, it was possible to conclude that the point of care technology is extremely important, even essential for determining the definitive and confirmatory diagnosis of a series of pathological and clinical conditions in the daily routine of hospital care, especially. This technology should be increasingly encouraged in practice, considering not only the fact that it allows for an early diagnosis, but also because it provides a better prognosis for those cases considered more serious, contributing to the saving of lives.

Keywords: Point of Care. Diagnosis. Quality management.

1 INTRODUCTION

The healthcare market is constantly changing, involving scientific research, increasingly efficient and autonomous equipment, new treatments, and innovations in information technology to create predictive algorithms for chronic diseases and patient population management.

More and more resources and devices have been created to contribute in a more decisive way to facilitating and improving the quality of services provided, especially in the hospital environment, where excellence and quality are always the priority.

The creation of technological devices and computerized tools can also represent an important contribution to the promotion of more humanized and efficient assistance, adding value to all those involved and contributing significantly to the provision of quality services in a highly competitive market.

Thus, the technological and systematized tools at the service of health sciences must be analyzed and, because of their efficiency, must be put into practice in routine activities performed at the hospital level. An important resource developed in recent decades has been the development of so-called point-of-care (POC) tests, whose main objective is to make diagnoses faster and more efficient (DUSSE et al, 2012). The objective of this study is to highlight the advantages and contributions brought by point-of-care exams, pointing out the consensus on this topic today.

2 METHODOLOGY

This is a literature review study, which will be elaborated through data collection carried out from secondary sources, through a bibliographic survey. The steps, which will enable the operationalization of the review, will begin with the search for primary documents, through the Scielo database, the Virtual Health Library (BVS), and PubMed.

As inclusion criteria, the period from 2011 to 2021 was delimited, accepting publications in full or only their published abstracts. Only articles published in Portuguese and English will be accepted, without exception. The descriptors to be used will be, namely: point of care, technology, and diagnosis.

The exclusion criteria to be used will be articles published outside the period, and that are not related to the approach. The reading of the material will initially be exploratory through abstracts of the articles, followed by a selective reading of the content and later analytical, aiming at the identification of the information and synthesizing through records to provide a partial report on the topic under study. The data of each study will be extracted, presented, and finally discussed, presenting at the end the conclusion.

3 RESULTS AND DISCUSSION

Leal et al (2013) stated that an adequate preoperative evaluation is essential to optimize the respective procedure for each patient, reducing risks and costs.

Arienzo et al (2019) stated that a rapid and accurate diagnosis is essential to ensure timely and effective therapy. In the case of, for example, urinary tract infection tests, along with culture-based reference methods, several point-of-care tests for early detection of UTIs have been developed.

Phillips et al (2019) highlighted that healthcare professionals who have access to point-of-care tests are increasingly requesting the same POC test performance they expect from the laboratory. With the introduction of the Cobas®Liat instrument, highly sensitive molecular diagnostic tests can be performed closer to the patient in CLIA-free POC settings.

Crocker et al (2014) stated that point-of-care laboratory tests offer reduced response time and can promote operational efficiency improvements. In the study by these authors, after the implementation of POCT, there was a 21% reduction in tests requested per patient; an 89% reduction in follow-up calls and phone calls, and an 85%, respectively; 61% decrease in patient revisits. It was concluded that POCT can significantly improve operations with cost savings through improved efficiency practices.

According to Schilling (2015), in Canada, the use of POC tests during the stabilization of patients before the inter-hospital transfer was calculated, resulting in substantial time savings. Yet, in the US, the implementation of POCT resulted in a 20% decrease in chest pain unit admissions and simultaneously substantial savings. In the cardiac observation unit, the introduction of the troponin POC test reduced the length of stay, decreased admission rates, and resulted in fewer costly procedures, with a 25% cost savings per patient. In cardiothoracic surgery with high use of expensive blood products and clotting factor concentrates, the introduction of coagulation measurement by POC test resulted in savings of 56%.

Bollinger and Tanaka (2017) consider that the POC clotting test allows for quick clinical decisions on hematologic interventions and, when used in conjunction with an appropriate transfusion algorithm, can reduce blood product usage and potential complications associated with blood transfusion.

Nunes et al (2016) mentioned that bedside ultrasound (POCUS), from English point-of-care ultrasonography, occupies a propaedeutic role of increasing importance in clinical diagnosis. In general, clinicians have demonstrated skill in obtaining images that allow them to answer simple, typically binomial, questions. The integration of these images into the clinical history and physical examination results has improved the management of patients by their clinicians.

Physicians are showing interest in POCUS, and some medical schools, particularly in the US, have already introduced ultrasound into their undergraduate curricula. In Brazil, the Faculty of Medicine of the Federal University of Juiz de Fora (FAMED/UFJF) is developing a pioneering initiative that involves the structured and horizontal incorporation of POCUS into the curriculum of the medical school.

Schilling (2014) stated that the use of POC systems allows the rapid analysis of blood samples, especially in emergency units, bringing numerous advantages. In this study, we analyzed the potential economic impact of using the iSTAT POC system in an emergency department of a university hospital. As a result, it was observed that the use of the POC resulted in direct savings per the analysis of 111 US$ for each patient. The mean delay between POC results and laboratory results was 48.5 ± 28.67 minutes. This

is equivalent to 32,333 hours of work per year. Emergency department personnel bills for $1.5 per patient per minute. The time saved by the POC translates to a potential savings of $72.75 per patient. Based on 40,000 patient visits per year to our ER, $7,350,000 could be saved by rigorous use of the POC.

The authors concluded that the use of POC can produce a major economic impact on the emergency unit if all potential savings are realized. Considering the potential savings in waiting times, the POC can also increase patient safety and satisfaction, as well as help alleviate overcrowding in these hospitals.

Phillips et al (2019) cited in their study that, as more sensitive tests become available, there is a concern about instrumentation contamination due to improper handling, errors made during processing, or environmental contamination.

According to Schilling (2015), in the NICU, POC testing has been shown to reduce costs per patient by 8.3% as a result of reduced key laboratory tests and fewer transfusions. In the pediatric emergency department, the introduction of the POC test for detection of human respiratory syncytial virus in the triage of patients has been significantly changed, bringing faster therapeutic decisions as well as isolation procedures for such as significant capacity could be released during the epidemic periods, with large savings as a consequence.

Aljadi et al (2019) cited that the Basophil Activation Test (BAT) based on flow cytometry is used for the diagnosis of allergic response. However, flow cytometry is time-consuming, requiring skilled personnel and complicated processing, which has limited its use in the clinic. The authors presented a new microfluidics-based immunoaffinity BAT (miBAT) method. It was concluded that this device is capable of isolating basophils directly from whole blood for on-chip activation and detection. The new miBAT method awaits validation in larger patient populations to assess performance in diagnosing and monitoring patients with allergies at the point of care.

Lusignan et al (2019) highlighted that point-of-care testing (POCT) for influenza promises to provide real-time information to influence clinical decision-making and improve patient outcomes. Public Health England has published a toolkit to help implement these tests in the UK's National Health Service. The authors conducted a feasibility study to assess the implementation of the influenza POCT in primary care as part of a sentinel surveillance network. A mixed methods study was conducted to compare sampling rates in practices that use POCT and current virology swab practices that do not use POCT, and to understand the issues and barriers to implementing POCT for influenza in primary care work.

Six practices were recruited and data collection started on March 11, 2019. In addition, 312 swab samples were collected at the time of protocol submission, which was 32.5% (312/960) of the expected size of the protocol. sample. In addition, 68 samples were positive for influenza, which was 20.1% (68/338) of the expected sample size. It was concluded that it is highly feasible to implement POCT in primary care and the opinions of professionals on the use of POCT for influenza in primary care, including its impact on primary care workflows.

Barcellona et al (2017) stated that oral anticoagulant therapies with anti-vitamin K (VKA) drugs, warfarin, acenocoumarol, and phenprocoumon, are employed in primary and secondary antithrombotic prophylaxis in patients with venous thromboembolism, atrial fibrillation, and mechanical heart valves. Telemedicine and telecare can provide significant help in managing this therapy, allowing patients to test at home or anywhere else with a handheld device, i.e. point-of-care testing (POCT), and send the result to a thrombosis (CT). Patients may receive dose adjustments sent back by the CT. The effectiveness of this type of management is equal to or superior to traditional VKA monitoring in terms of hemorrhagic and thrombotic events.

A 10-year cost analysis reveals that both self-testing and self-management are inexpensive tests. In a study carried out by Nunes et al (2016), the authors sought to present the results of the development of competencies for the use of point-of-care ultrasound (POCUS) in Nephrology. A total of 9 residents, 4 from Nephrology and 5 from Internal Medicine, attended a 16-hour theoretical-practical ultrasound course. Ultrasound topics related to the urinary tract, lung, heart, blood vessels, renal biopsy, and central venous catheter insertion were addressed.

The assessment consisted of multiple choice cognitive tests (CT) and image association before and after the course and a practical assessment of skills in generating ultrasound images and performing procedures by the Structured Clinical Skills Examination (OSCE). All residents have completed the course. A significant improvement in knowledge was observed when the scores obtained by residents before and after the multiple-choice and image association CT were compared. Furthermore, it was observed that the competence assessment of residents by the OSCE, except for the lung station, was considered very good. It was concluded that a 16-hour POCUS course in Nephrology, not limited to urinary tract topics, enables the development of skills in obtaining images and performing nephrological procedures. The curriculum developed can serve as a model for learning POCUS in Nephrology, thus contributing to the training of non-radiologists in the use of ultrasound (US) and due to the need for physicians to integrate "new" clinical information into the diagnostic process. Discussions around the need to carry out complementary exams in the pre-surgical period have been increasing in recent years.

We can attribute this increase in discussions due to observance and understanding of the exaggerations often carried out around the requirement for exams that only increase hospital costs, delay the performance of procedures, increase the demand for services, and can even interfere with patient safety.

Therefore, what is observed is, in fact, a process of rationalization of exams, in a worldwide trend observed today, as the studies selected here were able to prove.

Many of the tests until recently required in a preoperative period, today it is already observed that, in reality, they are not indispensable, and can be avoided, except in specific clinical cases.

There was also a consensus that, as a rule, clinical assessment, through a detailed anamnesis, is essential and allows the patient to be offered the lowest possible surgical risk.

Corroborating the view of Guerra et al (2012), a well-detailed clinical examination is certainly essential and indispensable, and also sufficient to reduce the number of preoperative examinations by up to 60%. The same view was defended by Leal et al (2013) and Giordano et al (2009) who also agreed that adequate preoperative evaluation is essential to optimize the respective procedure for each patient, reducing risks and costs.

It is within this context that point-of-care tests are inserted, considered in practice as an important tool for a faster and more accurate diagnosis of a wide range of diseases and clinical conditions that, in most cases, require early and rapid intervention.

Through this bibliographic survey, it became evident that the advantages in the practice of point-of-care tests are numerous, and there is no longer any way to think about medicine today without associating it with the use and development of the currently available methods of point-of-care diagnosis.

In our understanding, technology and the preparation of professionals for the correct use of these tools must be stimulated and carried out, thus ensuring a better prognosis for patients from an accurate, fast diagnosis and even at lower costs for hospitals and patients, advantages that point of care technology provides and that is its great differential.

4 CONCLUSION

Through the bibliographic survey carried out, it is possible to conclude that point-of-care technology is extremely important, even essential to determine the definitive and confirmatory diagnosis of a series of pathological and clinical conditions in the daily life of hospital care, especially. This technology should be increasingly encouraged in practice, considering not only the fact that it allows an early diagnosis, but also because it allows a better prognosis for those cases considered more serious, contributing to the saving of lives.

REFERENCES

ALJADI, Z.; KALM, F.; RAMACHANDRAIAH, H.; NOPP, A.; LUNDAHL, J.; RUSSOM, A. Microfluidic immunoaffinity basophil activation test for point of care allergy diagnosis. J. Appl. Lab. Med., 4(2):152-163, 2019.

ARIENZO, A.; CELLITTI, V.; FERRANTE, V.; LOSITO, F.; STALIO, O.; MURGIA, L.; MARINO, R.; CRISTOFANO, F.; ORRÚ, M.; VISCA, P.; DI SOMMA, S.; SILVESTRI, L.; ZIPARO, V.; ANTONINI, G. A new point-of-care test for the rapid detection of urinary tract infections. Eur. J. Clin. Microbiol. Infect. Dis., 2019.

BARCELLONA, D.; FENU, L.; MARONGIU, F. Point-of-care testing INR: an overview. Clin. Chem. Lab. Med., 55(6):800-805, 2017.

BOLLINGER, D.; TANAKA, K.A. Point of care coagulation testing in cardiac surgery. Semin. Thromb. Hemost., 43(4):386-396, 2017.

CROCKER, J.B.; LEE-LEWANDROWSKI, E.; LEWANDROWSKI, N.; BARON, J.; GREGORY, K.; LEWANDROWSKI, K. Implementation of Point-of-Care Testing in an Ambulatory Practice of an Academic Medical Center. Am J Clin Pathol;142:640-646, 2014.

DUSSE, L.M.S.; OLIVEIRA, N.C.; RIOS, D.R.A.; MARCOLINO, M.S. RNI Point of care test (POCT): esperança ou ilusão? Revi. Bras. Cirurg. Cardiovasc., 27(2):296-301, 2012.

GIORDANO, L.A.; GIORDANO, M.V.; GIORDANO, R.O.S. Exames pré-operatórios nas cirurgias ginecológicas eletivas. Femina, 37(1), 2009.

GUERRA, M.E.; PEREIRA, C.S.; FALCÃO, D.P.; SIGWALT, M.F.; SKINOVSKY, J. Análise da relevância dos exames laboratoriais pré-operatórios solicitados em cirurgias eletivas em um hospital universitário. Rev. Med. Res.; 14 (1): 47-53, 2012.

LEAL, F.P.; SILVA, A.P.; OLIVEIRA, E.S. Avaliação pré-operatória: exames complementares de rotina? Brazilian Journal of Surgery and Clinical Research, 4(1):49-55, 2013.

LUSIGNAN, S.; HOANG, U.; LIYANAGE, H.; YONOVA, I.; FERREIRA, F.; DIEZ-DOMINGO, J.; CLARK, T. Feasibility of point-of-care testing for influenza withing a national primary care sentinel surveillance network in england: protocol for a mixed methods study. JMIR Res. Protoc., 8(11):141, 2019.

NUNES, A.A.; PAZELI JUNIOR, J.M.; RODRIGUES, A.T.; TOLLENDAL, A.L.S.V.; EZEQUIEL, O.S.; COLUGNATI, F.A.B.; BASTOS, M.G. Desenvolvimento de competências para o uso da ultrassonografia point-of-care em Nefrologia. J. Bras. Nefrol., 38(2):209-214, 2016.

PHILLIPS, J..; McCUNE, S.; FANTZ, C.R.; ENGSTROM-MELNYK, J.; OSIECKI, J.C. Assay integrity of a PCR influenza point of care test remains following artificial system contamination. J. Appl. Lab. Med., 4(3):422-426, 2019.

SCHILING, U.M. Time is Money—the Economic Impact of Point of Care on the Emergency Department of a Tertiary Care University Hospital. Point of Care;13: 21–23, 2014.

SCHILING, U.M. The economic benefits of point-of-care testing. HHE Article Martin Schilling 038655 Rev A 03/15, 2015.

CHAPTER 27

Form of constitution of brazilian sports entities and the impacts on the management model and the level of indebtedness

10.56238/rsfohsv1-027

Fagner da Silva Pereira
Master in Local Development from the Centro Universitário Augusto Motta
Institution: Centro Universitário Augusto Motta (UNISUAM)
Address: Av. Paris, 84, Bonsucesso, Rio de Janeiro - RJ
Email: fagnerdasilvapereira@gmail.com

ABSTRACT
For decades the Brazilian soccer clubs have been experiencing negative results in their balance sheets, making the problem of indebtedness of these entities chronic The present article aimed to identify the level of indebtedness of the main Brazilian professional soccer clubs, correlating this data to the type of management applied to them. Our hypothesis is that Brazilian clubs need to improve their form of governance, as well as an adequate legal framework, in a way that is appropriate for the sector, considering the large volume of their financial transactions and the absence of qualified managers. The methodology used was the bibliographic and documental research on the financial situation and management practices of the Brazilian clubs and the management and financial recovery measures used mainly in Europe, in particular during the transition process of non-profit clubs into corporate clubs, the same process can be carried out in the Brazilian clubs as a measure to reverse the process of indebtedness.

Keywords: sports management, soccer clubs, indebtedness, sports business management.

1 INTRODUCTION

Soccer is the most practiced sport nowadays and also the one that occupies the most space in the media, as can be seen by observing the number of players and the financial turnover of the clubs. According to the Brazilian Institute of Geography and Statistics (IBGE), in a 2015 survey, it was found that the most practiced sport by Brazilians is soccer, with 15.3 million players. This number corresponds to 39.3% of the 38.8 million who practice some sport (AGÊNCIA BRASIL, 2017).

In Brazil, as highlighted by Reis (2020), the soccer sports theme occupies an expressive space in the media, either by the broadcasting of games or even by the television programs destined to comment them. This indicates that news on this theme is highly valued in the competitive space in the media.

Analyzing the sector from a financial perspective, based on a study conducted by Ernst & Young at the request of the Brazilian Football Confederation (CBF) in 2018, soccer generated 52.9 billion reais in the Brazilian economy, which represents 0.72% of the gross domestic product (GDP) that year. The financial movement in a direct way performed by CBF, federations and clubs accounts for 11 billion reais (CBF, 2019).

Based on the above data and comparing it with the financial situation of the main Brazilian clubs, there is a huge contradiction

According to Santos (2020), it is observed that these financial moves do not correspond to a stable sector, because in another survey conducted in 2018 for Itaú BBA company, it was pointed out that the accumulated debt of the main teams in the sector reached 6.6 billion in 2017.

Our hypothesis is that Brazilian clubs need to improve their form of governance, as well as the appropriate legal framework for these entities, in a manner appropriate for the sector, given the large volume of their financial transactions and the absence of qualified managers.

Faced with the problem situation, we can formulate the following question:

As the industry has a large capacity and financial turnover in Brazil, one wonders why the clubs are having big problems with their financial results.

The study will be based on literature and document review, focusing on cases of professionalization, especially in major European leagues that are highlighted in this segment, because these leagues had the same management model of Brazil until the 80's and 90's, but due to recurring management problems was carried out the change to club business model. With this, the indebtedness of the clubs was reduced and a transparent management was established.

2 HISTORY OF SOCCER CLUBS INDEBTEDNESS AND ITS EFFECTS ON THE SECTOR

The process of indebtedness of Brazilian soccer clubs took place a long time ago and today it is a chronic problem. This process was deepened mainly in the 1980s and 1990s. According to Cardoso (1991), in the 1970s Brazil was affected by the oil crises, which would have occurred in 1973 and 1979. The greatest impact was in the second crisis, in 1979, as a result of which the Brazilian domestic market suffered a monetary crisis (inflationary process) that lasted until the implementation of the Real Plan[1] and its consolidation in the 1990s.

This crisis directly affected the soccer-related sports sector, from the country's governing body (then CBD) to the soccer clubs. The Brazilian Sports Confederation (CBD) was extinguished on September 24, 1979, after extensive administrative and structural changes were made in order to comply with the decree of the *Federation Internationale Football Association* (FIFA), which determined the need for national entities exclusively dedicated to soccer development. Thus, the Brazilian Football Confederation (CBF) was created, with the prerogative of ensuring the independent management of Brazilian soccer and of the Brazilian National Teams (CBF, 2020) in relation to other sports practices.

These modifications generated a series of conflicts between CBF and clubs. This escalation of tensions resulted in the creation of the "Clube dos 13[2] " in 1987 with the purpose of defending the interests of the 13 biggest Brazilian clubs against the changes that would be implemented by CBF. The 1986 Brazilian Championship was totally modified from the previous year. CBF decided to merge the Gold, Silver and Bronze Cups, which corresponded to the A, B and C series of the championship, into a single competition, with 80 teams divided into 8 groups of 10 clubs in the first phase, and 32 clubs divided into 4

[1] Brazilian program aiming at economic stabilization and reforms, started on February 27, 1994, during the administration of former president Itamar Franco.

[2] Officially the union of the major Brazilian soccer clubs, it was created on July 11, 1987, to mediate the commercial and political interests of the 13 best ranked clubs in CBF's *Ranking.* The clubs that comprised it in 1987 were: Atlético-MG, Bahia, Botafogo, Corinthians, Cruzeiro, Flamengo, Fluminense, Grêmio, Internacional, Palmeiras, Santos, São Paulo, and Vasco.

groups in the second phase. However, due to legal problems and pressure from clubs Vasco and Portuguesa, the championship was modified to have 36 teams in the second phase. These changes had an impact on the relegation system, since the teams not qualified would automatically be relegated to the 1987 Championship. The decision to modify the second phase caused a great deal of protest from the teams that would be relegated. As a consequence, CBF received several lawsuits in the common and sports courts, culminating with no team being relegated this year. These facts generated financial problems for CBF. After several legal disputes, in 1988 the Brazilian championship was unified under the command of CBF, becoming a more organized championship and with strong television appeal, starting a strong influence and dissemination of the championship throughout Brazil.(**GALLINDO and ZIRPOLI,** 2016)

On the other hand, on the international scene, the European market stands out in terms of fundraising capacity and media prominence, as it began the professionalization process in the 1980s. Three countries were more proactive in this process of professionalization in soccer management, they are: England, Spain and Italy. The process was headed by Tottenham Hottspur Club, in 1983. This club was the first to become a corporate club, a public limited company. In its first share sale, the sporting entity managed to raise 9.2 million pounds. However, the most successful case is Manchester United, which has achieved great success on and off the field, with decades of positive balance sheets and increased revenues (DANTAS and BOENTE, 2011).

On the opposite path, in the 1990s, Brazilian clubs entered a slow and gradual process of worsening their debts, for several reasons: from fraudulent management, investments above the club's financial capacity, lack of knowledge in financial management, bad contracts, and mistaken projects.

This whole process of indebtedness, in particular the lack of collection of taxes and other social charges, affects the public revenue of the states and municipalities, which stop investing more money in essential public services to the population.

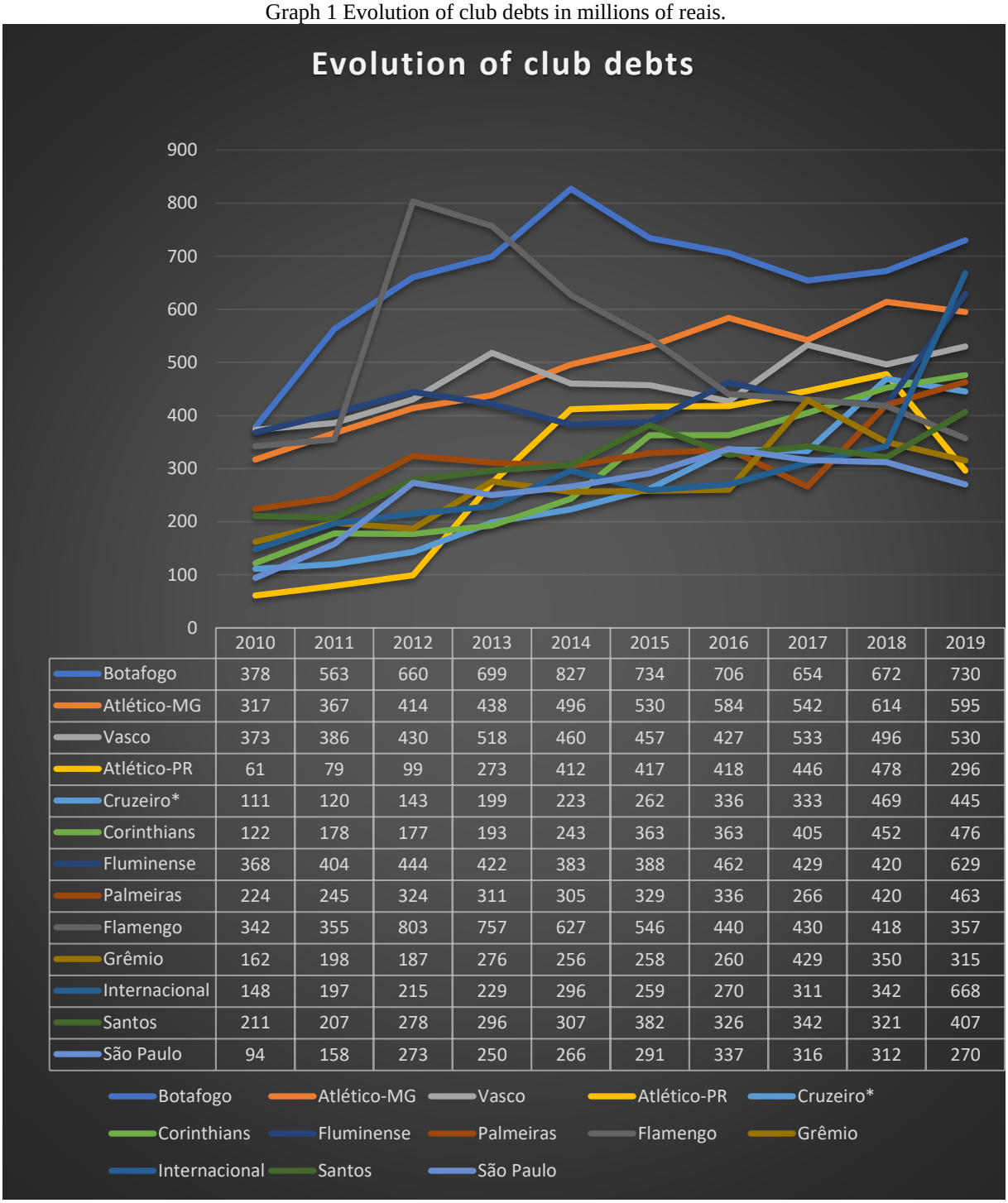
In 2015, the Federal Government, in order to encourage the payment of debts and establish a more transparent financial management of clubs, enacted Law 13,155/15, called the Program for Modernization of Management and Fiscal Responsibility of Football, better known as the Program for Modernization of Management and Fiscal Responsibility of Brazilian Football (PROFUT) (BRASIL, 2015). This initiative was taken based on the historical indebtedness rates that reached their peak in 2014. The largest portion of the indebtedness is concentrated in debt of a tax nature to the various federative entities. This was not the first time that the Federal Government created incentives for debt renegotiation and tax collection alternatives, with the purpose of amortizing the tax liabilities of these entities (SILVA, 2015).

Among the main initiatives of the Federal Government for adjustment and tax incentives are: Law 8931/1994, which was a proposal for debt renegotiation; Law 9.964/2000, Fiscal Recovery Program (REFIS), which is another proposal for debt renegotiation and, in 2006 was created by Law 11.345 the Timemania, which aims to establish the criteria for participation and adherence of professional soccer sports entities and provides for the installment payment of tax and non-tax debts and the Employee Severance

Indemnity Fund (FGTS). In exchange, Caixa Econômica Federal uses the names and shields of the sports entities in its lottery activities (PARADELA,2016, p. 12).

Observing the evolution of the debts of the clubs (Graph 1), we see a momentary change in this picture as a reduction in the degree of indebtedness in the year 2014, because in that year there was a renegotiation of the REFIS debts, but after a short time it worsens again. Most clubs appropriated these tax benefits to their balance sheets, in a speculative way (speculation of collection), that in the long run, due to deficit balance sheets (expenses higher than their collection), these benefits are lost and the debts return to collection, with interest and monetary correction (SILVA,2019).

Graph 1 Evolution of club debts in millions of reais.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Botafogo	378	563	660	699	827	734	706	654	672	730
Atlético-MG	317	367	414	438	496	530	584	542	614	595
Vasco	373	386	430	518	460	457	427	533	496	530
Atlético-PR	61	79	99	273	412	417	418	446	478	296
Cruzeiro*	111	120	143	199	223	262	336	333	469	445
Corinthians	122	178	177	193	243	363	363	405	452	476
Fluminense	368	404	444	422	383	388	462	429	420	629
Palmeiras	224	245	324	311	305	329	336	266	420	463
Flamengo	342	355	803	757	627	546	440	430	418	357
Grêmio	162	198	187	276	256	258	260	429	350	315
Internacional	148	197	215	229	296	259	270	311	342	668
Santos	211	207	278	296	307	382	326	342	321	407
São Paulo	94	158	273	250	266	291	337	316	312	270

Source: Adapted from Itaú BBA (2020).

This situation becomes more evident when we examine the case of Botafogo de Futebol e Regatas, due to its leading position on the list of indebted clubs. In 2014, the club had a debt of 827 million reais, but by joining REFIS, this debt fell substantially, reaching the amount of 654 million reais in 2017. However, four years after the implementation of the refinancing, the club started to obtain new negative financial results. In the same sense, we see the cases of the clubs Fluminense Football Club and Sport Club Internacional. The two clubs obtained large negative results of their debts, respectively, in 209 and 326 million reais. This represents an increase of 49.79% and 95.32%, respectively in the years from 2015 to 2017.

Another case to highlight is that of Cruzeiro Esporte Clube. Despite not showing great prominence in the chart of debts, the club is involved in a series of accusations for fraudulent tax practices, in a criminal investigation process promoted by the Public Ministry of the State of Minas Gerais (process number 10000181068354001, filed in March 2019). In addition to the huge increase in labor court cases, which rose by 300% from 2017 to 2020, in 2017 the club had 31 cases, and in 2020 it has 98 such lawsuits, which may lead to severe punishments, fines, and damages, which will certainly impact its future balance sheets.

In continuation of the analysis of the degree of indebtedness (graph 1), it is observed that some clubs have a constant growth in their degree of indebtedness, even with REFIS, because these clubs, despite adhering to the program, have failed to comply with the installment payments or have not appropriated the amortization of interest in their balance sheets.

3 BRAZILIAN PUBLIC POLICY FOR SPORTS

The Brazilian soccer legal model was based on the Decree Law N° 3.199, of April 14, 1941, which was the law that established the bases for the organization of sports throughout the country. According to Campagnone (2009), from this decree on, a verticalization of the sports administration was created, which gave birth to the Brazilian Sports Confederation with the purpose of a national management of sports.

In the 1970s, the 1941 decree-law was revoked for the modernization of sports. To replace it, Law 6.251/75 was created, keeping a national management by the Ministry of Education and Culture, but decentralizing the management of each sport. Thus, providing the basis for the future creation of CBF, the same law regulated the first tax support mechanisms for the sports promoter (TUBINO, 2002).

The Law no. 6.354/76, better known as the Pass Law, sought to establish the labor relations of the soccer professional athlete with the sports entities, thus aiming at a formal labor relationship and regulating transfer issues. Thus, the club owned the player's pass, athletic registration, but even after the end of the work contract. The sports entity still held the athlete's registration rights for 10 years of employment or 32 years of age. This law reflected the world trend of the sector, in this period (MENDES, 2000).

Due to the Bosman Case, there was a profound change in relation to the athletic registration rights, defining that the sports bond will be maintained only during the effective time of the employment contract and with the possibility of signing a pre-contract only 6 months before the end of the contract. With this,

Law 8.672/93, better known as Zico Law, was issued, which also aimed at adapting the sport to the current international situation. This law also instituted the regulation on Sports Justice (DOS SANTOS, 2017).

In 1998 the Zico Law (Law 8.672/93) was repealed by Law 9.615/98, better known as Pelé Law, which was a landmark in the National Sports Legislation, for it reinforced and expanded the sports incentive policy centered on sports entities with legal personalities of private law. Associated to administrative reforms, it reinforced and defined broader bases for the establishment of the corporate club (CASTELLANI, 2008). The referred Law 9.615/98 suffered changes in its structure, implemented by Law 14.0753 of October 14, 2020, for its adequacy to the public calamity period.

It is worth noting that there is a bill (PL 5.082-A/2016) already approved in the House of Representatives, whose object, among others, is the creation of the corporate club. The bill also establishes a special taxation regime for these entities that are created to practice soccer activities (Simples-Fut).

4 SCENARIO OF THE SPORTS SECTOR IN BRAZIL

Currently the sports sector in Brazil is founded on an archaic system, based more on a political administration than on a managerial one. This model has as its central figure the "cartola" (top hat). Most of the major sports institutions are managed by this typical figure, club members, who divide their professional life with that of sports "managers". This voluntary and incipient form of management is incompatible with the economic and financial complexity of soccer today (DA ROCHA, 2011).

According to Freitas (2013, p.70), this archaic structure is extremely bloated, political and with major obstacles. Observing the structures of these teams, of Brazil's major league, one realizes that there are councils with 120 members, and may reach 3,000 councilors, and that in most of these councils, the people who are part of them are allocated to the positions by political choices, without any technical training to occupy these positions, and that hold deliberative, executive and advisory powers, which gives greater complexity to the decision-making process, transparency and accountability.

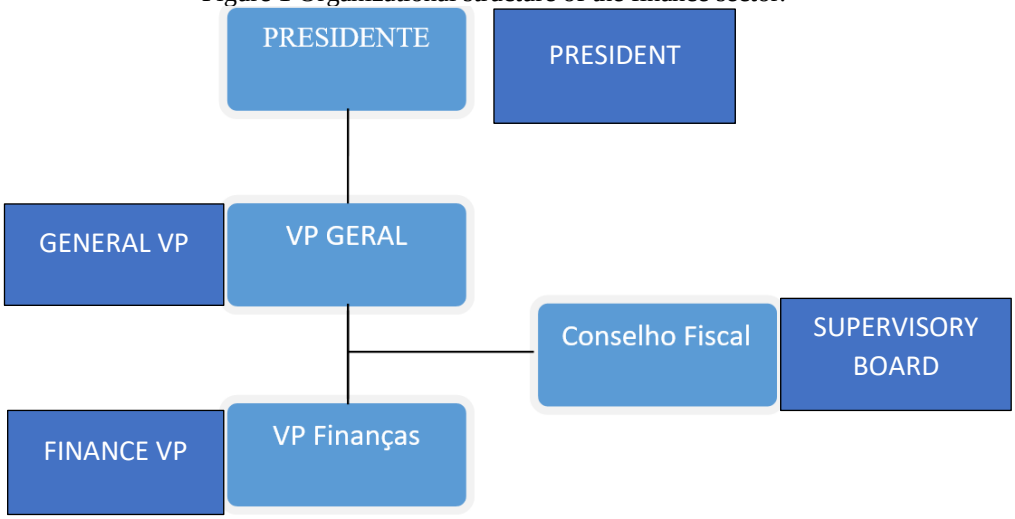
It is important to mention the structures of these councils, common in most clubs, such as Botafogo de Futebol e Regatas, Cruzeiro Esporte Clube, Sport Club Corinthians Paulista, and Sport Club Internacional:

a.) General Assembly,
b) Deliberative Council,
c) Fiscal Council;
d) Board of Directors;
e) Council of Grand Merits;
f) Administrative Board and
g) Board of Directors.

For Assis (2017), this confusing structuring of the councils, and with an unclear delimitation of the limits of the areas of action, especially in the administrative and fiscal sectors, are amplified with the creation of committees for advice. According to Freitas (2013), clubs can have 30 to 91 committees, if they

deem it necessary. This configuration makes the management structure overloaded and slow in decision-making, and is at odds with good management practices (see the IBGC Governance Code), available on the IBGC website.

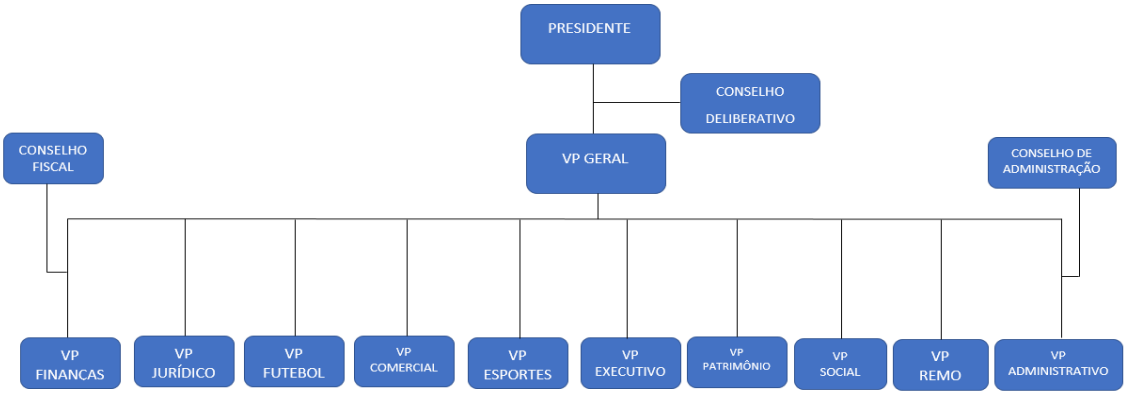
Figure 1 Organizational structure of the finance sector.



Source: Adapted from Botafogo de Futebol e Regatas website (2020).

Below, taking as an example what occurs with the Botafogo de Futebol e Regatas club, we have the representation of the organizational structure common to Brazilian soccer clubs, which is the structure of clubs as non-profit associations, with few variations. These variations are restricted to the voting model and the organization chart of the entity, subdivisions of the Vice and its directorships. Therefore, there are few variations to a statutory sport or amateur/olympic sport (Figure 2). Figure 2 represents the structuring and segmentation of the sectors of a club, managed by its vice-presidents, who are mostly selected by political affinity, and have no remuneration, because the club's statute does not allow it, as established in Law No. 12,868 of 2013.

Figure 2 Example of the organizational structure of Botafogo de Futebol e Regatas .

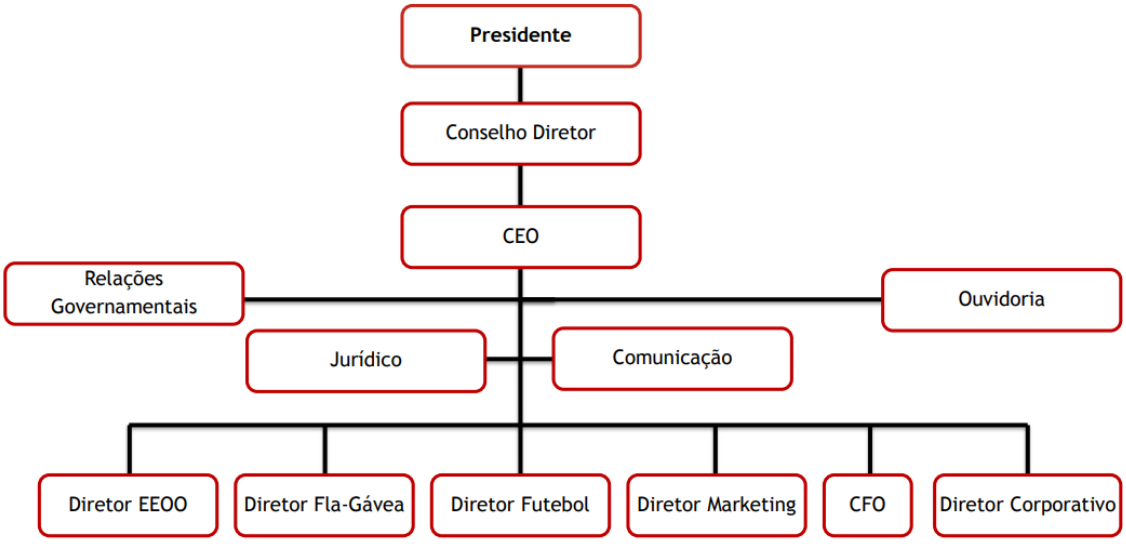


Source: Adapted from Botafogo de Futebol e Regatas' website (2020).

Still using the organizational structure (Figure 2), Botafogo de Futebol e Regatas segments its management into ten vice-presidents, which may be subdivided into directorates, due to the lack of technical knowledge of these vice-presidents, as the club's statute only allows for remuneration from this level on. Even though these segments have some technical experts, the decision-making power is concentrated in the vice-presidents, and sometimes they also suffer with direct and indirect decisions from the boards and commissions. It is important to point out that the entire governing body comes from the clubs' membership, by means of a vote, without evaluating the effective technical preparation for the function.

Using Figure 3, a hybrid structure is observed. In this structure, there is the function of CEO and elements of club-company, but it is submitted to the board of directors, the president of the club and legally classified as a non-profit association. Clube de Regatas do Flamengo is the only team to adopt this structure among the major teams in Brazil. It was modeled after the great reformulation period of the entity. Even though this model obtained positive results, it still shows a high political interference in its decisions, as it presents two political structures of intervention in the technical choices. However, this is the model that comes closest to a management model based on corporate governance.

Figure 3 Example of the organizational structure of Clube de Regatas do Flamengo.



Source: Adapted from the Clube de Regatas do Flamengo website (2020).

5 EUROPEAN MODEL OF SOCCER ENTITIES

According to the *Organization for Economic Cooperation and Development*, which establishes as principles of Corporate Governance, aiming at the adequacy of the economic part, in the same way as the business context, which establishes the macroeconomic measures, the level of competition in products, services and market aspects. The corporate governance structure also stands out according to industry laws, regulations, and the institutional environment. The OECD cites elements that have an impact on the

long-term recognition and success of corporate management, such as the social interests of communities, business ethics, and corporate environmental awareness. In general, corporate governance is a set of institutional economic and legal rules that can be modified through political measures, giving the possibility of security of external investments and a protection mechanism against expropriation. In addition, there are a series of mechanisms that impose compliance with disclosure laws and the evidencing of accounting, economic or financial information of the organization, which is the essential basis for corporate governance (RESENDE and FACURE, 2009).

In Europe, as explained above, the clubs have been practicing the professionalization of their management and this has led to good results. But it wasn't always like this. Until the 80's the European clubs lived with a recurrent evil, consisting in the administration by small political groups without training and constant violence from the fans. According to Dunning (2009), the violence practiced by fans, better known as "*hooligans*" was one of the biggest factors driving away fans in stadiums in Europe in the period from the 60s to the 80s. Reaching its peak in the Heysel tragedy in 1985 and the Hillsborough tragedy in 1989, the Heysel tragedy in the decision of the title between Liverpool Football Club and Juventus Football Club for the European Champions League, which caused the death of 39 people and more than 350 injured, the incident caused by Liverpool fans, as a result of which generated a ban for five years of English clubs in European competitions (MELCHOR, 2020). The Hillsborough tragedy, was the match for the semifinal of the FA Cup between Liverpool Football Club and Nottingham Forest Football Club, this tragedy caused the death of 96 people and more than 800 injured (BACK,2016).

From this fact on, a commission was created to investigate and take measures to guarantee the spectacles. As a result of this investigation the Taylor Report was generated, which proposed a series of measures were taken from the simplest of ticket sales through identity, police history of the supporter and even strict security protocols and disasters (LOPES,2017).

In the administrative field, professionalization measures were the insertion of the concept of profitability as a result of achievement, thus attracting economic agents to the sector. Consequently, as a legal measure, a series of general legislation was established at the European level, which regulates the management of entities with some specifics from country to country, thus establishing management concepts to ensure investors' investments (BECK, 2012).

According to ESPN (2019), due to the management and quality of the show presented by the *Premier League* (England's main soccer league), the league managed to capture 123 million pounds, only with television rights sales. The other leagues have raised: £56 million *La Liga* (Spain's top soccer league); £52 million *Serie A (*Italy's top soccer league); £52 million *Bundesliga* (Germany's top soccer league), and £27 million *Ligue 1* (France's top soccer league).

It results from these reports that English clubs have obtained great profitability compared to other clubs, even more expressive on the international scene, as will be shown in figure 4 below.

Figure 4 Ranking of European clubs made the highest profitability in 2019.

LUCRO DOS CLUBES EUROPEUS NO ANO DE 2019		
COLOCAÇÃO	CLUBE	LUCRO EM LIBRAS
1°	LIVERPOOL	152 MILHÕES
2°	MANCHERSTER CITY	151 MILHÕES
3°	CHELSEA	146 MILHÕES
4°	TOTTENHAM	145 MILHÕES
5°	MANCHERSTER UNITED	143 MILHÕES
6°	ARSENAL	142 MILHÕES
7°	BARCELONA	130 MILHÕES
8°	EVERTON	129 MILHÕES
9°	WOLVERHAMPTON	127 MILHÕES
10°	REAL MADRID	125 MILHÕES
11°	LEICESTER	123 MILHÕES
12°	WEST HAM	123 MILHÕES
13°	NEWCASTLE	120 MILHÕES
14°	CRYSTAL PALACE	114 MILHÕES
15°	WATFORD	114 MILHÕES
16°	BOURNEMOUTH	108 MILHÕES
17°	BURNLEY	107 MILHÕES
18°	BRIGHTON	106 MILHÕES
19°	SOUTHAMPTON	104 MILHÕES
20°	CARDIFF CITY	103 MILHÕES

Source: Adapted from sports news site ESPN (2020).

The European management model is broad, as it has several options for framing the corporate club, the most commonly used modalities being: joint stock companies, open capital, with shares allowed for trading on the stock exchange, or closed capital joint stock companies. With this, the clubs have easier access to financial resources and a light and competitive administrative structure. The framework varies according to the laws of each country, as explained below.

In Germany, there is no specific legislation on sports companies. Most clubs in Germany emerged in the traditional form as associations and there are many in this format, since the entities have management autonomy and differentiated taxation methods. Another highlight is that there is no prohibition for associations to engage in secondary commercial activities, but the financial return must be reverted to the entity's main activity. If the entity obtains profit through sponsorship, the product of this commercial activity must be passed on to an open company in order to be taxed.

Due to these changes, the German Football Association authorized, as of 1998, the transformation of the professional soccer department into companies. With this, the non-profit model that was the basis of the structure of German clubs underwent a major transformation. The Bundesliga, which is the main German league, accepted the transformations into autonomous entities, with professionalization. For better adaptation, three types were created for management: Limited Liability Company, Limited Joint Stock Company, and Joint Stock Company (FRANCO, 2019).

There was also the creation of the basic 50 +1 rule, which is a league clause, which states that in order to obtain a license to compete in the league, the Corporate Club, regardless of the three formats framed

above, must retain a majority of its voting rights. This rule is established as a way to ensure that the club members retain their majority control, this is a mechanism to safeguard against outside influence from investors. However this rule has an exception, when the club has been originated by a natural or legal person for a period of 20 continuous years, so that its control is carried out in a majority manner.

The rules and the format of application vary from country to country. In Germany the regulation establishes that more than 50% of the club's shares must belong to its associations, thus to ensure sovereignty in relation to the decisions taken, but as an alternative to this three companies created their teams: Bayer Leverkusen which belongs to the chemical and pharmaceutical company Bayer, Wolfsburg which belongs to the car manufacturer Volkswagen, and RB Leipzig which belongs to Red Bull. In England and Italy there is no such limitation, allowing the negotiation of 100% of the clubs' shares, which caused a large volume of investment in these two leagues, because large groups and even millionaires have invested massively in these clubs (TORRES, 2009).

In Italy, changes began to be made in 1981, when the first law on management in professional sports was passed. It was one of the first countries to deal with the subject, but only in 1996 did the Italian Soccer Federation decide to adopt a legal structure compatible with the context in which companies can operate. The Italian Federation decided to put an end to sports associations and to simultaneously convert them into a new legal entity, forming a company, as one of the main requirements to participate in the Italian championship (CAÚS, 2014).

Law no. 586/96 established the goal of profit for Club-Companies as the basic premise. With this, it allowed sports companies to operate in various segments of the sports practice, in a way that facilitated the performance and linkage of image and sale of services. In the following year, regulations were established for the performance of clubs on the stock market.

In Spain, in the year 1990, it was established the obligation that professional clubs participating in official national sports competitions should be incorporated into a sports corporation. Thus through Law 10/90 (Framework Law on Sports) this new legal norm came into effect. There is the exception of five clubs to this rule: Real Madrid Club de Fútbol, Futbol Club Barcelona, Club Atlético Osasuña, Granada Club de Fútbol and Athletic Club de Bilbao. For these teams obtained positive results in the 1985/86 season, and for this they had the option of choosing the management mode, according to the Additional Provision 7ª of the 1990 Law (TORRES, 2009).

The Spanish SAD model was consolidated in the Royal Decree 1251/99 that established some aspects: The shares could be traded on the stock exchange as of January 1, 2002; that the shares representing its capital will have to be ordinary shares and the minimum capital stock of these companies was set at 25% of the average charges of the clubs and companies participating in the competition. The league treats in a decentralized way and as a club's right the negotiation of the clubs' broadcasting rights, being up to the clubs to negotiate this (BATISTA, 2012).

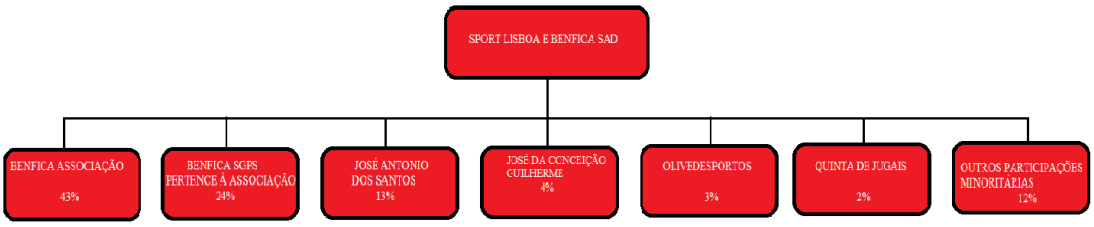
However, there are cases that require the authorization of the Superior Council of Sports for the acquisition of shares and there are situations in which this acquisition is totally forbidden, such as: SADs and clubs may not hold shares in other teams of the first and second Spanish division in the same sport; individuals or companies that hold voting rights, directly or indirectly, of 5% or more of a SAD may not own shares in another SAD in the same sport; and individuals who have a labor relationship in a SAD may not own 1% in another SAD.

In England, after the Taylor Report, which foresaw a series of modifications in the stadiums, the English Football Federation allowed clubs to sell their stadium shares in the market, and they became owners; it was a measure to finance the modifications. In England, there is no impediment to a club having a single owner.

The organizational structure of English sports entities is structured into four modalities: Association, widely used by amateur clubs, due to being simpler and cheaper; Limited Company, this model is used by clubs that do not intend to obtain a financial result. The members of this model cannot transfer their participation to a third party; Limited Joint Stock Company, a closed capital business model. Clubs that aim for profit adopt this model, it is the main model used in the country's main leagues; and Public Limited Company, is the model in which the shares can be freely traded to the public.

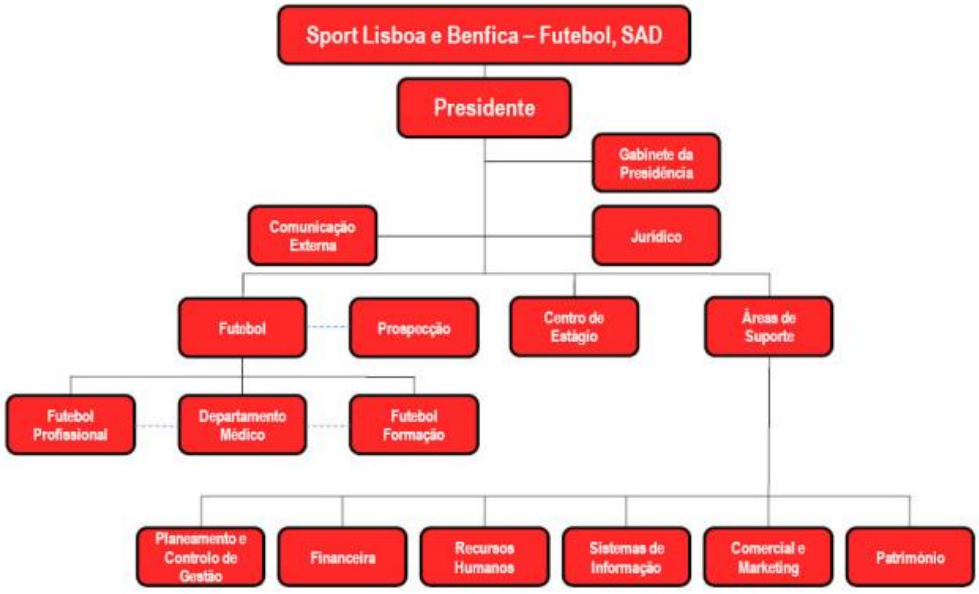
In Portugal, the legal model of Sports Corporations was adopted, by Decree-Law No. 10/13, which approximated the regime of sports business companies to that of corporations provided for in the Portuguese Commercial Code. The civil associations continued to be majority owners of the companies, but they started to sell stakes in the corporate structure of the clubs to entrepreneurs and other companies. This model brought greater supervision and reliability to the best managed clubs, with easier access to the market and obedience to the fiscal rules that frame companies. As a highlight we have Sport Lisboa e Benfica and its representation of the composition of the management group in Figure 4 and its organization structure in Figure 5 (COELHO, 2019).

Figure 5 Composition of Sport Lisboa e Benfica's management group.



Source: Benfica SAD (2020).

Figure 6 Sport Lisboa e Benfica's organizational structure.



Source: Benfica SAD (2020).

The *Union of European Football Associations* (UEFA), the federation responsible for managing competitions on the European continent. In 2011, it pioneered the implementation of a set of rules aimed at promoting economically responsible club management, better known as "Financial *Fair Play*". At first these rules were aimed at clubs with management problems, but with the influx of large revenues concentrated in specific clubs, the federation extended to large player transfers to ensure a more competitive league.

6 THE LEGAL MODEL OF SOCCER CLUBS IN BRAZIL

Here in Brazil, most of the soccer clubs are organized under the legal form of non-profit associations. As established in art. 53 of the Civil Code, associations "are constituted by the union of people who organize themselves for non-profit purposes. It can thus be observed that associations are not destined to profit, since the law expressly excludes the possibility of acting as economic agents, that is, having profit as their objective, even though they must be surplus, The difference between associations and companies is that the latter carry out an economic activity, which indicates that they seek profit by means of the exploitation of this activity. In the case of companies, whether simple or entrepreneurial, profit is the goal, whose achievement will give their partners a return on the capital invested in the business. When facing a company, the investors, always interested in a portion of the profits, are more interested in the management, whose professionalization is always required from those who are managing them, even because, in the case of entrepreneurial companies, bad management can lead them to bankruptcy (Law 11.101/2005).

If the soccer clubs were to obligatorily adopt the business model, especially the open corporation model, which is justified by the volume of capital they move, as seen above, they would have a professional

management and, most of all, they would be directly inspected by the CVM - Securities Commission (Law 6385/76), with autonomy to verify illegal acts practiced by managers of open joint stock companies (among others) with the application of penalties ranging from fines to temporary disqualification/prohibition (maximum of 20 years) to exercise the position of manager or fiscal council member of the company. These inspection procedures would give more transparency to the market and, more than anything, would generate value for the clubs, providing security to investors, including foreign investors, and sponsors.

By adopting the legal model of a business company, especially in the form of a corporation, its directors would be market professionals, recruited from among the best executives available. On the contrary, in the current structure, the management positions are held by club members, elected by the assembly, as provided by the statutes.

Another point to be considered would be the adaptation of these soccer clubs to the corporate governance system, in which the governance structure would be geared towards serving the interests of all stakeholders and this would impact on the attractiveness of sponsors, on the quality of the shows, on the approximation with university research centers, etc.

7 FINAL CONSIDERATIONS

Sports management in Brazil is stagnating in the model used in the 80's. As a result, the national soccer market has been losing attraction to investors. One of the major consequences of this is that young players are fleeing earlier and earlier, and the quality of the spectacle is declining. The Brazilian clubs that in past decades rivaled the great European clubs, today only manage to get some projection at a national level.

For there to be a positive change in this sad reality, CBF should stipulate fiscal and governance rules in order to make the transition from this archaic management model to the most modern and adequate model for the country's characteristics, which should reverse most of the current problems of the clubs. However, this change should start first in the qualification of the managers of these entities, removing the power of the "cartola", because this character holds political power and the directions of the sports institution that often prevent changes for fear of losing political power in the institution.

In order to have a more modern management system and without the interference of the folkloric figures of the "cartolas", the clubs should go through several changes, starting with the legal structure of association in business companies, primarily in joint stock companies, at least for those with the largest financial transactions.

This situation becomes clear when we analyze the financial situation of the major clubs in the country, on the verge of insolvency with little prospect of recovery in the long term, because their revenues are strangled by short-term debts and with old labor debt liens that could be enforced at any time. This is aggravated by political management, because this type of management is aimed at obtaining titles and satisfaction only for the fans.

If there is no change in this management model and or migration to the business partnership form, the Brazilian soccer scenario may worsen, especially in function of the impacts brought by the pandemic to the economy.

Comparing the changes operated in the European clubs with the Brazilian soccer scenario, it is possible to explain why such clubs, that initially did not have so many talents in their teams, managed to balance their accounts, hire new strikers and obtained large amounts of sponsorship and publicity money and an increase in capital from the moment many of them were able to put their shares up for negotiation in the stock market.

REFERENCES

Agência Brasil. Informação sobre a prática de esporte no Brasil; Disponível em: <https://agenciabrasil.ebc.com.br/pesquisa-e-inovacao/noticia/2017-05/ibge-100-milhoes-de-pessoas-nao-praticam-esporte-no-brasil>. Acesso em: 1º maio 2020.

AZEVÊDO, Paulo Henrique. O Esporte como Negócio: uma visão sobre a gestão do esporte nos dias atuais. Revista EVS-Revista de Ciências Ambientais e Saúde, v. 36, n. 5, p. 929-939, 2009.

BATISTA, Carlos Vítor Silva. Cláusulas de rescisão no contrato de trabalho desportivo. 2012.

BECK, Matheus Passos. Estádios pós-modernos para um futebol hiper-real: análise comparativa das arenas para a Copa do Mundo de 2014. 2012.

BECK, Matheus Passos. A hiper-real verdade: três discursos do the sun pós-desastre de hillsborough 27 the hyper-real truth: three discourses of the sun post-hillsboroughs disaster. 08 a 10 de setembro de 2016, p. 35.

BENIN, Maicon Manoel; DIEHL, Carlos Alberto; FIGUEIRA-MARQUEZAN, Luiz Henrique. Determinantes da evidenciação de indicadores não financeiros de desempenho por clubes brasileiros de futebol. Estudios Gerenciales, v. 35, n. 150, p. 16-26, 2019.

Botafogo Futebol e Regatas. Estrutura Organizacional do Clube Botafogo de Futebol e Regatas; Disponível em: < https://www.botafogo.com.br/conselho_diretor.php?
cat=oclube>. Acesso em: 1º maio 2020.

CAPINUSSÚ, J. M. Administração Desportiva Moderna. São Paulo, Editora Ibrasa, 2002

CAÚS, Cristiano. Direito aplicado à gestão do esporte. Trevisan Editora, 2014.

CARDOSO, Eliana. Da inércia à megainflação: o Brasil nos anos 80. Pesquisa e Planejamento Econômico, v. 21, n. 1, 1991.

Confederação Brasileira de Futebol. História da institucional da Confederação Brasileira de Futebol (CBF). Disponível em: <https://www.cbf.com.br/a-cbf/institucional/index/a-cbf>. Acesso em: 09 mar. 2020.

Confederação Brasileira de Futebol. Informações do setor do futebol; Disponível em: <https://www.cbf.com.br/a-cbf/informes/index/cbf-apresenta-relatorio-sobre-papel-do-futebol-na-economia-do-brasil>. Acesso em: 09 mar. 2020.

CAMPAGNONE, Vinicius Gonçalves. Legislação no futebol profissional do Brasil: da Lei do Passe aos agentes. Trabalho de Conclusão de Curso (Graduação em Educação Física) –Faculdade de Educação Física, Universidade Estadual de Campinas, 2009.

CASTELLANI, L. O Estado brasileiro e os Direitos Sociais: o esporte. In: Estado, política e emancipação humana: lazer, educação, esporte e saúde como direitos sociais. Santo André, SP: Alpharrabio, 2008.

COELHO, Ari Bruno Brito et al. A reestruturação jurídica das entidades de prática desportiva do futebol brasileiro. 2019.

Clube de Regatas do Flamengo. Estrutura Organizacional do Clube de Regatas do Flamengo; Disponível em: < https://www.flamengo.com.br/transparencia/organograma>. Acesso em: 06 junho 2020.

DA ROCHA, Cláudio Miranda; DA CUNHA BASTOS, Flávia. Gestão do esporte: definindo a área. Revista Brasileira de Educação Física e Esporte, v. 25, p. 91-103, 2011.

DA SILVA DANTAS, Marke Geisy; BOENTE, Diego Rodrigues. A eficiência financeira e esportiva dos maiores clubes de futebol europeus utilizando a análise envoltória de dados. Revista de Contabilidade e Organizações, v. 5, n. 13, p. 75-90, 2011.

DA SILVA DANTAS, Marke Geisy; MACHADO, Márcio André Veras; DA SILVA MACEDO, Marcelo Alvaro. Fatores determinantes da eficiência dos clubes de futebol do Brasil. Advances in Scientific and Applied Accounting, v. 8, n. 1, p. 113-132, 2015.

DA SILVA, Cristiano Moreira; SILVA, Dayson Mansur Irffi; RODRIGUES, Diva de Souza Silva; SOUZA, Jordana de Castro; SILVIA, Leilane Ribeiro. O impacto do profut nas ações financeiras dos clubes sócio esportivos: um estudo de caso da gestão empresarial aplicada ao futebol mineiro/The impact of profut on the financial shares of the sportive partnership clubs: a business case study applied to soccer in Minas Gerais. Brazilian Journal of Development, v. 5, n. 2, p. 1219-1237, 2019.

DE ALENCAR SILVA, Doutora Roselene Cássia. Desporto e Inclusão Social, Estudo da Fundação de Apoio ao Cidadão e Mobilização Social (FAMFS), Feira de Santana, Bahia – Brasil, 2016.

DO NASCIMENTO, Christiane Larissa Duarte; DA SILVA DANTAS, Marke Geisy; AZEVEDO, Yuri Gomes Paiva. A Influência dos Fatores Financeiros e Esportivos Sobre o Valor dos Clubes de Futebol Brasileiros. Revista Evidenciação Contábil & Finanças, v. 7, n. 1, p. 94-111, 2019.

DOS SANTOS, Raidan Iago. Desempenhos econômico e financeiro dos clubes de futebol participantes dos campeonatos brasileiros das séries a, b e c no ano de 2017. CAFI-Contabilidade, Atuária, Finanças & Informação, v. 3, n. 1, p. 67-82, 2020.

DUNNING, Eric. Hooliganismo no futebol como um fenómeno europeu e mundial. Estudos de Sociologia, v. 2, n. 14, p. 43-73, 2009.

Entertainment and Sports Programming Network (ESPN). Informação sobre a lucratividade dos clubes europeus; Disponível em: <https://www.espn.com.br/futebol/artigo/_/id/6050124/com-premier-league-em-peso-veja-o-ranking-dos-20-clubes-que-mais-faturam-com-tv-na-europa>. Acesso em: 10 out. 2020.

FRANCO, Diogo Botelho; DETONI, Maurício Paraboni. A evolução do regramento jurídico-despotivo e a sua influência no letárgico processo de moralização do futebol brasileiro–perspectivas para o futuro, 2019.

GALLINDO, André; ZIRPOLI, Cassio. 1987: de fato, de direito e de cabeça. Editora: Onze Cultural, 2016.

Instituto Brasileiro de Governança Corporativa (IBGC). Conhecimento de governança corporativa. < https://www.ibgc.org.br/conhecimento/governanca-corporativa> Acesso em: 19 maio 2020.

JÚNIOR, Daniel Luiz Igrejas Andrade; FERREIRA, Hugo Lucindo; PIVA, Thais Azzolini. Influência do Desempenho Esportivo e da Adesão ao Profut no Nível de Endividamento de Clubes de Futebol no Brasil. USP, 2019.

MELCHOR-CHÁVEZ, Pedro et al. El futbol y la seguridad social, caso “Las tragedias de los estadios Hillsborough y Heysel”. XIKUA Boletín Científico de la Escuela Superior de Tlahuelilpan, v. 8, n. 15, p. 36-43, 2020.

MENDES, Gilmar Ferreira. Tendências e expectativas do Direito Desportivo. In: Direito Desportivo. Campinas: Ed. Mizuno, 2000

Ministério Público de Minas Gerais. Consulta ao processo contra o Cruzeiro Esporte Clube; Disponível em: <https://www.mpmg.mp.br/main.jsp?lumPageId=8A9 1CFAA4D1CDE88014D20C1055831BE&lumI=portalmpmg.service.Consultaprocessual.interessadoList &itemId=9092398>. Acesso em: 16 junho 2020

LOPES, Felipe Tavares Paes; DOS REIS, Heloísa Helena Baldy. Ideologia, futebol e violência: uma análise do relatório “Preservar o Espetáculo, Garantindo a Segurança e o Direito à Cidadania”. Arquivos Brasileiros de Psicologia, v. 69, n. 3, p. 36-51, 2017.

PARADEL, Israel Moreira. Dívidas tributárias dos clubes de futebol: breves considerações. Revista tributária e de finanças públicas, v. 131, 12-14, 2016.

REZENDE, Amaury J.; FACURE, Carlos EF; DALMÁCIO, Flávia Z. Práticas de governança corporativa em organizações sem fins lucrativos. In: Congresso USP de Controladoria e Contabilidade. 2009. p. 2009.

SILVA, Cláudio Vicente Di Gioia Ferreira; CAMPOS FILHO, Luiz Alberto Nascimento. Gestão de clubes de futebol brasileiros: fontes alternativas de receita. Sistemas & Gestão, v. 1, n. 3, p. 195-209, 2009.

SILVA, Edson Cordeiro da. Governança corporativa nas empresas. São Paulo: Atlas, 2006.

TUBINO, Manoel José Gomes. 500 anos de legislação esportiva brasileira: do Brasil Colônia ao início do século XXI. Rio de Janeiro: Shape, 2002

Grupo Globo de Comunicação. Problemas dentro e fora do campo que levaram o Cruzeiro Esporte Clube para série b do brasileiro; Disponível em: <https://globoesporte.globo.com/futebol/times/cruzeiro/noticia/da-administracao-ao-campo-o-conjunto-de-problemas-que-levou-o-cruzeiro-a-serie-b-do-brasileiro.ghtml> Acesso em: 15 fev. 2021.

Grupo Globo de Comunicação. Planos para a redução da divída do clube; Disponível em: <https://globoesporte.globo.com/futebol/times/cruzeiro/noticia/no-1o-semestre-presidente-do-cruzeiro-preve-queda-da-divida-para-r-800-milhoes-e-ordens-de-pagamento-na-fifa.ghtml> Acesso em: 17 fev. 2021.

Super Esporte. O banco analisa a situação financeira do Cruzeiro Esporte Clube; Disponível em:<https://www.mg.superesportes.com.br/app/noticias/futebol/cruzeiro/2020/07/28/noticia_cruzeiro,3856473/banco-itau-bba-analisa-situacao-financeira-do-cruzeiro.shtml> Acesso em: 17 fev. 2021.

CHAPTER 28

Imaginary and representation in amazonian literature: inferno verde and the conditions for teaching regional literature

10.56238/rsfohsv1-028

Antonio Marcelo Tavares Birimba
Master in Teaching Humanities and Languages at Universidade Federal do Acre – UFAC

ABSTRACT
Therefore, readings and passages from several short stories from Alberto Rangel's Inferno de Verde were selected, demonstrating how the process of creating an imaginary develops within them through certain particularities. The main objective then becomes the pedagogical direction in the classroom of a classic text that tells us of a very different reality of survival for students in Amazonian cities today. As we try to make the student aware of the importance of traveling in time, through images, we will try to dive into the roots and origins of the riverside people; the basis of a good part of the existence of a universe always rich in creative suggestibility. The images recreated from the clash of cultures to form a new civilization in the Amazon at the beginning of the 20th century, characterized by means of the chaining disposition of the tales, will produce a new challenge to the teacher of Portuguese language and literature in order to awaken the interest of a student who is always recalcitrant as to the contact with the expressions of regional letters. This didactic-pedagogical relationship in the classroom gives rise to a sharing of mutable limits from side to side, provoked by images that will lead to very current discussions regarding the Amazon in the contemporary scenario.

Keywords: imaginary. civilization and jungle. teaching challenges.

1 INTRODUCTION

The dreams that have lived in a soul live on in his works...
Gaston Bachelard

The reading of the fictional literary text, in an attentive way, promotes the perception of a reading that involves the plot, with the characters, contextualizing space and time, while perceiving the construction of language point by point; in this case, through the Bachelardian perspective, it sensitizes the involvement of the attentive reader to dive into the empty spaces that are filled by the oneiric reverie of the imaginary. In this way, the sensibility that allows us to go through the abstraction of silence involves the pleasure and delight of diving into the poetic images, revealing the dialectical levels of distancing and approximation that an improved reading, through the perception of symbology, can bring about through the stages of gain in reading.

The enjoyment of literary reading also depends on the way the text is organized and structured; to escape from the hegemonic weaving of the referential function, this is the great initial challenge. The revealing apprehension of the literary text requires skills and knowledge to be developed by readers in order to unveil the challenging repertoire of difficulties in the interpretative process. The correct path to be taken is closely linked to the teacher's qualification, who must seek new ways to redefine his methodology of

knowledge, through the interpretation of the symbolic elements that make up the text, always as a challenge in the construction of the reading path and of the student-reader himself, in the classroom.

This relationship must be reciprocal, between teacher/student, school community, or between proponent/attentive reader, because the student needs to walk a path in the constant search to feed his self-knowledge and the deepest desire to continue finding in literature the food for his questions, through moments of identification of his past in order to understand his present, now, contaminated by re-significations or by his perplexities that may lead him to a future.

The systematic use of textbooks is nowadays perceived, in accordance with the experiences I have had during my teaching career, routinely in the classroom with public high school students, where they treat literature in a systematic way, as a simple playful artifact or illustrative of historical contexts, without exploring the true life that comes from the text, without exploring the very power of expression of language. Many of them bring aspects of regional literature as clippings, summarized and insignificant to the most sensitive learning. This didactic perspective is very far from offering symbolic and fictional elements as enriching instruments that elevate the soul, purify knowledge, in the sense of modifying conducts, behaviors, and making the individual re-signify his life and his being through attentive reading, or by providing new experiences through the text itself. For me, the act of reading is a way to revive the conditions of use of the literary text in a broader and more challenging sense.

Depending on the perceptive level of the attentive reader, the text, which does not sharpen the reverie, loses its abstract character and the ability to go beyond superficiality, creating immobilizing barriers of one's own imaginary, because it does not allow a vision in a sharper interpretative and provocative perspective of sensitive reality. This brings us to the big question that permeates the teaching challenge in the classroom at this beginning: would it be possible to work with a classic text for high school students to the point of provoking new interests between the elaborated language and the load of sensitive experiences that they already carry?

From the Bachelardian perspective, in accordance with the reality of the students and the reading experiences they bring with them, the idea is to go far beyond the books themselves and the written texts. In other words, the question posed would be to establish parameters to know how the reader has been prepared throughout his or her high school years. Even if these questions are not favorable to them, there is still time to resensitize them in High School itself, because they are subjects in formation, who bring a great internal potential from their intimate life because of their years of experience. Bachelard intermediates the explanation regarding the simplicity and ingenuity of the emergence of a poetic image, establishing a differentiation between soul and spirit. In his conception, creation proceeds from the feelings of the soul. He understands that resonance becomes the moment of ecstasy in the reception of the poetic image when it reaches the depths of our being.

Memory, in this case, is configured as the temporal theater, in which the space, or the scenery of memories, keeps the characters in their role. He warns that the house is the privileged receptacle of

memories. To this end, he refers to the house's primary function as a protective space and explains that, in the memories, reality and reverie merge. However, one realizes that the particularities of the spaces of the house relate to the refuges of memory and imagination.

> It is thanks to the house that a great number of our memories are stored; and when the house gets a little complicated it has a basement and an attic, corners and corridors, our memories have increasingly well-characterized refuges. To them we return all our lives in our daydreams. [...] Sometimes we believe we know ourselves in time, while we know only a series of fixations in the spaces of stability of being, of a being that does not want to pass through time; that in the past itself, when it goes in search of lost time, wants to "suspend" the flight of time. In its thousand alveoli, space retains compressed time. This is the function of space (BACHELARD, 1993, p. 199)

Thus, great images have both a history and a prehistory at the core of each subject. One never experiences the image in early childhood. Every great image has an unfathomable dreamlike background, and on it, the personal past puts particular colors. Only those who see a certain sensitive experience of life can contemplate and revere, in its essence, an image by discovering its roots beyond the factual history fixed in memory, which can be reworked. For the author, the attentive reader when in contact with a poem cannot visualize the image of the space lived by the author, but will relive his own space lived in the past, through the phenomenon of repercussion.

For Bachelard (1993, p. 200), "life begins well, because it begins protected, closed, sheltered inside the house however humble it may be; it encompasses the conscious and the unconscious, because this maternal space reigns inside the being and the being of the interior." According to the philosopher of the poetry of matter, in the realm of absolute imagination, we are young too late. For him, it is necessary to lose the earthly paradise to live it in the reality of its images, in the absolute sublimation[1] that transcends any passion. Poetry gives us the nostalgia of the expressions of youth, no doubt. It offers us images as we should have imagined them in the initial impulse, even in childhood.

Bachelard (1993) understands that space, images, and the sensitive are our interpretative key, the one that opens the investigation and guides us through the rooms, as it brings, concomitantly, intimacy and invites us, also, to leave the house and reach the immensity of space, or the sensitive forces of the landscape, like the air and the wind, or the sweet water of the singing stream, for example. All this trickery puts us in the condition of potential inhabitants in the poetic space. The word of a poet, for Bachelard, shakes deep layers in our being, and in this same vein we could say that the spaces he encounters shake the deep layers of his words, like a threshold of onirism, in which neither the place nor the poet are the same anymore: they become a being to which something has been added.

The trip, thus, is an invitation to daydream, an invitation to feel the aroma of other winds, the flavors or discomforts that are offered in the place. The house (tapiri) is the resting place of the caboclo. As it is also configured in the dwelling of the rubber tapper (the northeasterner in Rangel's prose) who infiltrates

[1] Superior capacity for self-knowledge in Bachelardian language.

the forest, where the limit permeates the dimension between heaven and earth; the imagination imagines and connects itself to the space and landscape, for it is an imaginary source, or a mythographic horizon in the articulated consciousness of images and the convergence between sensibility, memory, and imagination.

The spatiality is given from the body that evokes images through the reader's sensibility, which instigates the memorial dimension of space, constitutive of the being that inhabits it. The house is inside the being, just as the being is inside the house, for this is the essential feature of the intimate space that irrigates Bachelard's thought, since it is a spatiality generated from sensations and unknown feelings. Every house is a house of time and, in this way, every house is the house of poetry, which the thinker called a *happy space*.

For him, without the house, man would be a dispersed being: the images of the house exemplify his gregarious postulate in the world and are at the same time a becoming of expression and also a becoming of our being. Before being thrown into the world, man is placed in the cradle of the house. "We inhabit our living space according to the dialectics of life, as we root ourselves, day by day, in a corner of the world [...] the house is our corner of the world." (BACHELARD, 1993, p. 200)

The house is part of the poetry of being, of the poetry of space. In the house, we are poets, and from it, we have the most precious asset, since it shelters the daydream and protects the dreamer, and allows him to dream; it is the locus of daydreaming. We have the starting point through a deep reflection about the imagetic representativeness that the house represents: "... every corner of a house, every angle of a room, every reduced space where we like to hide, to talk to ourselves, is, for the imagination, a solitude, that is, the germ of a room, the germ of a house" (BACHELARD, 1993, p. 286)

To retire into one's corner seems to be a poor expression, but it gains strength, because the act of retiring evokes numerous images, which may come from an antiquity, or from a psychologically primitive sensibility. The song keeps us safe. It is the certainty of the place that is close to my immobility. An imaginary corner/apostment is built around our body, which gives us the feeling of being well hidden when we take refuge in a corner.

On the path of daydreaming of the immensity, the real product is the expanding consciousness. The immensity is in us. Trapped in a kind of expansion of being that life curbs, that prudence holds back, but that returns again to solitude. The immensity is the movement of the immobile man: "The forest, above all, with the mystery of its space indefinitely prolonged beyond the curtain of its trunks and leaves, a space veiled to the eye but transparent to action, is a true psychological transcendent. (BACHELARD, 1993, p. 317) The thinker here not only describes, he knows that his task is greater. The godly and fallow forest, closed and "encipoed," accumulates in itself its infinity. He refers to the symphony of an eternal wind that lodges in the movement of the treetops. The peace of the forest is for him a peace of the soul, a state of the soul.

In such reveries, which dominate man, and in his silence he meditates, some details are perceived to fade, or the glittering loses its shine, or the picturesque loses its color, or the hour no longer sounds, and

then space loses its limit. We might name such reveries as reveries of the infinite through the images of the deep forest. Here we confront the man who meditates before an endless universe. In this context, we would evoke a singular complex, where the pride of seeing is the core of the consciousness of the being who meditates, who contemplates.

One realizes that immensity is an inexhaustible poetic theme. The soul finds in the object the nest of immensity. When we become hypersensitive to the word *vast* we will see that it is an accession of blissful breadth. Here we differ the meaning of immensity from vast, though semantically it means a sense of greatness, the former would embrace the supreme synthesis; a strategic difference that exists between the discursive steps of the spirit and the powers of the soul; the lyric soul makes vast throws as syntheses; the soul then finds its synthetic being; it brings together the opposites. Immensity is an intensity of being, intensity of a being that reveals itself in a vast perspective of intimate immensity**.**

In the Bachelardian perspective, (BACHELARD, 2013, p. 13) "ontologically, water in its essence is pure. It symbolizes life and death. The human being, like the waters of the river, dies every instant. The literary image of water reveals an imaginary determinism."

But if we can convince our reader that beneath the superficial images of water there is a series of deeper and deeper, more and more tenacious images, he will soon feel, in his own contemplations, a sympathy for this deepening; he will feel opening up, beneath the imagination of forms, the imagination of substances. He will recognize in water, in the substance of water, a kind of intimacy, an intimacy quite different from those which the depths of fire or stone suggest. It will recognize that water's material imagination is a particular kind of imagination. Strengthened by this knowledge of a depth in a material element, the reader will understand, at last, that water is also a kind of destiny, no longer just the vain destiny of fleeting images, the vain destiny of an unending dream, but an essential destiny that ceaselessly metamorphoses the substance of being. So the reader more sympathetically, more painfully, one of the characteristics of heraclitism. We do not bathe twice in the same river, because, already in its depth, the human being has the destiny of the flowing water.

> Water is really the transitional element. It is the essential metamorphosis between fire and earth. The being consecrated to water is a being in vertigo. It dies every minute, something of its substance constantly crumbles. Everyday death is the death of water. Water always flows, water always falls, it always ends in its horizontal death.... " (BACHELARD, 2013, p. 13)

As life is a dream within a dream, so the universe is a reflection within a reflection; the universe is an absolute image. The water is its limpidity, it is an inverted sky in which the stars acquire a new life. Thus, in this contemplation by the water, he forms a strange double concept of a star-island, liquid star prisoner of the lake, of a star that would be an island of the sky. Both the island and the lake are the junction points of the dream that, through them, changes register, changes matter. In this articulation, water takes on the sky. The dream gives water the sense of the most distant homeland, a celestial homeland. Thus,

water, through its reflections, duplicates the world, duplicates things. It also duplicates the dreamer, not simply as a vain image, but involving him in a new oneiric experience.

The reader would feel, finally, physically, the invitation to a trip, because he would also be involved by a delicious sensation of strangeness. In front of the deep water, "[...] you choose your vision; you can see at will the still bottom or the current, the shore or the infinite; you have the ambiguous right to see and not to see; you have the right to live like a new race of laborious fairies, endowed with perfect taste, magnificent and thorough." (BACHELARD, 2018, p. 53)

We understand that water is the true material support of death, or, by a perfectly natural inversion in the psychology of the unconscious, thus the deep sense, for the material imagination marked by water, death is the universal hydra. In this context, still waters evoke the dead because dead waters are sleeping waters. From the bias of the psychology of the unconscious of matter, we understand that the dead, when they are among the living, are sleeping people. They are resting. After the funeral, they are absent persons, that is, they are more hidden, more covered, more asleep. They only awaken when our sleep, deeper than the memories, reencounters the missing, in the homeland of the night, in the contact with the phenomena. Some sleep in rivers, others in green creeks, others on the gray, slippery, stinking mud of swamps.

This is why water is the material of beautiful and faithful death. Only water can sleep while retaining its beauty; only water can die, motionless, while retaining its reflections. Reflecting the face of the dreamer faithful to the great memory, water gives all shadows and makes all memories revive. It is in this frenetic fruition of evocation that is born the kind of delegated and recurrent narcissism that gives beauty to everyone we once loved. Man relives his past in which every image is for him a memory of material sensation.

It is important to note that water carries within it so many essences. It is imbued with all colors, all tastes, all smells. It is understood, then, that the phenomenon of the dissolution of solids in water is one of the main phenomena of this naive chemistry that continues to be the chemistry of common sense and that, with a little bit of dreaming, is the chemistry of poets, of fictionalists sensitive to the flavor of the matter-phenomenon.

When we daydream about the combinations of imaginary elements, some mixtures of elements with water intervene in our refined sensibility: the successive union of water and fire, of water and night, above all, or of water and earth. In this way, we perceive the combination in which the reverie of form and matter suggests the most eloquent themes of the creative imagination.

When we examine the images suggested by alcohol, an inflammable and strange matter, when it covers itself in flames, to accept a phenomenon contrary to its own substance is to cause great strangeness. When alcohol burns on a party night, it seems that the matter has gone mad, it seems that the water that represents the feminine soul has lost its modesty and surrenders, deliriously, to its master, fire.

For Bachelard, "it is not surprising that certain souls cluster around this exceptional image of multiple impressions, contrary feelings, and that under this symbol a true complex is formed."

(BACHELARD, 2018, p. 100) This complex known in psychological studies as Hoffmann's complex[2] , the symbol of the punch[3] , appears in tales narrated by fantastic storytellers. Thus, it comprises all allegory of feelings that sometimes separate, mix, confuse. Vibrant images that recall the tender adventures of childhood, in the realm of imaginary fantasies. Copious fantasies of the northeastern immigrants who came in search of Eldorado in this Amazon region, which will be analyzed a *posteriori* through the imagetic impact of Rangelian imagery.

It is possible to understand that certain individuals make use of this artifice to explain the foolishness of their beliefs, which provoke the importance of their role in the unconscious. Thus, the author does not hesitate to say that "water that is kept for a long time becomes a spirituous liquor, lighter than other waters, and can almost be lit like brandy. [...] ...to those who scoff at this good bottle of aged water, this water which, like a good wine, attains the Bergsonian duration[4] " (BACHELARD, 2018, p. 101) It is worth noting that aguardente became a precious liquid in the lives of the northeastern migrants, who immersed themselves in this unknown region, and found in the effect of this drink the courage to face the unknown, the mysteries of the forest, and the dream of wealth.

In the Bachelardian perspective, water is a burned body, it is the culmination of vital experience. To such an imagination, water alone, isolated, pure water is nothing but an extinguished punch, a widow, a ruined substance. It will take a burning image to revive it, to make a flame dance again on its mirror, so that one can say: "...your image burns the water of the slender channel. [...] The water is a wet flame." (BACHELARD, 2018, p. 102)

At the heart of the contraries, we find the perfect marriage of reverie in which water puts out fire, woman puts out ardor. Thus, we can say that water and fire provide perhaps the only really substantial contradiction. If logically one evokes the other, sexually one desires the other. Like dreaming of greater genitors than water and fire. "Appearing among the waters, the blazing Agni[5] grows, rising above the churning flames and spreading its glory; heaven and earth are alarmed when the radiant Agni comes to birth. [...] Associated with the firmament in the firmament with the waters, he assumes an excellent and radiant form; the sage, support of all things, sweeps the rain fountain." (BACHELARD, 2018, p. 103) Very strong image that is glimpsed to the viewer's delight as they observe the infinite sea. The image of the sun with the river will give itself in an atmospheric fusion of less intensity, but does not lose its vibrant eloquence. The Juruá River expresses with all its vigor a great natural spectacle, when one sees in its fullness the magic of the sunrise or sunset on its banks.

[2] Exceptional image of multiple impressions, contrary feelings.
[3] It is the term used to define a wide variety of beverages, both alcoholic and non-alcoholic, most often containing fruit juice.
[4] Bergson, a French philosopher who considers intuition as a superior instinct capable of allowing knowledge from the character of time as merely spatial duration.
[5] He is a Hindu deity. The word agni is Sanskrit for "fire" (name), with the same origin as Latin ignis. In Hinduism, he is a deva, second in power and importance ascribed in Vedic mythology, only surpassed by Indra.

The image of the sun coming out of the sea is a dominant objective image. The sun is the Red Swan. In this sense, imagination necessarily moves from the cosmos to the microcosm. It alternately projects the small onto the large and vice versa. The sun is the magnificent husband of water. It is necessary that in the dimension of libation water "surrenders" to fire, that fire "takes" water. Metaphorically, the bodies are scorched on the nocturnal path, and everything around them drips with fire. This is how love, the principle of things, reigns:

> Night, by the lake, brings a specific fear, a kind of damp fear that penetrates the dreamer and makes him shiver. Alone the water would give clearer obsessions. Water in the night gives a penetrating fear. But when the night spread its mantle over the place, as over everything else, and the mystical wind came to murmur its music, then, oh! Then I always awoke to the terror of the isolated lake.(BACHELARD, 2018, p. 107)

If the fear near the lake at night is a special fear, it is certainly a fear that preserves a certain horizon. Which is different from fear in the forest, because the riverside man needs to face the mysteries of the night, on the banks of the rivers, in the ravines of the streams. The shadows on the water are, in a way, more mobile than the shadows on the land, where he needs to penetrate the forest to extract latex. These are images, among others, that we will analyze in the next chapter. The invitation is to remain attentive to the traps that the imagetic unconscious will provide you with. It is through the activity of water that the first reverie of the worker who kneads begins. Thus, it is not surprising that water is dreamed in an active ambivalence. There is no reverie without ambivalence, no ambivalence without reverie.

The sea is, for all men, one of the greatest challenges of imaginary penetration; one of the most constant maternal symbols. The sea sings a deep song for them. This deep song is the maternal voice, the voice of our mother. Because something of us, of our unconscious memories, finds a way to reincarnate. Since filial love is the first active principle of the projection of images, it is also the driving force of imagination, an inexhaustible force that takes hold of all images to place them in the maternal perspective. The adventure of the sea led men to penetrate the hinterlands of the Amazon, through its caudal rivers, also by means of an insatiable imaginary of symbols of origin:

> The more a feeling of love and sympathy is metaphorical, the more it needs to draw strength from the fundamental feeling. Under these conditions, to love an image is always to illustrate a love; to love an image is to find without knowing it a new metaphoric for an old love. To love the infinite universe is to give a material sense, an objective sense to the infinity of love for a mother. To love a lonely landscape, when we are abandoned by all, is to compensate a painful absence, is to remember the one who does not abandon... When we love a reality with all our soul, it is because that reality is already a soul, it is because that reality is a memory.(BACHELARD, 2018, p. 120)

Then we can go further in our search in the unconscious itself, for we must say that all water is a milk. More exactly, every happy drink is a mother's milk. Just like the dream of the northeasterner to extract from the veins of the rubber tree the milk of his dream, the enrichment of the arduous, daily trajectory.

The dream has a pivotal root that descends into the great infantile unconscious of primitive life. However, water is a milk when it is sung with fervor, when the feeling of adoration for the motherhood of the waters is passionate and sincere.

For Bachelard, there are dreamers of murky water who are amazed by the black water of the pit, water that shows veins in its substances, that causes, by itself, a whirlpool of mud. From this angle, one can see that it is the water that dreams and covers itself with nightmarish vegetation. It is important to point out that this oneiric vegetation is already caused by daydreaming in the contemplation of aquatic plants. In this context, for certain souls, the flora of the waters is a true exoticism, a temptation to dream of a somewhere, far from flowers, far from the sun, far from limpid life.

In many impure dreams, ancient reminiscences blossom in the water that shows itself heavily on the water itself, like the thick flattened hand of water lily[6] . Many impure dreams the sleeping man feels circulating in himself, around himself, black and muddy currents, Stiges[7] of heavy waves, laden with evil. And our heart is stirred by this dynamic of the black. And our sleeping gaze follows indefinitely, black after black, this becoming of blackness.

Bachelard is amazed at the Manichaeism of pure and impure water. For him, there is no balanced Manichaeism, because the scales tip more to the side of pure water. He examined in the folklore of water, as he was amazed by the few names of cursed springs: "The devil is rarely in connection with springs, and very few bear his name, while a great number of them are named after a saint and many after a fairy." (BACHELARD, 2018, p. 146)

Tears are sources of human waters that express feelings. In tearful reverie, we find the artificial tears, more external, less sad. They are not feminine tears. The tears of the fighting walker are not of the order of sorrows, they are of the order of anger, which highlight the anger of the storm.

The walker, who in his pure gait, like pure poetry, impresses greatly by the will to power. This can only happen in the discursive state. The great shy ones are great walkers; they win symbolic victories with each step; they compensate for their shyness with each stone. Away from cities, away from women, they seek the solitude of the summits:

> To the sea it nourished, to the green and skimpy Spot, my heart is more solidly bound than to anything else in the world; it lays bare for me a generous breast, intones for me the most solemn song of love, commands for me to spread to it more generously the brightness of its light, and makes sound for me the impetuous trumpet whose tones are so sweet to me.(BACHELARD, 2018, p. 171)

Thus, we can understand that water is the mistress of fluid language, of language without brusqueness[8] , of continued language, of language that slows the pace, of language that softens the heart.

[6] A genus of aquatic plants, of the nymphaea family, widely used as ornamentals in large water containers for their white, red, or yellow flowers; nymphaea.
[7] In Greek mythology, she is a nymph and also a hellish river in Hades dedicated to her.
[8] It means incoherent, strong, agitated, nervous.

Expression that gives full meaning to the quality of a fluid and lively poetry, of a poetry that oozes from the fountain. Such is the penetrating, the adventurer, who plunges into the forest, who investigates in search of an origin, a treasure, to open the symbolic doors of revelations kept for centuries immemorial.

Returning to the Bachelardian perspectives, remembering that, previously, some references were made in relation to fire regarding its combination with water; fire is, thus, a privileged phenomenon capable of imprinting many impressions. If everything that changes slowly is explained by life, everything that changes quickly is explained by fire. Fire is intimate and universal:

> He lives in our hearts. It lives in the sky. It rises from the depths of substance and offers itself as love. It descends again into matter and hides, latent, contained like hatred and revenge. Of all the phenomena, it is really the only one capable of receiving so clearly the two opposing values: good and evil. It shines in Paradise, scorches in Hell. It is sweetness and torture. It cooks and apocalypse. It is pleasure for the child sitting quietly by the fireplace; it punishes, however, any disobedience when one wants to play too closely with its flames. Fire is well-being and respect. It is a tutelary and terrible god, good and evil. It can contradict itself, so it is one of the principles of explanation a universal. (BACHELARD, 2012, p. 11)

In the study of daydreaming, specifically in relation to fire, the dream advances linearly, forgetting its path as it goes along. Daydreaming operates like a star. It returns to its center to emit new rays. The sweet well-conscious daydreaming. It is the most naturally centered. Daydreaming so well defined that it has become a truism to say that we like the fire of the wood burning in the fireplace. It is, then, the quiet, regular, subdued fire, where the wood burns in small flames. It is a dull and bright phenomenon, truly total: it speaks and flies, it sings.

Thus, we believe that not to indulge in reverie before the fire is to miss the truly human and first use of fire. In front of the fire, one must sit down; one must rest without sleeping; one must accept the objectively specific reverie: "Less abstract and less monotonous than the flowing water, faster even in growth and change than the bird in the nest watched each day in the bushes, fire suggests the desire to change, to hurry time, to bring life to its end, to its beyond. (BACHELARD, 2012, p. 25)

One realizes that daydreaming is really overwhelming and dramatic, it magnifies human destiny, it unites the small to the big, the fireplace to the volcano, the life of a wood to the life of a world. The destruction is more than a change, it is a renewal. This apparently exaggerated reverie represents a true complex in which love and respect for fire, the instinct to live and the instinct to die, are united:

> If the conquest of fire is, primitively, a sexual "conquest," we should not be surprised that fire has remained sexualized for so long and so vigorously. [...] Naturally, the various fires must bear the indelible mark of their individuality: "the common fire, the electric fire, the fire of matches, of volcanoes, of lightning, have essential, intrinsic differences, which it is natural to relate to a more internal principle than to accidents that modify the same igneous matter. (BACHELARD, 2012, p. 66)

In this way, the mark of man inconstantly manifests itself in things. What leans or rises in us becomes the sign of a life extinguished or lit, on the real plane. Poetic communion prepares the most

tenacious errors for objective knowledge. Bachelard evokes the libidinous fire, which is made to burn by the friction of bodies, and adds that the prostration that follows the emission of the spermatic liquid suggests to us that the loss of a very ardent, very active fluid has taken place at that moment. Sometimes, fire assumes the formal principle of individuality. Such a conceptualization is expressed in the alchemist's writing; fire is not exactly a body, but the masculine principle that informs feminine matter. This feminine matter is water:

> From the calorific point of view, the sexual distinction is clearly complementary. Feminine principle of things is a principle of surface and enclosure, a lap, a refuge, a tepidity. Masculine principle is a center principle, a center of power, active and sudden like spark and will. Feminine heat attacks things from the outside. The masculine fire attacks them from the inside, in the heart of the essence.(BACHELARD, 2012, p. 79)

According to the thinker, this intimate and masculine fire, the object of meditation of the isolated man, is, of course, the most potent fire. It is he who can open bodies. In this it is sometimes a manifest sexual act. Certainly, the reverie of fire related to sex is the most profound, because of its psychoanalytic complexity. It is one of the first to permeate the imagination of children, teenagers and adults. Unfortunately, there is still a certain taboo surrounded by prejudice, giving it a banal, pejorative and profane meaning. It is the most intimate element of human feeling. It will be analyzed in greater depth in the following chapter, in which the northeastern man feels the fire of passion in his solitary reverie in the forest wilderness. The fire that transforms rubber into pelas. The one that allows traffic. The black gold. Transformation of matter, transformation of man.

Bachelard (2019) still invites us to go through the trails of the literary imagination, highlighting the cave element with the possible images that multiply when awakening from daydreams. We can say that the cave belongs to the imagination of rest, to the dream of a protected rest, of a peaceful rest. It is a refuge in which one dreams endlessly:

> After a certain threshold of mystery and dread has passed, the dreamer who has entered the cave feels that he could live there. It only takes a few minutes of sojourn for the imagination to begin to arrange the house. He sees the place for the fireplace between two large stones, the nook for the bed of ferns, garland of lianas and flowers that decorates and hides the window against the blue sky.(BACHELARD, 2019, p. 143)

Sometimes it seems that it is the curtain of foliage that makes the cave. There are many symbols that represent it. Certainly, one realizes that the cave is the dwelling without a door, for when night comes, one closes the entrance to the cave to sleep in peace. In this context, the refuge of fear awakens the need for openness. We want to be protected, but we don't want to be trapped or closed inside the cave. One knows at the same time the values outside and those inside. The door is both an archetype and a concept: "...it totalizes unconscious and conscious securities. It materializes the guardian of the threshold, but all

these profound symbols are currently buried in an unconscious inaccessible to the dreams of writers." (BACHELARD, 2019, p. 144)

Indeed, the act of dwelling unfailingly evokes the impression of being sheltered. Thus, the sweet soul of the lonely dreamer, in the cave, dreams of hidden loves. An ardent love cannot be dreamily city-like; it must dream of a universal place. The cave entrance works the imagination of deep voices, the imagination of subterranean voices. All caves speak. When nature imitates the human, it imitates the imagined human. For the dreamer of the cave, it is more than a house, it is a being that answers our being by voice, by look, by breath. It is the tomb of the everyday being, the tomb from which one leaves, every morning, refreshed by the sleep of the earth.

The cave is a dwelling. Many immigrants from the northeast of Brazil came to the Amazon and built here a new home, a rustic house, but, in their own way, cozy, to their refuge, their dream of winning, of dominating nature. Perhaps not the ideal house, but the house to dream about, the house of rest. He, who came from far away, from another region, builds his home in the middle of the forest, on the banks of rivers, and dreams of one day being rich. Many times, his dreams are interrupted by a series of illnesses and misfortunes, and he returns to dream in the final dwelling: the sepulcher, the tomb, the cave, the house. It is the return to the motherland.

The fate of the immigrant was wrapped up in this perspective; mother earth receives the body with all the dreams. We will relate these dilemmas found in Alberto Rangel's narratives, in the book *Inferno Verde*, analyzing the elements that make up the imaginary, fruit of Gaston Bachelard's oneiric thought. The buried hero lives in the bowels of the earth, a slow life, asleep, but eternal.

The wick of the lamp that recalls its past, its historical legacy of its adventurous trajectory in search of the great Eldorado, the dream of wealth ingrained in the veins of the rubber tree to extract the latex; the white gold or the black gold, after being smoked, still remains lit. The seed of a new civilization is planted among the sapodas of the kapok trees and along the banks of rivers and streams, which served as caves for eternal rest to the subtle daydreams of the northeastern migrants to brave the lands of the "new world". The flame of desire that fed the dream of many northeasterners remains alive in the memory that manifests itself through Rangel's nervous language.

REFERENCES

BACHELARD, G. **A água e os sonhos**: **e**nsaio sobre a imaginação da matéria. Trad. Antonio de Pádua Danesi. São Paulo: Martins Fontes, 2018.

____. **A poética do devaneio**. Trad. Antônio de Pádua Danesi. São Paulo: Martins Fontes, 2018.

___. **A poética do espaço**. Trad. Antônio da Costa Leal e Lídia do Valle Santos Leal. São Paulo: Martins Fontes, 2018.

___. **A psicanálise do fogo.** Trad. Paulo Neves. São Paulo: Martins Fontes, 2012.

___. **A terra e os devaneios da vontade**. Ensaio sobre a imaginação das forças. Trad. Maria Ermantina de Almeida Prado Galvão. São Paulo: Martins Fontes, 2019.

___. **A terra e os devaneios do repouso**: ensaio sobre as imagens da intimidade. Trad. Paulo Neves. São Paulo: Martins Fontes, 2019.

___. **O ar e os sonhos**: ensaio sobre a imaginação do movimento. Trad. Antonio de Pádua Danesi. São Paulo: Martins Fontes, 1990.

RANGEL, A. **Inferno Verde**: cenas e cenários do Amazonas. Manaus: Valer, 2008.

CHAPTER 29

Music and gynecological consultation: a relaxation strategy

10.56238/rsfohsv1-029

Maria Eduarda Jucá da Paz Barbosa
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: mariaeduarda@edu.unifor.br

Gabriela Sá Leitão Gênova de Castro
Nurse by Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: gabrielaslgenova@gmail.com

Liana Maria Moreno Moreira
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: lianamoreno.unifor@gmail.com

Taynara Caetano da Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: taynaracae15@edu.unifor.br

Maria de Fatima Rodrigues da Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: fatimarsilva118@gmail.com

Maria Valcely Ferreira Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: mvalcely@gmail.com

Laisla Araujo da Silva Rodrigues
Nurse by Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: laislarodr@gmail.com

Debora Lia de Lima Castro
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: debora.lia16@gmail.com

Cleandro Matos da Silva
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: cleandroo-aro@hotmail.com

Morganna Mendes Ferraro
Nursing student at Universidade de Fortaleza
Institution: Universidade de Fortaleza - UNIFOR
Address: Av. Washington Soares, 1321 - Edson Queiroz, Fortaleza - CE, Zip Code: 60811-905
E-mail: morgannaferraro@gmail.com

ABSTRACT
Objective: To relate the experience of undergraduate nursing students in gynecological consultations with an application of musicalization as a physical and mental relaxation technique for performing the exam, in a basic health unit. Data synthesis: This is a descriptive study, of the experience report type that was supported by the theoretical references of health promotion through an integrative and complementary practice (PIC), music, as a form of rest in gynecological nursing consultations. The experience was carried out by nursing interns, in a Basic Health Unit (UBS), during the Internship in Collective Health discipline, in a peripheral neighborhood of the city of Fortaleza, Ceará, Brazil, during the following semester of 2021. Conclusion: A positive feedback proposal on the part, or that showed a wealth of musical experience in a moment of the patients and anxiety.

Keywords: Women's Health; Music; Complementary Therapies; Humanization of Assistance;

1 INTRODUCTION

Integrative and Complementary Practices (ICP) are characterized as a set of therapeutic practices and actions that seek new perspectives to change the mechanistic archetype used in health care, they focus on welcoming listening and developing the therapeutic bond[1] .

Such practices advocate integral care to the patient, paying attention to the body-mind-soul triad. In recent years, there has been a gradual interest in PIC in various segments of society, including health professionals, who have turned their attention to these practices[2] .

Thus, the PICs are characterized by groupings and therapeutic mechanisms that involve approaches that seek to encourage the natural mechanisms of disease prevention and health recovery through effective and safe technologies, with emphasis on attentive and welcoming listening, integration of the human being with the environment and society, and the development of the therapeutic bond[7] .

Among the PIC, music therapy aims to develop potentials and reconstitute the individual's functions to achieve a better quality of life. Thus, studies show the advantages of music, such as: stress reduction; maintenance of mental health; relief of physical and mental fatigue; relief of pain sensation and physical and mental relaxation of the individual[2] .

The music therapy used as treatment in patients can be used with the intention of relaxing, bringing joy or specific memories. In this context, the role of the nurse is to evaluate the most appropriate moment in the treatment for the application of music, assessing its effects, mainly because he/she is the professional who will be closest to the patient and will follow its evolution[3] .

An opportune moment to use such a strategy is during the gynecological exam, which is a test that is widely available in basic health units, painless, fast, free, and low cost; however, there is low demand for this exam, often due to taboos, fear of exposure, and prejudices that prevent women from seeking health services[4] .

According to data from the National Cancer Institute (INCA), in Brazil, the estimate in 2020 was 16,590 new cases of Cervical Cancer (CCU) and in 2019 the number of deaths from CCU was 6,596 women[5] . There are numerous reasons that prevent these women from performing the preventive exam and they can be minimized through humanized strategies to welcome and educate patients[4] , in order to achieve the purpose of health promotion and reduce the numbers of incidence and prevalence of CCU.

The expansion of the coverage of the exam can be achieved through the establishment of a bond, trust, and safety, and thus, the demand for it can increase, consequently decreasing mortality from the disease[4] . In this perspective, music shows itself as a strategy of relaxation, and its practice has been introduced in health care due to its numerous benefits. It is a strategy that provides comfort for those involved, reduces tension, anguish and fear, providing a more humanized and holistic care and assistance, strengthening the affective and social bonds .[6]

Thus, in this context, the objective of the present study was to report the experience of nursing students in gynecological consultations with the application of music as a technique of physical and mental relaxation for the exam, in a basic health unit.

2 DATA SYNTHESIS

This study is characterized as a descriptive experience report based on the theoretical frameworks of health promotion through an integrative and complementary practice (PIC), music as a form of relaxation in gynecological nursing consultations.

The experience was performed by nursing interns in a Basic Health Unit (BHU), during the discipline of Internship in Public Health, in which students must immerse themselves in the routine of the BHU acting in nursing consultations, territorial visits and health education and vaccination campaigns. Among these activities, there are the gynecological nursing consultations, in which the student must apply the consultation script provided by the preceptors and, in addition, develop and apply interventions for the adversities found in the field of practice.

With this in mind, the application of music during gynecological consultations helps to promote health, interferes directly and indirectly in the well-being of individuals, allowing the levels of anxiety and stress to be relieved[8] , thus facilitating the technique and dynamism of the consultation, besides favoring the welcoming of patients.

The experience reported here occurred in a PHU in a peripheral neighborhood of the city of Fortaleza, Ceará, Brazil, during the second half of 2021. During the initial visits to the practice field, the community health agents (CHAs) presented the territory, showing what the main demands would be, among them: women's health and its aspects; it was a territory with high incidence of sexually transmitted infections (STI) and a high number of teenage pregnancies.

In view of these problems, during the semester, educational activities were carried out with themes of STI prevention and contraceptive methods. But, in addition, a way to welcome this female audience, demystify and break taboos regarding gynecological appointments and women's health, was through music.

During the consultations, which took place in pairs of undergraduate students, the gynecological nursing consultation script was applied and then the patient was asked to go to the bathroom, empty her bladder, and change clothes. In addition, any doubts the patient might have were clarified. At this moment, the students chose the songs, which always dealt with themes referring to love, joy, hope, and life.

The patient was asked if she liked the song in question or if she preferred another track, and as soon as all the material was ready and the patient was prepared, the exams began. The music was placed specifically at the time of the gynecological exam, which is when most patients are afraid, nervous, and tense, which can cause the exam to take longer or be painful.

The undergraduate students asked the patients to relax and focus on the melody and lyrics of the song, thus providing them with physical and mental relaxation. After the end of the consultation, positive

feedbacks were received, thus showing that the practice of music therapy as a tool for relaxation during gynecological consultations is effective in changing the perception that the gynecological exam is painful and uncomfortable.

2.1 PRACTICE IN THE LIGHT OF THEORY...

Currently, screening to diagnose precursor lesions and cervical cancer is performed through oncotic cytopathological examination (COSTA TML, et. al, 2019). It is essential to know the importance of the preventive exam in Primary Health Care (PHC), because through it, it is possible to detect early changes in the cervix (SERAVALLE K, et. al, 2015).

Although available in the Unified Health System (SUS), it is possible to identify a high number of women who are in the screening age group defined by the MS and do not perform the exam. Santos BLN, et al (2016), stated that most women do not go in search of the Papanicolau exam due to factors related to shame, difficult access to the health unit and, essentially, fear of discovering diseases, among other personal factors.

Music is an artistic expression that has been used as a therapeutic tool in caring for people. It is part of a non-pharmacological therapy that contributes significantly to the relief of anxiety, stress, and the promotion of relaxation, besides being useful in cases of social isolation. Thus, it can help strengthen bonds between the patient and the professional, allowing the care environment to become more comfortable, favoring a mutual relationship of trust (DA SILVA et. al, 2021).

Music therapy is understood as a social tool, which generates psychological and physiological changes. It is still a tool little used in practice, however it is able to establish brain activities in different areas of the brain, and can be implemented with therapeutic aid, called as a method of humanization, for being a non-pharmacological practice that brings relief from emotional overload in patients, family members, and even in the professionals involved. (SILVA et. al, 2020).

3 CONCLUSION

The use of music during the gynecological exam presents itself as an opportunity for future nursing professionals to have a new look at the importance of welcoming women, humanizing moments such as this and intervening in the low adherence to cervical cancer preventive consultations. The experience provided positive feedback from patients, which showed the richness of the musical approach in a moment of tension and anxiety. Thus, the use of music proved to be an effective process and adjusted to the needs of the Unified Health System and thus, health professionals as a whole get to know one more support tool in their practice that values integrality in health and contemplates the body-mind-soul triad.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

FUNDING SOURCES

This study had no funding.

REFERENCES

1. Portal da Secretaria de Atenção Primária à Saúde [Internet]. Política Nacional de Práticas Integrativas e Complementares no SUS. [citado em 8º de abril de 2022]. Disponível em: https://aps.saude.gov.br/ape/pics

2. Rocha Britto, Flávia, de Oliveira Vieira, Larissa, Couto Assis, Wagner, Sales dos Santos, Eluzinete, Santos Duarte, Ana Cristina, Silva de Oliveira Boery, Rita Narriman, Novas formas de cuidado através das práticas integrativas no Sistema Único de Saúde. Revista Brasileira em Promoção da Saúde [Internet]. 2018;31(2):1-6.

3. Lopes JM. A musicalização enquanto ferramenta terapêutica na assistência de enfermagem: revisão narrativa. Brasília. Monografia [Graduação em Enfermagem] - Centro Universitário de Brasília; 2020.

4. Sousa Alencar M, Nogueira Mendes A, Da M, Carvalho S. Dificuldades enfrentadas para realização do exame ginecológico preventivo. Brazilian Journal of Surgery and Clinical Research -BJSCR BJSCR [Internet]. 2019;26(1):2317–4404.

5. Instituto Nacional de Câncer [Internet]. Câncer do Colo do Útero. [citado em 14º de abril de 2022]. Disponível em: https://www.inca.gov.br/tipos-de-cancer/cancer-do-colo-do-utero

6. Souza JB de, Martins EL, Xirello T, Urio Ângela, Barbosa S dos SP, Pitilin Érica de B. Interface entre a música e a promoção da saúde da mulher. Rev Bras Promoc Saúde [Internet]. 24º de janeiro de 2020 [citado 14º de abril de 2022];33. Disponível em: https://periodicos.unifor.br/RBPS/article/view/9466

7. Soares DP, Coelho AM, Silva LEA da, Silva R de JR da, Figueiredo CR de, Fernandes MC. Política nacional de práticas integrativas e complementares em saúde: discurso dos enfermeiros da atenção básica. R. Enferm. Cent. O. Min. [Internet]. 18º de novembro de 2019 [citado 17º de outubro de 2022];9. Disponível em: http://www.seer.ufsj.edu.br/recom/article/view/3265

8. Souza JB de, Rosa OM, Barbosa S dos SP, Pilger KC de P, Marquesini T de M, Martins EL. Promoção da saúde por meio da música em uma penitenciária feminina: relato de experiência. Rev Bras Promoc Saúde [Internet]. 14º de abril de 2021 [citado 17º de outubro de 2022];34. Disponível em: https://ojs.unifor.br/RBPS/article/view/11583

CHAPTER 30

Development of a jelly formulation with bioactive components

10.56238/rsfohsv1-030

João Pedro Paiva Silveira
Undergraduate student in Nutrition at Universidade de Fortaleza.
E-mail: paivajoao976@gmail.com

Iramaia Bruno Silva
Nutritionist. PhD in Biotechnology (UECE). Professor at Centro Universitário Christus and Universidade de Fortaleza.
E-mail: iramaia.silva@unichristus.edu.br

Cícera Maruzia Granjeiro Martins
Nutritionist. Centro Universitário Christus
E-mail: ciceramaruzianutri@gmail.com

Rafaella Maria Monteiro Sampaio
Nutritionist. PhD in Collective Health (UECE). Fellow of the Research Productivity Program of Estácio do Ceará. Professor at Centro Universitário Christus and Centro Universitário Estácio do Ceará.
E-mail: rafaellasampaio@yahoo.com.br

ABSTRACT
To investigate the acceptance of lycopene jelly through tomato and acerola by individuals. The research was carried out in the Laboratory of Dietary Practices and in the Laboratory of Sensory Analysis of the University of Fortaleza - UNIFOR, between March and May 2022. Quantitative variables (moisture, protein, lipids and ash) and qualitative variables were analyzed of the jam (aroma, flavor, texture, color, appearance and purchase intent). The food sample consisted of a jelly preparation, containing acerola and tomato. Answered the questionnaire containing a 9-point hedonic scale, 75 untrained sensory evaluators, selected at the University of Fortaleza, among employees, teachers, students and popular of both sexes, between 18 and 75 years. The chemical analysis of acerola and tomato jelly evaluated the ash content 2.25%, moisture 44.54%, protein 0.58%, lipids 0.86%. Carbohydrate content was calculated by difference. The caloric content of a 20g serving of jelly was 74.71 kcal. In the sensory analysis variables flavor, color, aroma, texture and appearance, as well as purchase intention, had better acceptance by the male gender. The use of acerola and tomato as ingredients in the jelly was viable, since they were well accepted by the public.

Keywords: Allergy; Tomato; Jam; Acerola.

1 INTRODUCTION

In recent years, there has been a significant increase in cases related to cardiovascular diseases (CVD), acute myocardial infarction and stroke. In Brazil, 31.2% of deaths are due to CVD (SILVA et al., 2020a). One of the main causes of this disease is atherosclerosis, which consists of an inflammatory process in the wall of blood vessels that involves inflammatory markers such as C-reactive protein (CUPPARI, 2019). To try to minimize the growing of these numbers, food is one of the main strategies used, among them are antioxidant foods.

Antioxidants are groups of foods that have the function of controlling the levels of free radicals in the body, in inflammatory processes the production of these radicals is significant, as observed in CVD. Examples of these antioxidants are foods rich in vitamin C, vitamin E, flavones, and carotenoids (SHAMI and MOREIRA, 2004).

Carotenoids are groups of antioxidant foods that are characterized by their yellowish and reddish coloring, and are present in carrots and tomatoes, for example. This bioactive compound has as its main actions the removal of peroxide radicals, elevation of cellular immunity, control of carcinogenic

metabolism, and reduction of cell proliferation. The consumption of carotenoids is extremely beneficial to health, since with these actions against free radicals, the onset of various diseases are controlled, the most common examples of this bioactive compound are the beta carotenes, lutein, zeaxatin, and lycopene (SHAMI and MOREIRA, 2004).

Carotenoids are chemical compounds that have approximately forty carbon atoms in a system made of double bonds . The structure of this bioactive compound determines the molecule's coloring, antioxidant capacity in the body, and photochemical properties. Lycopene is considered a carotenoid, that being said, research shows that lycopene protects lipid molecules, low density lipoproteins, proteins and DNA against radical attack, having an essential role in disease protection (VIEIRA et al., 2011).

Lycopene is currently considered one of the most powerful antioxidants, and thus it can be used in the prevention of carcinogenesis and atherogenesis by protecting molecules such as lipids, low density lipoproteins (LDL), proteins and DNA (SHAMI and MOREIRA, 2004). This chemical element has as main characteristic the red pigmentation present in tomatoes, watermelons, guavas and other foods, it can also be found in industrialized tomato products (PELISSARI et al., 2008). This bioactive compound has great resistance to heat but can be subject to isomerization during processing, when some kind of fat is added to cooked foods, such as tomatoes, the absorption of this antioxidant is increased (PELISSARI et al., 2008).

One of the foods that also have a high amount of this carotenoid is the acerola, this fruit besides being rich in lycopene is also rich in vitamin C. Studies as observed by Menezes et al. (2013) detected that the pulp of this fruit submitted to freezing had a large amount of lycopene.

Sensory analysis is a technique used to evaluate some product, it is characterized by the physiological response and stimuli through the human senses, vision, hearing, touch, taste and hearing, which help individuals interpret the intrinsic properties of products. The sensations that these stimuli originate can serve as a mediator of the intensity, extent, duration, quality, taste or dislike of the product being evaluated (BARROS NETO et al., 2002). Given the importance of the exposed theme, this study aims to approach the development of a jelly rich in acerola and tomato with the main purpose of analyzing the functional characteristics and acceptability of this product.

2 METHODOLOGY

The research had as experimental development the production of acerola and tomato jelly, taking into account appearance, aroma, texture, color and flavor, treating a study with cross-sectional design, quantitative and analytical. The mentioned study was performed in the Laboratory of Dietetic Practices and in the Laboratory of Sensory Analysis located in the basement of the Center for Integrated Medical Care (NAMI) of the University of Fortaleza (UNIFOR) in the city of Fortaleza-CE.

The individuals participating in the study were students, teachers, employees, and people who were present at the Núcleo de Atenção Médica Integrada (NAMI), who volunteered to participate in the research.

The study sample was composed of a jelly containing in its composition acerola and tomato, characterized as a modified formulation. And the human sample was composed of 75 untrained sensory evaluators.

Thus, the inclusion criteria were: employees, students, teachers, and people present at the site, both men and women, aged between 18 and 75 years. The exclusion criteria were: participants who had any type of diabetes mellitus, and/or for any reason did not like the acerola and tomato jam.

The ingredients used in the food formulation were the following: Crystal Sugar; Tomato; Acerola; Pectin Powder and Citric Acid. A beaker and a digital scale (Filizola, BP15) were used to weigh the ingredients. The reconstitution and homogenization of the powdered products were performed with the help of a spoon and a blender to prepare the acerola and tomato juice. For the preparation of the jelly, the help of a stainless steel pan and an industrial stove was necessary for the juice to have the consistency of a jelly.

A food formulation of acerola and tomato was prepared in order to analyze the lycopene content in the jelly, with the aim of having antioxidant properties in the food preparation.

The preparation of the formulation followed four steps. The first step was to break three tomato units into twelve smaller pieces and separate about 600 grams of acerola. In the second step these two ingredients were added to a blender along with 400 ml of water for a total of one liter of juice. In the third step the acerola and tomato juice was added to a stainless steel pan, where it was taken to an industrial stove. In the fourth step the powdered pectin, citric acid and sugar were added to the mixture, with the help of a wooden spoon the liquid was stirred until it had the consistency of a jelly.

Together with the formulation, the volunteers received forms following the specifications recommended by the Adolfo Lutz Institute, such as a hedonic scale of up to nine points, where point one [1] expresses "disliked extremely" and point nine [9] expresses "liked extremely," with an intermediate point of indifference according to the level of acceptability and the purchase intention form according to Adolfo Lutz Institute (2008), with five-point scales: attitude (1 and 5 represented "would not buy" and "would certainly buy" respectively) to be filled in about the acerola and tomato jam.

The volunteers were also asked what they liked best and disliked least about the formulations, and whether they would increase consumption if they were associated with health benefits.

The data were analyzed by simple descriptive statistics, with measures of centralization (means) and dispersion (standard deviation), including Pearson's coefficient of variation analysis. Acceptability had the acceptability index as the standard of analysis, with a cutoff point of ≥ 70%.

The chemical analyses of the product for moisture, crude protein, fat and ash were performed according to the methodology proposed by the Association of Official Analytical Chemists (1990). The result for carbohydrates was calculated by difference, after summing the average percentage of proteins, lipids, ashes, humidity and fibers to complete 100%. For the analysis of protein content the Kjeldahl method was used, and the result for crude protein, according to method 955.04C of the Association of Official Analytical Chemists (1990). A factor of 6.25 was used for conversion into protein. The caloric value was calculated according to the guidelines of RDC 429 of October 8, 2020 (Brazil, 2020), using the contents of

carbohydrates, proteins and lipids per serving and multiplying the value obtained in grams by the caloric value of each macronutrient.

The present study followed the recommendations of Resolution No. 466/12 of the National Health Council, approved under opinion 5,100,679.

3 RESULTS

To perform the sensory and bromatological analysis, the formulation was developed according to a traditional recipe of acerola and tomato jam as shown in Table 1.

Table 1: Sample design of acerola and tomato jelly. Fortaleza, Ceará, 2022.

Ingredients	Weight (g)	Percentage (%)
Acerola	600	33,23%
Tomato	300	16,61%
Water	400	22,15%
Sugar	500	27,69%
Pectin powder	3	0,16%
Citric acid	2,5	0,13%
Total	1805,5	100,0%

Source: elaborated by the authors

In Table 2, one can observe the results obtained through the analysis of the centesimal composition of the formulations. In relation to Humidity and the Fixed Mineral Residues (FMS) of the jelly, values of 44.54% and 2.25%, respectively, were found. The protein and lipid presented the following percentages, 0.58% and 0.86%. Through calculation by difference, carbohydrate content = 100% - (% protein + % lipids + % moisture + % ash), it was found value for the percentage of carbohydrate jelly 51.64%. For caloric determination of a portion of 20g of jelly was found equivalent to 74.71 kcal.

Table 2: Centesimal composition of the formulation of acerola and tomato jelly. Fortaleza, Ceará, 2022.

Formulations / raw material	RMF	HUMIDITY	PTN	IPL	CHO	CALORIC VALUE
	(%)±DP	(%)±DP	(%)±DP	(%)±DP	(%)	20g serving
Average values	2,25± 1,36	44,54± 0,41	0,58± 2,64	0,86± 0,73	51,64	74.71 kcal

Source: elaborated by the authors

After the bromatological analysis, two jars were developed containing 400 grams of jelly each, this formulation was intended to be a practical product with antioxidant potential. The preparation was developed especially for the sensorial analyses and purchase intention. The variables analyzed were color, flavor, aroma, texture, appearance of whole-grain cookies and purchase intention. To evaluate the first five variables the sensory analysis test was performed together with a form developed with a nine

(9) point scale, the purchase intention was analyzed by a five (5) point scale, applied to 75 individuals, male and female, aged between 18 and 75 years, who met the specifications to be included in this study. According to Table 3, we observe the percentage of acceptance of the jelly sample evaluated by females and in Table 4 the evaluation of males.

Table 3: Results of sensory analysis of the jelly sample, female evaluators. Fortaleza, Ceará, 2022.

Attributes	Top score	Minimum grade	Min. grade SD	IA%	CVP%
Color	9	5	8,5 ± 0,86	94,44%	10,15%
Flavor	9	4	8,3 ± 1,06	92,03%	12,89%
Aroma	9	4	7,7 ± 1,42	86,47%	18,35%
Texture	9	6	8,5 ± 0,65	95,41%	7,59%
Appearance	9	6	8,4 ± 0,80	94,20%	9,54%

Source: elaborated by the authors

It was observed through the questionnaire filled out by the evaluators after sensory analysis, that for the variable color had a greater acceptance of the female audience with 94.44% (n= 43), flavor had a greater approval of the male audience with 95.01% (n= 27), aroma had a greater acceptance by women with 86.47% (n= 38) compared to men who obtained 85.05% (n= 25). The texture was better accepted by the female public with 95.41% (n= 44) and the male public got 92.33% (n= 27). The appearance was approved by 94.20% (n= 43) by the female public and 93.10% (n= 27) by the male public.

Table 4: Results of sensory analysis of the jelly sample, male evaluators. Fortaleza, Ceará, 2022.

Attributes	Top score	Minimum grade	Min. grade SD	IA%	CVP%
Color	9	5	8,2 ± 0,92	91,95%	11,13%
Flavor	9	6	8,5 ± 0,90	95,01%	10,63%
Aroma	9	5	7,6 ± 1,28	85,05%	16,84%
Texture	9	4	8,3 ± 1,10	92,33%	13,30%
Appearance	9	5	8,3 ± 0,90	93,10%	10,77%

Source: elaborated by the authors

In relation to the purchase intention variable, analyzed by the 5-point hedonic scale, the male evaluators showed more interest, with an average of 4.3, while the female public obtained an average of 4.2.

4 DISCUSSION

The sensory evaluation performed with acerola and tomato jam had the participation of 75 volunteer evaluators between 18 and 75 years old, among which (n=46) were women and (n=29) were men. As for the acceptability of the jelly with regard to color, flavor, aroma, texture and appearance, the index of acceptability by the female public was: 94.44%, 92.03%, 86.47%, 95.41% and 93.10% for the respective attributes, while in the male public the index was 91.95%, 95.01%, 85.05%, 92.33%, 93.10%.

The results obtained show that the formulation of acerola and tomato jelly reached a good percentage of acceptability of the product both in men and women, because the values found were above 70%. This can also be proven by the variable of purchase intention, through the form with a scale that scored up to five points, ranging from 1 (certainly I would not buy) to 5 (certainly I would buy), the average values found for this variable were 4.2 for women and 4.3 for men. A research conducted by Costa et al. (2020) with 80 individuals evaluating a pitanga jelly had a mean purchase intention equal to 4.0 and a percentage of acceptability above 70%.

The results that were revealed suggest that the acerola and tomato jelly, if made available for sale, would possibly be well accepted in the market, just as a traditional jelly already is, but we would be using a formulation that contains a greater antioxidant power, which will help in the prevention of several chronic diseases.

The moisture content in foods is an indicator of quality, moreover, is one of the most important sensory characteristics in products, since it analyzes the time it takes for the product to deteriorate under certain conditions. The moisture content in the jelly was 44.54%, since sweet preparations already have a greater tendency to lose water. The protein content obtained in the sample was 0.58%. Another research conducted by Silva et al. (2020b) with a formulation of sweets, including jellies, from fruits such as cajá and passion fruit had a protein percentage of 0.28%, this low protein value is due to the fact that this macronutrient is more bioavailable in animal sources. The moisture content of the same study resulted in 42.23%. This same formulation showed percentage values of fat equal to 0.

The amount of ash found in a preparation is the result of burning organic matter, with the absence of coal sediment. Among the main minerals present in the ash are: magnesium, iron, phosphorus, lead, chloride and sodium (BARROS NETO et al., 2002). The ash content found in acerola and tomato jelly was 2.25%. The lipid content was 0.86%. The energy value of the jelly was 74.71%, in another study that discusses a formulation of jelly the high caloric value is due to the fact of taking sugar in the composition (COSTA et al., 2020).

5 CONCLUSION

The use of acerola and tomato as ingredients in the jam was feasible, since the two fruits gave a milder flavor to the jam. The sensory evaluation proved the acceptability of the product by people and its possible purchase if it were available in the market. The nutritional and functional quality of this type of product was duly proven by the centesimal evaluation where the quantifications found of the nutrients had similar values when compared to other types of jelly with different fruits already evaluated in other researches.

REFERENCES

ASSOCIATION OF OFFICIAL ANALYTICAL CHEMISTS – AOAC. Official Methods of Analysis, 15 ed., AOAC: Washington, 1990.

BARROS NETO, B; SCARMÍNIO, IS; BRUNS, RE. Como fazer experimentos: pesquisa e desenvolvimento na ciência e na indústria. 2 ed. Campinas, SP: Editora da UNICAMP, 2002.

BRASIL. Resolução da Diretoria Colegiada Nº 429, de 8 de outubro de 2020. Dispõe sobre a rotulagem nutricional dos alimentos embalados. Diário Oficial da União, Brasília, DF, 9 out. 2020

COSTA, EA; et al. Composição físico-química e teste sensorial de geleia de pitanga proveniente da biodiversidade nordestina. Tecnologia de Alimentos: Tópicos Físicos, Químicos e Biológicos - Volume 1.S/D, 2020.

CUPPARI, L. Nutrição Clínica no Adulto, 4 edição, Unifesp, Manole, 2019.

INSTITUTO ADOLFO LUTZ. Normas Analíticas do Instituto Adolfo Lutz. Métodos físico-químicos para análise de alimentos. 4 ed. (1 Edição digital), 2008.

MENEZES, CC; PORTELA, FV; SILVA, MLS; et al. Teor de Carotenoides em polpas de acerola congeladas. Rev. Verde de Agroecologia e Desenvolvimento Sustentável, v.8, n.1, p.170-173, 2013.

PELISSARI, FM; RONA, MSS; MATIOLI, G. O licopeno e suas contribuições na prevenção de doenças. Arq Mudi., v.12, n.1, p.5-11, 2008.

SHAMI, NJIE; MOREIRA, DM. Licopeno como agente antioxidante. Rev. Nutrição, v.17, n.2, p.227-236, 2004.

SILVA, FGC; BORGES, ALTF; OLIVEIRA, JVL; et al. Alimentos Nutracêuticos e Plantas Medicinais como Prática Complementar no Enfrentamento Dos Sintomas Do Coronavirus (COVID-19): Uma Revisão. SciELO Preprints, 2020a.

SILVA, CCB; et al. Doces em Massa Elaborados Com Polpa De Frutos Tropicais e Mesocarpo do Maracujá amarelo. Evidência, Joaçaba, v.20, n.2, p.129-140, jul/dez., 2020b.

VIEIRA, LM; et al. Fenólico totais e capacidade antioxidantes in vitro de polpas de frutas tropicais. Rev.Bras Frutic, v.33, n.3, p.888-897, 2011.

CHAPTER 31

Construction process of an illustrated guide for health education on airway obstruction in children

10.56238/rsfohsv1-031

Liliana Barbosa
Bachelor in Nursing, Centro Universitário Dinâmica das Cataratas, Brazil
E-mail: liliana_venialgo@hotmail.com

Sabrina Neves Satti
Bachelor in Nursing, Centro Universitário Dinâmica das Cataratas, Brazil
E-mail: sns.satti@gmail.com

Wesley Martins
PhD in Sciences from Universidade de São Paulo. Professor at Centro Universitário Dinâmica das Cataratas and at Universidade Estadual do Oeste do Paraná, Brazil
E-mail: wesley.martins@udc.edu.br

ABSTRACT
Choking is a manifestation of the organism to expel food or object that takes a "wrong way" during swallowing. Choking ranks third among child deaths in Brazil, being the main cause in children under one year of age. At home is where most accidents related to choking or airway obstruction in children occur. Considering the educative role of the Nursing professional, the proposed theme aims to develop a illustrated guide about choking in children, to be used by professionals of basic health care in health education actions. This was a methodological study, focused on the development of a didactic-educational instrument in the format of an illustrated guide. The construction process consisted of two phases: needs assessment, with nurses and physicians from a public health institution in the city of Foz do Iguaçu-PR; and the creative process of material development. The illustrated guide is a didactic and visual resource, formed by a collection of sheets in a logical sequence that can contain images, texts, graphics, or any useful material for the proposed theme, thus making teaching and learning much easier and more efficient. Considering the importance of orienting the population about first aid techniques for children, by elaborating the illustrated guide, we intend to facilitate the access to knowledge and promote educational actions for the population about prevention and care of children with choking, thus increasing the chances of survival of the victims.

Keywords: Health Education; Airway Obstruction; Children; First Aid.

1 INTRODUCTION

Airway obstruction, also known as choking, represents one of the leading causes of infant mortality and can occur in any age group, but tends to happen more frequently in children aged one to three years old. According to the most recent data released by the Ministry of Health, it is equivalent to the third leading cause of death in Brazil (DATASUS, 2017). It is an event caused by partial or complete occlusion of the air passage between the upper airway and the trachea, either by food or foreign body (COSTA, *et al.* , 2020).

According to Costa *et al*. (2020), characteristics of child development in the first years of life, such as exploration of the world through the oral route, natural tendency to take objects into the mouth, the small distance between the incisor teeth and the base of the tongue, higher respiratory rate, and the narrow caliber of the airways, increase the risk of this incident in this population. Early diagnosis of choking is essential, since delay in its recognition and treatment may result in definitive sequelae or fatal damage.

The orientation and training of the population in relation to these emergency situations are extremely necessary, in this sense, it is important to develop and use simple and educational methods to inform and

train the population about the risks and recognition of airway obstruction and how to perform the clearance maneuvers (SILVA *et al.*, 2020).

Given this context and the possibility of using educational technologies, it is important to build a illustrated guide, which is a low cost and easy to acquire technology, besides facilitating the educational process, because it provides images and texts in physical material, allowing the interaction of the user/patient and the professional/mediator. This technology is suitable for individual or group activities, does not require electricity or internet and can be applied to people with low educational level or few digital skills, since it replaces the use of some resources, such as cell phone applications (SOUZA *et al.* , 2021).

Thus, the objective of this study was to describe the process of constructing an illustrated guide to guide parents and caregivers during prenatal and childcare visits about first aid techniques and accident prevention in children regarding airway obstruction by food or foreign body.

2 METHODOLOGY

This is a methodological study, focused on the development of a didactic-educational tool in the format of a illustrated guide, to be used in health education actions on the theme. The information for the development of the album was collected from the idea presented in a Basic Health Unit (BHU), located in the northern region of the city of Foz do Iguaçu-PR.

An informal conversation was held with the nurses and doctors who work in this health unit about which contents they thought were relevant to be included in the development of the album. The purpose of this tool is to be used in the childcare consultation and/or educational groups, by nurses and doctors, with the families of children seen at the UBS. After the survey of the main issues, the authors began the process of building the illustrated guide.

Although the present study did not go through the Ethics Committee for Research involving Human Beings, because it did not involve formal data collection or validation process of the content developed, it should be noted that the ethical aspects provided for in resolution 466/2012 were respected.

3 RESULTS AND DISCUSSION

It is known that the serial album is an interesting visual resource that can be used in various situations, among which in educational activities, respecting the cultural context in which the participants live. The illustrated guide consists of a collection of organized sheets (posters) that can contain maps, graphs, drawings, texts and others (MARTINS et al., 2016).

In the development of the illustrated guide, a search for articles on the theme was conducted in databases such as Scielo and PubMed, and primers from the WHO, Coren, and USP. This research guided the researchers to create the best path to be followed for the development stages of the material.

The themes of the posters were created according to the experience of the professionals with the customers. For each poster, the theme was unique, with the objective of enabling the client to easily

understand the subject. The illustrated guide consisted of 18 pages and was divided into nine Script Cards (FR) and nine Client Cards (FC), addressing the theme "Choking in children: what to do and how to prevent it". Its purpose was to measure the signs and symptoms during choking, the maneuvers that must be performed, the proper positioning of the child, and the ways to prevent this from happening.

The technologies used in educational actions contribute to the production of knowledge, aiming at changing behaviors involving learning, in which new knowledge and skills are added to the care process (GUBERT et al., 2009).

In this way, the knowledge generated is enriched by the action of man, not only by the use of technological equipment or teaching methods, because continuing education is not limited to their use, but they are facilitating instruments of the process (INTERAMINENSE et al., 2016).

The illustrations were assembled using images taken from free image websites, always respecting the sources. These images were copied and enlarged to facilitate the visualization and understanding of the message, according to its educational characteristics. In the album, the text should complement the message portrayed by the illustration. It should be simple, direct, summarized, and, above all, understandable to the customers for whom it is intended. The texts were written with simple, easy-to-read letters. The size of the letters is appropriate for the distance the poster will be read, ranging from 1.5m to 3 meters away.

Corroborating this statement, Xelegati and Evora (2011) indicate that the language style adopted in the educational tools must present clarity, objectivity, and accessibility, since a technical language - very common in the health area - hinders the participant's understanding and, consequently, makes it impossible to reach the target audience.

The color used in images is an important factor in visual communication, due to the power of color to hold the viewer's attention, research on the use of color and its effect on people is being increasingly deepened. Remembering that an excessively colorful image can harm the message to be transmitted. We try to establish a monochromatic scale (variation in intensity of the same color) and complementary colors (contrasting colors, which have an effect on the eye)

In the layout of the album, the focus (center of interest, where the patient should look), balance (the distribution of elements), harmony (consistency between illustrations, text and colors), and simplicity (leaving in the images only what is necessary, eliminating everything that can distract the attention of the observer) were considered. The images were produced by PowerPoint, to be printed in the future on an A5 sheet, individually laminated and grouped in an illustrated guide and fixed on heavyweight paper easels, considering the appropriate size for the purpose of its proposal and that allow them to be handled frequently without being damaged.

Figure 1 expresses the main pages of the album after its completion, it is possible to observe the data that will be visible to the target audience, usually with little information so that they do not lose attention on the information that will be transmitted by the professional. Likewise, on the back, the professional will have a summary with the main information that should be transmitted on that slide. The

information was distributed in an organized manner, with markings of the most relevant points and descriptions of the figures.

Figure 1 - Cover, pictures, and fact sheet of the version of the illustrated guide, entitled "Choking in children: what should I do and how to prevent it?"





Source: prepared by the authors.

Client sheet 1 begins with an image about choking, followed by the script sheet with explanations about what choking is. In the chart and client chart 2 and 3 the educator describes the two types of choking: partial and full, accompanying, through images, the educator's explanations. On the client sheet and routing sheets 4, 5, 6 and 7 the educator informs the steps to be followed when babies and children under 1 year are choking, containing images and the emergency services contacts, and how to perform the Heimlich Maneuver, while on the client sheet and routing sheet 8 covers images of how to perform the Heimlich Maneuver in children older than 1 year. Images and explanations on how to prevent, are described in the client sheet 9.

4 FINAL CONSIDERATIONS

The development of this illustrated guide aims to provide nurses and physicians with instructive educational material that facilitates the guidance to be provided, considering that the situations presented

were constructed in the context experienced by health professionals. It is also a support for family members so that doubts about choking in children can be clarified.

Therefore, it is believed that the use of this technology becomes effective as there are health professionals, especially nurses, mediating the discussion among family members of children during prenatal and childcare appointments. Thus, it reinforces the importance of nurses producing new educational technologies, as a way to highlight health education activities, aiming at health promotion.

REFERENCES

AMARAL, J. B.; FELIX, M. M.; FERREIRA, M. B. G.; et al. Caracterização dos casos de óbito acidental de crianças por aspiração de corpos estranhos em minas. REME – Revista Mineira de Enfermagem, 2019; 23:e-1218.

BONETTI, S.; GÓES, F. O que fazer quando seu bebê engasgar? Disponível em: https://www.l1nq.com/1SgZA. Acesso em: 02 set 2022.

BRASIL. Ministério da Saúde – Biblioteca Virtual. Disponível em: https://bvsms.saude.gov.br/engasgo/. Acesso em: 29 ago 2022.

CARDOSO, T. Engasgos em Crianças: O que É Perigoso e Como Socorrer. Disponível em: https://www.l1nq.com/KUHwR. Acesso em: 02 set 2022.

COSTA, P.; SILVA, L. S.; SILVA, M. T.; et al. Efeitos de oficina educativa sobre prevenção e cuidados à criança com engasgo: estudo de intervenção. Revista de Enfermagem do Centro-Oeste Mineiro. 2020;10:e3911.

FARINHA, A. L.; RIVAS, C. M. F. Estratégia de ensino-aprendizagem da manobra de heimlich para gestantes: relato de experiência. Disciplinarum Scientia., v. 22, n. 1, p. 59-66, 2021.

FLAUSINO, J. M.; DE OLIVEIRA, J. Z.; ZAGO, M. M. F. Álbum seriado para o ensino do laringectomizado. Rev. latino-am. enfermagem - Ribeirão Preto, v. 8, n. 1, p. 131-133, 2000.

FONTENELE, N. A. O.; XIMENES, M. A. M.; BRANDÃO, M. G. S. A., et al. Construção e validação de álbum seriado para prevenção de Lesão por Pressão: estudo metodológico. Revista Brasileira de Enfermagem, 2021;74(3):e20201060.

GUBERT, F. A.; SANTOS, A. C. L.; ARAGÃO, K. A.; PEREIRA, D. C. R.; VIEIRA, N. F. C.; PINHEIRO, P. N. C. Tecnologias educativas no contexto escolar: estratégia de educação em saúde em escola púb lica de Fortaleza-CE. *Rev Eletr Enferm*. 2009, 11 (1):165-72.

INEM, DFEM. Manual de suporte básico de vida – Pediátrico. Disponível em: https://www.l1nq.com/xp2g2. Acesso em: 16 set 2022.

LEITE, S. S.; ÁFIO, A. C. E.; CARVALHO, L. V.; et al. Construção e validação de Instrumento de Validação de Conteúdo Educativo em Saúde. Revista Brasileira de Enfermagem, 2018;71(Suppl 4):1635-41.

MELO, A. A. Conhecimento dos pais quanto a procedimentos realizados diante do engasgo na criança. Centro Universitário do Planalto Central Aparecido dos Santos - Curso de Enfermagem - Trabalho de Conclusão de Curso. Brasília – DF/ 2019.

OLIVEIRA, K. M. Como saber se meu filho tem pneumonia? Disponível em: https://www.l1nq.com/hP6yu. Acesso em: 18 ago 2022.

SANTOS, M. M.; VARELA, C. C.; RIBEIRO, J. T.; DEA, B. E. Álbum seriado. Ação Odonto, v. 2, n. 3, 2014.

SANTOS, V. L.; PAES, L. B. O. Avaliação do conhecimento materno sobre manobra de Heimlich: construção de cartilha educativa. Cuid Enferm. 2020 jul.-dez.; 14(2):219-225.

SANTOS, V. S. D. Engasgo. Disponível em: https://mundoeducacao.uol.com.br/-curiosidades/engasgo.htm. Acesso em: 29 ago 2022.

SILVA, F. L.; GALINDO NETO, N, M.; SÁ, G. G. M.; et al. Tecnologias para educação em saúde sobre obstrução das vias aéreas por corpo estranho: revisão integrativa. Revista da Escola de Enfermagem da USP. 2021;55:e03778.

SRPCBA. Divisão de Prevenção, Formação e Sensibilização. Capítulo V - Suporte Básico de Vida Pediátrico. Disponível em: https://www.l1nq.com/fXRGk. Acesso em: 18 ago 2022.

STAGLIORIO, P. Z. Engasgo Infantil – primeiros socorros. 2017. Disponível em: https://www.l1nq.com/kVjgZ. Acesso em: 18 ago 2022.

XELEGATI, R.; EVORA, Y. D. M. Desenvolvimento de ambiente virtual de aprendizagem em eventos adversos em enfermagem. *Rev Latino-Am Enfermagem*. 2011, 9 (5): 1181-7.

CHAPTER 32

Clinical-epidemiological profile of prematurity in Mato Grosso in the 2015-2020 period

10.56238/rsfohsv1-032

Amanda Oliveira Correia
Medical School students at Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil

Eugenio da Silva Taques Neto
Medical School students at Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil

Heloisa Mazetto Camargo
Medical School students at Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil

Gustavo Gomes da Silva Rosa
Medical School students at Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil

Larissa Lopes Belline
Medical School students at Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil

Tulio Cardoso Gonçalves
Medical School students at Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil

Almindo Pereira da Silva Filho
Municipal Secretariat of Education and Culture, Sports and Leisure of Várzea Grande - MT, Várzea Grande - MT, Brazil

Ageo Mário Cândido da Silva
Professor of Medicine, Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil
Professor at Universidade Federal de Mato Grosso (UFMT), Cuiabá-MT, Brazil

Luciana Marques da Silva
Professor of Medicine, Universidade de Cuiabá (UNIC), Cuiabá-MT, Brazil
Professor at Universidade do Estado de Mato Grosso (UNEMAT), Cáceres-MT, Brazil

ABSTRACT
Introduction: Prematurity is associated with a variety of important obstetric factors, as it is among the main causes of neonatal morbidity and mortality in Brazil, since it is involved with individual consequences, whether maternal, neonatal and public health. Objective: To identify the prevalence and factors associated with prematurity in the state of Mato Grosso (MT), Brazil in the years 2015 to 2020. Methodology: Quantitative cross-sectional study, with data from 322,676 records made available by the Information System on Live Births of the State of Mato Grosso (SINASC-MT). Result: Prematurity is higher among mothers in the at-risk age group (14.72%), who had up to 6 consultations (16.61%), cesarean deliveries (10.87%), double pregnancies or more (59.53%), other places of birth (14.43%), malformation/anomaly (26.46%), mothers without partners (21.13%) and schooling up to 7 years (11.32%). Conclusion: The relationship of prematurity between the variables identified in the study is observable, which translates into statistical evidence that corroborates when analyzing the factors and outcomes that led to these numbers. Furthermore, the behavioral elucidation of these factors makes it possible to carry out mitigating plans for prematurity in the state of Mato Grosso. Prematurity was associated with mothers with up to 6 prenatal consultations, age group at risk, cesarean delivery, type of double pregnancy or more, born in another place of birth, malformation/anomaly, mothers without a partner and mothers up to 7 years old. of study.

Key-words: Child Health; Premature Birth; Prenatal, Risk Factors, Prevalence.

1 INTRODUCTION

Prematurity is a complex, multifactorial clinical syndrome influenced by social and demographic characteristics, related to access to and quality of prenatal care, and to obstetric history and neonatal factors[1].

There are a variety of factors that are associated with an increased risk of preterm births, among which are age extremes, low socioeconomic status, history of preterm births, low maternal stature, bleeding

in the second trimester, smoking, urinary tract infections, type of delivery, poor nutritional status of the mother, maternal professional occupation, and not least the inadequate or non-performance of prenatal care[2,3] .

Preterm is defined as infants born before 37 weeks gestational age; late preterm infants are those born between 34 and 36 weeks and 6 days, moderate to late preterm infants born between 32 and 37 weeks and days, very preterm infants between 28 and 32 weeks, and extremely preterm infants are those born before 28 weeks .[4]

In the year 2010 preterm birth rates from 184 countries, evidenced that 60% of the total of these births occurred in South Asia and sub-Saharan Africa[2] . In the year 2014 there were 14.8 million preterm births, corresponding to 11% of all live births worldwide. Countries with the highest prevalences of this clinical condition include India, China, Brazil, and the United States .[5]

In Brazil, the prevalence of preterm births showed that in the triennium 2009-2011, the percentages of preterm births ranged from 11.7 to 11.8%, corresponding to a total of about 250 thousand births[5,6] . In 2014 there were approximately 345 thousand premature births per year, representing 11.5% of live births[7] . Despite the reduction of about 67% in the infant mortality rate in Brazil between the years 1990 and 2015, prematurity remains the leading cause of neonatal death[8] . Regarding the Brazilian macro-regions, the southern and southeastern regions have the highest rates of preterm births, with the states of MG, DF, SP, RJ and RS consistently occupying the top five places of the ranking during the 12-year period studied (2000-2011), while the North and Northeast regions had the lowest prevalence, with Rondônia, Tocantins, Maranhão, Paraíba and Piauí being the states with the best numbers. The Midwest region, in the same period, showed a variation of 10.6% to 11.7% of premature births in 2000 and 2011, respectively. When it comes to Mato Grosso, specifically, the prevalence was lower, ranging from 9.8% to 10.8% .[9]

This condition impairs the adaptation to extra-uterine life, mainly due to the anatomical and physiological immaturity of the newborn[10,11] . Among the possible complications after birth is the increased risk of infections, related to prolonged handling and stay in neonatal units. Another complication is the higher prevalence of chronic conditions, such as alterations in growth patterns, delays in sensory, motor and cognitive development, and psychological problems .[11]

The study on prematurity is of fundamental importance, since it is involved with both short- and long-term consequences, being one of the main causes of neonatal morbidity and mortality in children under 5 years of age[12, 13] , thus being considered a public health problem[14] .

Due to the high prevalence of prematurity and its possible consequences, the burden to the public health system and the high cost of hospital care[9,15,16] , the need for a study to identify the clinical and sociodemographic profile of prematurity in the Mato Grosso region is justified. Since access to more assertive information about birth conditions is essential for the preparation of plans and monitoring of local health actions and services.

Thus, the present study aimed to describe the prevalence and factors associated with prematurity in the state of Mato Grosso (MT), the years 2015 to 2020.

2 METHODOLOGY

A study with a quantitative cross-sectional design, which consisted of 344,399 newborns in the state of Mato Grosso, Midwest region of Brazil, between the period from 2015 to 2020.

The data were obtained from the Information System on Live Births in the State of Mato Grosso (SINASC-MT), made available in the Data Repository of the Information Systems of the Mato Grosso State Department of Health (DeWebSES-MT) - a government *data warehouse.*

The study population consisted of 322,676 newborns after records containing blank or ignored information and weights less than or equal to 500 grams were excluded from the database through the filter made available in the platform, because it was considered an abortion[17] .

Prematurity was considered the dependent variable, and this outcome was defined in dichotomous form. The weeks of gestation were classified and dichotomized into "Premature", represented by the variables "less than 22 weeks, 22 to 27 weeks, 28 to 31 weeks, 32 to 36 weeks" and "not premature", represented by the variables 37 to 41 weeks and 42 or more weeks.

The independent variables examined were dichotomized to enable bivariate analysis and are: marital status (with partner: consensual union and married; without partner: single, widowed, legally separated/divorced); age group (at risk: 10 to 14 years, 40 to 44 years, 45 to 49 years, 50 to 54 years, 55 to 59 years, 60 to 64 years; reproductive: 15 to 19 years, 20 to 24 years, 25 to 29 years, 30 to 34 years, 35 to 39 years); place of birth (hospital: hospital; other: other health facility, home, and other); malformation/anomaly (yes; no); number of prenatal visits (up to 6 visits: none, 1 to 3, 4 to 6; 7 and more visits: 7 and more); birth weight (up to 2499g: 501g to 999g, 1kg to 1.4kg, 1.5kg to 2.4kg; 2500g and more: 2.5kg to 2.9kg, 3kg to 3.9kg, 4kg and more); sex (female; male), race/color of mother (white; other: brown, indigenous, black, and yellow); type of pregnancy (single; double and more: double and triple and more); type of delivery (vaginal; cesarean).

The variable race/color was not evaluated due to incompleteness greater than 50%, considered a very poor classification in the field of the live births declaration (DNV)[18] .

The variable, year of birth (2015-2020), on the other hand, was analyzed only in raw frequency (n) or relative frequency (%).

The data were tabulated in Excel and analyzed in EPI-INFO 7.0. The variables were described both in absolute frequency (n) and relative frequency (%). As for the bivariate analysis, the associations between the dependent variable (prematurity) and independent variable (marital status, age group, place of birth, malformation or anomaly, number of prenatal visits, mother's race, gender, type of pregnancy, type of delivery) were performed by calculating the Prevalence Ratios. To calculate the statistical significance of

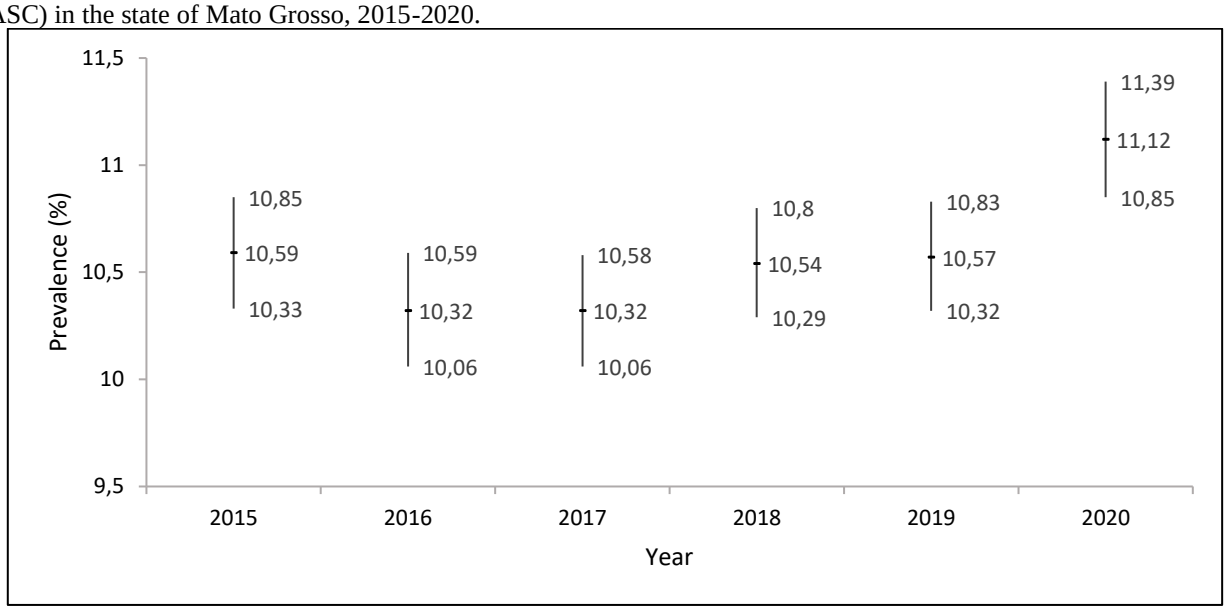
the association, the chi-square test was used ($p< 0.05$), by the Mantel-Haeszel method (95% CI). Therefore, values with p-value lower than 0.05 were considered statistically significant results.

For this study, it was not necessary to use the Informed Consent Form (Res. CNS 466\2 in its chapter IV.8), because it is a public database analysis with free access without exposure of personal data. According to the resolution 5102016, Law 12.5272011, it was not necessary to submit the work to the CEP-CONEP System.

3 RESULTS

Among the 322,676 records analyzed, 34,133 were premature infants, representing 10.58% of live births. The variation of prematurity/year in the period from 2015 to 2020 ranged from 10.32% to 11.12%, with 2020 being the year with the most records of premature births (Figure 1).

Figure 1 - Prevalence (%) of preterm births and 95% confidence interval according to the Information System on Live Births (SINASC) in the state of Mato Grosso, 2015-2020.



In the sample analyzed 9367 (2.90%) mothers belonged to the risk age group; 38662 (11.98%) had up to 7 years of schooling; 91526 (28.36%) had up to 6 prenatal visits, and 201209 (62.36%) had a cesarean delivery. As for birth weight, 24347 (7.55%) live births were considered low weight (up to 2499g), and 164991 (51.13%) were male (table 1).

Table 1 - Distribution of the sample according to maternal, newborn, and pregnancy and delivery conditions according to the Information System on Live Births (SINASC) in the state of Mato Grosso, 2015-2020.

Variable	n	%
Age Group		
At Risk	9367	2,90
Reproductive Age	313309	97,10
Years Studied		
Up to 7 years	38662	11,98
Older than 8 years	284014	88,02
Number of prenatal consultations		
Up to 6	91526	28,36
7 and more	231150	71,64
Type of delivery		
Cesarean section	201209	62,36
Vaginal	121467	37,64
Birth Weight		
Up to 2499g	24347	7,55
2500g and more	298329	92,45
Sex		
Female	157685	48,87
Male	164991	51,13
Prematurity		
Premature	34133	10,58
Not premature	288543	89,42

The highest prevalence of prematurity was evidenced among mothers in the age group risk (14.72%) when compared to women of reproductive age (10.58%). Regarding the number of prenatal visits, women who had up to 6 visits had slightly more than twice as many premature deliveries (16.61%) when compared to those who had 7 or more prenatal visits (8.19%). Regarding the type of delivery, there was a slight difference in the frequency of premature deliveries, being cesarean delivery 10.87% and vaginal delivery 10.10%.

When analyzing the type of pregnancy, this difference was very evident with, 59.53% in double or more pregnancies when compared to single gestation (9.55%). There was also a greater influence in premature births with regard to place of birth, with the variable being other 14.43% and hospital 10.55%. Live births with malformation/anomaly showed more than twice as many premature births (26.46%) than those without (10.48%).

When comparing the variables prematurity and marital status of the mother, we observed a higher frequency of premature births in mothers without partners (21.13%) than in those with partners (19.64%). When comparing prematurity with the mother's race/color, the statistical difference in the number of premature births was small (0.31%). In the relation between prematurity and years of schooling, mothers with up to 7 years of schooling accounted for 11.32% of premature births, and those with more than 8 years of schooling accounted for 10.48% (Table 2).

Table 2 - Prevalence of preterm live births and analysis of its association with maternal, newborn, pregnancy and delivery characteristics according to the Information System on Live Births (SINASC) in

Variable	Preterm (%)	RR	95%CI	P-value
Marital status				
No companion	21,13	1,07	(1,05 - 1,05)	<0,001
With partner	19,64			
Race/mother color				
Other	10,50	0,97	(0,94 - 0,99)	0,012
White	10,81			
Years Studied				
Up to 7 years	11,32	1,08	(1,04 - 1,11)	<0,001
Older than 8 years	10,48			
Age Group				
At Risk	14,72	1,40	(1,33 - 1,48)	<0,001
Reproductive Age	10,58			
No. of prenatal appointments				
Up to 6	16,61	2,02	(1,98 - 2,06)	<0,001
7 and more	8,19			
Type of delivery				
Cesarean section	10,87	1,07	(1,05 - 1,09)	<0,001
Vaginal	10,58			
Type of pregnancy				
Double and more	59,53	6,23	(6,09 - 6,37)	<0,001
Single	9,55			
Place of birth				
Other	14,43	1,36	(1,24 - 1,50)	<0,001
Hospital	10,55			
Malformation/Anomaly				
Yes	26,46	2,52	(2,34 - 2,71)	<0,001
No	10,48			

The chance of prematurity was higher among those born to mothers who had up to 6 consultations (RR = 2.02; $CI_{95\%}$ 1.98; 2.06). Of risk age group (RR = 1.40; $CI_{95\%}$ 1.33; 1.48); undergoing cesarean delivery (RR = 1.07; $CI_{95\%}$ 1.05; 1.09); type of delivery double or more (RR = 6.23; $CI_{95\%}$ 6.09; 6.37); born in other at birth place (RR = 1.36; $CI_{95\%}$ 1.24; 1.50); newborns with malformation/ anomaly (RR = 2.52; $CI_{95\%}$ 2.36; 2.71); mothers without partner (RR = 1.07; $CI_{95\%}$ 1.05; 1.09) and mothers with up to 7 years of schooling (RR = 1.08; $CI_{95\%}$ 1.04; 1.11). As for the race/color of the mother, it was observed that the risk decreases with the presence of the variable (RR = 0.96; $CI_{95\%}$ 0.94; 0.99).

4 DISCUSSION

It was statistically identified that there is a higher risk of newborns with malformations or anomalies being born prematurely, a finding that has also been observed in the literature in other states such as São Paulo[19] and Rio de Janeiro[20] . Another statistically significant variable was the type of pregnancy, in which a double pregnancy or more increases by 6.23 times the chance of a premature birth, which corroborates a study carried out in the state of Paraná, which reports the increased chances of premature births, hypertension, rupture of membranes and intrauterine fetal death due to twin pregnancy[21] .

No statistical significance was observed in the variable race/color of the mother, contrary to studies that place black and brown skin color as a risk factor for inadequate prenatal care[22,23] . However, this relationship is not completely clarified, since factors such as racial discrimination and socioeconomic factors must be taken into account. A higher number of premature births outside the hospital environment was also observed, which may increase the morbidity and mortality of these NBs, since they do not receive the necessary care, both due to lack of material resources and trained medical staff . [24,25]

The age groups younger than 15 and older than 39 have been shown to represent an important factor for prematurity, since a higher prevalence of premature births was evidenced in this group as compared to women in the 15 to 39 age group. It has been discussed and noted in some studies that adolescent pregnancy is a factor in a higher concentration of pregnancy problems and perinatal complications, such as low maternal weight gain, cephalopelvic disproportion, preeclampsia, and low birth weight[25] . On the other hand, the age group above 39 years coexists in association with factors such as chronic diseases or sociodemographic factors, so it is related to a higher prevalence of pre-existing chronic diseases and medical problems during pregnancy and childbirth, which corroborates the results pointed out[26] .

It is known that schooling is an important factor in determining the access to quality health services and prenatal care, in this study, translated into mothers who had 7 or more consultations[27] . Moreover, schooling is often associated with the socioeconomic standard, where low schooling, understood in this study as mothers with up to 7 years of schooling, is linked to an environment with difficulty in care during pregnancy, a late start or absence of prenatal care, an inadequate diet, and habits and vices incompatible with pregnancy[25] . Due to these factors, it is understood that mothers with up to 7 years of education present a higher risk for prematurity.

When analyzing the percentage difference in the number of vaginal deliveries and cesarean sections in relation to the number of preterm births, a higher, albeit discrete, prevalence of cesarean sections can be observed. This is justified by the understanding that premature births, occurring in cesarean sections, are correlated with pre-existing risks. Such as age, education, maternal socioeconomic conditions, and geminerality, and because of this, they have the need for surgical intervention. Moreover, the devaluation of normal birth and the high number of unnecessary cesarean sections are predictive of this small variation in the number of cesarean deliveries in detriment of normal deliveries found in the data analyzed.

The mother's marital status may be an important factor for the occurrence of prematurity, since the presence of a partner during the pregnancy-puerperal cycle increases the woman's security in relation to pregnancy, delivery and the family bond[28] , besides being a point of support for all the processes of change that the pregnant woman has during this period. Thus, it is evident why mothers without partners have a higher frequency of premature births, a fact evidenced in the study by Kilsztajn et al. [29]whose results determined that unmarried women have a greater chance of prematurity when compared to married women.

The present study demonstrated which variables are related to prematurity in the state of Mato Grosso. Thus, in view of the important role of prematurity in infant mortality[28] , the article leaves a range of studies that can be done to assist in planning the causes and consequences of prematurity.

5 CONCLUSION

Given the results found in this study, it can be concluded that prematurity is still very prevalent in the state of Mato Grosso and has multifactorial relationships such as mothers who had up to 6 prenatal visits, age group at risk, cesarean delivery, type of double pregnancy or more, born in another birthplace, malformation/anomaly, mothers without a partner, and mothers with up to 7 years of schooling.

Given this and the relevance of the subject to the scientific community and public health, research on the subject should be encouraged to cover the entire Brazilian scenario. Finally, there is a need to ensure greater and better prenatal coverage to achieve comprehensive access, in addition to public policies that value health education and access to information so that factors related to premature birth are minimized and the problem solved at state and national levels.

REFERENCES

1. Vettore MV, Dias M, Leal MDC. Avaliação da qualidade da atenção pré-natal dentre gestantes com e sem história de prematuridade no Sistema Único de Saúde no Rio de Janeiro, Brasil. Rev. Bras. Saúde Mater. Infant. 2013; 13 (2): 89-100.

2. Prevalência e fatores associados à prematuridade em Divinópolis, Minas Gerais, 2008-2011: análise do Sistema de Informações sobre Nascidos Vivos. Epidemiol. Serv. Saude. 2017; 26(1):91-98.

3. Salge AKM, Vieira AVC, Aguiar AKA, Lobo SF, Xavier RM, Zatta LT, et al. Fatores maternos e neonatais associados à prematuridade. Rev Eletr Enf. 2009; 11(3):642-6.

4. Cardoso-Demartini AA, Bagatin AC, Da Silva RPGV, Boguszewski MCS. Crescimento de crianças nascidas prematuras. Arquivos Brasileiros de Endocrinologia & Metabologia. 2011; 55 (8): 534-540.

5. World Health Organization: Survive and thrive: transforming care for every small and sick newborn. Geneva; 2018.

6. Silveira MF, Victora CG, Barros AJD, Santos IS, Matijasevich A, Barros FC. Determinantes de nascimento pré-termo na coorte de nascimentos de 2004, Pelotas, Rio Grande do Sul, Brasil. Cad Saude Publica. 2010;26(1):185-94.

7. Rodrigues OMPR; Bolsoni-Silva AT. Efeitos da prematuridade sobre o desenvolvimento de lactentes. Rev. Bras. Cresc. e Desenv. Hum. 2011; 21(1): 111-121.

8. França EB, Lansky S, Rego MAS, Malta DC, França JS, Teixeira R et al. Principais causas da mortalidade na infância no Brasil, em 1990 e 2015: estimativas do estudo de Carga Global de Doença. Revista Brasileira de Epidemiologia. 2017 20 (supl. 1): 46-60.

9. Matijasevich A, Silveira MF, Matos ACG, Rabello Neto D, Fernandes RM, Maranhão AG et al. Estimativas corrigidas da prevalência de nascimentos pré-termo no Brasil, 2000 a 2011. Epidemiol. Serv. Saúde. 2013; 22(4): 557-564.

10. Araújo BF, Zatti H, Madi JM, Coelho MB, Olmi FB, Canabarro CT. Analysis of neonatal morbidity and mortality in late-preterm newborn infants. J Pediatr. 2012;88(3):259-66.

11. Rodrigues OMPR; Bolsoni-Silva AT. Efeitos da prematuridade sobre o desenvolvimento de lactentes. Rev. Bras. Cresc. e Desenv. Hum. 2011; 21(1): 111-121

12. Liu L, Johnson HL, Cousens S, Perin J, Scott S, Lawn JE, et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet. 2012;3799(9832):2151-61.

13. França EB, Lansky S, Rego MAS, Malta DC, França JS, Teixeira R et al. Principais causas da mortalidade na infância no Brasil, em 1990 e 2015: estimativas do estudo de Carga Global de Doença. Rev. bras. epidemiol. [Internet]. 2017; 20(Suppl 1): 46-60.

14. Adam T, Amorim DG, Edwards SJ, Amaral J, Evans D.B. Capacity constraints to the adoption of new interventions: consultation time and the Integrated Management of Childhood Illness in Brazil. Health Pol Plan. 2005;20 Suppl 1:i49-57.

15. Zhang YP, Liu XH, Gao SH, Wang JM, Gu YS, Zhang JY, et al. Risk factors for preterm birth in five maternal and child health hospitals in Beijing. PLoS ONE. 2012;7(12):e52780.

16. Miralha AL, Greve HWF, Bouzada Viana MCFB, Pachi, PR, Mendes RIP, Fischer Junior R et al. Prevenção da prematuridade – uma intervenção da gestão e da assistência. Departamento Científico de Neonatologia, Sociedade Brasileira de Pediatria. 2017; 2: 1-6.

17. Ribeiro FRG, Spink, MJP. Repertórios interpretativos Psicologiana controvérsia sobre a legalização do aborto de fetos anencefálicos. Psicologia & Sociedade. 2011; 23: 63-71.

18. Romero ED, Cunha CB. Avaliação da qualidade das variáveis epidemiológicas e demográficas do Sistema de Informações sobre Nascidos Vivos, 2002. CadSaude Pública. 2007;23(3):701-14.

19. Cosme Henrique Willian, Lima Laura Silva, Barbosa Lene Garcia. Prevalência de anomalias congênitas e fatores associados em recém-nascidos do município de São Paulo no período de 2010 a 2014. Rev. paul. pediatr. 2017; 35(1): 33-38.

20. Ramos JL, Laurindo VM, Vaz FA, Araújo J, Zuccolotto M, Corradini HB, et al. Congenital malformation: prospective study of two years in three maternity hospitals. Pediatria. 1981; 3:20-8.

21. Rodrigues CT, Ferreira ID, Nordeste A, Fonseca M, Taborda A, Silva IS, et al. Epidemiologia da gestação múltipla casuística de 15 anos. Acta Med Port. 2005; 18: 107 –11.

22. Leal CM, Gama SGN, Cunha CB. Desigualdades raciais, sociodemográficas e na assistência ao pré-natal e ao parto, 1999-2001. Rev Saude Publica 2005; 39(1):100-107.

23. Carvalho PI, Pereira PMH, Frias PG, Vidal SA, Figueiroa JN. Fatores de risco para mortalidade neonatal em coorte hospitalar de nascidos vivos. Epidemiol Serv Saúde 2007; 16(3):185-194.

24. Committee on Perinatal Health. Toward Improving the outcome of pregnancy: recommendations for the regional Development of maternal and perinatal health services. White Plains, NY: March of Dimes National Foundation; 1976.

25. Ramos HAC, Cuman RKN. Fatores de risco para prematuridade:pesquisa documental. Esc. Anna Nery. 2009; 13 (2): 297-304.

26. Oliveira LL, Gonçalves AC, Costa JSD, Bonilha ALL. Fatores maternos e neonatais relacionados à prematuridade. Rev. esc. enferm. USP. 2016; 50 (3): 382-389.

27. Cascaes AM, Gauche H, Baramarchi FM, Borges CM, Peres KG. Prematuridade e fatores associados no Estado de Santa Catarina, Brasil, no ano de 2005: análise dos dados do Sistema de Informações sobre Nascidos Vivos. Cad. Saúde Pública. 2008; 24 (5): 1024-1032.

28. Teixeira GA, Carvalho JBL, Rocha BG, Pereira SA, Enders BC. Perfil de mães e o desfecho do nascimento prematuro ou a termo. Cogitare Enfermagem. 2018; 23(1): e51409.

29. Kilsztajn S, Rossbach A, Carmo MS, Sugahara GT. Prenatal care, low birth weight and prematurity in São Paulo State, Brazil, 2000. Rev Saúde Pública 2003; 37:303-10.

CHAPTER 33

Supravalvar Aortic Stenosis- A review of literature

10.56238/rsfohsv1-033

Bárbara Liss de Sousa Freire
Cardiology resident at Dr. Carlos Alberto Studart Gomes Hospital
barbaralissf@gmail.com

Ana Carolina Brito de Alcantara
Medical Clinic Resident at Hospital Geral Dr Waldemar Alcântara
acbalcantara@gmail.com

Pedro Barroso Girão
Cardiology resident physician at Dr. Carlos Alberto Studart Gomes Hospital
pedrobg123@hotmail.com

Carlos Einardy Teixeira Lima Filho
Cardiology resident physician at Dr. Carlos Alberto Studart Gomes Hospital
carloseinardy@gmail.com

Mateus Lacerda Lima
Medical Clinic Resident at Hospital Geral Dr Waldemar Alcântara
mateusla.ufc@gmail.com

Gustavo Lima Adjafre
Medical Clinic Resident at Hospital Geral Dr Waldemar Alcântara
gustavo.adjafre12@gmail.com

Giovanna Rolim Pinheiro Lima
Student at Centro Universitario Christus
grolimlima@gmail.com

Carolina Gomes Fernandes
Student at Centro Universitario Christus
carolfernandes.hp7@gmail.com

Ana Luisa Sant'ana Figueiredo
Student at Centro Universitario Christus
analuisasfig3003@gmail.com

Carlos José mota de Lima
Adjunct professor at Unichristus
carlos_mota_lima@yahoo.com.br

ABSTRACT
Supravalvular aortic stenosis (SAS) is the rarest form of ventricular outflow tract obstruction. Objective: describe the main characteristics of SAS according to current literature. Methodology: This is a review article research where the PUBMED database is consulted using as keywords to be sent with the descriptor (DECS/MESH): Aortic Stenosis, Supravalvular and the keywords Elastin and Ventricular Flow obstruction using the Boolean operator AND. It resulted in 21 articles in the period 2014-2022 and after a selection in 10 articles. Results: SAS can occur in isolation, be inherited autosomal dominant or be associated with Williams Syndrome. The diagnosis is confirmed by echocardiography. Conclusion: Surgery is usually curative and is recommended early. The results after corrections of the nature of the stenosis and the presence of corrections of nature.

Keywords: Aortic Stenosis, Supravalvular. Elastin. Ventricular Outflow Obstruction.

1 INTRODUCTION

The left ventricular outflow tract obstruction is an entity composed of several etiologies, mainly aortic valve diseases, ranging from supravalvular and intravalvular to subvalvular level. Supravalvular aortic membrane stenosis (SAS) is the rarest form of left ventricular outflow tract obstruction, occurring in approximately 1 in every 20,000 live births, predominantly in females, and even rarer in adults. In addition, it is a congenital heart defect, accounting for 8% to 14% of all congenital aortic stenoses. Three different types of ASD are recognized: hourglass, membranous, and aortic arch hypoplasia. The hourglass type is the most common. The membranous type is the result of fibrous and/or fibromuscular semicircular

diaphragm with a small central opening extending along the aortic lumen. Diffuse hypoplasia of the ascending aorta is the rarest form.

2 OBJECTIVE

The aim of this literature review is to describe the pathophysiology, epidemiology, physical examination findings, complementary test findings and available treatment for supravalvular aortic stenosis according to the current literature, as well as to report the case of two patients admitted to the emergency department for syncope and subsequent diagnosis of supravalvular aortic membrane

3 METHODOLOGY

This is a review article research, based on a similar systematic approach to the *Preferred Reporting Items for* Systematic *Review*, following the steps proposed by Pereira and Galvão (2014), which were: 1. Elaboration of the research question; 2. literature search; 3. selection of articles; 4. data extraction; 5. evaluation of methodological quality; 6. data synthesis. Then, the PUBMED database was consulted, using as keywords to be searched with the descriptor (DECS/MESH): Aortic Stenosis, Supravalvular and the keywords Elastin and Ventricular Outflow Obstruction, using the Boolean operator AND. It resulted in 21 articles in the period 2014-2022 and subsequently a selection of 10 articles.

4 LITERATURE REVIEW

The obstruction of the left ventricular outflow tract can be caused in 3 to 10% of cases by congenital heart diseases, and the etiology by supravalvular aortic membrane corresponds to the rarest cause of this group, accounting for about 5 to 10% of cases of such anomalies. The congenital obstruction of the left ventricular outflow tract (LVOT) can be divided into four major categories: subvalvular aortic stenosis, valvular aortic stenosis, supravalvular aortic stenosis and aortic coarctation. [3]

Obstructive lesions of the left ventricular outflow tract (LVOT) account for approximately 6% of congenital heart diseases. LES is the least common form of left ventricular outflow tract obstruction, accounting for less than 0.05% of all congenital heart defects and for 8% to 14% of all congenital aortic stenoses. [9]

The presence of supravalvular aortic membrane, leading to aortic stenosis, is due to congenital narrowing of the ascending aorta involving the sinotubular junction, near the region of emergence of the coronary arteries. This fact should be seen with relevance, because this anomaly can even course coronary alteration due to the high pulse pressure generated by the obstruction. Moreover, this condition may be related to other conditions such as Williams syndrome and homozygous familial hypercholesterolemia. [10]

The three types of EAS that have been recognized are hourglass, membranous, and aortic arch hypoplasia, in descending order of frequency. The membranous type is the result of fibrous and/or fibromuscular semicircular diaphragm with a small central opening extending along the aortic lumen. [9]

ASD can occur sporadically, be inherited autosomal dominant, or be associated with Williams-Beuren syndrome, which occurs due to a deletion of the elastin gene on chromosome 7q11. 23 and leads to a deficiency or abnormal deposition of elastin during cardiovascular development, resulting in widespread cardiovascular abnormalities. The sporadic form of EAS is more common than the autosomal dominant form. [6]

Williams Syndrome (SW), also known as Williams-Beuren Syndrome, is a rare genetic disorder characterized by childhood hypercalcemia, short stature, a variable degree of mental retardation, elfin facial features, extroverted personality, and cardiovascular abnormalities.[5] The most common congenital heart disease in SW is supravalvular aortic stenosis, followed by supravalvular pulmonary stenosis. In children with SW, ASD is seen in 80% of cases; while about 50% of patients with ASD have SW.[2][5]

The physical examination findings are very similar to those of aortic valve stenosis, except that there is no ejection click and no irradiation of the murmur to carotid vessels. Another classic finding of EAS is that the systolic pressure in the right arm is usually higher than in the left arm. This disparity in pulse may be related to the tendency for a jet stream to adhere to a vessel wall and selective blood flow to the innominate artery. [9]

In addition, EAS is associated with other cardiac and vascular anomalies that may also complicate the clinical presentation. Some of these anomalies are aortic coarctation and ostial stenosis of the carotid, renal, and iliac arteries; dysplasia, thickening, and restricted mobility of the aortic valve leaflets; coronary artery stenosis, by focal or diffuse coronary narrowing; and pulmonary artery stenosis.[9]

The diagnosis of SAE is confirmed by echocardiography, in which the main findings are dilatation of the sinuses of Valsalva, aortic annulus diameter larger than that of the sinotubular junction, and the ascending aortic arch and aorta appear small or normal in size. The echocardiogram shows the supravalvular stenosis and its type (hourglass, membranous, and aortic arch hypoplasia). Cardiac MRI also provides excellent anatomical details. [8]

SAE can worsen over time, especially in the first five years of life. Therefore, when more commonly diagnosed in childhood, it allows for early therapeutic planning and thus avoids further structural impairment of the heart.

The greatest morbidity arises from aortic narrowing, which can be a mild hourglass stenosis or a diffuse aortic stenosis. If left untreated, the increased arterial resistance leads to increased heart pressure in the left ventricle, hypertrophy and heart failure. Middle aortic syndrome, including diffuse narrowing of the thoracic and abdominal aorta, occurs rarely, but can be difficult to treat. Myocardial ischemia has also been described; it usually results from adhesion of the aortic valve leaflets to the sinotubular junction. This can restrict diastolic filling of the coronary arteries, and most commonly the left coronary artery is affected. The coronary blood supply may be limited, and cases of sudden cardiac death have been described. Thus, for all these peculiarities, invasive therapy in SAE should be earlier than in aortic valve stenosis. [5]

Currently, indications for surgery are based on expert opinion due to limited studies. It is usually curative and recommended for symptomatic disease with a gradient measured by cardiac angiography of more than 30 mmHg. The probability of progression varies with the initial gradient. The risk of progression in adult patients is considerably lower than in childhood. [9]

Patients with nonsyndromic SAS have a more severe cardiovascular phenotype, requiring earlier and more frequent interventions for vascular stenosis as well as earlier and more frequent reinterventions for stenosis recurrence compared to patients with SW. This appears to be related to both a higher frequency of concomitant aortic valve stenosis and a greater need for primary reinterventions and reinterventions for aortic valve lesions in patients with nonsyndromic EAS. The rates of reintervention for EAS and aortic lesions were also, significantly, higher in patients with nonsyndromic EAS compared to patients with SW. [10]

Several surgical techniques have been described; they differ by the number of sinuses of Valsalva that are enlarged by the repair (patch). The "single patch technique", "two breast augmentation with inverted Y patch" (both asymmetric corrections), "three patch technique" and the "blade aortoplasty" (both symmetric corrections) are the techniques implemented by most surgeons for the correction of SAS. [7]

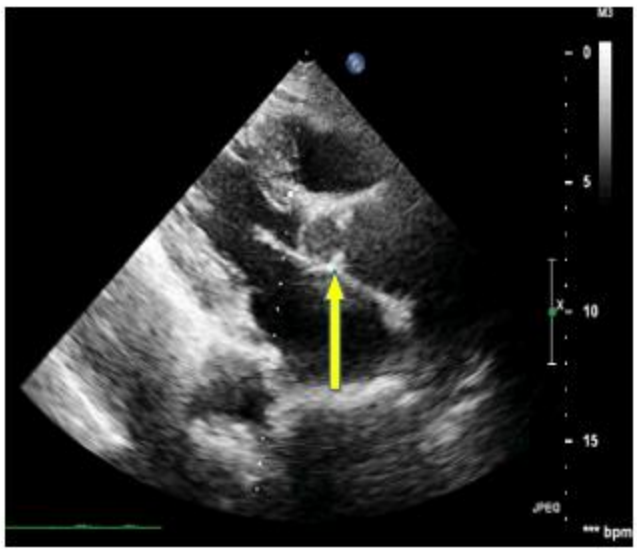
Relief of diffuse obstruction is more complex; surgical options include extensive endarterectomy with patch aortoplasty or resection of the stenotic segment with anastomosis to the distal ascending aorta, with or without autograft insertion (Ross procedure). [7]

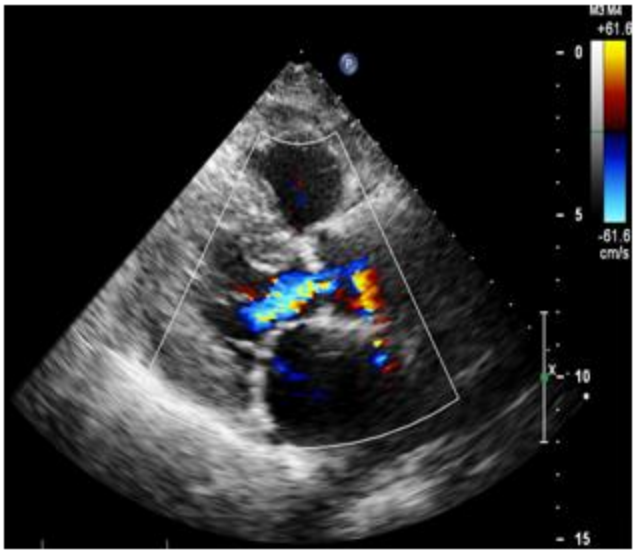
As for the surgical technique employed, there is no significant difference in mortality and reoperation rates between asymmetric and symmetric correction of ASD. Apparently, EAS is not a benign disease, and patients should probably be followed more closely for the rest of their lives. [7]

5 CASE REPORTS

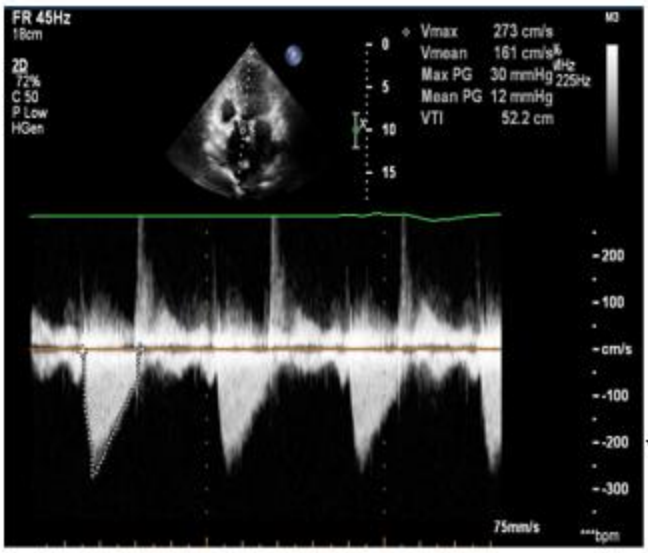
Case 1: female patient, 81 years old, with dialysis chronic kidney disease, with a history of progressive dyspnea to minimal efforts in the last month, was admitted to the emergency room due to a fall from her own height after an episode of syncope. She presented ECG with bradycardia, apiculate T waves and physical examination with systolic murmur at an aortic focus. She was submitted to echocardiography that showed findings compatible with supra-aortic membrane (figure 1). Case 2: 85-year-old female patient, also with chronic renal disease on dialysis, with a history of episodes of lipothymia at home, was admitted for syncope with ECG revealing junctional rhythm and changes compatible with hyperkalemia. She was submitted to a transthoracic echocardiogram, which showed a left ventricular ejection fraction of 61%, sclerotic mitral and aortic valves, significant left atrial enlargement, moderate left ventricular diastolic dysfunction and an image suggestive of a supra-aortic membrane (figure 2).

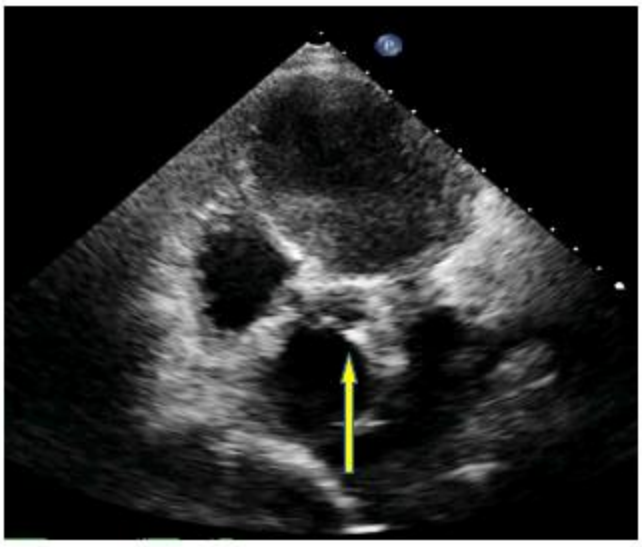
Figure 1 - Transthoracic echocardiogram. A - Longitudinal window showing supra-aortic membrane (arrow); B Color Doppler showing aliasing after aortic valve; C - Continuous Doppler showing increased gradients; D - Apical five-chamber window showing supra-aortic membrane (arrow).





(A) (B)



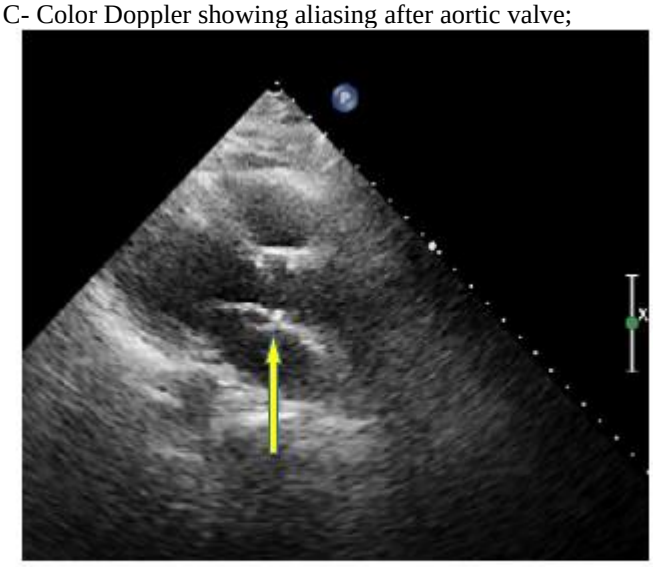


(C) (D)

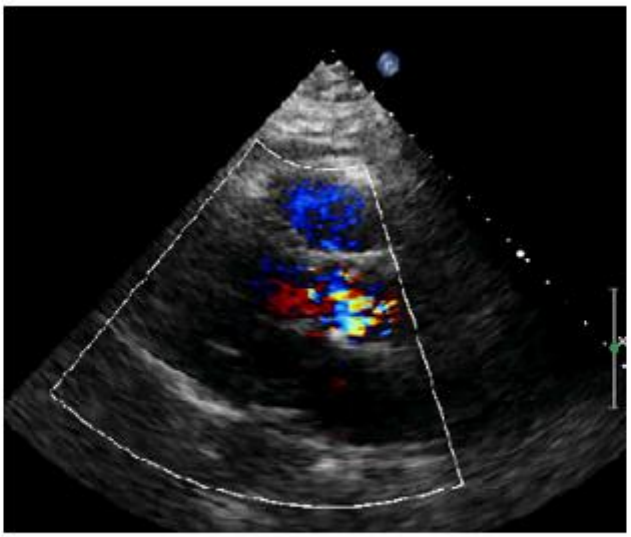
Figure 2. transthoracic echocardiogram. A- Apical two-chamber window showing significant left atrial enlargement; B - Longitudinal window showing supra-aortic membrane (arrow); C- Color Doppler showing aliasing after aortic valve;



(A)



(B)



(C)

6 CONCLUSION

The EAS is the rarest form of obstruction of the left ventricular outflow tract, and can occur in isolation, be inherited in an autosomal dominant manner or associated with Williams Syndrome. Surgery is usually curative and is recommended for symptomatic disease with a gradient measured with cardiac angiography of more than 30 mmHg. Outcomes after surgical correction depend on the nature of the stenosis and the presence of associated cardiac lesions, and echocardiography is an essential diagnostic method in this context. Predictors of worse outcomes and frequent surgical intervention are the presence of diffuse lesions compared with mild stenosis or the presence of associated aortic valve disease.

REFERENCES

1. SABZI, Feridoun. Congenital combined atresia of the left main coronary with supravalvar aortic stenosis. Ann Card Anaesth, v. 21, ed. 4, p. 423-426, out. 2018.

2. COLLINS, R. Thomas. Cardiovascular disease in Williams syndrome. Curr Opin Pediatr. v. 30, ed. 5, p. 609-615, out 2018.

3. CARR, Michelle, et al. EDUCATIONAL SERIES IN CONGENITAL HEART DISEASE: Congenital left-sided heart obstruction. Echo Res Pract. v.5, ed 2, p 23-36, jun 2018.

4. YUAN, Shi-Min. Congenital heart defects in Williams syndrome. Turk J Pediatr. v. 59, ed 3, p. 225-232. 2017.

5. KOZEL,Beth A, et al. Williams Syndrome. Nat Rev Dis Primers. Jun 2021
HAYANO Satoshi, et at. Frequent intragenic microdeletions of elastin in familial supravalvular aortic stenosis. Int J Cardiol. v 274, p 290-295, jan 2019.

6. ROEMERS, Rosa, et at. Surgical Correction of Supravalvar Aortic Stenosis: 52 Years' Experience. World J Pediatr Congenit Heart Surg. v 9, ed 2, p. 131-138, mar 2018.

7. CONSTANTINE, Mavroudis, et at. The Ross, Konno, and Ross-Konno operations for congenital left ventricular outflow tract abnormalities. Cardiol Young. v.24, ed. 6, p 1121-1233, dez 2014.

8. R. VINDHYAL, Mohinder, et al. Supravalvar Aortic Stenosis. StatPearls Publishing. Jan, 2022.

9. MIN, Sander, et al. Genetic Diagnosis and the Severity of Cardiovascular Phenotype in Patients With Elastin Arteriopathy. Circ Genom Precis Med. v 13, ed 6, dez 2020.

10. VALENTE, Acrisio Sales et al . Estenose aórtica supravalvar em adulto com anomalia de vasos da base e insuficiência aórtica. Rev Bras Cir Cardiovasc, São José do Rio Preto , v. 28, n. 4, p. 545-549, dez. 2013 .

CHAPTER 34

Low flow, low gradient paradoxical aortic stenosis: case report and literature review

10.56238/rsfohsv1-034

Saulo Farias Lustosa Da Costa
Cardiology resident at Dr. Carlos Alberto Studart Gomes Hospital
saulo_lustosa@hotmail.com

Ana Carolina Brito de Alcantara
Medical Clinic Resident at Hospital Geral Dr Waldemar Alcântara
acbalcantara@gmail.com

Anderson Alberto Façanha Lima
Medical resident at Hospital Geral Dr Waldemar Alcântara

Viviane Maria Sydrião Peixoto
Medical resident at Hospital Geral Dr Waldemar Alcântara
viviane.msp@hotmail.com

Ranna Jorge de Araújo
Medical resident at Hospital Geral Dr Waldemar Alcântara
rannajorge@gmail.com

Marcos Paulo Ildefonso
Medical Clinic Resident at Dr Waldemar Alcântara General Hospital
marcospauloi@hotmail.com

Giovanna Rolim Pinheiro Lima
Student at Centro Universitario Christus
grolimlima@gmail.com

Carolina Gomes Fernandes
Student at Centro Universitario Christus
carolfernandes.hp7@gmail.com

Ana Luisa Sant'ana Figueiredo
Student at Centro Universitario Christus
analuisasfig3003@gmail.com

Carlos José Mota de Lima
Assistant Professor at Unichristus
carlos_mota_lima@yahoo.com.br

ABSTRACT

Aortic stenosis (AoS) is the most frequent acquired aortic valve disease and will have increasing importance in the coming decades as a more pronounced trend toward population aging occurs. Some patients with aortic valve stenosis (AoS) present low gradients (mean transvalvular gradient < 40mmHg), despite a valve area compatible with significant AoS (AVA < 1.0 cm2) and preserved left ventricular ejection fraction (EF > 50%). Among these patients, it is possible to identify two groups: one with normal flow (indexed systolic volume, VSI > 35 mL/m2), which presents good evolution and prognosis, comparable to patients with moderate AoS (AVA 1.0 to 1.5 cm2), and another, with low flow (VSI ≤ 35mL/m2) that is associated with worse prognosis, being defined as carriers of "paradoxical AoS" (or low-flow, low-gradient AoS with preserved ejection fraction). Objectives: To report the case of a patient admitted to a tertiary hospital and describe the main characteristics of paradoxical low-flow, low-gradient AoS, in addition to its multimodal diagnostic approach. Methodology: This is a review article research in which the database PUBMED was consulted, using as keywords to be searched with the descriptor (DECS/MESH): Paradoxical, aortic stenosis and the keywords Echocardiography and Cardiovascular diagnostic techniques, using the Boolean operator AND. It resulted in 35 articles in the period 2007-2022 and after in a selection in 9 articles. Results: The adoption of a multimodal evaluation by transthoracic echocardiography and computed tomography with quantification of the aortic valve calcium score are essential in the optimization of the diagnostic process, risk stratification and therapeutic approach of patients with AoS low flow, low paradoxical gradient, having direct repercussions on their prognosis. Conclusion: Low-flow, low-gradient paradoxical AoS is a challenging entity in cardiology and these patients should be carefully evaluated so that they are not erroneously classified as having moderate AoS, since the delay in diagnosing the severity of the pathology causes a delay in intervention, leading to increased mortality.

Keywords: Paradoxical Aortic Stenosis; Echocardiography; Cardiovascular diagnostic techniques

1 INTRODUCTION

Aortic stenosis (AoS) is the most frequent valve disease, accounting for the majority of valve intervention procedures. The most frequent etiologies are: degenerative, bicuspid aortic valve and rheumatic disease, the first being the main one and which will gain more and more prominence in the coming decades with the aging population. There is no pharmacological therapy that reduces the progression of the disease, and valve replacement, either surgical or percutaneous, is the only treatment. These patients have risk factors traditionally referred to coronary artery disease and mitral valve annulus calcification (MAC).4

Low-flow, low-gradient aortic stenosis despite preserved ventricular ejection fraction, referred to as paradoxical aortic stenosis, is one of the most challenging valve diseases in cardiology. It is defined by a valvular area ≤1 cm2, valvular area indexed to body surface area ≤0.6cm2/m2, mean gradient <40mmHg, ejection fraction ≥50% and the presence of low flow (indexed systolic ejection volume <35ml/m2).1-5

Paradoxical aortic stenosis continues to be underdiagnosed, with its indication for surgery 40 to 50% lower than those with significant aortic stenosis of high gradient. It is important to understand the diagnostic flowchart of this pathology in order to intervene at the appropriate time and reduce morbidity and mortality.1-3

2 GOALS

The objectives of this paper are: to report the case of a patient admitted to a tertiary hospital and describe the main characteristics of AoS low flow, low paradoxical gradient, and the importance of its multimodal diagnostic approach.

3 METHODOLOGY

This is a review article type of research, based on a similar systematic approach to the Preferred Reporting Items for Systematic Review, following the steps proposed by Pereira and Galvão (2014), which were: 1. Elaboration of the research question; 2. literature search; 3. selection of articles; 4. data extraction; 5. evaluation of methodological quality; 6. data synthesis. Then, the PUBMED database was consulted, using as keywords to be searched with the descriptor (DECS/MESH): Paradoxical, Aortic Stenosis and the keywords Echocardiography and Cardiovascular diagnostic techniques, using the Boolean operator AND. The result was 35 articles from 2007-2022, and then a selection of 9 articles.

4 CASE REPORT

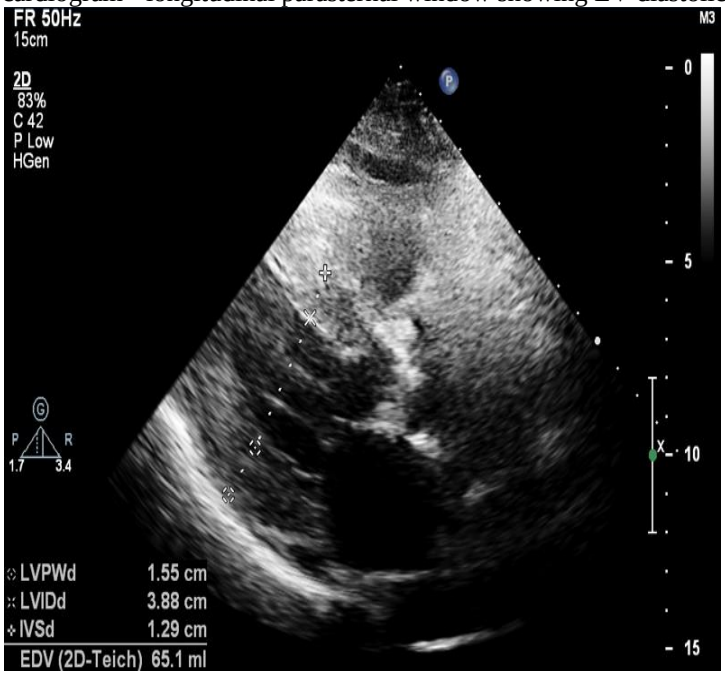
84-year-old male patient, 60 kg, 1.55 m, with a history of heart failure without defined etiology and non-dialytic chronic kidney disease. He had been complaining of dyspnea on moderate effort for a year,

worsening in the last month, referring the symptom on minimal effort, which made him seek medical attention at the emergency room of a tertiary hospital, where he was admitted to the hospital.

Upon admission, he was in regular general condition, with jugular turgor, but with a comfortable breathing pattern; cardiopulmonary auscultation revealed a systolic murmur at an aortic focus, crescendo-decrescendo +++/6+ with Gallavardin phenomenon, in addition to crackles at the lung bases. A two-dimensional transthoracic echocardiogram was performed which showed: left ventricular (LV) systolic diameter: 38x27 mm; left ventricular septum: 15 mm; left ventricular posterior wall: 15 mm (Figure 1); left atrial volume: 53 ml/m2 (RV < 29 ml/m2); left ventricular mass index: 136.25 g/m2 (VN < 116 g/m2); LVEF (by Simpson method: 67 % (Figure 2); indexed systolic volume: 26 ml/m2; aortic valve showing significant calcification with restricted opening, area: 0.79 cm2 (0.47cm2/m2); LV-AO gradient (mean): 28 mmHg, maximum aortic transvalvular velocity: 3.43 m/s (Figure 3). Concentric left ventricular hypertrophy; valvuloarterial impedance (AVZ): 5.53 mmHg/ml/m2 (important when > 5 mmHg/ml/m2), LVEDD 18 mm, IVDD = 0.3. Global longitudinal strain analysis in apical 4-chamber projection: -14% (Figure 5). Blood pressure during echocardiography: 120x80 mmHg.

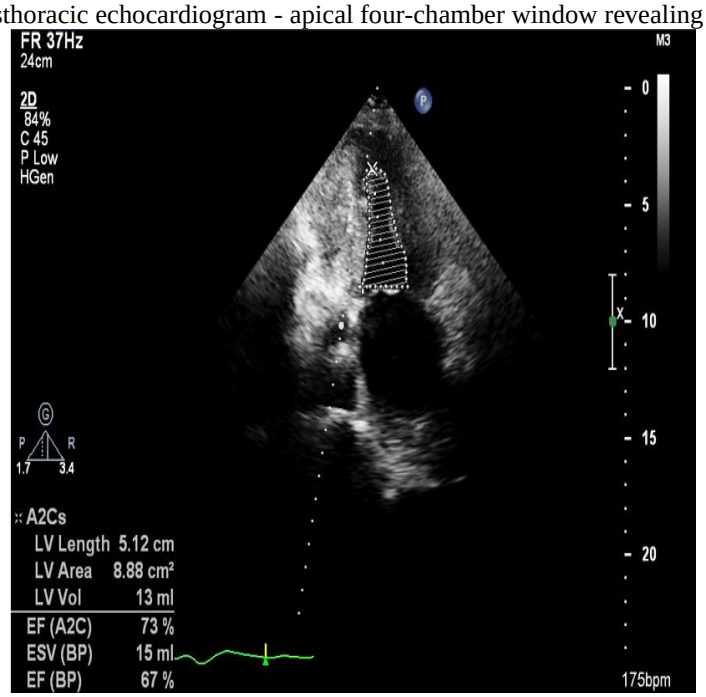
After characterizing the condition as low-flow, low-gradient aortic stenosis with preserved (or paradoxical) ejection fraction, a chest CT scan was performed to evaluate the aortic valve calcium score (Figure 5), which was 2349 Agatston (AU), configuring the pathology as important.

Figure 1: Transthoracic echocardiogram - longitudinal parasternal window showing LV diastolic diameter and wall thickness



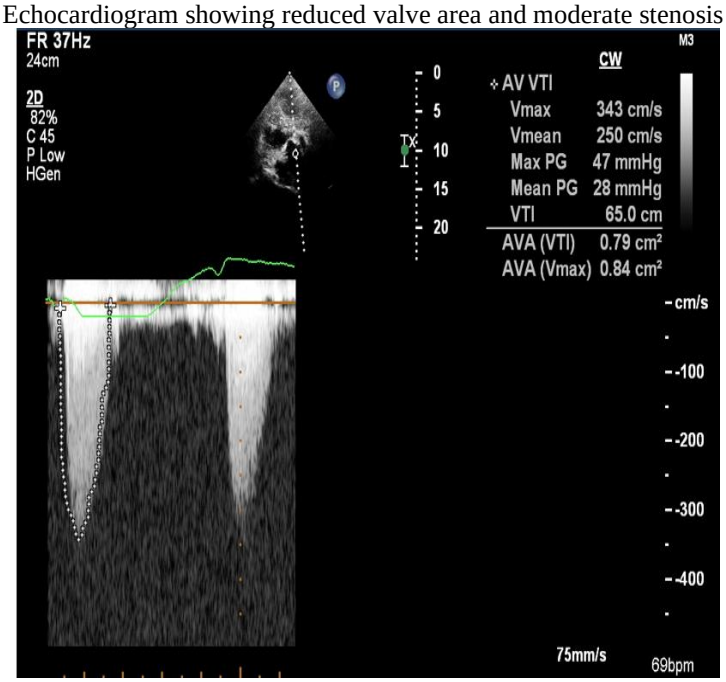
Source: Personal collection.

Figure 2: Transthoracic echocardiogram - apical four-chamber window revealing LVEF of 67%.



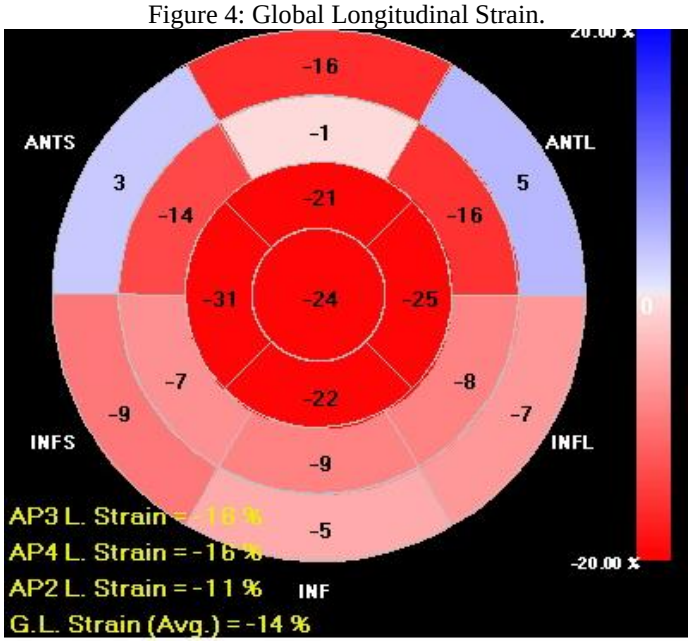
Source: Personal collection.

Figure 3: Echocardiogram showing reduced valve area and moderate stenosis gradients.



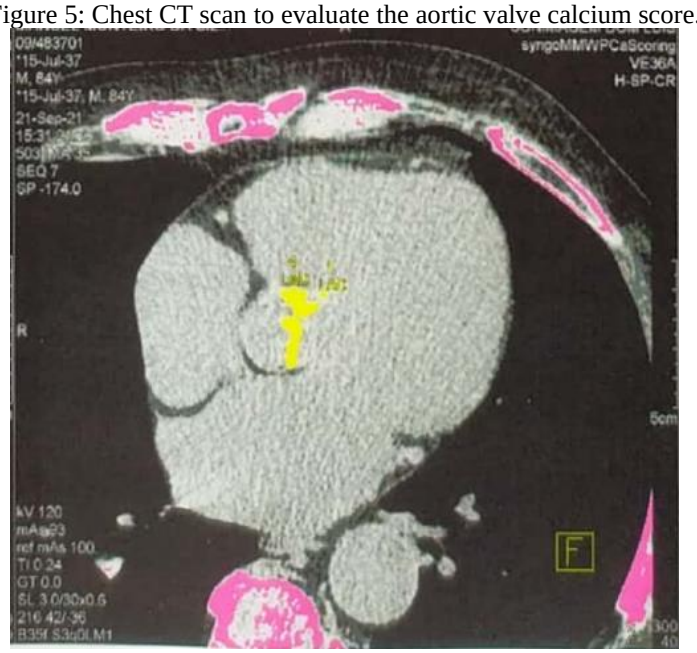
Source: Personal collection.

Figure 4: Global Longitudinal Strain.



Source: Personal collection.

Figure 5: Chest CT scan to evaluate the aortic valve calcium score.



Source: Personal collection.

5 LITERATURE REVIEW

First described in 2007 by Hachicha et al. paradoxical aortic stenosis remains one of the most challenging entities in clinical cardiology practice.6 It is defined by a valve area ≤1 cm2 or indexed ≤0.6cm2 /m2 , with a peak velocity <4 m/s, low indexed systolic ejection volume (≤ 35 ml/m2) and a mean transvalvular pressure gradient <40mmHg despite preserved LVEF (≥50%). 1,2,3

Some studies have indicated a prevalence of up to 30% of patients with paradoxical AS among those with significant AoS. These patients are more often hypertensive, elderly and women. Moreover, in the study by Clavel et al, they also had a higher incidence of coronary artery disease and diabetes mellitus than patients with major high-gradient AoS.5,8

In essence, classic low flow low gradient aortic stenosis represents heart failure with reduced left ventricular ejection fraction (ICFEr), while paradoxical aortic stenosis represents heart failure with preserved ejection fraction (ICFEp).5

Paradoxical AoS shares many pathophysiological and clinical similarities with ICFEp. In fact, these entities are often associated with advanced age, female gender, and systemic hypertension. Furthermore, the mechanisms (impaired diastolic filling and reduced systolic longitudinal function) underlying the reduction in systolic volume is similar in both entities.5

A large proportion of patients (25-35% depending on the institution or country) with AoS have a low-flow state despite a preserved LVEF and these patients have worse outcomes.5 Furthermore, because of the low-flow state, patients often have a low gradient despite reduced valve area, making it difficult to assess the severity of stenosis. Reduced systolic volume is usually related to pronounced concentric LV remodeling with major reduction of its cavity, impaired LV diastolic filling, and reduced LV longitudinal systolic function.5,6 Systolic volume measurement should be systematically indexed by the patient's body surface in the echocardiographic evaluation of AoS and the presence of low flow, i.e., indexed systolic volume < 35 mL /m2 , should be reported. Some authors, however, propose that the transvalvular flow rate is not only dependent on the systolic volume, but also on the duration of LV ejection, defining low flow as an average transvalvular flow of 200ml/s.4

The most common technical pitfall that can lead to a misdiagnosis of low-flow status and overestimation of stenosis severity is an underestimation of the left ventricular outflow tract diameter (LVOTD) measurement. The effective aortic valve area (AVA) is determined by the continuity equation method, where the numerator is the measured LV outflow tract systolic volume (LVOT), calculated by multiplying the outflow tract area (ACTVSVE) by the LV outflow tract velocity time integral(LVIVVSVE), and in the denominator is the velocity time integral (VTI) of the aortic transvalvular flow (Equation 1).4

$$\mathrm{AVA} = \frac{\mathrm{ACT_{VSVE}} \times \mathrm{VIT_{VSVE}}}{\text{VIT da valvula aórtica}}$$

Equation 1

Since the LVOT diameter is squared in the continuity equation, a small error in this measurement can result in a major error in the calculation of systolic volume and AVA. Consequently, an underestimation of the LVOT diameter can lead to the false conclusion that the patient has low flow.4,8

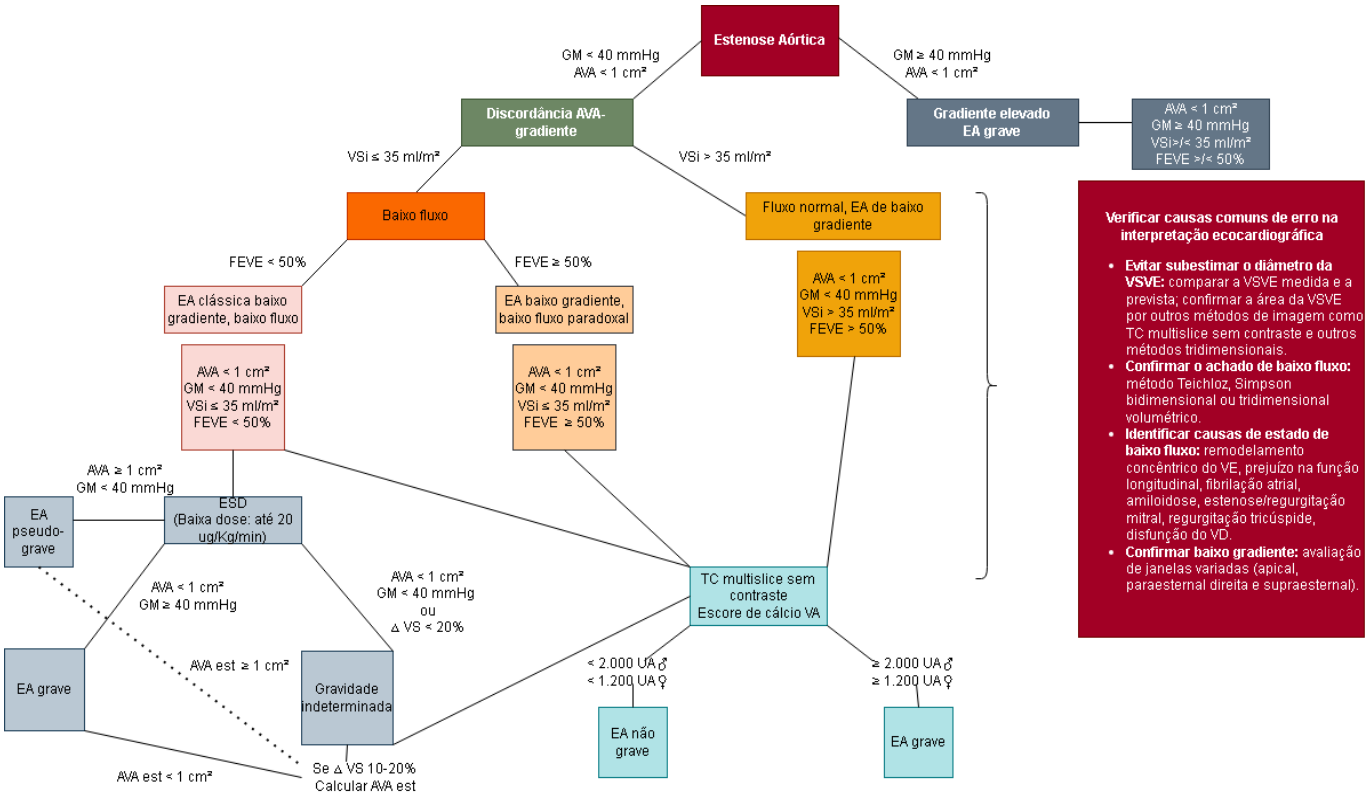
Other factors may lead to a decrease in LV systolic volume and transvalvular flow rate, including significant mitral regurgitation, mitral stenosis, tricuspid regurgitation, or right ventricular dysfunction. If echocardiographic examination reveals the presence of a low-flow state, the underlying cause of the reduced systolic volume should be identified. If no obvious factor can be identified to explain the low flow,

one should then reevaluate the accuracy of the echocardiogram and re-measure the systolic volume or consider other modalities for measuring flow.8

In recent years, other non-invasive diagnostic methods have emerged, important to corroborate the paradoxical phenotype of severe AoS, of which we highlight the evaluation of the left ventricular remodeling, the evaluation of the AVA and LVOT by three-dimensional methods (tomographic and non-tomographic) and the determination of the aortic valve calcium score, the latter being the final step of the diagnostic flowcharts of paradoxical aortic stenosis, according to the main international guidelines. Measurements of aortic valve calcium scores higher than 1200 or 1300AU for women, varying among references, and higher than 2000AU for men constitute significant AE.1-3

The prognosis of patients with paradoxical AoS resembles that of patients with moderate AoS and is better than that of severe (high gradient) forms of AoS. In addition, patients with severe AoS with high gradient evolve, in the absence of valve replacement treatment, to a low-flow, low-gradient phenotype rather than to a paradoxical form.5,7

Figure 6: Algorithm for assessing the severity of aortic stenosis in the different flow-gradient scenarios



Note: Abbreviations: MG = Mean transvalvular gradient; AVA = Aortic valve area; AE = Aortic stenosis; VSi = Indexed systolic volume; LVEF = Left ventricular ejection fraction ; VA = Aortic valve; CT = computed tomography; UA = Agatston units; ESD = dobutamine stress echocardiography; △ VS = Systolic volume change; AVAest = Estimated aortic valve area; LVOT = Left ventricular outflow tract; LV = Left ventricle; RV = Right ventricle.

Except for the PARTNER I cohort B randomized clinical trial that showed improved survival after transcatheter aortic valve implantation (TAVI) compared with conservative management in patients with

paradoxical AoS. It was also shown that TAVI was associated with better survival at 1 year compared to conventional surgical valve replacement in patients with paradoxical AoS. 5

However, all studies evaluating survival in patients with paradoxical AE according to the type of treatment were observational and residual confounding factors cannot be excluded.

A recent meta-analysis showed that patients with paradoxical AS have a 67% higher risk of mortality compared to high-gradient AS, and corroborated that valve replacement reduces mortality by 57% in patients in this subgroup.9

More advanced LV myocardial involvement, documented by higher degree of myocardial fibrosis measured by cardiac MRI, moderate / severe LV diastolic dysfunction, reduced LV global systolic longitudinal strain and very low indexed systolic volume are associated with increased mortality risk in patients with paradoxical aortic stenosis and with worse outcomes after valve replacement. In some studies, baseline longitudinal strain has been shown to be more sensitive than global longitudinal strain for predicting outcomes. However, regional strain is more susceptible to variation than global strain.1,4

Although plasma BNP levels have proven useful for risk stratification in patients with low-flow, low-gradient classic aortic stenosis, their role is unclear for those with paradoxical AoS. In contrast to patients with low-flow, low-gradient classical AS, those with paradoxical AS exhibit pronounced LV concentric remodeling and small cavities. The extent of myocardial stretch and consequent natriuretic peptide release may therefore not accurately reflect the severity of myocardial structural change and function in these patients.1,4

Recent studies have shown that patients with paradoxical aortic stenosis were less frequently treated invasively with valve replacement than other AoS groups. The less frequent use of the valve replacement option observed in these patients may be related to their worse risk profile and by the likely underestimation of severity by the low gradient. The incorporation of multimodal assessment was essential for a reduction in the number of cases of paradoxical aortic stenosis wrongly classified as moderate, directly impacting on their prognosis. In summary, the literature seems relatively unanimous regarding the need for aortic valve replacement (surgical or percutaneous) in a symptomatic patient with paradoxical AoS.7

It is therefore recognized in the European, American, and Brazilian guiding documents on valvular disease that aortic valve replacement in paradoxical AoS has a class IIa indication (although with level of evidence C).1,2,3

The delay in diagnosing paradoxical AoS causes a delay in intervention, leading to an increase in mortality.9 In order to facilitate this process and the timely treatment of the pathology, a flowchart was developed by the main international guidelines (figure 2).1,2,3

In this way, it is possible to take a targeted approach with earlier diagnosis of these patients, preventing their symptoms from being neglected, leading to the triggering of interventional treatment at an opportune moment.1,3

6 CONCLUSION

Paradoxical aortic stenosis, whose pathophysiology remains undefined and natural history uncertain, is characterized by reduced indexed systolic volume and low gradient in patients with severe reduction of the aortic valve area and preserved LV systolic function.1-5 The adoption of a multimodal evaluation by transthoracic echocardiography, with attention to measurement errors and adequate pressure levels during the examination, and the use of the aortic valve calcium score are essential in optimizing the diagnostic process, risk stratification, and therapeutic approach. 5

Although the literature is not consensual, the prognosis of symptomatic paradoxical AS is unfavorable. In patients with symptomatic paradoxical AS, valve replacement therapy can be performed, either surgically or percutaneously, with an impact on reducing symptoms and mortality.5,8,9 The current evidence suggests that TAVI is preferable to surgery in this phenotype of AoS, however, more studies will be necessary to define the best intervention strategy to be used. 7

BIBLIOGRAPHIC REFERENCES

Vahanian A, Beyersdorf F, Praz F, Milojevic M, Baldus S, Bauersachs J, Capodanno D, Conradi L, De Bonis M, De Paulis R, Delgado V, Freemantle N, Gilard M, Haugaa KH, Jeppsson A, Jüni P, Pierard L, Prendergast BD, Sádaba JR, Tribouilloy C, Wojakowski W; ESC/EACTS Scientific Document Group. 2021 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2021 Aug 28:ehab395. doi: 10.1093/eurheartj/ehab395. Epub ahead of print. PMID: 34453165.

Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation. 2017 Jun 20;135(25):e1159-e1195. doi: 10.1161/CIR.0000000000000503. Epub 2017 Mar 15. PMID: 28298458.

Tarasoutchi F, Montera MW, Ramos AIO, Sampaio RO, Rosa VEE, Accorsi TAD, Santis A, et al. Update of the Brazilian Guidelines for Valvular Heart Disease – 2020. Arq. Bras. Cardiol. 2020;115(4):720-75.

Baumgartner H Chair, Hung J Co-Chair, Bermejo J, Chambers JB, Edvardsen T, Goldstein S, Lancellotti P, LeFevre M, Miller F Jr, Otto CM. Recommendations on the echocardiographic assessment of aortic valve stenosis: a focused update from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. Eur Heart J Cardiovasc Imaging. 2017 Mar 1;18(3):254-275. doi: 10.1093/ehjci/jew335. PMID: 28363204.

Clavel MA, Magne J, Pibarot P. Low-gradient aortic stenosis. Eur Heart J. 2016 Sep 7;37(34):2645-57. doi: 10.1093/eurheartj/ehw096. Epub 2016 Mar 31. PMID: 27190103; PMCID: PMC5030681.

Hachicha Z, Dumesnil JG, Bogaty P, Pibarot P. Paradoxical low flow, low gradient severe aortic stenosis despite preserved ejection fraction is associated with higher afterload and reduced survival. Circulation. 2007;115(22):2856-64. doi: 10.1161/CIRCULATIONAHA.106.668681.

Pibarot P, Dumesnil JG. Low-flow, low-gradient aortic stenosis with normal and depressed left ventricular ejection fraction. J Am Coll Cardiol. 2012;60(19):1845-53. doi: 10.1016/j.jacc.2012.06.051.

Clavel MA, Burwash IG, Pibarot P. cardiac imaging for assessing low-gradient severe aortic stenosis. JACC Cardiovasc Imaging. 2017;10(2):185-202. doi: 10.1016/j.jcmg.2017.01.002.
Maes F, Boulif J, Piérard S, et al. Natural history of paradoxical low-gradient severe aortic stenosis. Circ Cardiovasc Imaging. 2014;7:714---22.

CHAPTER 35

Turcot syndrome, a case report

10.56238/rsfohsv1-035

Carolina Maria Monteiro e Silva
Graduated in Medicine at Centro Universitário do Espírito Santo (UNESC) in 2020/2
Address: Rua Adamastor Salvador, 219, Bairro Centro - Colatina, ES, Zip Code: 29700-050
E-mail: carolinamariabrasil@hotmail.com

Lucas Arantes
Physician, by UNESA - RJ
Residency in Internal Medicine at HFCF (Hospital Federal Cardoso Fontes)
Estrada dos três rios, 1245, Freguesia, RJ
Zio code: 22745-004
E-mail: lucasarantesvasconcelos@hotmail.com

Mayana Cerqueira Martins da Silva
Medical Student at Universidade Salvador (UNIFACS)
Institution: UNIFACS
Address: Rua Minas Gerais, 298- apto 103. Pituba - Salvador, BA, Zip Code: 41830-020
E-mail: maycerqueirams@gmail.com

Rodrigo Marcelo Moreira de Oliveira Filho
Graduated in medicine at PUC Goiás
Address: Alameda dos Bosques, Quadra 3, Lote 14; Condominio Jardins Monaco; Bairro Vera Cruz - Aparecida de Goiânia, Goiás, Zip Code: 74934-706

Ardala Policena Alexandre Fernandes
Medical Student, 11th period, Universidade de Rio Verde, Aparecida Campus
Address: Rua Coronel Cosme, 85, Res Harmonia apto 2503B, Setor Leste Vila Nova - Goiânia, Goiás, Zip Code: 74635-030
E-mail: ardalapaf@hotmail.com

Beatriz Geraldo Moitinho
Doctor by USCS - Universidade Municipal de São Caetano do Sul - SP 2021/02
Institution: UPH North Zone Sorocaba / UPA of Eden Sorocaba
E-mail: biagmoitinho@gmail.com

Sarah Souza Quiste Schwening
Doctor by UNIFENAS-BH (José do Rosário Vellano University)
Pedro Miranda Institute - IPM
E-mail: sarahquiste@hotmail.com

Talita Trindade França
Medical degree from Centro Universitário de Brasília (CEUB) in 2021.2.
Institution: Armed Forces Hospital
E-mail: talitafranca.med@gmail.com

Mariana de Arruda Frazao
Physician by the institution Uniceuma in 2020.2.
Institution: Tempo Clinic
E-mail: frazaoamariana@gmail.com

Victoria de Oliveira Carmo Borges
Undergraduate student of Medicine, Faculdade São Leopoldo Mandic- Campinas SP
Institution: São Leopoldo Mandic College, Campinas SP
Email: borgesvictoria1006@gmail.com

Thaciane Karen Ribeiro
Physician at Adamantina University Center 2021
Municipal Hospital Vereador José Storopolli
E-mail: thacikarenribeiro@gmail.com

Maria Carolina de Moraes Marques
Medical at the Universidade Tocantinense Presidente Antônio Carlos (Araguaina-TO).
Institution: FEAES (State Foundation for Health Care).
E-mail: carol.moraesmarques@gmail.com

Mariana Queiroz Souza Pereira
Doctor by UNICEPLAC-2019
Institution: Coordination of Basic Care of the Balneário Piçarras - SC City Hall
E-mail: marianaqueiroz_@hotmail.com

Beatriz Plotegher Zaramella
Doctor by USCS - São Caetano do Sul Municipal University - SP 2021/2
Grajaú General Hospital - São Paulo
Email: biapzaramella@gmail.com

José Roberto Beretta Paiano de Oliveira
Medical student at UNOESTE
UNOESTE (Presidente Prudente Campus)
E-mail: joseberetta2015@gmail.com

Luiza Helena Bauermann Gubert Carvalho
Medical degree at the Universidade Evangélica de Goias
Instituto Pedro Miranda- IPM
E-mail: lu.bgubert@gmail.com

Nathália Borges de Paiva
Instituto Master de Ensino Presidente Antônio Carlos - IMEPAC
Emergency Care Unit of Araxá-MG
E-mail: nattybpaiva@hotmail.com

Bruna Cunha de Mello
Universidade Federal do Tocantins (UFT)
Sagrado Coração de Jesus Hospital
E-mail: brunacunhamello1@gmail.com

Júlia Saliba Santos Avelans

Doctor, graduated at UNICEPLAC
Institution: J. S. A. Medical Services
E-mail: julia@santosavelans.com.br

Kênia Marques Novato Rolindo
Physician, graduated at Universidade Federal do Tocantins (UFT)
Santa Marcelina Hospital
E-mail: keniamarques14@hotmail .com

Kamila Basilio Arruda
M.D. from the Federal University of Mato Grosso - UFMT
Municipal Health Secretariat of Uruana Goias
E-mail: kamilabasilioarruda@gmail.com

Lays Nascimento Leão
Physician graduated at Universidade José Rosário Vellano (Unifenas Belo Horizonte)
Working at the Nefron clinic and SAMU of Rio Verde
laysn.leao@hotmail.com

Giovanna Machado Prudente
Medical student at Universidade de Rio Verde Campus Aparecida de Goiânia (UniRV)
Institution: Universidade de Rio Verde Campus Aparecida de Goiânia (UniRV)
Email: gii.prudente@hotmail.com

ABSTRACT
Introduction: Polyposis intestinal syndrome associated with brain tumor is also known as Turcot syndrome. The intestinal manifestations in this syndrome are identical to those found in FAP, and the CNS tumors described in this syndrome are often astrocytomas, glioblastomas and medulloblastomas. Case presentation: a 16-year-old Caucasian female patient, admitted in October 1990 at the Colon and Rectum Service Infirmary of the Digestive Surgery Department of the HC, FMUSP, complaining of tumors in the anal region for two years, accompanied by bleeding. She had been submitted to hemorrhoidectomy one year before. Colonoscopy showed a 2 cm sessile polyp located 10 cm from the anus. Discussion: Turcot syndrome is a rare inherited disease characterized by the association of familial adenomatous polyposis with central nervous system tumors. Polyps are the most common neoplasms of the digestive tract, they can be single or multiple, hereditary or acquired. They are usually asymptomatic and can be diagnosed by rectosigmoidoscopy, enema or colonoscopy, through a polyp and its histopathological study. Conclusion: The importance of early identification, follow-up and counseling of families that present this syndrome is of fundamental importance for the prognosis and treatment of lesions, since the modifications and reversals of genetic structures that promote the specific disease are not yet reversible.

Keywords: turcot syndrome; intestinal polyposis; astrocytomas.

1 INTRODUCTION

Polyposis intestinal syndrome associated with brain tumor, is also known as Turcot syndrome.

Denominations such as multiple polyposis, disseminated polyposis, familial adenomatosis, familial polyposis of the colon, adenomatous intestinal polyposis and others have been used to describe this disease. Currently the term Familial Adenomatous Polyposis is preferred, suggested by the *Leeds Castle Polyposis Group,* to highlight the origin of the polyps and the hereditary nature of the disease (THOMSON, 1987) (WEXNER, 1991).

The intestinal manifestations in this syndrome are identical to those found in FAP, and the CNS tumors described in it are often astrocytomas, glioblastomas, and medulloblastomas (TATAGIBA, 2017).

This syndrome has been subdivided clinically and genetically into two main types: type 1, with mutations in one of the MMR (*mismatch repair* - DNA nucleotide repair) genes, and type 2, with mutations in the APC (*colonic adenomatous polyposis*) gene (SOUSA, 2012). Early detection of the disease is only possible in relatives of individuals with the condition.

In this study, the case of an X-year-old patient with Turcot Syndrome is reported. Its main objective is to approach the epidemiology, diagnosis, and treatment of this disease, considered rare.

2 PRESENTATION OF THE CASE

M.P.S., a 16-year-old Caucasian female patient admitted in October 1990 at the Colon and Rectum Ward of the Digestive Surgery Department of the HC, FMUSP, complaining of a tumor in the anal region for two years, accompanied by bleeding. She had been submitted to hemorrhoidectomy one year before. Colonoscopy showed a 2 cm sessile polyp located 10 cm from the anus.

Colonoscopy showed a 2 cm sessile polyp located 10 cm from the anus. Near the rectosigmoid transition a large polypoid tumor of approximately 10 cm and sessile polyps throughout the colon ranging in size from 2 mm to l cm were found. In addition, there was a large amount of polyps throughout the ileal segment examined. In November of the same year she underwent total colectomy with ileo-rectal-anastomosis and was discharged one week later. Pathological examination revealed the presence of numerous tubular adenomas as well as a villous-tubular adenocarcinoma of the sigmoid. After three months, she was admitted to the Neurosurgery Emergency Room of the same hospital with a history of headache and vomiting for three days, accompanied by altered level of consciousness. Cranial computed tomography (CT) revealed a left frontal basal cystic tumor

On the same day, she was submitted to frontal craniotomy with subtotal excision of the process. The pathological examination revealed that it was a glioblastoma multiforme. The patient was submitted to 5550 rads in the cephalic segment. She remained asymptomatic for one year, when she again presented signs of intracranial hypertension, caused by a recurrence of the frontal process. Reoperated in April 1992, she was discharged after 10 days, without neurological sequelae. The patient died 5 months after the last surgery, in her home town.

3 DISCUSSION

Turcot syndrome is a rare inherited disease characterized by the association of familial adenomatous polyposis (FAP) with central nervous system (CNS) tumors.

Polyps are the most common neoplasms of the digestive tract, they can be single or multiple, hereditary or acquired. They are usually asymptomatic and can be diagnosed by means of rectosigmoidoscopy, enema, or colonoscopy, to obtain a polyp and thus perform a histopathological study. They can be limited to the bowel only or be present in extra-colonic manifestations, constituting syndromes such as Turcot syndrome.

CNS tumors, on the other hand, are astrocytomas, glioblastomas, and medulloblastomas. The medulloblastoma is the most frequent, developing from embryonic cells. The patient's clinic consists of headache, malaise and vomiting due to increased intracranial pressure.(RUIZ HERNANDEZ,2018) - (GOUVEIA, 2017).

There are some manifestations added to Turcot syndrome, such as coffee-colored skin patches, formation of multiple benign fatty tumors, and the development of basal cell carcinoma.(CORBERA-HINCAPIE, 2018)

Some researchers divide it into type 1 (TS1) which is characterized by the occurrence of glial tumors and is caused by mutations of some of these genes (MLH1, MSH2, PMS2 and MSH6). Type 2, caused by mutations of the APC gene, whose phenotypic manifestations are intestinal polyposis, colorectal carcinoma and medulloblastoma (GIUNTI L, 2009).

Treatment consists of surgical resection. In patients who have adenomatous colorectal polyps, surgery is the mainstay due to the high chance of the PAF becoming an adenocarcinoma, the options are total colectomy with ileo-rectal anastomosis, total proctocolectomy with definitive terminal ileostomy and reconstructive proctocolectomy with ileal pouch confection, and the process of choosing the surgical approach should be adapted to the severity of the disease, the patient's age, clinical conditions and personal preference. In patients who develop brain tumors, surgery is also used (CAMPOS, 2014), (KHATTAB A, 2021).

4 CONCLUSION

The prevalence and mortality of Turcot syndrome is not yet well established since it is a rare pathology with a description of 200 records in the literature. Of these, according to Stavrou et al. the overall survival of children diagnosed with medulloblastoma who had started treatment was 52% in 10 years, while in the study by Hamilton et al. of individuals with type 2 syndrome only one patient did not progress to death out of the 8 followed.

Although knowledge of chromosomal alterations implies better case management, genetic testing is still not as routinely available and reproducible, thus having colonoscopy and other imaging methods as follow-up and screening tools.

In short, the importance of early identification, follow-up, and counseling of families that present this syndrome is of fundamental importance for the prognosis and treatment of the lesions, since the modifications and reversals of the genetic structures that promote this specific disease are not yet reversible.

REFERENCES

Ahmed Khattab ; Dulabh K. Monga .Síndrome de Turcot. **National Library of medicine-** USA, 2021.

CAMPOS, Fábio Guilherme C. M. de. Polipose Adenomatosa Familiar - Bases do Diagnóstico, Tratamento e Vigilância. **Sociedade Brasileira de Coloproctologia,** 2010, RJ.

Chung HJ, Oh ST, Kim JG, Kang WK. Turcot syndrome: a case report in an unsuspected setting. J Gastrointest Surg. 2012 Feb;16(2):411-4. doi: 10.1007/s11605-011-1698-0. Epub 2011 Sep 30. PMID: 21959784.

Corbera-Hincapie , M. e Beasley, G. "Uma decisão desafiadora de tratamento para um relato de caso de associação rara de síndrome de Turcot familiar com doença de Crohn Fistulizing". **Pediatria de Fronteiras** . 2018.

Emerson Brandão Sousa; Cléciton Braga Tavares; Igor Brenno Campbell Borges; lruena Moraes Kessler. Síndrome de Turcot: relato de caso e achados da imunoistoquímica. Serviço de Neurocirurgia do Hospital de Base do Distrito Federal e Serviço de Neurocirurgia do Hospital da Universidade de Brasília, Brasília, DF, Brasil. **Arq Bras Neurocir** G1í2J: OU—B. 2012

GOUVEIA, Cláudio. Polipose Adenomatosa Familiar: Uma Revisão. Clínica Universitária de Cirurgia II. **Trabalho Final-mestrado integrado em medicina,** 2017. Faculdade de Medicina-Lisboa.

Haggar FA, Boushey RP. Colorectal cancer epidemiology: incidence, mortality, survival, and risk factors. Clin Colon Rectal Surg. 2009 Nov;22(4):191-7. doi: 10.1055/s-0029-1242458. PMID: 21037809; PMCID: PMC2796096.

Hamilton, S. R., Liu, B., Parsons, R. E., Papadopoulos, N., Jen, J., Powell, S. M., … Kinzler, K. W. (1995). The Molecular Basis of Turcot's Syndrome. New England Journal of Medicine, 332(13), 839–847. doi:10.1056/nejm199503303321302
IHOSVANY RUÍZ HERNÁNDEZ, DALGIS JENKI DELGADO, YOSVANY JIMÉNEZ VENTOSA, CARLOS LISANDRO SILVERA RODRÍGUEZ, YANET CARMONA DENIS. Revista médica eletrônica, Vol. 40, No.4, 2018.

Laura Giunti, Valentina Cetica, Ugo Ricci et AL Type A microsatellite instability in pediatric gliomas as an indicator of Turcot syndrome. Eur J Hum Genet. 2009 Jul; 17(7): 919–927.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2986495/

Paraf F, Jothy S, Van Meir EG. Brain tumor-polyposis syndrome: two genetic diseases? J Clin Oncol. 1997 Jul;15(7):2744-58. doi: 10.1200/JCO.1997.15.7.2744. PMID: 9215849.

Sousa EC. A Ressecção Total do Reto: Qual o Papel da Técnica de Eversão? Rev bras Coloproct, 2004; 24(1):38-44. Thompson-Fawcett MW, Warren BF, Mortensen NJ. A new look at anal transitional zone with reference to restorative proctocolectomy and the columnar cuff. Br J Surg 1998,November;85(11): 1517-1521.

Sousa, Emerson & Tavares, Cléciton & Borges, Igor & Kessler, Iruena. (2012). Síndrome de Turcot: relato de caso e achados da imunoistoquímica. Arquivos Brasileiros de Neurocirurgia: Brazilian Neurosurgery. 31. 105-108. 10.1055/s-0038-1625670.

Stavrou T, Bromley CM, Nicholson HS, Byrne J, Packer RJ, Goldstein AM, Reaman GH. Prognostic factors and secondary malignancies in childhood medulloblastoma. J Pediatr Hematol Oncol. 2001 Oct;23(7):431-6.

TATAGIBA, Marcos et al. Síndrome de Turcot. JBNC - JORNAL BRASILEIRO DE NEUROCIRURGIA v. 2 n. 4, 2017: Dezembro.
Thompson-Fawcett MW, Mortensen NJ. Anal transitional zone and columnar cuff in restorative proctocolectomy. Br J Surg 1996, august; 83(8):1047-1055.

TURCOT J, DESPRES JP, ST PIERRE F. Malignant tumors of the central nervous system associated with familial polyposis of the colon: report of two cases. Dis Colon Rectum. 1959 Sep-Oct;2:465-8. doi: 10.1007/BF02616938. PMID: 13839882.

CHAPTER 36

Gestational depressure: factors associated with its occurrence and influences on the mother-child bond

10.56238/rsfohsv1-036

Denise da Silva Modolo
UNICESUMAR University
deni.modolo@gmail.com

Beatriz Angieuski Camacho
UNICESUMAR University
beatrizzcamacho@gmail.com

Adriana Cunha Vargas Tomaz
UNICESUMAR University
adriana.tomaz@docentes.unicesumar.edu.br

ABSTRACT
Depression is the most common psychopathology during pregnancy, is more prevalent in high-risk pregnancies, and about 20% occur in developing countries. The objective of this work is to analyze the consequences of gestational depression on women's health and their relationship with their child. We carried out a survey research with a quantitative approach, of basic and descriptive nature with 70 pregnant women of all age groups. Two questionnaires were applied (Self-Report Questionnaire and a protocol of evaluation of the bond between mother and child), by means of an on-line form and, in person, at the UBS Aclimação (Maringá-PR) and at the Lar Preservação da Vida, in Maringá-PR. Then we analyzed them using descriptive statistics and presented them in tables with frequency and percentage distributions of the variables. The research has approval from the ethics committee and follows the norms of Resolution No. 466/2012 CNS. As results, the interviewees showed a depressive symptom rate of 27.14%, with the most prevalent contributing factors being absent parents during the pregnant woman's childhood (34.29%) and dialogue deprivation (44.29%). Thus, we conclude that external and internal factors influence the mental health of the pregnant woman and the development of the bond with the fetus, and the study of these factors is important to create ways to improve the condition, so that it does not bring harm to the pregnant woman or the child.

Keywords: Pregnancy; Depression; Maternal Health.

1 INTRODUCTION

Depression is the most common psychopathology during pregnancy, being more prevalent in high-risk pregnancies. About 20% of the cases occur in developing countries and 10 to 15% in developed countries, with the highest occurrence in the third trimester of pregnancy (ARAÚJO et. al., 2016). According to Martins (2014), studies conducted in Portugal showed that depression during pregnancy is as prevalent as postpartum depression. Studies conducted in São Paulo and Rio Grande do Sul showed a prevalence of depressed pregnant women of 19.6% and 20.5%, respectively (MORAIS et. al., 2017).

The diagnosis of depression is a complicated task for researchers, as there are still no parameters to accurately state whether the respondent is a carrier of the disease or not (SILVA et al, 2018). However, Araújo et al. (2016) conducted a study with data collection through the Edinburgh Postnatal Depression Scale (EPDS), a self-assessment scale considered one of the best in identifying depressive symptoms, being applicable in the puerperium and gestational period. The authors' research showed that there is a relationship between gestational depression and other variables, such as unplanned pregnancy, low income, education, and multiparity.

Silva et. al. (2018) related the predominance of maternal depression to younger women, or those who had difficulties getting pregnant, in addition to the existence of prenatal depression, marital difficulties,

lack of social support, or birth of babies with anomalies. This demonstrates the influence that socioeconomic factors have on the health of the pregnant woman, to the point of triggering a psychological illness. Since socioeconomic factors present themselves as an endemic problem in Brazil, it is possible to infer that the domain of gestational depression is proportionally as high as these factors, pointing out its magnitude and importance, so often ignored. Depression during pregnancy is also closely related to the child's prematurity, low birth weight, sleep disorders, and is a risk factor for postpartum depression and pre-eclampsia, besides preventing the mother from performing a positive engagement with the child (PEREIRA, ARAÚJO, 2018).

In addition, Greinert et. al. (2018) stated in their research that gestational depression brought difficulties for the establishment of bonding between mother and child, because the pregnant woman has difficulty in performing actions that stimulate the creation of this bond, which is made since intrauterine life. For the depressed pregnant woman, simple acts such as caressing her belly, listening to songs that please the baby, or feeling joy with small movements of the child, are impossible (ARRAIS et. al., 2018).

Perelli et. al. (2014) address the attachment theory, according to which the establishment of attachment is inherent to the human being and the mother is the being able to bring the sense of safety and security that the child needs. Therefore, attachment is not only a psychological need, but also a physiological one. During pregnancy the bonding with the fetus occurs in a more abstract way, because it is necessary for the pregnant woman to imagine her child, to have dreams and hopes for it.

Morais et. al. (2017) state that the failure to create a bond between mother and child compromises the health of both, bringing impacts, for example, on children's learning and increased predisposition to psychiatric disorders. Thus, in depression, since the symptoms of psychopathology prevent the woman from developing positive thoughts about the child being born, the lack of bonding can lead to problems such as decreased dialogue between mother and child, less exchange of glances, and less affectionate relationships (SILVA, 2016).

Given the above, we reflect that research related to gestational depression is still scarce, with greater disclosure of postpartum depression. Therefore, it is of utmost importance to elucidate gestational depression, its triggering factors, and its impacts, since both Araújo et. al. (2016) and Morais et. al. (2017) highlight it as an important public health problem and cause of maternal morbidity and mortality.

This study aims to show that the frequency of depressive conditions during pregnancy is relatively high and that this condition can influence the creation of the mother-child bond.

2 METHODOLOGY

This work is a survey research with a quantitative approach, of a basic and descriptive nature. The research was developed with seventy pregnant women of all age groups who attended, in Maringá-PR, the UBS Aclimação, for prenatal care, and the Lar Preservação da Vida, a Non-Governmental Organization

that welcomes pregnant women in situations of risk or vulnerability in order to prevent abortions in the event of unwanted or unplanned pregnancies, providing protection for women and their children.

Data were collected in person using the Google Forms tool. Data collection occurred in the waiting room of the UBS Aclimação and Lar Preservação da Vida. First, the research objectives were explained to the participants individually, and after their verbal consent and signature of the Informed Consent Form (ICF), the questionnaire was applied.

Two questionnaires were used. The first instrument applied to all pregnant women was the Self-Report Questionnaire (SRQ), which is a self-report questionnaire and screening tool for mental disorders and makes it possible to identify non-psychotic disorders in the community. Comprised of twenty questions with affirmative or negative answers, this questionnaire aims to track the mother's emotional state over the past fifteen days. Adding up the "yes" answers gives a score that can range from one to twenty. A positive classification ≤ 8 indicates that the pregnant woman needs more specific assistance from Psychology professionals.

The second instrument has two parts, and the first has the objective of evaluating the mother-child bond and is composed of fifteen questions with yes/no answers; in case of a positive answer, there are items from "A" to "E" that identify specificities of the questioned item. During its application, it is possible to verify, through the mother's history, indicators of the quality of the mother-child bond, which refer to significant events for her, such as: childhood, adolescence, pregnancy, delivery, postpartum, current facts (professional, personal, marital, and family satisfaction). The second part of the instrument aims to evaluate the possible triggering factors of gestational depression, being composed of fifteen yes/no questions that verify the presence of vulnerability conditions.

The data were compiled in Excel spreadsheet, analyzed using descriptive statistics and presented in tables with frequency and percentage distributions of the variables. The present research began after the approval of the ethics committee and followed the norms of Resolution No. 466/2012 CNS. Authorizations were obtained from the Lar Preservação da Vida and the Secretary of Health to carry out the study, and the pregnant women were asked to sign the Informed Consent Form.

3 PRESENTATION OF THE DATA (RESULTS)

The questionnaires were applied to seventy pregnant women, six (8.57%) with gestational age of up to twelve weeks (first trimester); 31 (44.28%) with gestational age between thirteen and twenty-four weeks (second trimester); and 32 (45.71%) with gestational age above twenty-four weeks (third trimester).

Table 1 classifies the number of pregnant women according to age group and trimester of pregnancy. This study indicated that 18.57% of the pregnant women were between 14 and 23 years old; 50% of the pregnant women were between 24 and 31 years old, and 31.43% of the pregnant women were between 32 and 43 years old. Regarding social aspects, 15.7% were unemployed and 10% had low income. Still, 95.7% had access to health services and adequate housing, and 88.57% had completed high school.

Table 1. Identification data of pregnant women according to gestational trimesters. Maringá, 2022.

	1st quarter		2nd quarter		3rd quarter		Total	%
	n	%	n	%	n	%	n	%
Age Group								
14 - 23	1	16,67	6	19,35	6	18,75	13	18,57
24 - 31	4	66,67	15	48,39	16	50	35	50,00
32 - 43	1	16,67	10	32,26	11	34,38	22	31,43
TOTAL	6	100	31	100	32	100	70	100
Social factors								
Unemployment	2	33,33	4	12,90	5	15,63	11	15,71
Low Income	0	0	4	12,90	3	9,38	7	10,00
Adequate housing	6	100	31	100	30	93,75	67	95,71
High school complete	6	100	28	90,32	28	87,5	62	88,57
Access to health services	6	100	29	93,55	32	100	67	95,71

Source: own elaboration.

Table 2 relates the quality of the daily activities performed by pregnant women according to gestational age. It can be observed that 44.29% found satisfaction in performing their daily activities, while 38.57% had a loss of interest. Still, 32.86% of the pregnant women felt frustrated professionally and 45.71% found it difficult to make decisions. Finally, 51.43% had low quality sleep.

Table 2. Quality of daily activities of pregnant women according to trimester of gestation. Maringá, 2022.

	1st quarter		2nd quarter		3rd quarter		Total	%
	n	%	n	%	n	%	n	%
Satisfaction in daily activities	1	16,67	16	51,61	14	43,75	31	44,29
Difficulty in making decisions	3	50	11	35,48	18	56,25	32	45,71
Loss of interest in activities	3	50	9	29,03	15	46,88	27	38,57
Professional frustration	3	50	9	29,03	11	34,38	23	32,86
Poor quality sleep	3	50	13	41,94	21	65,63	36	51,43

Source: Own elaboration, 2022.

Table 3 identifies relevant aspects about signs and symptoms reported by pregnant women according to each trimester. It is noteworthy that 28.57% had frequent headaches, with most of this percentage concentrated in the second trimester (17.14%). Lack of appetite was present in 15.71% and was more frequent in the second trimester (19.35%); 42.86% said they were easily frightened, and 11.43% presented hand tremors. Epigastralgia was present in 44.29% of the interviewees, being more frequent in the third trimester, probably related to the size that the uterus reaches in this phase of pregnancy. Symptoms of poor digestion were found in 42.86% of the interviewees and fatigue was present in 61.43% of them, the former being more frequent in the second trimester and the latter in the third trimester.

Table 3. Signs and symptoms commonly presented by pregnant women, divided according to each gestational trimester. Maringá, 2022.

	1st quarter		2nd quarter		3rd quarter		Total	%
	n	%	n	%	n	%	n	%
Frequent headaches	1	16,67	12	38,71	7	21,88	20	17,14
Lack of appetite	1	16,67	6	19,35	4	12,5	11	15,71
Scares easily	2	33,33	14	45,16	14	43,75	30	42,86
Hand tremors	2	33,33	2	6,45	4	12,5	8	11,43
Poor digestion	3	50	15	48,39	12	37,5	30	42,86
Fatigue	3	50	18	58,06	22	68,75	43	61,43
Epigastralgia	3	50	13	41,94	15	46,88	31	44,29

Source: Own elaboration, 2022.

Table 4 shows data referring to feelings and emotions, according to the gestation period. It is possible to observe that 74.29% felt nervous or worried frequently; 42.86% reported sadness and difficulty to think clearly, and 60% had frequent crying episodes; 40% considered they had low self-esteem and 32.86% had feelings of worthlessness; 70% felt anxious frequently, while 27.14% felt depressed. Professional frustration was a feeling that reached 37.14% of the interviewees, besides the feeling of disbelief, which was present in 24.29%. Finally, the feeling of isolation was part of the emotional state of 14.29% of the pregnant women, being more prevalent in the last trimester. Suicidal ideation was present in 5.71%, which was not present in the first trimester and was equally distributed between the second and third trimesters.

Table 4. Distribution of emotions presented by the interviewees according to the trimester of pregnancy. Maringá, 2022.

	1st quarter		2nd quarter		3rd quarter		Total	%
	n	%	n	%	n	%	n	%
Nervousness and worry	4	66,67	20	64,52	28	87,5	52	74,29
Difficulty in thinking clearly	3	50	13	41,94	14	43,75	30	42,86
Sadness	4	66,67	12	38,71	14	43,75	30	42,86
Frequent crying	5	83,33	14	45,16	23	71,88	42	60,00
Feeling of worthlessness	3	50	8	25,81	12	37,5	23	32,86
Feeling of discredit	2	33,33	4	12,90	11	34,38	17	24,29
Suicidal ideation	0	0	2	6,45	2	6,25	4	5,71
Low self-esteem	3	50	11	35,48	14	43,75	28	40,00
Professional frustration	3	50	9	29,03	14	43,75	26	37,14
Insulation	0	0	2	6,45	8	25	10	14,29
Depression	1	16,67	6	19,35	12	37,5	19	27,14
Anxiety	2	33,33	23	74,19	24	75	49	70,00

Source: Own elaboration, 2022

Table 5 aims to evaluate the quality of the bond between mother and child. For this, the data were divided into aspects related to the pregnant woman's childhood and aspects of current life. Thus, regarding the biopsychosocial aspects of the interviewee's childhood, 8.57% said they had neglectful parents, 10% had aggressive parents, and 34.29% had an absent parent. Still, 20% considered that they had a childhood deprived of affection, 11.43% dealt with feelings of rejection, 44.29% felt a lack of dialogue in the family environment, and 18.57% considered that they had negative parental references. It was also observed that 28.57% faced financial difficulties in their childhood and 11.43% had mothers with multiple partners during this same phase. Finally, 55.71% considered that they had present and loving parents.

Regarding current life, 15.71% said it was an unwanted pregnancy, and 5.71% had attempted abortion. Even so, 92.86% had had adequate prenatal care and were moved by fetal movements or images of the baby in the ultrasound exam. The percentage of respondents who accepted well the sex of the baby was 95.71%, and 35.71% had had previous pregnancies. The use of alcohol was reported by 68.57% of the interviewees, and 17.14% said they had already used some illicit drug such as marijuana, crack, cocaine, and LSD. Finally, 14.29% of pregnant women reported having some chronic disease, being this characteristic more prevalent in the third trimester.

Table 5. Evaluation of the bond between mother and child through past and present elements in the pregnant woman's life. Maringá, 2022.

	1st quarter		2nd quarter		3rd quarter		Total	%
	n	%	n	%	n	%	n	%
Childhood of the pregnant woman								
Neglectful Parents	0	0	2	6,45	4	12,5	6	8,57
Aggressive parents	0	0	2	6,45	5	15,63	7	10,00
Absent Parents	2	33,33	11	35,48	11	34,38	24	34,29
Affection deprivation	1	16,67	6	19,35	7	21,88	14	20,00
Feeling of rejection	0	0	3	9,68	5	15,63	8	11,43
Financial difficulties	2	33,33	10	32,26	8	25	20	28,57
Dialogue Deprivation	1	16,67	13	41,94	17	53,13	31	44,29
Mother with multiple partners	1	16,67	2	6,45	5	15,63	8	11,43
Present and Loving Parents	3	50	17	54,84	19	59,38	39	55,71
Negative parental reference	1	16,67	7	22,58	5	15,63	13	18,57
Current life of the pregnant woman								
Unwanted Pregnancy	0	0	8	25,81	9	28,13	17	15,71
Attempted abortion	0	0	1	3,23	3	9,38	4	5,71
Adequate prenatal care	6	100	30	96,77	29	90,63	65	92,86
Commotion in the face of fetal movements	5	83,33	31	100	29	90,63	65	92,86

Acceptance of the sex of the baby	6	100	28	90,32	32	100	67	95,71
Previous pregnancies	1	16,67	10	32,26	14	43,75	25	35,71
Use of illicit drugs	0	0	3	9,68	9	28,13	12	17,14
Alcohol Use	4	66,67	22	70,97	22	68,75	48	68,57
Chronic Diseases	1	16,67	2	6,45	7	21,88	10	14,29

Source: Own elaboration, 2022

Table 6 shows data regarding the presence of support during pregnancy, separated in partner support and family support as a whole. Regarding the support received from the partner, 14.29% of pregnant women found a high level of frustration in the current relationship, with 17.14% reporting frequent fights, 12.86% pointed out the lack of acceptance of pregnancy and 1.43% reported physical aggression and separation from the partner. No pregnant women were found with lack of support from their partner in the first trimester of pregnancy, with the third trimester being the main period for these factors.

Regarding family acceptance, 14.29% of the interviewees said they did not receive support from their families and heard criticism about their current state. Still, 7.14% found themselves in a family environment with constant fighting, 4.29% had at least one family member addicted to alcohol and/or drugs, 2.86% reported physical aggression in the family environment, and 1.43% had at least one family member in prison or prostitution.

Table 6. Support during pregnancy, divided into partner support and family support, according to the trimester of pregnancy. Maringá, 2022.

	1st quarter		**2nd quarter**		**3rd quarter**		**Total**	**%**
	n	%	n	%	n	%	n	%
Relationship								
Dissatisfaction/High level of frustration	0	0	2	6,45	8	25	10	14,29
Frequent Fights	0	0	4	12,90	8	25	12	17,14
Physical Assaults	0	0	0	0	1	3,13	1	1,43
Non-acceptance of pregnancy	0	0	1	3,23	8	25	9	12,86
Partner Separation	0	0	0	0	1	3,13	1	1,43
Family								
Criticism, poor acceptance of pregnancy	1	16,67	2	6,45	7	21,88	10	14,29
Constant fighting	0	0	1	3,23	4	12,5	5	7,14
Member(s) addicted to alcohol or drugs	0	0	0	0	3	9,38	3	4,29
Physical Assaults	0	0	0	0	2	6,25	2	2,86
Prostitution or arrest of member(s)	0	0	0	0	1	3,13	1	1,43

Source: Own elaboration, 2022

4 DISCUSSION

As stated by Arrais et. al (2014), pregnancy is not always a period of joys and achievements for women. There are still few studies on gestational depression, with more space for studies on postpartum depression.

Pregnancy itself is a time of changes and is an important factor for the development of stress. If it is accompanied by other risk factors, such as nulliparity, maternal age extremes and domestic violence, for example, the chances of developing psychopathologies during this period are greatly increased (GOMES et. al., 2021).

The present study identified that 18.57% of pregnant women were aged up to 23 years, constituting an important risk factor. The data also showed a significant number of pregnant women with symptoms suggestive of depression, such as low quality sleep, professional frustration, loss of interest in daily activities, nervousness, worry, frequent crying, difficulty to think clearly, low self-esteem, anxiety, among others. We also found significant portions of pregnant women with negative parental references and current family environment with constant fights and arguments, besides the presence of chronic diseases and use of alcohol and drugs.

Correlating the data obtained with the studies analyzed, it was found that among the main risk factors for the presence of depressive feelings in the gestational period is early maternal age (SILVA; SILVA; FRIZZO; DONELLI, 2018). Just as Pereira and Carvalho (2020) state in their study, gestating a child involves a range of physiological factors, such as the hormonal changes characteristic of the period, as well as psychic factors such as insecurity and the responsibility of raising a child. Therefore, in the questionnaires used in this study, questions such as desire for pregnancy, abortion attempt, and commotion before fetal movements were present and showed rates, respectively, of 15.71%, 5.71%, and 92.86%. It is possible to compare these results with the prevalence of depressive symptoms presented by 27.17% of the pregnant women. Also, corroborating the thesis of Araújo et. al. (2016), these symptoms are found more strongly in the third trimester of pregnancy, presenting in 16.67% of the interviewees in the first trimester, 19.35% in the second trimester and 37.5% in the third trimester, demonstrating an increasing character of depressive symptoms as gestation advances.

Anxious symptoms were even more expressive, being present in 70% of the sample of this study. In line with this data, the study by Costa, Souza, Pedroso, and Strufaldi (2018) shows a higher prevalence of 40% in the population studied. Although not a high value like the one in this study, it is still a significant value. Also, in this study, approximately 60% of pregnant women met at least one criterion for depression.

According to Barros and Aguiar (2019), depressed women have a strong tendency to present social isolation. In agreement with this data, the present study shows that 14.29% of the pregnant women interviewed have this behavior.

As shown in the article by Silva et. al. (2018), the etiology of gestational depression is multifactorial, however, there are related factors that are present in significant amounts in the population sample of this

study, such as primiparity, present in 64.29%, marital difficulties, present in 17.24%, and the lack of social support, especially from family, present in 14.29% of the pregnant women interviewed.

Regarding the bonding between mother and baby during intrauterine life, Costa and Porto (2021) state that maternal depression hinders the bonding and this brings consequences to the child's development and to its relationship with the mother. The depressed pregnant woman is not able to perform basic maternal functions and, according to Martins (2014), this contributes to alcohol and drug abuse by the pregnant woman. In the present study, the percentage of alcohol use was 68.57%, and illicit drugs, 17.14%.

Saviani-Zeoti and Petean (2015) state that the relationship between mother and child, in intrauterine life, manifests itself through the expectations that the mother has about the child. It is a fact that these feelings can be altered by numerous factors, such as, the presence or absence of family and marital support during pregnancy, financial conditions and feeling of ability to care for a child. Thus, it can be concluded that the factors that influence the development of depression during pregnancy are very similar and permeate parameters very close to the criteria that show influence on the establishment of bonding between mother and baby (COSTA, NASCIMENTO, 2020).

5 CONCLUSION

The development of this study allowed an analysis of how external and internal factors influence the mental health of pregnant women and the development of the bond with the fetus. The questionnaire with yes and no answers facilitated the evaluation of the prevalence of several factors, such as the presence of physical symptoms, feelings and emotions, family configuration and structure, among others.

It was possible to correlate the prevalence of depressive symptoms, presented by 27.14% of the pregnant women, with the history of deprivation of affection in childhood, present in 20% of the interviewees, and with the history of absent fathers, presented by 34.29% of the women.

The prevalence of attempted abortion is 5.71% in the study population and the prevalence of adequate prenatal care and emotion before fetal movements is 92.86%. From this, it can be inferred that pregnant women who attempted abortion cannot perform an adequate prenatal care or feel emotions before the perception of the presence of the child, i.e., the depressive feelings and rejection of pregnancy do not allow the pregnant woman to have the expected behaviors for her condition, which makes it very difficult to create a bond with the baby.

Regarding the factors associated with depression, presented in Table 3, we conclude that the percentages are similar, i.e., a pregnant woman hardly ever presents only one single problem - it is more common that factors such as low sleep quality, frequent headache, and epigastralgia, for example, appear concomitantly. It is known that many of these symptoms are associated with the evolution of pregnancy and are a consequence of the growth of the uterus and the baby and the increased demand for energy by the mother, who needs to provide energy for herself and the child, but it is undeniable that symptoms such as lack of appetite, headache, and fatigue, for example, are characteristic of depressive conditions.

Among the limitations of the study is the sample size, which was seventy pregnant women - it is known that a larger number increases the possibility of a more reliable result. Still, the scarcity of data collection instruments aimed exclusively at the gestational period was also a challenging event.

In line with the thesis of Silva (2014), it is necessary that public policies be developed in order to help these women. According to Salvadego et. al (2021), it is very important that the health team creates a bond with the pregnant woman during prenatal care, allowing the depressive symptoms to be noticed earlier and a better quality follow-up can be performed. The work of Guimarães et. al (2021) corroborates this theory, stating that the reception team of Basic Health Units needs adequate preparation to attend to these patients.

Therefore, the authors suggest that future studies should use a larger population sample and that social aspects, especially income, should take more space in the research in order to relate the onset of depressive symptoms and the difficulty of bonding with the fetus to social issues.

REFERENCES

Araújo, W. S. D., Romero, W. G., Zandonade, E., & Amorim, M. H. C. **Efeitos do relaxamento sobre os níveis de depressão em mulheres com gravidez de alto risco: ensaio clínico randomizado.** Revista Latino-Americana de Enfermagem, v. 24, 2016. Disponível em: < https://www.scielo.br/j/rlae/a/Jz9cMRWQKkDhybHM7ByjzLS/?format=pdf&lang=pt>. Acesso em 12/08/2022.

Arrais, A. D. R., Araujo, T. C. C. F. D., & Schiavo, R. D. A. **Fatores de risco e proteção associados à depressão pós-parto no pré-natal psicológico.** Psicologia: Ciência e Profissão, v. 38, p. 711-729, 2018. Disponível em: < https://www.scielo.br/j/pcp/a/nzLTSHjFFvb7BWQB4YmtSmm/abstract/?lang=pt>. Acesso em 18/02/2022.

Arrais, A. D. R., Mourão, M. A., & Fragalle, B. **O pré-natal psicológico como programa de prevenção à depressão pós-parto**. Saúde e Sociedade, v. 23, p. 251-264, 2014. Disponível em: <https://www.scielo.br/j/sausoc/a/ScBXWZFtCyVFXXfzs8jQRmp/abstract/?lang=pt>. Acesso em 27/05/2022.

Barros, M. V. V., & Aguiar, R. S. **Perfil sóciodemográfico e psicossocial de mulheres com depressão pós-parto: uma revisão integrativa.** Revista de Atenção à Saúde, n. 17 v.59, 2019. Disponível em: < https://seer.uscs.edu.br/index.php/revista_ciencias_saude/article/view/5817/pdf>. Acesso em 29/09/2022.

Costa, K. L., & Porto, M. A**. SUPORTE SOCIAL NO PUERPÉRIO E SUA INFLUÊNCIA NA DEPRESSÃO PÓS-PARTO E VÍNCULO MÃE-BEBÊ**. Revista InterCiência-IMES Catanduva, n.1 v.7, p. 27-27, 2021. Disponível em: < https://www.scielo.br/j/ean/a/wvn5x49ZqbgzhKGs4pqPnqb/?lang=pt>. Acesso em 27/05/2022.

Costa, D. O., Souza, F. I. S. D., Pedroso, G. C., & Strufaldi, M. W. L**. Transtornos mentais na gravidez e condições do recém-nascido: estudo longitudinal com gestantes assistidas na atenção básica.** Ciência & Saúde Coletiva, v. 23, p. 691-700, 2018. Disponível em: < https://www.scielo.br/j/csc/a/Z6JBYjY99CHjsFmkygVrfTS/abstract/?lang=pt>. Acesso em 18/10/2021.

da Silva PEREIRA, T. F., & CARVALHO, P. H. **O TRATAMENTO DA DEPRESSÃO GESTACIONAL NUMA PERSPECTIVA ANALÍTICO-COMPORTAMENTAL: UMA REVISÃO SISTEMÁTICA**. Facit Business and Technology Journal, n. 2 v.19, 2020. Disponível em: <http://revistas.faculdadefacit.edu.br/index.php/JNT/article/view/717/521>. Acesso em 25/05/2022.

de Oliveira, M. G., Teixeira, R. S., Costa, V. N. M., de Alencar, P. H. L., Rodrigues, E. O., Costa, A. C. M. A. C., & Chaves, A. F. L. **Sentimentos de mulheres com depressão pós-parto frente ao aleitamento materno**. Enfermagem em Foco, n. 10, v. 3, 2019. Disponível em: <http://revista.cofen.gov.br/index.php/enfermagem/article/view/1702/595>. Acesso em 29/03/2022.

Gomes, L. A. S., Paiva, I. M., Bemfica, M. P. V., Morais, F. M. L., Oliveira, M. C. L., Machado, M. M., ... & de Souza Filho, G. R**. Depressão gestacional e o impacto da pandemia pela COVID-19: relato de caso.** Revista Eletrônica Acervo Saúde, n. 13 v.3, p. e6630-e6630, 2021. Disponível em: < https://acervomais.com.br/index.php/saude/article/view/6630/4265>. Acesso em 29/09/2022.

Guimarães, R. B., dos Santos, R. B., dos Santos, T., Carvalho, A. R., Lima, M. A. C., Costa, T. A., ... & Farah, L. E. **Atuação do enfermeiro à gestante e puérpera com depressão.** Revista Eletrônica Acervo Saúde, n. 13 v.1, p. e5178-e5178, 2021. Disponível em: < https://acervomais.com.br/index.php/saude/article/view/5178/3508>. Acesso em 12/08/2022.

Greinert, B. R. M., dos Reis Carvalho, E., Capel, H., Marques, A. G., & Milani, R. G. **A relação mãe-bebê no contexto da depressão pós-parto: estudo qualitativo.** Saúde e Pesquisa, n. 11 v. 1, p. 81-88, 2018. Disponível em: < https://periodicos.unicesumar.edu.br/index.php/saudpesq/article/view/5919/3168>. Acesso em 22/10/2021.

Morais, A. O. D. D. S., Simões, V. M. F., Rodrigues, L. D. S., Batista, R. F. L., Lamy, Z. C., Carvalho, C. A. D., ... & Ribeiro, M. R. C. **Sintomas depressivos e de ansiedade maternos e prejuízos na relação mãe/filho em uma coorte pré-natal: uma abordagem com modelagem de equações estruturais.** Cadernos de Saúde Pública, v. 33, 2017. Disponível em: < https://www.scielo.br/j/csp/a/C4Gr7sSNfRvJc6TT6fh5L3y/abstract/?lang=pt>. Acesso em 22/10/2021.

Martins, C. D. S. R (Ed.). **Comparação de dois instrumentos para rastreamento da depressão gestacional em uma amostra de adolescentes grávidas na cidade de Pelotas, RS,** 2014. Disponível em: < https://pos.ucpel.edu.br/ppgsc/wp-content/uploads/sites/3/2018/03/Clarissa-Martins-Compara%C3%A7%C3%A3o-de-dois-instrumentos-para-rastreamento-da-depress%C3%A3o-gestacional-em-uma-amostra-de-adolescentes-gr%C3%A1vidas-na-cidade-de-Pelotas-RS.pdf>. Acesso em 18/10/2021.

Nascimento, B. R. D. S. D., & Costa, J. S. D (Ed.). **Influência da depressão gestacional para a relação materno infantil**, 2020. Disponível em: < https://dspace.uniceplac.edu.br/bitstream/123456789/287/1/Julia%20Costa_002563_Brendha%20Nascimento_0002399_parcial.pdf>. Acesso em 18/09/2022.

Pedrotti, B. G., & Frizzo, G. B. **Influência da chegada do bebê na relação conjugal no contexto de depressão pós-parto: perspectiva materna.** Pensando familias, n.23 v.1, p. 73-88, 2019. Disponível em: < http://pepsic.bvsalud.org/scielo.php?script=sci_abstract&pid=S1679-494X2019000100007>. Acesso em 18/03/2022.

Pereira, D. M., & Araújo, L. M. B. **Depressão pós parto: Uma revisão de literatura.** Brazilian Journal of Health Review, n.3 v.4, p. 8307-8319, 2018. Disponível em: < https://brazilianjournals.com/ojs/index.php/BJHR/article/view/13286/11167>. Acesso em: 05/10/2021.

Perrelli, J. G. A., Zambaldi, C. F., Cantilino, A., & Sougey, E. B. **Instrumentos de avaliação do vínculo entre mãe e bebê**. Revista Paulista de Pediatria, v. 32, p. 257-265, 2014. Disponível em: <https://www.sciencedirect.com/science/article/pii/S010305821470019X>. Acesso em 11/11/2021.

Salvadego, I. S., Lago, M. T. G., Catai, J. A. C. G., & Siqueira, C. S. **Atuação do enfermeiro na identificação precoce da depressão gestacional.** Revista Terra & Cultura: Cadernos de Ensino e Pesquisa, v. 37(especial), p. 186-196, 2021. Disponível em: < https://acervomais.com.br/index.php/saude/article/view/5178/3508>. Acesso em 12/08/2022.

SAVIANI-ZEOTI, F., & Petean, E. B. L. **Apego materno-fetal, ansiedade e depressão em gestantes com gravidez normal e de risco: estudo comparativo**. Estudos de Psicologia (Campinas), v. 32, p. 675-683, 2015. Disponível em: < https://www.scielo.br/j/estpsi/a/TRkCgMCnffgZWxY9YhjNBgj/abstract/?lang=pt>. Acesso em 14/06/2022.

Silva, H. C. D., Silva, M. D. R., Frizzo, G. B., & Donelli, T. M. S. **Sintomas psicofuncionais e depressão materna: um estudo qualitativo**. Psico-USF, v. 23, p. 59-70, 2018. Disponível em: <https://www.scielo.br/j/pusf/a/S3JtLzNX84WJtkhNWNR75PL/abstract/?lang=pt>. Acesso em 22/05/2022.

Silva, R. C. D. **Depressão gestacional: uma revisão de literatura**, 2016. Disponível em: < https://repositorio.ufsc.br/bitstream/handle/123456789/168522/Renata%20Costa%20da%20Silva-PSICO-TCC.pdf?sequence=1&isAllowed=y>. Acesso em 13/06/2021.

Soares, W. D. D., Santos, C. G., Jesus, M. I. R., Soares, R. S. D. M. V., & Jones, K. M. **A relação mãe-bebê na depressão pós-parto**. Cadernos UniFOA, 2022. Disponível em: < https://revistas.unifoa.edu.br/cadernos/article/view/3690/2903>. Acesso em 28/09/2022.

CHAPTER 37

Animal-assisted activities: alternative therapy in oncologic patients in light of the literature

10.56238/rsfohsv1-037

Simone Maria de Araújo Martins
ORCID: https://orcid.org/0000-0002-9638-5130
Veiga de Almeida University, Brazil
E-mail: rafaelmone@hotmail.com

Marilene Lopes de Jesus
ORCID: https://orcid.org/0000-0001-7062-6533
Augusto Motta University Center, Brazil
E-mail: marilenejesus@gmail.com

Aliana Amandula Santos
ORCID: https://orcid.org/0000-0002-1459-2444
Souza Aguiar Municipal Hospital, Brazil
E-mail: alianaamandula@gmail.com

Liliane Dutra de Amorim
ORCID: https://orcid.org/0000-0002-3116-1371
Celso Lisboa University Center, Brazil
E-mail: lilianeamorim573@gmail.com

Ana Cláudia Agra Vieira
ORCID: https://orcid.org/0000-0002-4063-9437
IBMR University Center, Brazil
E-mail: anaclagra@gmail.com

Kennya Nunes Araujo
ORCID: https://orcid.org/0000-0002-1651-7253
Augusto Motta University Center, Brazil
E-mail: kennya_araujo@hotmail.com

Beatriz de Queiroz Rosa dos Santos
ORCID: https://orcid.org/0000-0002-8514-5465
Souza Aguiar Municipal Hospital, Brazil
E-mail: beatrizqueirozrosa@gmail.com

Josele da Rocha Schräder
ORCID: https://orcid.org/0000-0003-3314-2307
Federal University of the State of Rio de Janeiro, Brazil
E-mail: rochajosele@gmail.com

Eduardo da Silva
ORCID: https://orcid.org/0000-0001-6861-6037
University Center of Rio de Janeiro, Country
E-mail: edumon7@yahoo.com

Claudemir Santos de Jesus
ORCID: https://orcid.org/0000-0002-2294-3064
University Center of Rio de Janeiro, Brazil
E-mail: udemi34@gmail.com

ABSTRACT
The Animal-Assisted Therapy is a very old technique that prevails even today, with the aim of bringing well-being to hospitalized people undergoing treatment against various diseases, especially cancer. Providing many benefits, as many researches prove that cancer is a disease that greatly affects the emotional and psychological part of people. This work aimed to do a bibliographic survey focusing on the studied theme, especially cancer, using the dog. This study allowed us to conclude the possibility of minimizing the symptoms caused by cancer. Because experts guarantee that contact with the dog contributes to the improvement of physical and mental health, and even the resolution of various pathologies.

Keywords: Therapy Animals; Patients; Cancer Care Facilities.

1 INTRODUCTION

The reports of the studies in front of animals for human benefit willing to help, are dated since the ancient civilizations BC, which made think of animal-assisted therapy as a facilitator therapeutic method for the aid of treatment, in which is performed by health professionals (Mandrá, 2019; Teixeira, 2015; Lima et al., 2018).

Animal-assisted therapy helps to improve physical, social, emotional, and cognitive functions. It promotes self-esteem and self-confidence. So much so, that specialists confirm the proof that animals have therapeutic power, by helping through joy, feeling of pleasure and well-being, by releasing endorphins in the immune system (Araújo & Lima, 2018; Lima, Leotty & Furlanetto, 2020).

Animal-assisted therapy, created in 1,792 in York Retreat, but the psychiatric doctor Nise da Silveira, in the 1950s was the precursor in Brazil, which refers us to favor motivation, socialization, emotional balance, body, attention span and concentration (Pereira et al, 2017; Squilasse & Squilasse Junior, 2018).

Thus, there are protocols for the registration of the visit by the animals with the intention of efficient inclusion in the treatment, which refers to the integration of families through the exchange of experiences, socialization, strengthening bonds, reducing the feeling of loneliness, uselessness, and pain, but it is worth mentioning the possible contraindication in hematological patients, allergic patients, patients with open skin lesions, respiratory diseases, and phobias (Teixeira, 2015; Lima, Leotty & Furlanetto, 2020).

The dog is used in assisted therapy, however it must be vaccinated, regular in periodic visits to the veterinarian, have basic training, strict control of infection and zoonoses, to avoid transmission to the clientele (Squilasse & Squilasse Junior, 2018; Lima et al., 2018).

For such, cancer is a disease associated with death, in which the presence of the animal in the hospital creates a channel to aid treatment, which promotes the therapeutic bond, by occupying it with different activities of daily life through trust in the other, having an effect on cardiovascular regulation, psychological symptoms, improvement of the immune system, facilitates communication and empathy, as well as interferes even in the mood of professionals (Mandrá, 2019; Pereira et al, 2017).

The dog becomes a facilitator of the treatment, because by taking the focus off the pain, it makes the treatment not torturous but joyful and relaxed, in an environment that most see sadness and suffering, creating expectation for the day of the animal's visit (Araújo & Lima, 2018; Squilasse & Squilasse Junior, 2018).

In view of the above, the study aimed to analyze the productions that show the benefits achieved by animal-assisted activities as an alternative therapy for oncologic patients in Brazilian hospitals.

2 METHODOLOGY

This is an integrative review study, which aims to verify the publications related to the theme, mainly to evidence in the scientific field the knowledge generated, with a qualitative approach (Souza, Silva & Carvalho, 2010).

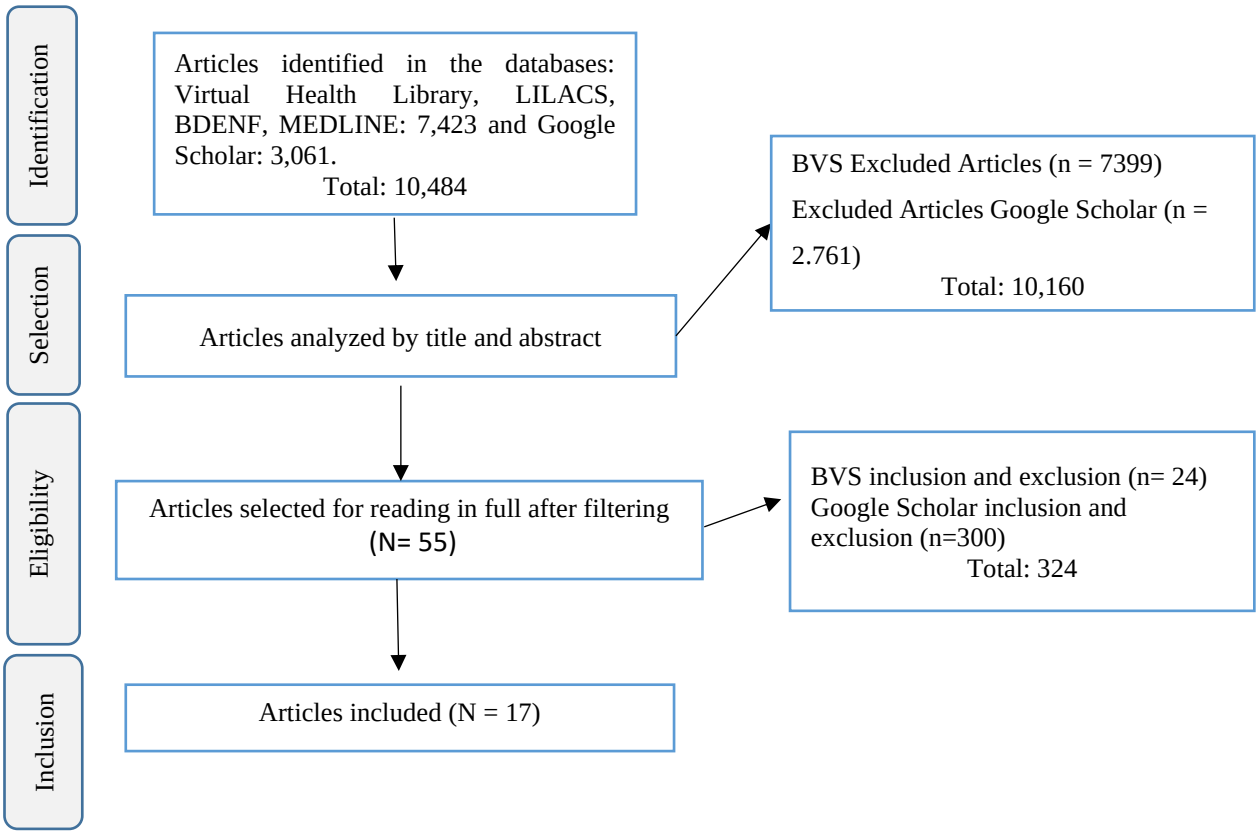
In the first stage, the research question was outlined: Do scientific productions show the benefits achieved by animal-assisted activities as an alternative therapy for oncologic patients in Brazilian hospitals?

In the second stage there was a search in the Virtual Health Library and Google Scholar, with the inclusion criteria: article available in Portuguese, in the LILACS, BDENF and MEDLINE databases, in the temporal period from 2016 to 2021, with the descriptors: Animal-Assisted Therapy, health, neoplasms.

I emphasize that the exclusion criteria established were: unavailability of access, publications in more than one database, abstracts, texts in the form of projects, in other languages. Outside the time frame defined in the inclusion criteria, and all articles that were not articulated to the theme.

Thus, I justify that studies in other languages were excluded because the intention was to observe the theme studied in institutions in Brazil. For, it is known, especially in the United States, that animal-assisted therapy is much more applied not only in oncologic patients but in others as well.

3 RESULTS



When using the descriptors Animal-Assisted Therapy, Health and Neoplasia, with a total of 616 productions, related to the criteria 02, 01(2016) was selected; Animal-Assisted Therapy and Health found 4,599 studies, of which 17 met the inclusion criteria. However, only 02 articles were captured (01-2018; 01-2020); Animal-Assisted Therapy and Neoplasms had 2,208 productions, with the 05 filter, which allowed the capture of 01 (01-2019).

Upon writing, it was observed that the Virtual Health Library search found 7,423 searches, 24 of which met the inclusion criteria in principle, but there was little uptake of only 08 articles.

Thus, a search was conducted in Google Scholar, with the inclusion criteria of articles in Portuguese, in the time frame 2016 to 2021, classified by relevance and the item review articles, with the descriptors: Animal-Assisted Activity; Patients; Hospitalized, in which 09 articles were captured.

In the third step we used a data collection instrument, which aims to extract the key information from each selected article, which met the time frame of 2015 to 2021, it was evidenced 16 articles in Portuguese, related to the themes of the studies, of these we noticed the productions in 2014 (1); 2015 (01); 2016 (04); 2017 (04), 2018 (06) and 2021 (02).

The searches were found in the following databases BDENF - Enfermagem (03); LILACS (05); MEDLINE (02) and GOOGLE ACADÊMICO (07). The construction sites of the studies were RS (04); SP (04); SC (01); DF (01). When describing the professions of the authors we noticed an expressive number for Nursing (04). Of the others, we found Psychology (03), Speech Therapy (03), Veterinary (2), Medicine (01), Physiotherapy (01) and Pedagogy (01).

In the fourth stage, the articles that were selected for integrative review are analyzed to verify their authenticity, methodological quality, importance of information and representativeness. So much so, that to the type of research, we identified Case study (01); Qualitative descriptive study (02); Descriptive, transversal study (01); Qualitative study (06); Bibliographical research (05). Type of Document showed 06 review articles and 10 original articles.

The studies showed that the research design, the analysis was based on levels 1: evidence from individual studies with experimental design; 2: evidence from descriptive studies (non-experimental) or with a qualitative approach; 3: evidence from case or experience reports.

The fifth step consisted in the interpretation and discussion of the data and results found that were related to the goal of describing the importance of animal-assisted activity in cancer patients.

With the end of the data treatment of the Integrative Review, it was identified the need to find more studies, in a floating search, outside the inclusion and exclusion criteria, as well as other forms of documents, being possible to capture 24 productions in the years 2005 (01); 2007 (01); 2008 (01); 2014 (02); 2016 (04); 2017 (05); 2018 (07); 2019 (01), being 20 articles; 01 online book; 02 undergraduate TCCs and 01 graduate TCC.

Regarding the journals, 19 studies were published in Cadernos Brasileiros de Terapia Ocupacional (01); CoDAS (02); Distúrb Comum (02); Enferm. Foco (01); Estudos e Pesquisas em Psicologia (01); Noética (01); Rev Dor (01); Revista Brasileira de Enfermagem (01); Revista Científica Eletrônica de Medicina Veterinária (01); Revista de Educação Continuada em Medicina Veterinária e Zootecnia do CRMV-SP (01); Revista MV&Z (01); Revista Saúde (01); Revista Saúde e Desenvolvimento (01); Revista UNINGÁ Review (01); Saúde Coletiva (01); Sci Med. (01); Uninga (01); as well as from 05 universities UFRGS (01); Universidade Federal de Santa Catarina (01); Universidade Federal do Rio Grande (01); Universidade Federal do Rio Grande do Sul (01); Universitário da Ânima (01).

The data analysis was performed, based on the selected articles, in which it was possible to observe, count and add, describe and qualify the data, to agglomerate the knowledge produced through the theme in this review. In the sixth step, the review and synthesis of the knowledge that was seen in articles analyzed on the theme was demonstrated (Soares, 2014; Souza, Silva & Carvalho, 2010).

Chart 03: Structural survey of the selected articles

Title	Periodical	Database	Year	Authors
Animal-assisted activities effects communication and social interaction in a school environment	*Distúrb Comun*	LILACS	2016	Oliveira, Ichitani & Cunha
Effect of animal-assisted activity on communicative behavior in the elderly: Speech Therapy Approach	*Distúrb Comun*	LILACS	2017	Oliveira, Cunha
Playful interaction in the activity assisted by dogs in pediatrics	*Enferm. Foco*	BDENF	2017	Pereira & Ribeiro
Animal-Assisted Therapy as a physiotherapeutic resource for institutionalized elderly people	*Sci. med*	BDENF	2016	Cecheti & Pagnussat
Animal-Assisted Therapy - a systematic review of the literature	*Codas*	LILACS-MEDLINE	2018	Mandra, Pupin
Animal-Assisted Therapy and Neurodevelopmental Disorder	*Est. Pesqui. Pscol.*	LILACS	2017	Marinho & Souza
Therapeutic visits by dogs to patients in a palliative care unit	*Com. Ciências e Saúde*	BDENF	2018	Milhomen & Moreira
Healing Animals: Animal-Assisted Therapy	*Uninga*	Google Scholar	2017	Goncalves & Gomes
Animal-Assisted Activity in pediatrics a strategy for humanization of care	*UFSC*	Google Scholar	2018	Aguiar
Animal-assisted activity and pain sensation in hospitalized children and adolescents	*Revista Dor*	Google Scholar	2016	Ichitani & Cunha
Animal Assisted Interventions; Promoting the well being of those being assisted	*Revista Expressa Extensão*	Google Scholar	2018	Lima & Moura
Benefits of the human-animal relationship	*UFRGS*	Google Scholar	2014	Lampert
The Benefits Presented in Using Animal-Assisted Therapy: A Literature Review	*Revista Saúde*	LILACS	2018	Lima & Souza
Animal-Assisted Interventions: General Considerations	*Revista MV&Z*	Google Scholar	2018	Squilasse & Squilasse Junior
Animal-Assisted Therapy: The Nurses' experience using this practice in an oncology hospital	*Ciaiq*	Academic Google	2016	Almeida, Nascimento & Duarte
Dog-assisted occupational therapy: a scoping review of the Brazilian literature	*Cadernos Brasileiros de Terapia Ocupacional*	MEDLINE	2021	Figueiredo, Alegretti, & Magalhães
Benefits of animal-assisted therapy: a literature review	*Repositório Universitário da Ânima*	Google Scholar	2021	Silva, Siqueira & Gonçalves

When using the descriptors Animal-Assisted Therapy, Health and Neoplasia, with a total of 616 productions, related to the criteria 02, 01(2016) was selected; Animal-Assisted Therapy and Health found 4,599 studies, of which 17 met the inclusion criteria. However, only 02 articles were captured (01-2018; 01-2020); Animal-Assisted Therapy and Neoplasms had 2,208 productions, with the 05 filter, which allowed the capture of 01 (01-2019).

Upon writing, it was observed that the search in the Virtual Health Library found 7,423 searches, 24 of which met the inclusion criteria in principle, but there was little uptake of only 02 articles.

Thus, we searched Google Scholar, with the inclusion criteria of articles in Portuguese, in the time frame 2016 to 2021, classified by relevance and the item review articles, with the descriptors: Animal-Assisted Activity; Patients; Hospitalized, as shown in the table below.

In the third step we used a data collection instrument, which aims to extract the key information from each selected article, which met the time cut from 2015 to 2019, it was evidenced 15 articles in

Portuguese, related to the themes of the studies, of these we noticed the productions in 2014 (1); 2015 (01); 2016 (04); 2017 (04) and 2018 (06).

The searches were found in the following databases BDENF - Enfermagem (01); LILACS (05); LILACS -Express (02); SCIELO (01) and GOOGLE ACADÊMICO (07). The construction sites of the studies were RS (04); SP (04); SC (01); DF (01). When describing the professions of the authors we noticed an expressive number for Nursing (04). Of the others, we found Psychology (03), Speech Therapy (03), Veterinary (2), Medicine (01), Physiotherapy (01) and Pedagogy (01).

In the fourth stage, the articles that were selected for integrative review are analyzed to verify their authenticity, methodological quality, importance of information and representativeness. So much so, that to the type of research, we identified Case study (01); Qualitative descriptive study (02); Descriptive, transversal study (01); Qualitative study (06); Bibliographical research (05). Type of Document showed 06 review articles and 10 original articles.

The studies showed that the research design, the analysis was based on levels 1: evidence from individual studies with experimental design; 2: evidence from descriptive studies (non-experimental) or with qualitative approach; 3: evidence from case or experience reports.

The fifth step consisted in the interpretation and discussion of the data and results found that were related to the goal of describing the importance of animal-assisted activity in cancer patients.

With the end of the data treatment of the Integrative Review, it was identified the need to find more studies, in a floating search, outside the inclusion and exclusion criteria, as well as other forms of documents, being possible to capture 24 productions in the years 2005 (01); 2007 (01); 2008 (01); 2014 (02); 2016 (04); 2017 (05); 2018 (07); 2019 (01); 2021 (02), 2022 (01) being 21 articles; 01 online book; 02 undergraduate TCCs and 01 graduate TCC.

Regarding the journals, 19 studies were published in Cadernos Brasileiros de Terapia Ocupacional (01); CoDAS (02); Distúrb Comum (02); Enferm. Foco (01); Estudos e Pesquisas em Psicologia (01); Noética (01); Rev Dor (01); Revista Brasileira de Enfermagem (01); Revista Científica Eletrônica de Medicina Veterinária (01); Revista de Educação Continuada em Medicina Veterinária e Zootecnia do CRMV-SP (01); Revista MV&Z (01); Revista Saúde (01); Revista Saúde e Desenvolvimento (01); Revista UNINGÁ Review (01); Saúde Coletiva (01); Sci Med. (01); Uninga (01); as well as from 05 universities UFRGS (01); Universidade Federal de Santa Catarina (01); Universidade Federal do Rio Grande (01); Universidade Federal do Rio Grande do Sul (01); Universitário da Ânima (01).

The data analysis was performed, based on the selected articles, in which it was possible to observe, count and add, describe and qualify the data, to agglomerate the knowledge produced through the theme in this review. In the sixth step, the review and synthesis of the knowledge that was seen in articles analyzed on the theme was demonstrated (Soares, 2014; Souza, Silva & Carvalho, 2010).

4 DISCUSSION

Animal-Assisted Therapies is a technique used with diverse patients with the therapeutic goal of uniting animals that have been with humans for a long time. So much so that today it is known that with the tests and observations of a simple act of petting an animal is able to bring physical, emotional and mental benefits and results (Lampert, 2014; Gonçalves & Gomes, 2017; Lima & Souza, 2018).

For patients hospitalized in the inpatient sector, one of the biggest complaints is pain, but when performing the application of Animal Assisted Therapy large and small serve as a new resource for the hospital environment. The participating coterapeutas do the activities to the reduction of self-reported pain, in addition to improving emotional aspects of hospitalization, focusing on closeness, play, promoting well-being, reducing tension and increment in mood, being pointed as something unique and positive that brings benefits and a possible activity in the hospital (Ichitani & Cunha, 2016; Pereira et al., 2017; Aguiar, 2018; Lima, Leotty & Furlanetto, 2020)

The clientele promotes bonding through touch and affection that correlates to the development of the specific activities of each assisted such as decreased hospital stress, better social interaction, motricity, and cognition, which can prevent bed confinement syndrome (Lima et al, 2018; Teixeira, 2015; Araújo & Lima, 2018).

To this end, the experience of the insertion of the animal in the hospital is a viable practice that should be encouraged by professionals on behalf of patients, with the nurse's role being paramount in palliative care. It makes animal-assisted therapy a stimulating and challenging initiative for everyone (Almeida et al., 2016; Milhomem et al., 2018).

Animal-Assisted Therapies as resources for patients hospitalized in the oncology area have positive effects for the activities and conducts in communication, the state of the individual in the multidisciplinary approach, which proved to be evaluated with the therapeutic effect mainly in palliative care in order to comfort and welcome the person either out of therapeutic possibilities or terminal (Oliveira & Cunha, 2017; Cechetti et al., 2016; Lima, Leotty & Furlanetto, 2020).

Thus, when evaluating the effects of Animal-Assisted Activity, it was realized that it has benefits in relieving the pain sensation, even when performing playful activities with adults, in which there was interaction because of the presence of the animal, which in the perception of professionals in the hospital unit is seen as a way to decrease or better effects of medications (Ichitani & Cunha, 2016; Pereira et al., 2017; Aguiar, 2018).

The benefits achieved by animal-assisted activities as alternative therapy in oncology clientele in the Brazilian hospital environment, when investigating therapy in oncology clientele, in some studies described the effects, with or without the use of the animal, which with the dog was positive in patients in both genders in the hospital environment, focused on communicative behaviors, with the speech therapy team perceived to be a facilitator in the most significant verbal and non-verbal elements of the professional-client interaction (Oliveira & Cunha, 2017; Cechetti et al, 2016; Araújo & Lima, 2018; Silva et al., 2022).

The understanding of the experiences with animals were experienced by nurses of a hospital unit in palliative care. It was perceived as a differential for the assistance to the client in the institution, by recognizing the benefits seen as favorable and receptive in practice, marked by the interaction that comforts the pain and, many times, the intrinsic loneliness in the process of becoming ill. But there are moments that the animal must be removed so that procedures can be performed. Therefore, I see the importance in the routine of the sector when recognizing the need for specific moments that must be agreed upon individually according to the clinical picture (Almeida et al., 2016; Milhomem et al., 2018).

According to the data, the use of animals can reduce anxiety, have better social interaction than in oncology hospital, facilitation between the multidisciplinary team, clientele and family members. Also, the application of animal-assisted interventions makes one realize the taking of autonomy, stimulation and motivation on the part of the patient, which are valuable benefits in oncologic palliative care (Squilasse & Squilasse Junior, 2018; Lampert, 2014; Gonçalves & Gomes, 2017; Lima & Souza, 2018).

In a study, there was the implementation of therapeutic visits of dogs to inpatients revealed reports of patients, companions and staff favorable, has positive evolution in the subject in the interaction with patients included who are isolated because of the news of the insertion in palliative care, with the reduction of aggression and usual isolation, by serving as comfort from the stigmatized condition, no incidents were reported with respect to behavior of dogs and no outbreaks of infections were recorded (Oliveira et al., 2016; Milhomem et al., 2018; Silva et al., 2022).

In other research, the programs were used by different health professionals, in which the use of animal-assisted therapy scientifically evidenced that there was an improvement in mood, acceptance to participate in activities and affectivity, greater mobility out of bed, and also aided in easing homesickness (Lima & Souza, 2018; Squilasse & Squilasse Junior, 2018; Lima et al., 2018; Mandrá et al., 2018).

When the use of dogs is introduced in the routine, the multidisciplinary team needs to discuss the activities, days, and times, so that everyone can interact with the clientele in a favorable manner. Therefore, the quantity of animals must be thought about, with strict requirements to prepare the animal. Not only for the care with people, but for the care itself as well. This is why partnerships with kennels for donations and outsourced or own services to prepare them for assisted activities. When thinking about the costs of a kennel or proper place for training, feeding, and resting of the animals whose cost is high for the patient and even for the hospital, with rigorous protocols to perform the visits with the animals, starting from the patient being receptive to this activity (Lampert, 2014; Gonçalves & Gomes, 2017; Aguiar, 2018; Teixeira, 2015)

Despite the demands shown above, it was found that the area has been growing significantly and more robust observations are being published through theoretical-scientific constructs and field research with the benefits of Animal-Assisted Therapy in practice being a strategy for humanization of care. What can generate the use of professionals as an adjunctive treatment that point to beneficial potential for intervention with individuals in the social, cognitive, and physical fields (Gonçalves & Gomes, 2017; Squilasse & Squilasse Junior, 2018; Marinho & Zamo, 2017).

5 FINAL CONSIDERATIONS

With this work, we can conclude through bibliographic research that Animal-Assisted Therapy is a very current and important subject. Animal-assisted therapy is not a cure for disease, but a complementary resource for the treatment of hospitalized patients.

Especially when the patient is affected by cancer, the use of animals as part of the therapeutic resources helps them to improve their quality of life and positive results when the treatment is carried out in this way.

By applying this therapy, the dog brings back the patient's self-esteem and joy, confidence. It makes him socialize with people and allows greater acceptance of the professionals who need to get involved to help in the treatment. This encourages the therapists to get closer to the patients, who end up forgetting about the disease. It takes her focus off the pain for at least as long as she is interacting with the dog, creating a bond between the specialist and her, facilitating her treatment.

There is still a need for many studies related to the topic and other research methods and evaluations that substantiate the benefits of animal therapy, especially in oncology nursing care, due to the complex situations.

REFERENCES

Aguiar, C. F. F. (2018). *Atividades assistidas por animais em pediatria: uma estratégia para humanização do cuidado.* Trabalho de conclusão de curso de graduação. Universidade Federal de Santa Catarina, Florianopolis. https://repositorio.ufsc.br/bitstream/handle/123456789/191425/Atividades_Assistidas_Por_Animais_em_Pediatria.pdf?sequence=3&isAllowed=y

Almeida, F. A., Nascimento, A. A. & Duarte, A. M. (2016). Terapia Assistida por Animais: a experiência dos enfermeiros com ao uso desta prática em um hospital oncológico. *Atas - Investigação Qualitativa em Saúde*. 2. https://proceedings.ciaiq.org/index.php/ciaiq2016/article/view/818

Araújo, G. F. M. M. & Lima, M. S. (2018) A *terapia assistida por animais e a prática do psicólogo*: uma revisão sistemática. 6(11), 242-267. https://doi.org/10.21665/2318-3888.v6n11p242-267

Cechetti, F. et al. (2016). Animal-assisted Therapy as a physical therapy resource for institutionalized elderly. *Scientia Medica*, *26*(3), ID23686. https://doi.org/10.15448/1980-6108.2016.3.23686

Figueiredo, M. O., Alegretti, A. L. & Magalhães, L. (2021). Terapia ocupacional assistida por cães: uma revisão de escopo da literatura brasileira. *Cadernos Brasileiros de Terapia Ocupacional*. 29, e2087. https://doi.org/10.1590/2526-8910.ctoAR2087

Gonçalves, J. O., & Gomes, F. G. C. (2017). ANIMAIS QUE CURAM: A TERAPIA ASSISTIDA POR ANIMAIS. *Uningá Review*, *29*(1). https://revista.uninga.br/uningareviews/article/view/190

ICHITANI, T. & CUNHA, M. C. (2016). Atividade assistida por animais e sensação de dor em crianças e adolescentes hospitalizados. *Rev Dor***.** São Paulo, 17(4), 270-3. https://doi.org/10.5935/1806-0013.20160087

Lampert, M. (2014). *Benefícios da relação homem-animal*. Monografia de graduação em Medicina Veterinária. Universidade federal do Rio Grande do Sul. Faculdade de veterinária, Porto Alegre. https://www.lume.ufrgs.br/handle/10183/104881?locale-attribute=pt_BR

Lima, A. S. & Souza, M. B. (2018). Os benefícios apresentados na utilização da Terapia Assistida por Animais: revisão de literatura. *Revista Saúde e Desenvolvimento*. 12(10), 224-241. https://www.revistasuninter.com/revistasaude/index.php/saudeDesenvolvimento/article/view/880#:~:text=Podem%20apresentar%20de%20acordo%20com,na%20postura%20educativa%2C%20dentre%20outros

Lima, C. M. et al. C. (2018). Intervenções assistida por animais: promoção do bem-estar aos assistidos. FURG. *17ª Mostra da Produção Universitária.* Universidade Federal do Rio Grande. https://mpu.furg.br/images/17aMPU/TrabalhosSI/s18.pdf

Lima, M. M. C, Leotty, C. L. R. & Furlanetto, M. P. (2020). Terapia assistida por animais nos cuidados paliativos. *Fisioter Bras*. 21(4), 417-27. https://doi.org/10.33233/fb.v21i4.3667

Mandrá, P. P. et al. (2019). Terapia assistida por animais: revisão sistemática da literatura. *CoDAS*. 31(3), e20180243. https://doi.org/10.1590/2317-1782/20182018243

Marinho, J. R. S. & Zamo, R. S. (2017). Terapia assistida por animais e transtornos do neurodesenvolvimento. *Estudos e Pesquisas em Psicologia*, *17*(3), 1063-1083. http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1808-42812017000300015&lng=pt&tlng=pt

Milhomem, A. C. M., Calefi, M. P. S. S. & Marodin, N. B. (2018). Visita terapêutica de cães a pacientes internados em uma unidade de cuidados paliativos. *Comunicação Em Ciências Da Saúde*, *29*(1), 84–87. https://doi.org/10.51723/ccs.v29iSuppl 1.170

Moreira, R. L. et al. (2016). Terapia assistida com cães em pediatria oncológica: percepção de pais e enfermeiros. *Revista Brasileira de Enfermagem*. 69(6), 1188-1194. https://doi.org/10.1590/0034-7167-2016-0243

Oliveira, G. R. & Cunha, M. C. (2017). Efeitos da Atividade Assistida por Animais nas condutas comunicativas de idosos: abordagem fonoaudiológica. *Distúrb Comun*, São Paulo, 29(4), 644-653. http://dx.doi.org/10.23925/2176-2724.2017v29i4p644-653

Oliveira, G. R., Ichitani, C. & Cunha, M. C. (2016). Atividade Assistida por Animais: efeitos na comunicação e interação social em ambiente escolar. *Distúrb Comun*, São Paulo, 28(4), 759-763. https://revistas.pucsp.br/index.php/dic/article/view/28017

Pereira, V. et al. (2017). Interação lúdica na atividade assistida por cães em pediatria. *Enfermagem em Foco*, *8*(1), 07-11. https://doi.org/10.21675/2357-707X.2017.v8.n1.831

Silva, J. K. S., Siqueira, L. M. C. & Gonçalves, W. S. (2021). *Benefícios da terapia assistida por animais*: uma revisão bibliográfica. Repositório Universitário da Ânima. UNA, Catalão-MG, TCC de Graduação e Especialização, Psicologia. https://repositorio.animaeducacao.com.br/bitstream/ANIMA/17280/1/TC%20Final%20%281%29.pdf

Silva, F. C. et al. (2022). Efeitos da terapia assistida por animais na qualidade de vida de idosos com síndrome demencial. *Research, Society and Development*, *11*(8), e25711830864. https://doi.org/10.33448/rsd-v11i8.30864

SquilasseA. F., & Squilasse JuniorF. T. (2018). Intervenções assistidas por animais: Considerações gerais. *Revista De Educação Continuada Em Medicina Veterinária E Zootecnia Do CRMV-SP*, *16*(2), 30-35. https://doi.org/10.36440/recmvz.v16i2.37778

Teixeira, I. S. (2015). *A Terapia Assistida por Animais como uma forma de associação*: um estudo antropológico sobre a relação humano-animais na promoção da saúde humana, no Brasil. https://www.lume.ufrgs.br/bitstream/handle/10183/179467/001067032.pdf?sequence=1

CHAPTER 38

Spiritual anamnesis and doctor-patient relationship: review and reconstruction of a daily routine instrument

10.56238/rsfohsv1-038

Claudio Martins de Queiroz
Highest academic qualification: Graduated from the residency in medical clinic at Instituto Prevent Senior
Current Institution: Hospital Sancta Maggiore
Address: Rua Butantã, 285 - Pinheiros, São Paulo - SP, 05424-140
Email: claudioqueiroz29@gmail.com

Ivy Redi Abdalla

Raquel Delatorre Dupas

Rodolfo Pessoa de Melo Hermida

ABSTRACT
Introduction: spiritual anamnesis is fundamental to familiarity with patient's beliefs. It enables health professionals to: investigate how patients face the treatment, understand the role and importance of religion in the life of this individual, how much spirituality may interfere in the health-disease process and in the disease experience. It also helps detect spiritual needs and mobilize resources to promote the biopsychosocial and spiritual wellness of the individual. Objective: identify spiritual questionnaires in literature. Methods: This article is a bibliographic review. Researching was on books and electronically based from August to December 2014. PUBMED and SCIELO databases were used in English and Portuguese. Inclusion factors: short, brief and easy to memorize questions to know if the patient's beliefs interfere in medical treatments and to what extent. Exclusion factors: not try to convert or to interfere with the patient's rights, not try to influence their beliefs or to make anamnesis on emergency situations or acute medical consultations. Results: based on the questions of seven samples of spiritual questionnaires found in literature, health professionals identified the patient's spiritual needs and the beliefs likely to interfere in the doctor-patient relationship and in the therapeutic conduct as such. The anamnesis models found converge in some points, but differ mainly as to time excess some questionnaires demand (due to the large number of questions) when compared to others (shorter) and/or when going deeper into a particular aspect of beliefs, leaving some important points out. Conclusion: the anamnesis found are as follows: FICA Questionnaire; HOPE Questionnaire, Kunh's Spiritual Inventory, CSI-MEMO, ACP Spiritual History, Matthews Spiritual History, Maugans Spiritual History. The main points found in these seven questionnaires are: resources mobilization to meet the patients' spiritual demands; to what extent spirituality may interfere both in adherence to the treatment and in the clinical treatment and in strengthening the doctor-patient relationship.

Keywords: spiritual anamnesis, doctor-patient relationship, spiritual questionnaire.

1 INTRODUCTION

Spirituality can be conceptualized as the intrinsic search of every human being for the meaning and indisputable purposes of life. This meaning can be found in religion, but it can be broader, including the relationship with transcendence, with interpersonal relationships, as well as the spirituality found in nature, in art, and in thought (KOENIG 2008)[1,2] . This concept is found in all cultural and social forms and is made explicit in the subject's search for ultimate meaning through religious activity and/or belief in God, family, arts, and humanism (KOENIG 2008) .[3]

Spirituality encompasses both cognitive, experiential, and behavioral aspects, the latter being the way in which the individual externalizes his or her own spiritual beliefs and inner spiritual state[4] . Thus, it is important to understand some concepts, which are often taken as synonymous:

Religion: According to KOENIG (2008), this concept is defined as an arrangement of beliefs and practices contemplated by a community, supported by rituals that characterize, idolize, communicate with, or approach the Sacred, God. Religion is generally grounded in an aggregation of scriptures and precepts that characterize meaning and design of the world, responsibility and relationships among individuals and with nature, and life after death. Religion provides a moral code of conduct, which is generally adhered to by members of the community .[1]

Religiosity: For KOENIG, MCCLLOUGH, LARSON (2001), religiosity is the extent to which the individual believes in and exercises a religion[5] , and this can be organizational, involving participation in religious performances, meetings and groups or also non-organizational which is that which the individual performs by himself, as for example, when he watches religious programs, prays and meditates alone[1] .

Unlike religion, spirituality, because it encompasses a broad psychological, sentimental, and belief spectrum, must be taken into consideration in health treatments: this has been proven by science from studies involving the correlation between spirituality and immunology, for example, as seen in research done by the Psychology Department of Harvard University[6,1] . However, spirituality should be included in health care, as religions are considered to be based on the principle of spirituality. Moreover, many patients are religious and deal with adversity through their beliefs. This type of approach strengthens the relationship between patient and physician, since many would like these professionals to consider their spiritual needs, since religion influences the ability to face the disease .[7]

Taking a spiritual history is fundamental to become familiar with the patient's beliefs, to know how they view medical treatment; to understand the role of religion in this individual's life when dealing with the disease or way of triggering stress; to detect spiritual needs that require follow-up; to present information about the support network that the patient has through the community resources that can help them (KOENIG 2005).

It is necessary to point out that the spiritual anamnesis does not aim to change the patient's religion, even when there is a lack of it (in cases of atheism).

In the survey by MONROE, BYNUM, SUSI et. Al (2003) from 31% to 74% of physicians, believe that it is necessary to build a spiritual history of the patient. The chance of such an accomplishment increases proportionally with the severity of their medical situation[9] . Thus, the purpose of the spiritual history is to highlight the needs of beliefs that will interfere with the patient's medical treatment[1] . CURLIN, CHIN, SELLERGREN, ROACH, and LANTOS (2006) also report in their study that 55% of physicians consider it appropriate to ask about patients' religious/spiritual beliefs, versus 45% who consider it inappropriate .[8]

Another study was conducted with family physicians in the state of Missouri[11] and revealed that 71% of the physicians believe that the lack of time during a consultation is a determining factor for not taking the questionnaire. Despite these arguments, the research of CHIBNALL and BROOKS (2001), shows that only 8% of physicians believe that knowledge about religion has no relevance in treatment, justifying that religious issues are not part of their work, which contrasts with the 64% of those who agree

that "the support and recognition of the professional in relation to the patient's religious values can improve the outcome and the treatment process"[12] . Thus, it becomes clear that such claims are fallacious, as most professionals assume that this type of conduct should be considered, despite possible barriers.

Therefore, the spiritual anamnesis can be inserted after the medical or psychiatric history, entitled spiritual history in consultations of long duration, over ten minutes. It is also recommended for patients with a severe prognosis, in which their chronic or terminal illness is addressed. Patients admitted to nursing homes and intensive care are also considered valid. It can also be performed during the examination of a healthy patient at an annual check-up (KOENIG 2008). Depending on socioeconomic events during your life, your spiritual outlook may change, and you should update this questionnaire .[1,7]

Adherence to the personal spiritual history offers benefits to both the physician and the patient, thus indicating its importance. The doctor-patient relationship tends to become stronger when there is recognition by the professional of the individual's beliefs. Studies indicate that religious patients are more likely to obey the health professional in relation to prescribed medications and in returns to the doctor[13] and likewise refer to the possibility of greater effectiveness in treatment, even when this is not fully effective[21] . It was statistically proven that the assent to treatment was 2.6 times higher in patients whose doctors knew more details about them. As for the physician, the benefit of performing a spiritual anamnesis goes back to his or her Galenian essence, resuming the principles practiced in the past, where the physician's function encompassed the care of the patient in three spheres: physical, mental and spiritual, thus validating the integrity of his or her professional choice[7] .

2 OBJECTIVES:

Identify existing spiritual questionnaires in the literature.

3 METHODS:

This article consists of a bibliographic and qualitative literature review. Scientific articles were searched electronically and in books, in the period from August to December 2014. The PUBMED and SCIELO databases were used, in English and Portuguese.
For analysis and critique of the spiritual questionnaires found, inclusion and exclusion criteria were used. These are:
Inclusion criteria (which validate a spiritual questionnaire) (KOENIG 2005):
-questions that are short and accomplished in a few minutes[7] ; -questions that are uncomplicated and easily remembered[7] ; -the questionnaire should be effective in obtaining the type of knowledge that is desired[7] ; -it should focus on the patient's beliefs, taking into consideration their particular religiosity, whether or not it is tied to an organizational religion; -To investigate if the patient uses religion or spirituality to help him/her cope with the disease or if this is a stressful approach for him/her; -to know if the patient

participates in a spiritual support community; -to know if the patient has any questions or concerns about spiritual themes; -to know if there is any spiritual belief that may influence the medical treatment;

Exclusion criteria (which do not validate an efficient spiritual questionnaire): -performing the anamnesis in accidents, heart attacks, pregnancy, in acute consultations and in surgical situations in general; -violation of human rights to be able to perform the spiritual anamnesis -attempt to convert the non-religious patient; -initiative of the doctor to ask to pray with the patient (this should only be performed if the patient requests it); - asking what the patient's religion is without clarifying the purpose of such questioning; -questions that do not address the fact that the patient needs some religious help and how the physician can get this help, in case the patient needs it to feel comfortable;

4 DISCUSSION AND RESULTS:

Seven periodicals were found, five of which were electronic scientific articles and two books. The research resulted in the finding of seven spiritual questionnaires, developed by physicians working in the academic sector, most of them being psychiatrists. Most of the questionnaires were published in medical reference journals.

Kuhn's Spiritual Inventory[14]

was reduced from thirty-five questions to five, as it presented an extensive number of questions. This new questionnaire was made short, with easy-to-remember questions, to effectively explore how the patient's faith may be relevant in health care. Moreover, it focuses on the patient's beliefs, and is considered a satisfactory anamnesis of the patient's spirituality. However, it is incomplete because it does not provide the physician with precise questions about how he or she can mobilize resources and fully assist the patient's spiritual needs.[7,14] . In addition, it does not indicate whether the patient's beliefs are a cause of stress for him and whether he belongs to a religious community.

Matthews' Spiritual History[15]

It is a quick method, easy to memorize and with good content, but it does not ask in the first instance if the patient has faith or if he is adherent to any religion, assuming, then, that the patient belongs to some religious order and disregarding the possibility of atheism. Besides, another point to be highlighted is the need to approach spirituality as a stressing factor, or not, when facing an illness. Also, the patient is not asked about his habits of religious practice, which is an important question, taking into consideration the tightening of the doctor-patient bond, once the professional can mobilize resources in order to meet the spiritual needs of the patient.

It has no scientific basis, and it was published in a popular book. [7]

The **FICA questionnaire**[5, 22]
is based on four topics and this makes it easy to memorize, due to the fact that each letter refers to a block of questions. In this way, the anamnesis is organized and feasible for the medical professional to perform. It also concisely addresses issues that enable the mobilization of the health team in relation to the patient's spirituality for a better treatment outcome. This is evidenced by the penultimate question in the last topic, which makes the FICA inventory a good spiritual questionnaire. It is noteworthy that the questions are very focused on the patient's beliefs, addressing how spirituality can influence treatment. On the other hand, there are two questions that are dispensable, because regardless of the answer, there will be no better or worse success in the treatment of the patient. They are: the one that asks about the patient's feelings towards people (if he loves any group of people) and the one that asks him to name a religious leader (the patient may present a non-organizational religiosity, in which his intimate beliefs are unrelated to a doctrine/rituals and also to a particular religious figure). This anamnesis was published in the Journal of Palliative Medicine. [7]

Maugans' eSPIRITual History[18]
It is one of the most extensive, time-consuming inquiries; it provides a broad investigation, but is difficult to remember. This anamnesis brings numerous more invasive questions, with a high degree of specificity. When applied, it must be adapted to the patient's profile[7] for it to be effective. However, it must be emphasized that the topic "implications to medical care" demonstrates a greater concern in understanding the spiritual aspects and the barriers that may or may not harm the relationship of the professional with the patient. Another conflicting point in this questionnaire is the direct question about the patient's religion. This type of inquiry may cause a strange situation if the purpose of the question and of the spiritual anamnesis is not clarified, for it may lead the patient to infer that his treatment will be subject to modifications or changes due to his religious and/or spiritual beliefs in relation to those of the physician, thus hindering the establishment of a good physician-patient relationship.

The **HOPE questionnaire**[4,7]
is presented in an organized manner, since the acronyms help the medical professional to remember the topics to be asked. Although it is easy to memorize, it is long because it contains several questions. Moreover, it approaches the patient's spirituality in a very generic way, allowing him to talk about his innermost beliefs, regardless of whether or not he follows an organized religion, thus being able to express how his feelings can also influence his treatment. It is worth mentioning that this is the only questionnaire that seeks to know if the disease has interfered/changed the patient's beliefs. Another important point is the possibility that this anamnesis offers to the physician to heal the spiritual needs of the patient through a direct action, asking him/her what actions he/she could practice to provide the patient with more spiritual comfort. It was published in the American Family Physician . [4]

Spiritual History of the ACP[19]

It is a short anamnesis, developed by the American College of Physician, containing four questions, making it readily memorable. Such questions are focused on the patient's spirituality, and can address patients with a severe prognosis. According to Koening (2005), the questions do not cover several important areas such as: identification of spiritual needs, relationship with spiritual communities, and beliefs that affect medical decisions, and these are its shortcomings. On the other hand, it is a widely recognized anamnesis due to the credibility of the physicians who developed it and the source where it was published[7] , Annals of Internal Medicine.

CSI-MEMO[1,20]

It is a very short and easy to memorize questionnaire. It is important because it can ensure possible mobilization of community entities in helping the patient's spiritual comfort through the patient's answers. It highlights the influence of spiritual beliefs in the treatment, and when it can become a stressful factor. It also questions the patient's participation in a religious community. It is applicable in clinical medicine, and accurately and broadly addresses the spirituality of the patient.

5 CONCLUSION

In these seven questionnaires we found as main points: the mobilization of resources to respond to the patients' spiritual demands; how spirituality can interfere with both adherence and clinical treatment, and the possibility of a closer doctor-patient relationship.

Chart I - Instruments for obtaining spiritual history

Kuhn's Spiritual Inventory • What are the things you believe or have faith in? • Has this illness influenced your faith? • How do you practice faith in your life? • How did faith influence your behavior during this illness? • What role does your faith play in restoring your health? **Matthews' Spiritual History** • Is religion or spirituality important to you? • Does your religion or spiritual belief influence the way you view your health problems and the way you think about your health? • Would you like me to discuss your religious or spiritual practices and beliefs with you? **FICA Questionnaire** F - Faith / Belief	**HOPE Questionnaire** **H** - Sources of Hope, Significance, Comfort, Peace, Strength, Love and Social Relationship - What are your sources of hope, strength, comfort, and peace? - What do you cling to in difficult times? - What sustains you and keeps you going? **O** - Organized religion - Are you part of a religious or spiritual community? Does it help you? How does it help you? - In which aspects does religion help you and in which not so much? **P** - Personal and Practical Spirituality - Do you have any spiritual beliefs that are independent of your organized religion? - What aspects of your spirituality or spiritual practice do you find most helpful to your personality? **E-** Effects on medical treatment and terminal issues

- Do you consider yourself religious or spiritual?
- Do you have spiritual or religious beliefs that help you deal with problems?
- If not: What gives you meaning in life?

I - Importance or Influence

- What importance do you give to faith or religious beliefs in your life?
- Have faith or beliefs ever influenced you in dealing with stresses or health problems?
- Do you have any specific beliefs that may affect medical decisions or your treatment?

C - Community

- Are you part of any religious or spiritual community?
- How does she support you?
- Are there any groups of people that you "really" love or that are important to you?
- Are communities such as churches, temples, centers, support groups important sources of support?

A - Action in treatment

- How would you like your doctor or health care professional to consider the issue of religiosity/spirituality in your treatment?

Indicate, refer to some spiritual / religious leader.

eSPIRITual History of Maugans

- eSpiritual belief system
  - What is your religious affiliation?
  - Name or describe your spiritual belief system.
- Personal Spirituality
  - Describe the practices or beliefs of your spiritual belief system that you personally accept.
  - Describe the beliefs and practices that you do not accept.
  - What does your religion / spirituality mean to you?
  - How important is your religion or spirituality in your daily life?
- Integration within a spiritual community
  - Do you belong to a religious/spiritual group or community?
  - What is your position or role?
  - How important is this group to you?
  - Is it a source of support? In what way?
  - Does or would this group support you on health issues?
- Practice **rituals** and meditation
  - Are there specific practices that you follow as part of your religion / spirituality (e.g. prayers or meditations)?
  - Has getting sick affected your ability to do things that help you spiritually?
  - As a physician, is there anything I can do to help you access the resources that generally support you?
  - Are there any practices or restrictions I should know about your medical treatment?

Spiritual History of the ACP (American College of Physicians)

- Is faith (religion, spirituality) important to you in this illness?
- Has faith been important to you at other times in your life?
- Do you have someone to talk to about religious matters?
- Would you like to discuss religious matters with someone?

CSI - MEMO

- Do your religious/spiritual beliefs give you comfort or are they sources of stress?
- Do you have any kind of spiritual beliefs that may influence your medical decisions?
- Are you a member of any spiritual or religious community? Does it help you in any way?
- Do you have any other spiritual needs that you would like to talk to someone about?

- Are there certain lifestyle practices or activities that your religion encourages / prohibits? Do you accept these? - What significance do these practices and restrictions have for you? - Are there other specific elements of medical care that you refuse for religious / spiritual reasons? • Implications for medical care - What aspects of your religion/spirituality would you like me to keep in mind when caring for you? - Would you like to discuss religious or spiritual implications in your health care? - What knowledge or understanding would strengthen our relationship as doctor and patient? - Are there any barriers based on religious issues that hinder our relationship? • Event Planning Terminals - As we plan to care for your health until the end of your life, how would faith impact your decisions? - Are there particular aspects of treatment that you would like to dispense with or suspend because of your faith?	

REFERENCES

1. Koenig, Harold G. Medicina, Religião e saúde: o encontro da ciência e da espiritualidade. 1ed. Porto Alegre: L&PM Editores, 2012. 236p.

2. Puchalski, C.M. Spirituality and medicine: Curricula in Medical Education , Journal of Cancer Education 21 (2006): 14-16.

3. Associoação Americana das Faculdades de Medicina, Contemporary Issues in Medicine: Communication in Medicine, Medical School Objectives Project, Report III, 1999. Disponivel em: academics.utep.edu/portals/1887/templates/time/contemporary_issues_in_med_commun_in_medicine_report_iii_.pdf (acessado em novembro de 2014).

4. Anandarajah G., Hight E. Spirituality and medical practice: using the HOPE questions as a pratical tool for spiritual assessment. Am Fam Physician 2001; 63(1): 81-9.

5. Koenig H.G., Mccullough M., Larson D.B., editors. Handbook of religion and health: a century of research reviewed. New York: Oxford University Press; 2001.

6. McClelland D.C., The Effect of Motivational Arousal through Films on Salivary Immunoglobulin A, Psychology and Health 2 (1988): 31-52.

7. Koenig, Harold G., Espiritualidade no cuidado com o paciente: por quê, como, quando e o quê. 2ed. São Paulo: FE Editora, 2012. 136p.

8. Curlin, F.A., Chin, M.H., Sellergren, S.A., Roach, C.J and Lantos, J.D, "The Association of Physicians' Religious Characteristics with Their Attitudes and Self Reported Behaviors Regarding Religion and Spirituality in the Clinical Encounter", Medical Care 44 (2006): 446-53.

9. Monroe, Bynum, Susi, et al., Primary Care Physician Preferences Regarding Spiritual Behavior in Medical Practice.

10. Koenig, H.G., Hover, M., Bearon, L.B., Travis, J.L., (1991). Religious perspectives of doctors, nurses, patients and families: some interesting differences. Jounal of Pastoral Care, 45, 254-267.

11. Oyama, O.E., Koenig, H.G. (1998). Religious beliefs and practice in family medicine. Archives of Family Medicine, 7, 431-435.

12. Chibnall, J.T., Brooks, C.A, "Religion in the Clinic: The Role of Physician Beliefs, Southern Medical Journal 94 (2001): 374-379.

13. Koenig, H.G. et al (2001). Disease prevention, disease detection and treatment compliance. Handbook of Religion and Health (p. 397-408).

14. Kuhn, C.C. (1988). A spiritual inventory of the medically ill patient. Psychiatric Medicine, 6, 87-100.

15. Matthews, D.A., Clarck, C. (1998). The faith factor. New York: Viking.

16. Matthews, D.A., Mccullough, M.E., Larson, D.B., Koenig, H.G., Swyers, J.P., Milano, M.G. (1998) Religious commitment and health status: A review of the research and implications for family medicine. Archives of Family Medicine, 7, 118-124.

17. Puchalski, C.M., Romer, A.L., (2000) Taking a spiritual history allows clinicians to understand patients more fully. Journal of Palliative Medicine, 3, 129-137.

18. Maugans, T.A. (1996) The SPIRITual history. Archives of Family Medicine, 5, 11-16.

19. Lo,B., Quill, T., Tulsky, J. (1999) Discussing palliative care with patients. Annals of Internal Medicine, 130, 774-749.

20. Adaptado de H.G. Koenig, "An 83-Year-Old Woman with Chronic Illness and Stong Religious Beliefs, Journal of the American Association 288, nº4 (2002): 487-93; apresentado pela primeira vez em Koenig, Spirituality in Patient Care: Why, How, When, and Why, 2nd ed.

21. Benson, H., Stark, M. (1996). Timeless Healing: The Power and Biology of Belief. New York: Simon and Schuster.

22. Lucchetti, G. Granero, A.L., Bassi, R.M., et al. Espiritualidade na prática clinica: o que o clinico deve saber. Rev Bras Clin Med (2010); 8(2):154-8.

CHAPTER 39

The importance of nurses actions in basic health units and their impact on reducing maternal mortality

10.56238/rsfohsv1-039

Francisca Regilene de Sousa de Deus
Universidade Castelo Branco
regilenesousa77@gmail.com

Carlos Renan Barboza Eduardo
Universidade Castelo Branco
carlosrenanrj16@gmail.com

Jessica de Andrade Santos Duarte
Universidade Castelo Branco
jessicaandradelimeira@gmail.com

Maria Regina Bernardo da Silva
Universidade Federal do Rio de Janeiro
m.regina2000@uol.com.br

Halene Cristina Dias de Armada e Silva
Universidade Estadual do Rio de Janeiro
halenearmada@gmail.com

Natane Cristina dos Santos Vieira
Centro Universitário Augusto Motta
natane.cristina21@gmail.com

ABSTRACT
Objective: identify in the literature the actions of nurses in pregnancy and postpartum care with repercussions on maternal mortality rates. Method: This is an integrative literature review with a qualitative and descriptive, documentary approach of dialectical epistemology. Results: Three categories were constructed in the literature: prenatal care and treatment, maternal mortality profile and nurse in prenatal care. Conclusion: Maternal mortality is still a public health problem, especially in Brazil. Reports of failures in the care of health professionals and social vulnerabilities contribute to the high number of maternal deaths still prevalent in Brazil.

Keywords: Nursing; Public health; Women's Health; Prenatal; Maternal Mortality.

1 INTRODUCTION

Maternal health indicators have become a global concern, for this reason maternal morbidity and mortality rates have been decreasing over the years (Silva, 2018).

Maternal mortality is a public health problem, and its high rates are a violation of human rights. As described by the WHO, maternal mortality consists of the deaths of women that occur during pregnancy or up to 42 days after the end of pregnancy. When it occurs in a period longer than 42 days and less than a year after the end of pregnancy it is determined as late maternal mortality (Scarton, 2020).

The reduction of maternal mortality is directly related to quality basic health care, where it is possible to identify early treatment of various complications that can lead to pregnancy termination or worsening of health. It is estimated that approximately 92% of maternal deaths are caused by preventable causes (Santos, 2020).

In this context, the Ministry of Health, through the Prenatal and Birth Humanization Program (PHPN), establishes a protocol of procedures and exams to be offered to all pregnant women during prenatal care: The beginning of care should occur as early as possible, returning as soon as the exams are ready; the interval between consultations should be monthly until the 34th week, between the 34th and 36th weeks it becomes biweekly, and from the 36th until delivery weekly; routine laboratory tests and vaccinations, educational activities, and puerperal consultation.

According to the Pan American Health Organization, approximately 830 women die from preventable causes related to pregnancy and childbirth every day. About 99% of maternal deaths occur in developing countries (PAHO, 2018).

Currently, worldwide maternal mortality is around 210 deathsper 100,000 live births, being a major Public Health problem (Who, 2018).

In Brazil, the Maternal Mortality Ratio (MMR) in the country in2018 was 60.7/100,000 live births - a number well above the target signed with the UN, which is 30 maternal deaths for every 100,000 live births (NV), according to the Sustainable Development Goals (SDGs) (Silva, 20 20).

In order to respond to the world's need to reduce these indicators, in 2000 the United Nations Organization (UNO) launched the Millennium Declaration describing among its eight objectives the goal of "improving maternal health" (2015), thus the reduction of maternal mortality was agreed upon as the Millennium Development Goals (MDGs).

Maternal mortality remains one of the worst health indicators in places with few resources and the vast majority of deaths would be potentially preventable by the timely and appropriate action of professionals and the health system as a whole. In this sense, the surveillance and investigation of reported maternal deaths, as well as the deaths of women of childbearing age (FIM), is a fundamental tool for the identification of all maternal deaths and the understanding of their determinants in order to develop and adopt strategies for their control (Leal, 2017).

Based on this information, a national effort is essential for the implementation of health policies, as well as a strict inspection of these services offered. Aiming at the early diagnosis and treatment of pre- or post-existing pathologies (Guedes, 2020).

Thus, maternal mortality as a national health goal aims to reduce the number of deaths in relation to the number of births. Through actions that aim to reduce the incidence of the main direct and indirect causes responsible for such deaths. However, obstacles such as regional inequality still prevent the completion of a pre-stipulated goal (Silva, 2020).

We can cite some national policies that were created in order to reduce maternal mortality, among them are: the Pact for the Reduction of Maternal and Neonatal Mortality, the Program for Humanization of Childbirth and Birth (PHPN), the Maternal Death Committees, Program of Integral Assistance to Women's Health (PNAISM) and actions to reduce poverty and vulnerability. Ensured by the Federal Constitution and Law n.9.263/1965. (Santos, 2020).

It is still worth mentioning some sets of actions that help these national policies, among them family planning and birth control, which count on the Nurse as responsible for their implementation and management. Continuing education is a practice that must be inserted in the daily life of this professional, and he must identify pregnant women with restricted access to health services, ensure the continuity of prenatal care and monitoring of this pregnancy, directing it to other levels of care according to their clinical need, thus ensuring their rights (Santos, 2020).

In this context, the active work of the nursing professional during prenatal care is extremely important. It is up to the nurse to perform a monthly shared monitoring of the pregnant woman, track latent pathological processes, including heart disease, endocrinopathies and postural errors, current history of complaints and duration, personal morbid history and habits, history of violence, gynecological history, obstetric history, calculation of gestational age and probable date of delivery, general and specific physical examination, instructing the patient and the family on diet, care and warning signs. The nursing consultation is essential for prenatal planning and the procedures to be followed, because it is through it that the pregnant woman will be referred to the network of specialized care and receive appropriate treatment (Leal, 2017).

According to the opinion COREN-SP 008/2016 CT (2016), The nurse is technically qualified to monitor low-risk prenatal care, as well as high-risk prenatal care in an interdisciplinary manner and shared with health professionals. We emphasize that Nurses working in Primary Care should be qualified to identify risk factors and make referrals when necessary in their multidisciplinary work.

Given the scenario exposed arises as the object of study: the nurse's care from pregnancy to puerperium and its repercussion on the incidence of maternal mortality. During the academic internships in primary health care, the study problem emerged and was organized using the PICO strategy. According to (Akobeng, 2005), this strategy represents an acronym for Patient, Intervention, Comparison and "Outcomes" synonymous of outcome that helps in the construction of the research question and the search for scientific evidence.

In light of this organization, the guiding question that will inform this study arises: What are the actions attributed to nurses in the care of pregnant women and their impact on maternal mortality rates?

Nurse Protagonism in Pregnant and Postpartum Care

The nurse as part of the Family Health Strategy team has in its duties, the function of assisting women at all stages of their life cycle, a comprehensive care, stimulate women's autonomy regarding their health (Pasqual, 2015).

The Prenatal and Birth Humanization Program ratified the nurse as the health team professional qualified to provide direct care to pregnant women in low-risk prenatal care, endorsing the law of professional nursing practice that low-risk prenatal consultations and puerperium review can be performed by nurses (Brazil, 2002).

Among the private activities of this professional are the nursing consultation and the nursing prescription. The nursing consultation is regulated by Law # 7.498/86 and Decree # 94.406/87 which provides for the Professional Exercise of Nursing, by Resolution COFEN 195/97 which states that the nurse may request routine and complementary exams when exercising their powers, and by Resolution COFEN 358/2009 which provides for the Systematization of Nursing Care (Cofen, 2009).

Health professionals are co-responsible for the production and direct and indirect management of a comprehensive and humanized care, even though the management of the health sector in Brazilian municipalities is considered asymmetric regarding the implementation, monitoring and evaluation of

policies and normative instruments. From this perspective, it becomes essential to approach the professionals' conceptions about the use of protocols, considering that they operationalize the policy recommendations and protocol standards of health services that serve women (Vieira, 2016).

2 METHODOLOGY

To conduct this study, we defined as research method the integrative literature review, which according to the author (Souza, 2010) aims to gather a set of works on the pre-established theme in order to assist in the foundation for a particular action or research. The study in question refers to a qualitative, descriptive, documentary approach of dialectical epistemology.

The integrative review is done in six phases, as follows: 1st Phase: elaboration of the guiding question; 2nd Phase: literature search or sampling; 3rd Phase: data collection; 4th Phase: critical analysis of the included studies; 5th Phase: discussion of the results; and 6th Phase: presentation of the integrative review.

The guiding question that encouraged the study in question is: What are the actions attributed to nurses in the care of pregnant women and their impacts on maternal mortality rates? For the bibliographical survey, the descriptors were searched in the Virtual Health Library-BVS site, indexed in the databases Medical and Literature, Analyzes and Retrieval System online (MEDLINE), Latin American and Caribbean Literature on Health Sciences (LILACS), US National Library off Medicine National Institutes off Health Search data base Searchterm Seach (PUBMED) and Nursing Database (BDENF).

The data collection through research was conducted in the period from June to July 2021. For the bibliographical survey, a search was conducted on the site of the Descriptors in Health Sciences - DeCs, and the descriptors and their Boolean crossings were: Nursing AND prenatal AND puerperium AND maternal mortality.

In the inclusion eligibility of the articles used, the following prerequisites were analyzed: Publication in the period following the last five years (2016 to 2021), in Portuguese and full texts available online. The exclusion criteria were: articles not available for free, abstracts, editorials, duplicate articles, theses and articles outside the object of research and articles that did not make up the base of the Virtual Health Library-BVS.

One hundred and fifty-five hundred and 150 articles were identified, and of these, one hundred and thirty (130) studies were in Portuguese, nineteen (19) with more than five years, thirty-four (34) incomplete studies, thirty (30) duplicate studies, and 37 off-topic studies, leaving sixteen (16) articles eligible for discussion and analysis. Next, the structures of the selected articles were observed with the objective of extracting information. It was categorized by authors, journal, year, state, country, method, level of evidence and results.

The method used to categorize the level of evidence of the selected studies was based on the Oxford Center for Medicine, where the evidence classified in this study uses corresponding increasing numbers,

1A, 1B, 1C, 2A, 2B, 2C, 3 and 4, according to the quality of the studies and using the letters "N/E" representing the term level of evidence. Based on these data we can categorize the study performed as grade of recommendation A and level of evidence 2A, by the articles found.

It can be seen that after applying the criteria to the articles on the theme in the last five years, the sixteen (16) articles selected for discussion, in their majority presented a high level of scientific evidence, among them with more than one research method.

3 ADHERENCE AND PERFORMANCE OF PRENATAL CARE

As we can see in Martins (2018), although there is a universal offer of prenatal care in Brazil, the quality of care according to the PHPN recommendations is still low, considering that most women start prenatal care even late and do not complete the minimum number of consultations expected for gestational age at the time of delivery.

Maternal health is directly linked to the minimum number of prenatal consultations, as an establishment of promotion, prevention and with the diagnosis and treatment of intercurrent diseases of pregnancy, which can prevent the numbers of maternal mortality. As cited by (Barreto, 2017), greater surveillance is needed in women in the third trimester of pregnancies considered at increased risk for major obstetric complications, highlighting the importance of a reduced interval between consultations. It is worth noting that the number of prenatal consultations performed is directly linked to the increase in the number of chances related to the incidence of deaths in pregnancy, delivery and puerperium.

Castilho, (2016), shows that when compared to other ages, teen mothers live in a situation of lower economic income, not having a partner and having lower levels of education and greater vulnerability, associated with lack of adherence to prenatal care and increases the chances of depression in pregnancy.

Lopes, (2020), cite that one of the barriers to prenatal care is the unpreparedness of professionals who provide care to the mother-baby binomial and care strategies for pregnant and postpartum women in vulnerability. Among them, there is the early intake of prenatal care with sensitive reception to the demands and specificities of users.

According to Ruiz, (2017) puerperal care should be as important as prenatal care because it concentrates a time of risk to hemorrhagic problems that increase maternal mortality.

The Ministry of Health (2013) recommends the early capture of pregnant women (until the 12th gestational week) and a minimum of six prenatal consultations. According to (Martins, 2018) and (Barreto, 2017), most women started prenatal care in the second trimester, contributing to a reduction in the period of care.

However, it is important to ratify that increasing the number of consultations alone is not enough to prevent maternal mortality, and it is necessary to evaluate the quality of the service provided to these pregnant women in order to prevent prevent preventable maternal deaths, especially hypertensive diseases.

The quality and qualification of the professionals responsible for prenatal care are as important as the number of consultations performed (Martins, 2018).

The Ministry of Health (2013) emphasizes the importance of the link between women and the Basic Health Units (BHU) in order to strengthen prenatal care, through the qualification of professionals, with more humanized, interprofessional, and less technical consultations, leading to a greater guarantee and increase in the chances of these women to continue their prenatal consultations.

Another important point found in the study that impairs both assistance and adherence to prenatal care is pregnant women in the prison system. In Brazil, the penitentiary is an inappropriate environment for the development of a pregnancy, since the assistance offered is far from what is recommended by public health policies. The violence and exposure to which these pregnant women are exposed when they enter health units in search of assistance is a topic that deserves attention and discussions in society in general, since it hurts the guidelines of the National Humanization Policy of the Unified Health System (Andrade, 2018).

Safe care, based on the best evidence and that respects the stages of childbirth, is a right of women, regardless of their clinical, social, or demographic particularities. However, it has shown that some of these characteristics may be associated with the non-adoption of practices considered humanized in the assistance to labor, delivery, and birth (Inagaki, 2018).

4 MATERNAL MORTALITY PROFILE

Martins, (2018) addresses the profile of maternal death in Brazil, where they show that the most affected age group is women between 20 and 41 years, of mixed race, single, and with low education. It is notorious and impossible to deny that socioeconomic influences and access to quality services directly impact the health care of pregnant women. Such information is confirmed by (Barreto, 2017), which shows that various barriers to not performing prenatal care or to early initiation of follow-up were identified, showing the social inequalities that persist in the country, with less access for indigenous and black women, those with lower education, with a higher number of pregnancies.

Risk factors may be present in the pre-pregnancy period or due to conditions/complications that may arise during pregnancy. Those prior to pregnancy include individual characteristics and unfavorable sociodemographic conditions such as age (less than 15 and greater than 35 years), low education, use of licit and illicit drugs, lifestyle habits, and adverse obstetric history, characterized by miscarriages, chronic clinical complications such as heart disease, Systemic Arterial Hypertension (SAH), Diabetes Mellitus (DM), Sexually Transmitted Infections (STI), Urinary Tract Infections (UTI), among other conditions. Those resulting from pregnancy are currently manifested by means of illnesses inherent to the pregnancy cycle, such as pre-eclampsia/eclampsia. The most common complications in pregnancy reported in the literature are represented by intrauterine fetal growth deviation (fetal macrosomia and restricted intrauterine growth), number of fetuses, changes in amniotic fluid volume, premature amniorrhexis, Premature Labor

(PLT), prolonged pregnancy, Severe Preeclampsia (PEG), Eclampsia, Gestational Diabetes (GD), pregnancy hemorrhages, isthmocervical insufficiency, alloimmunization and fetal death (Medeiros, 2020).

According to Lopes, (2020) the continuous and progressive use of psychoactive substances largely causes the emergence of pathologies such as abortion, premature placental displacement, intrauterine growth restriction, prematurity, low birth weight, neonatal abstinence syndrome, and fetal respiratory problems, culminating in high rates of maternal and neonatal mortality.

According to Ruiz,(2017) the increase in maternal mortality happens in the puerperal death period, most of which is postpartum hemorrhage characterized by blood loss above 500 ml in vaginal delivery and 1000 ml in cesarean deliveries. This picture conveys a need for more cautious evaluation of the puerperal woman and this monitoring cannot be interrupted after delivery, but must continue during the postpartum period until the woman's recovery.

In this context, the importance of health care for pregnant women is essential, since direct obstetric causes are responsible for two-thirds of maternal deaths, almost all of which are considered preventable (Brazil, 2009). Denoting the low quality of obstetric care and family planning provided to Brazilian women and, to change this picture, it is vital to adhere to a quality prenatal care.

5 THE NURSE IN PRENATAL CARE

Martins, (2018) highlight that reproductive planning, monitoring, early diagnosis and effective treatment of complications that occur during pregnancy, childbirth and postpartum contribute to the reduction of deaths, enabling the right to life. Conducts aimed at improving the living conditions of pregnant and postpartum women should be priorities to minimize maternal mortality, considering what happened not only as a health problem of difficult resolution, but evaluating socioeconomic indicators and tracking social vulnerability groups.

In this context, (Barreto, 2017) ratify that, with life skills training, nurses can act in primary care, outpatient and hospital network, in which it is possible to detect aggravations that may exist during pregnancy and the puerperium, leading nurses to provide maternal health care through quality assistance, contributing in such a way to the reduction of maternal mortality.

The nurse must promote preventive actions involving actions in his care, and this measure is evaluated by the Ministry of Health as an important factor for changing this picture. As well as educative actions aiming at the reduction of maternal mortality and guaranteeing the right to life and health of the woman, having as allies the existing public policies. Such practice of the nurse directed to the prevention of maternal mortality.

Ruiz, (2017) verifies the importance of nursing assessment to gestational and puerperal risks, giving examples such as the responsibility to quantify blood loss in the puerperium, be aware of signs and symptoms of bleeding, improve interdisciplinary communication, and mobilize a quick and appropriate response from the team. In this perspective, the nurse must be aware of the signs and symptoms of risk and

institute treatment as early as possible in order to have an adequate response and reversal. In this sense, he is responsible for carrying out the prescribed treatment, monitoring the patient, preventing complications and promoting comfort, and his role is essential for the proper treatment and better prognosis of pregnant and puerperal women.

It is known that Nursing is an important component of the multidisciplinary health team that provides care to patients in hospital institutions, since it performs care 24 hours a day and maintains greater contact with the patient. However, it is noted that the team often does not get emotionally involved in patient care, even as a form of barrier to protect themselves from psychological suffering.

Castilho, (2016), exemplifies the importance of individualized prenatal care, where it is possible to know the vulnerable pregnant women, the psychosocial, personal and family aspects, include the screening of depressive symptoms in the anamnesis and have within the attention network, a flow that highlights nursing as a professional with a wider range of vision in primary care.

In relation to hospital care, (Ribeiro, 2018) highlights that when there is a good relationship between the Nursing team and the parturient woman, there is greater receptivity, understanding, esteem, patience, and affection, which provides better stability for the woman during labor, reducing complications. The Nursing professionals play an important role in caring for the parturient woman, providing guidance, clarifying doubts, welcoming and helping during labor, delivery, and the puerperium.

According to Rahim (2017), nurses need to pay attention to the biopsychosocial needs of vulnerable pregnant women, such as HIV-positive women, considering their fear of contaminating other family members and the child, isolating and blaming themselves, in addition to the mental conflict and reproductive issues involved, seeking to provide quality care. In this context, the role of health education is reinforced as a way to counteract the myths and prejudice.

6 CONCLUSION

Maternal mortality is still a public health problem, especially in Brazil. Failures in the care of health professionals and social vulnerabilities contribute to the high number of maternal deaths still prevalent in Brazil. In this sense, it is noted that there is still a long way to go in the search for change in maternal health indicators. Given the results obtained, one can observe the importance of more and better publications on the subject.

The late initiation of prenatal care and the inadequate number of consultations contribute, among other factors, to an increase in mortality. For this, it is important to improve the quality of prenatal care, delivery and puerperium. It is important to prioritize primary care, with the nursing professional playing a leading role in this scenario. Since this professional has the capacity and legal support to carry out integral low-risk prenatal care.

The prenatal care performed by nurses is an important moment for early identification of obstetric risks, as well as intervention and referral. It is concluded that prenatal care for pregnant women can indeed

contribute to the prevention of maternal mortality, aiming at reducing the number of deaths with great impact on national health indicators.

The purpose of this reflection is to bring the importance of new research and studies on the theme of the importance of nurses' performance in basic health care units.

health and its impact on reducing maternal mortality. Having for its main role, strategies and measures outlined about the need for a plan and actions of differentiated care, putting on the agenda the suitability and complexity of the patient. Also highlighting a good knowledge and the potential complications during treatment, addressing the best way with quality and agility, always keeping the welfare as the basis.

REFERENCES

Akobeng, A. K. (2005). Principles of evidence based medicine. Archives of disease in childhood, 90(8), 837-840.

Brazil. Departamento de Ações Programáticas Estratégicas. (2009). Política nacional de atenção integral à saúde da mulher: princípios e diretrizes. Editora MS.

Brasil. Ministerio da Saude. Secretaria Executiva. (2000). Programa Humanização do Parto: humanização no pré-natal e nascimento. Brasil. Ministerio da Saude.

Brasil, & Ministério da Saúde. (2012). Política nacional de atenção básica.

Conselho Federal de Enfermagem. Resolução COFEN nº 0516/2016. Conselho Federal de Enfermagem. Brasil, DF, 2016. <http://www.cofen.gov.br/resolucao-cofen-no-05162016_41989.html >.

De Enfermagem, C. F. (2009). Resolução COFEN-358/2009. Dispõe sobre a Sistematização da Assistência de Enfermagem e a implementação do Processo de Enfermagem em ambientes, públicos ou privados, em que ocorre o cuidado profissional de Enfermagem, e dá outras providências [Internet]. Brasília: COFEn.

de Freitas, G. L. (2009). Discutindo a política de atenção à saúde da mulher no contexto da promoção da saúde. Revista eletrônica de enfermagem, 11(2).

Felix, L. G., Soares, M. J. G. O., & Nóbrega, M. M. L. D. (2012). Protocolo de assistência de enfermagem ao paciente em pré e pós-operatório de cirurgia bariátrica. Revista Brasileira de Enfermagem, 65, 83-91.

Goulart, C. S., Mariano, V. T., Castilho, W. R. F., do Nascimento Segura, J. S., & Mota, W. H. (2018). Percepção do enfermeiro da atenção básica acerca do atendimento à gestante soropositiva. Journal of Health & Biological Sciences, 6(3), 286-292.

Humanizada, A. Q. E. (2005). PRÉ-NATAL E PUERPÉRIO.

Jacobi, E. R. T., Gomes, C. M., & Jacobi, L. F. (2018). Análise dos indicadores relativos à saúde da gestante de um município do sul do Brasil. Saúde (Santa Maria), 3(44).

Leal, R. C., Santos, C. N. C., Lima, M. J. V., Moura, S. K. S., Pedrosa, A. O., & Costa, A. C. M. (2017). Complicações materno-perinatais em gestação de alto risco. Revista de Enfermagem UFPE on line, 11(4), 1641-1649.

Martins, A. C. S., & Silva, L. S. (2018). Perfil epidemiológico de mortalidade materna. Revista Brasileira de Enfermagem, 71, 677-683.

Martins, A. L. (2006). Mortalidade materna de mulheres negras no Brasil. Cadernos de Saúde Pública, 22, 2473-2479.

Moll, M. F., Goulart, M. B., Caprio, A. P., & Ventura, C. A. A. (2018). Enfermeiros no fortalecimento da rede de saúde numa cidade do triângulo Sul/Minas Gerais. Revista de Enfermagem do Centro-Oeste Mineiro, 8.

Moura, E. R. F., & Silva, R. M. D. (2004). Informação e planejamento familiar como medidas de promoção da saúde. Ciência & saúde coletiva, 9, 1023-1032.

PARECERCOREN-SP008/2016 – CT. Ementa: Pré-natal realizado por Enfermeiro em caso de gestação gemelar sem outros fatores de risco. Processo nº 651/2016.

Pasqual, K. K., Carvalhaes, M. A. D. B. L., & Parada, C. M. G. D. L. (2015). Atenção à saúde da mulher após os 50 anos: vulnerabilidade programática na Estratégia Saúde da Família. Revista Gaúcha de Enfermagem, 36, 21-27.

Paz, A. P. B., & Salvaro, G. I. J. (2011). Política nacional de atenção integral à saúde da mulher: propostas educativas em foco. Revista Electrónica de Investigación y Docencia (REID).

Pessoa, I. N., de Menezes, E. D., de Freitas Ferreira, T., Dotto, L. M. G., & Bessa, L. F. (2009). Percepção de puérperas sobre assistência de enfermagem na gravidez. Ciência, Cuidado e Saúde, 8(2), 236-241.

Santos, N. L. D., & Garcia, E. (2019). O planejamento familiar e a mortalidade materna por aborto. Rev. baiana saúde pública, 241-256.

Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A. B., Daniels, J., ... & Alkema, L. (2014). Global causes of maternal death: a WHO systematic analysis. The Lancet global health, 2(6), e323-e333.

Scarton, J., Thurow, M. R. B., Ventura, J., da Silva, D. N., Perim, L. F., & de Siqueira, H. C. H. (2020). Mortalidade materna: causas e estratégias de prevenção. Research, Society and Development, 9(5), e67953081-e67953081.

Secretaria Executiva. Ministério da Saúde. (2002). Programa humanização do parto: humanização no pré-natal e nascimento.

Silva, A. M. D., Santos, M. C. S. D., Silva, S. R. D. M., Ferreira, F. Â., Freitas, R. D. S. C., Santos, R. E. A. D., & Gouveia, M. T. (2018). Aleitamento materno exclusivo: empecilhos apresentados por primíparas. Rev. Enferm. UFPE on line, 3205-3211.

Silva, R. D. N. D. (2020). A agenda 2030, os ODS, o perfil dos (as) comandantes e as boas práticas das guardas municipais das capitais.

Souza, J. P. (2015). A mortalidade materna e os novos objetivos de desenvolvimento sustentável (2016-2030). Revista Brasileira de Ginecologia e Obstetrícia, 37, 549-551.

Souza, M. T. D., Silva, M. D. D., & Carvalho, R. D. (2010). Revisão integrativa: o que é e como fazer. Einstein (São Paulo), 8, 102-106.

Organização Pan-Americana da Saúde. (2018). Estratégia Regional para Redução da Mortalidade e Morbidade Materna. 26ª Conferência Sanitária Pan-Americana. 54ª Sessão do Comitê Regional. Washington DC, USA.

Vieira, L. J. E. D. S., Silva, A. C. F. D., Moreira, G. A. R., Cavalcanti, L. F., & Silva, R. M. D. (2016). Protocolos na atenção à saúde de mulheres em situação de violência sexual sob a ótica de profissionais de saúde. Ciência & Saúde Coletiva, 21, 3957-3965.

World Health Organization. (2019). Preventing unsafe abortion: evidence brief (No. WHO/RHR/19.21). World Health Organization.World Health Organization. (2019). Preventing unsafe abortion: evidence brief (No. WHO/RHR/19.21). World Health Organization.

CHAPTER 40

Comprehension of the aggravating factors of falls in the elderly at home

10.56238/rsfohsv1-040

Nayra Vanessa de Oliveira Silva
ORCID: https://orcid.org/0000-0003-1739-8628
Instituto de Ensino Superior Múltiplo, Brazil
E-mail: nayra.vanes@gmail.com

Lucas Manoel Oliveira Costa ORCID: https://orcid.org/0000-0001-7184-2318
Instituto de Ensino Superior Múltiplo, Brazil
E-mail: enflucasmocosta@gmail.com

Gaubeline Teixeira Feitosa
ORCID: https://orcid.org/0000-0001-7178-6037
Instituto de Ensino Superior Múltiplo
E-mail: g_teixeira_@hotmail.com

Luís Eduardo Martins da Costa
ORCID: https://orcid.org/0000-0001-8846-2784
Instituto de Ensino Superior Múltiplo, Brazil
E-mail: edwardoenf1@gmail.com

Silmara Alves Oliveira da Conceição Silva
ORCID: https://orcid.org/0000-0001-8158-0462
Instituto de Ensino Superior Múltiplo, Brazil
E-mail: silmara.aocsilva@gmail.com

Wenderson Felipe Moreira Lima
ORCID: https://orcid.org/0000-0003-4635-7761
Faculdade Maurício de Nassau, Brazil
E-mail: wenderson_fpe@hotmail.com

Sara Bianka Ribeiro Martins
ORCID: https://orcid.org/0000-0002-8904-3431
Centro Universitário Uninassau, Brazil
E-mail: sarabeinar2@gmail.com

Jordeilson Luis Araujo Silva
ORCID: https://orcid.org/0000-0002-2806-0377
Universidade Federal do Ceará, Brazil
E-mail: jordeilsonluis@gmail.com

Luzia da Paiva Silva
ORCID: https://orcid.org/0000-0003-3604-864X
Faculdade de ensino superior do Piauí, Teresina
E-mail: paivajuridica@gmail.com

Francisca Regina de Oliveira Sousa
ORCID: https://orcid.org/0000-0003-4757-3837
Centro Universitário Santo Agostinho, Teresina
E-mail: freginadsousa@gmail.com.br

ABSTRACT
Objective: to analyze the characterization and factors associated with falls in the elderly in the home environment in the available scientific literature. Methodology: this is an integrative literature review, outlined by the PICo strategy, conducted in the time frame from 2016 to 2021 in LILACS and PUBMED databases using the following descriptors: elderly, fall accidents, and risk factors. Results: a total of 852 articles were found, then the inclusion and exclusion criteria were applied, making a final total of 08 eligible articles. Discussion: It was identified the prevalence of this injury in elderly women in their homes. It was evidenced that falls are generally governed by two factors: environmental and physiological. Sarcopenia, aligned with hormonal factors, besides the other processes involved in aging, corroborated the worsening of this health problem. Furthermore, it was understood that falls in the elderly can result in serious complications, both physical and mental, leading to prolonged hospitalization, exposure to other pathologies and even the demand for home care. Conclusion: in general, falls have a growing incidence worldwide, being able to go beyond physiological complaints, implying mental health, family configurations, in addition to having a direct impact on autonomy and activities of daily living.

Keywords: Elderly; Accidental falls; Risk factors.

1 INTRODUCTION

Falls in the elderly are understood as a major public health problem, being related to risk factors that can lead to disability, injury and death. They are considered as geriatric syndromes that affect people's ability to manage their own lives as a result of physical, psychological, social and economic disabilities (Oliveira et al., 2021).

Statistically it is noted that people over 65 years of age who have suffered some episode of fall per year have a prevalence of 28% to 35%; in the 70-year-old age group this value permeates from 32% to 42%. According to official data from the Ministry of Health (MS), in 2013, 93,312 hospitalizations of people over 60 years of age who had suffered a fall were recorded, and of these records, 8,775 died from this cause. In Brazil, falls are one of the main reasons for hospitalization and cause of accidental death for people over 65 years of age, besides being one of the important causes of morbidity and mortality, surpassing the prevalent diseases for that age, such as non-communicable chronic diseases (NCDs) (Marinho et al, 2020).

In international countries, the prevalence of falls related to the elderly is 21% in East Asia and 19.1% in Poland. In Brazil, we can find studies showing different values for the same injury in different municipalities, such as Natal (68.2%), Uberaba (28.3%), Florianópolis (18.9%), São Carlos (27.6%), Cuiabá (37.5%), Sete

Lagoas (30%) and Catanduva (51%) (Lima, 2018).

Still at the national level, the Brazilian capitals present the highest records of falls in people aged 60 years or more, either by death or hospitalization associated with this grievance. The largest records related to mortality were in Vitória, Goiânia, Florianópolis and Porto Velho, which presented the highest rates of mortality by

decreases. The capital cities with the highest hospitalization rates were São Paulo, Natal, Belo Horizonte and Porto Alegre. Among the Brazilian regions, the Southeast, Northeast, and Midwest, followed by the South and North, were the most representative for this grievance (Gaspar et al, 2019).

In this scenario, health education stands out as a necessary tool for the promotion of quality of life (QoL) of the elderly, by providing knowledge to prevent and reduce injuries, make the person active in the transformation of life and encourage self-care and search for autonomy. However, it is essential to consider the uniqueness of the elderly to trigger changes in individual behavior (Sá et al, 2019).

Furthermore, the current literature reports that 60 to 70% of falls in the elderly occur in the home or its surroundings, and that the older the person, the greater the risk of serious complications, especially for people over 75 years of age. Thus, the identification of risk factors is important for the development of preventive measures and health promotion both in the community and at home (Oliveira et al, 2021).

In addition, it is highlighted that this grievance is delineated by two factors: intrinsic and extrinsic. The intrinsic risk factors are directly related to the elderly person, such as physiological changes of the life cycle, pathologies, polypharmacy, and reduction of their functional mechanisms. In turn, extrinsic aggravating factors are related to the conditions of the environment, such as exposure to slippery floors and carpets, poorly lit environments, absence of handrails, unstable furniture, and the presence of animals (Lemos et al, 2017).

Thus, this study aims to identify and understand, through the available scientific literature, the characterization and factors associated with falls in the elderly at home.

2 METHODOLOGY

This research is configured as an integrative review (IR) of the literature, which allows synthesis of knowledge, evaluation of important research for decisions and improvement of clinical practice, enabling knowledge of a given subject, as well as pointing out gaps in knowledge that need to be filled by conducting new studies (Mendes et al., 2019).

The guiding question of the study was: "What is the existing scientific evidence regarding the occurrence and factors associated with falls in the elderly at home?". The construction of the question in the PICo strategy was used, which represents a study formation referring to: P - Study population; I - Studied intervention or topic of interest; Co - Context. Thus the structure: P - elderly; I - Accidents by falls; Co - Risk factors.

The controlled descriptors were found in the Health Sciences Descriptors Database (DeCS), thus identifying the following descriptors: Elderly, Accidents by Falls and Risk Factors. The databases used: Latin American and Caribbean Literature on Health Sciences (LILACS), Nursing Database (BDENF), via Virtual Health Library (VHL) and National Library of Medicine (MEDLINE) via PubMed.

The inclusion criteria will be original articles, available in full, published between the years 2016 to 2021, in Portuguese, English and Spanish languages.The excluded related studies were from the reference year of the study, case reports, theses, literature review, monographs.

The level of evidence used will be that of Soares et al., 2014, which explains the levels of evidence used for classification were based on the Utilization - Focused Integrative Reviews in a Nursing Service: Level I: meta-analysis of multiple controlled studies; Level II: individual experimental studies; Level III: studies such as non-randomized clinical trials; Level IV: non-experimental studies related to descriptive or comparative research, qualitative research and case studies; Level V: data program evaluation data obtained systematically; Level VI: regulations and legislation. Data analysis was performed by reading the titles and abstracts of each article found during the search for the final analysis, in order to understand their suitability with the guiding question, and following the pre-established inclusion and exclusion criteria, making a final sample of 8 articles.

In addition, to broaden the search for findings, two strategies were used with controlled descriptors and alternative terms in more than one database and thus it was possible to expand the scientific findings. The authors used the search strategies described in Chart 1. These, in turn, were used in the following databases: LILACS, BDENF, via VHL, and Pubmed, via Medline.

Table 1: Search strategies employed in the databases during the search for studies. Brazil, 2022.

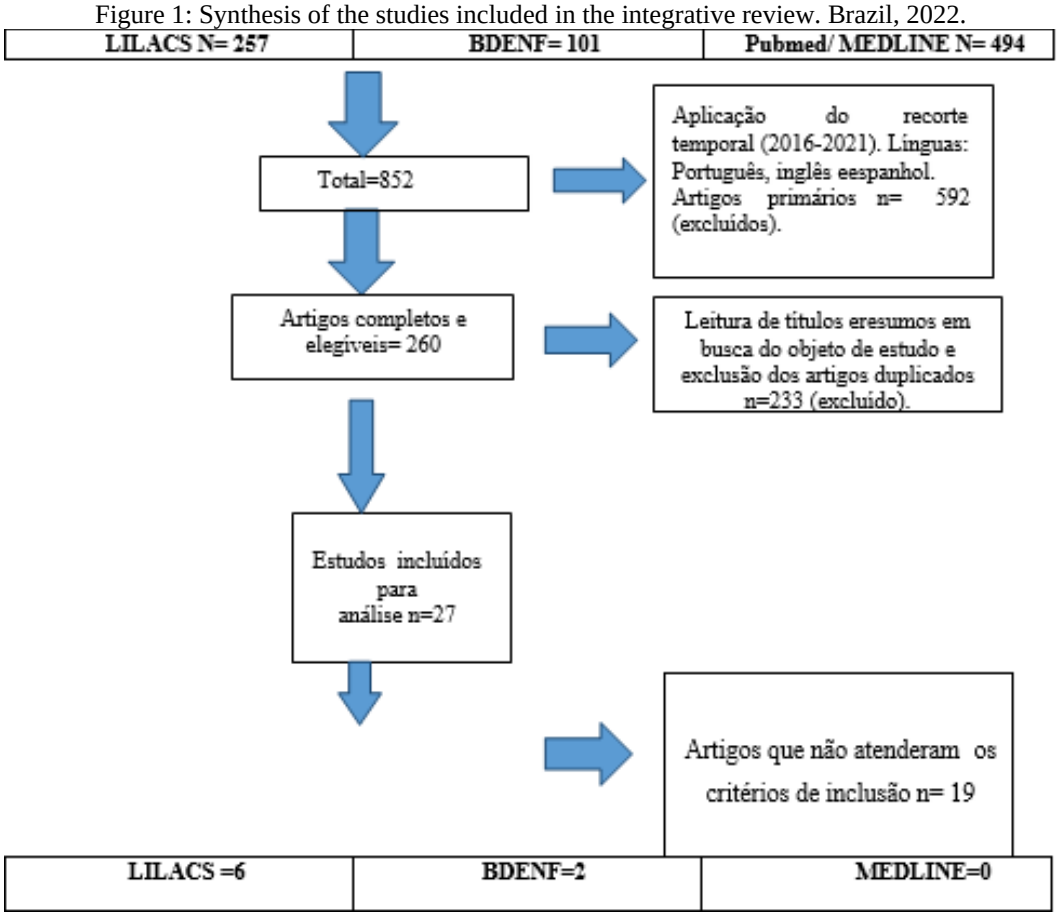
DATABASE	SEARCH STRATEGIES USED
LILACS, BDENF, (VIA BVS)	(Idoso) OR (Pessoa de Idade) OR (Pessoa Idosa) OR (Pessoas de Idade) OR (Pessoas Idosas) OR (População Idosa) AND (Acidentes por quedas) AND (Fatores de risco) OR (Correlatos de Saúde) OR (Fator de Risco) OR (População em Risco) OR (Populações em Risco)
PUBMED (via MEDLINE)	(Aged) AND (Accidental Falls) AND (Risk Factors)

Source: Authors.

Figure 1 describes the method used for the inclusion of the articles found with the strategy described above. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses = PRISMA (modified) method was used to expose the selection and inclusion steps.

The PRISMA recommendation consists of a 27-item checklist and a four-step flowchart. The purpose of PRISMA is to help authors improve their reporting of reviews, but it can also be used for the evaluation of interventions (Galvão & Pansani, 2015).

Figure 1: Synthesis of the studies included in the integrative review. Brazil, 2022.



Source: Authors.

3 RESULTS

According to Figure 1, by merging the descriptors (Chart 1) and applying them to the databases, we obtained a sample of 852 articles, 257 of which in Lilacs (30.61%), 101 in Bdenf (11.85%), and 494 in

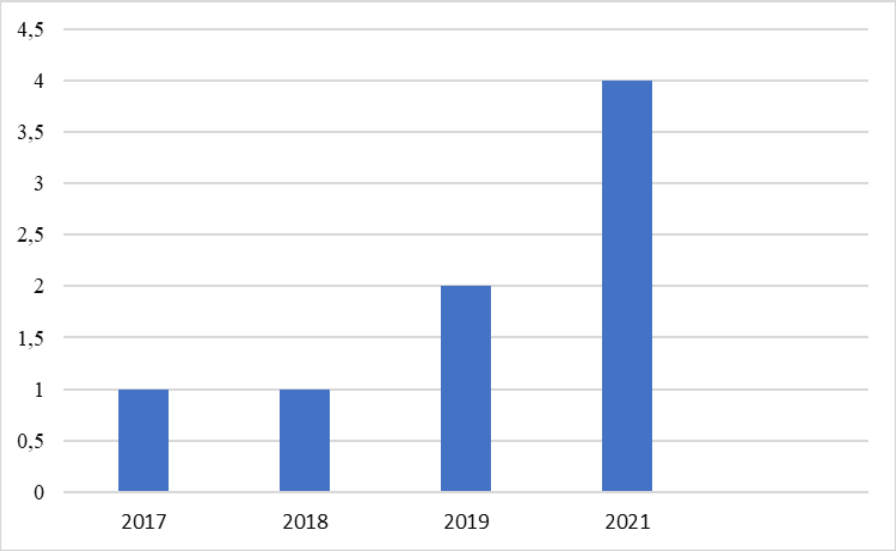
Pubmed (57.98%). After applying the inclusion and exclusion criteria cited in the methodology, a sample of 260 articles was obtained, i.e., 69.48% of the articles were discarded.

Subsequently, the authors performed a preliminary reading of the titles and abstracts of the remaining findings, aligning them to the guiding question of this study and excluding the ones that did not fit the proposal of this research. In addition, it is worth noting that duplicate articles were counted only once.

Therefore, it was evident that 233 articles did not match the objective of this research, resulting in a sample of 27 articles for individual analysis. Thus, after analytical reading of each material in its entirety, we obtained a final sample of 8 articles, distributed in the selected databases

In this sense, it was observed, as shown in Chart 1, regarding the year of publication, a higher prevalence of findings in the year 2021 and 2019, being the year 2021 represented with a total of 50.00% of the publications found (n=4) and the year 2019 with 25.00% (n=2). The years 2018 and 2017 presented 1 study each (25.00%, n=2).

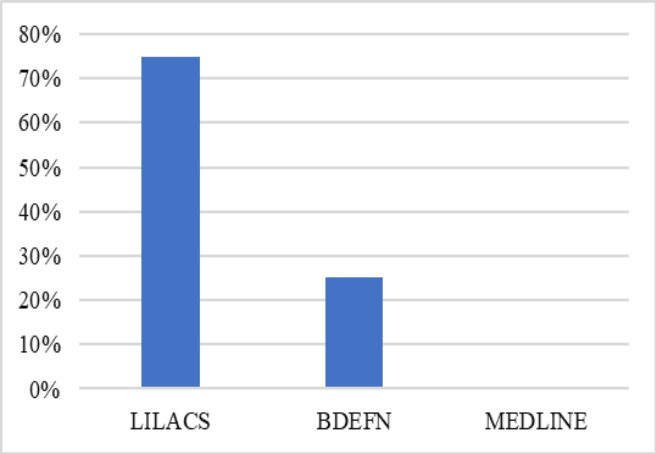
Graph 1: Distribution of selected articles by year of publication. Brazil, 2022.



Source: Authors.

The databases with the largest number of articles selected for this study were LILACS with 75.00% (n=6) and the second was BDENF with 25.00% (n=2), see Graph 2. The articles selected from the databases were 100% in Portuguese, with no need for translation.

Graph 2: Distribution of selected articles in the databases. Brazil, 2022.



Source: Authors.

Also, regarding the methodological design of each study, 62.50% of the findings were qualitative (n=5). There was no repetition of more than one journal among the findings. The studies were selected according to the authors, year of publication, databases, title, study methodology, journals or periodicals and level of evidence (Chart 2).

Chart 2: Characterization of the articles in the Integrative Review of this study. Brazil, 2022.

Author (Year)	Data base	Title	Study Methodology	Magazine/ periodicals	Level of Evidence
Batista, 2018	LILACS	Length of residence, motor skills, verbal fluency, depressive symptoms and their interrelationships in the elderly	Qualitative	UFF Scientific Journals	III
Souza, 2017	LILACS	Proprioception training to prevent falls in the elderly facing reality of the aging population	Quantitative	Unifaema Magazine	III
Oliveira et al., 2021	LILACS	Factors associated with frailty in the elderly followed-up in the Atenção Primary Health Care	Qualitative	Anna Nery School	IV
Teixeira et al., 2019	LILACS	Falls in the elderly: home environment restrictions and functional losses	Qualitative	Brazilian Journal of Geriatrics and Gerontology	III
Cruz & Contenças, 2019	LILACS	Evaluation of sarcopenia and fall risk indicators in the elderly	Quantitative	Brazilian Journal of Exercise Physiology	II
Aguiar et al., 2021	LILACS	Prevention of falls in the elserly at home	Qualitative	Multidisciplinary Journal of Northeast Minas Gerais	III
Amorin et al., 2021	BDENF	Prevalence of severe falls and associated factors in Brazilian elderly: results from the National Survey of Health, 2013	Quantitative	Science & Collective Health	V
Oliveira et al., 2021	BDENF	Risk factors for falls in the elderly in the home: a look at prevention	Qualitative	Brazilian Journal of health Review	III

Source: Authors.

4 DISCUSSION

After analyzing the findings in the literature, it was noticed a high prevalence in relation to the female gender regarding falls (78.2%), being more than twice as high when compared to males (within the binary findings). One of the justifications for this, according to what was found, is the characterization of the female gender with a longer prevalence in the domestic environment, in line with the clinical changes, the illness conditions resulting from a lower muscle strength, and also the process of chronic illness (Batista, 2018).

According to Aguiar et al. (2021), the growing incidence of this grievance in females, especially in the ages from 60 to 69, was delineated by: slippery floor (44.9%), walking without aid (56.25%), being 73.47% during the day and 57.14% at home, presenting as sequelae: myalgias (27.2%) and fears associated with falling (25.8%).

It is also noteworthy the association of falls in older women with underlying diseases, living alone, lower educational level and polypharmacy, increasing the likelihood of drug interaction. In addition, it is worth noting that such prevalence in women is due to hormonal factors, especially menopause, which can cause a greater loss of bone cells and, simultaneously, greater instability to ambulate and postural problems, thus being one of the risk factors for accidents (Aguiar et al., 2021).

In addition, there are the risk factors related to environmental conditions, the type of floor and the use of support bars that also interfere with the risk of falls, requiring a financial investment for the implementation of preventive measures that involve the social conditions of the elderly and their families (Teixeira et al., 2019).

It is necessary to emphasize that the aging process is something intrinsic and natural, with the body being subject to physiological. In this context, Souza (2017), emphasizes that such modifications trigger the decrease in bone density and muscle mass, as well as postural instability, impaired visual and auditory capacity, balance change, cognitive and functional decline, changes in gait speed, increased consumption of medications and with these changes, isolated or combined, there is an increasing prevalence of the risk of falls in this population, characterizing a process of frailty.

From this perspective, frailty is understood as a state of instability or imbalance of body homeostasis, associated with reduced body response to minimal aggravation, promoting cumulative declines that ultimately trigger greater dependence of the elderly. That being said, frail elderly have a higher risk of negative health outcomes when compared to robust elderly, such as falls, functional declines and prolonged institutionalization due to the degree of impairment related to the loss of muscle mass and cognitive functions (Oliveira et al., 2021).

Despite this, based on the study of Cruz and Contenças (2019), it was understood that frailty predisposes to falls in the elderly due to the fact that there is a decrease in physical endurance, changes in balance, appearance of muscle weakness and sarcopenia. Although different, frailty and falls are related,

since an individual with loss of muscle mass can cause sarcopenia, development of chronic diseases, use of medications, cognitive deficit, factors that clearly increase the likelihood of this injury.

Regarding external falls, it was understood that they routinely happen in gardens, yards, sidewalks, garages and streets. In addition, in the home context, the following aggravating factors can be indicated: uneven surfaces, wet or slippery floors, unfixed rugs or loose objects, unevenness of the floor, faulty steps, problems with footwear, lack of support and inadequate lighting (Oliveira et al., 2021).

Moreover, the risks of complications, such as femur neck fracture and head injuries, can lead to the need for prolonged hospitalization, exposing them to Healthcare-Related Infections (HAIs), especially those who already have chronic diseases such as hypertension, diabetes, or who have malnutrition (Cruz & Contenças 2019). Aligned to this, regarding hospital admissions, Oliveira et al. (2021) explain that the

The prolongation of hospitalization can have direct repercussions on the biopsychosocial factors of the patient, especially in cases where complications impact their autonomy and lead to dependence on home care afterwards.

It is noteworthy that sleep patterns also corroborate the high incidence of this grievance. That is, its fragmentation or continuous interruption has repercussions in a lower efficiency of rest, allowing moments of daytime sleepiness, increased use of medication for headaches, stress and anxiety, thus increasing the debilitation of moments of concentration in the activities of daily living (ADL), and reflecting in the prevalent scenario of falls and their complications (Amorin et al., 2021).

5 FINAL CONSIDERATIONS

In this study, it is possible to understand, based on the findings in the current literature, that there is a higher prevalence of falls in elderly females in the home environment, considering the physiological factors and environmental factors. Regarding the home, we noticed the correlation of environmental factors (slippery floors, loose steps, absence of support bars) with physiological factors (sarcopenia, bone mass reduction, sleep problems).

It was confirmed that falls in elderly people are configured as a serious public health problem, prevailing as a routine scenario in health services, especially for its complications that go beyond the physical characteristics, and may affect, in the long term, mental health. Corroborating this narrative are the identified bone lesions, which require hospitalizations, usually prolonged, increasing the exposure to infections, skin lesions, and even the dependence on continuous home care.

In this context, it was found in this research that falls are presented as multicausal factors, outlined by age, gender, environment, lack of family support/monitoring, low educational level, in addition to socioeconomic status. Thus, the prevention of this grievance through the extension of health services to the home is fundamental. Thus, it is suggested the implementation of studies that aim to implement methodologies to raise awareness of this population about this grievance, as well as allow the approach of health services to homes through current tools, such as telehealth.

REFERENCES

Aguiar, L., Chaves, J., & Gomes, C. (2021). Prevention of falls in the elserly at home. Revista Multidisciplinar do Nordeste Mineiro. 3(02), 01-21. https://revistas.unipacto.com.br/storage/publicacoes/2021/706_prevencao_de_quedas_em_idosos_no_domicilio.pdf

Amorim, J. S. C. de, Souza, M. A. N., Mambrini, J. V. de M., Lima-Costa, M. F., & Peixoto, S. V. (2021). Prevalência de queda grave e fatores associados em idosos brasileiros: resultados da Pesquisa Nacional de Saúde, 2013. Ciência & Saúde Coletiva, 26(1), 185–196. https://doi.org/10.1590/1413-81232020261.30542018

Batista, W. O. (2018). Tempo de residência, habilidades motoras, fluência verbal, sintomas depressivos e suas inter-relações em idosos. Revista científica UFF. https://doi.org/https://app.uff.br/riuff/handle/1/7251

Chehuen Neto, J. A., Braga, N. A. C., Brum, I. V., Gomes, G. F., Tavares, P. L., Silva, R. T. C., Freire, M. R., & Ferreira, R. E. (2018). Percepção sobre queda e exposição de idosos a fatores de risco domiciliares. Ciência & Saúde Coletiva, 23(4), 1097–1104. https://doi.org/10.1590/1413-81232018234.09252016

Cheng, M.-H., & Chang, S.-F. (2017). Frailty as a Risk Factor for Falls Among Community Dwelling People: Evidence From a Meta-Analysis. Journal of Nursing Scholarship, 49(5), 529–536. https://doi.org/10.1111/jnu.12322

Cruz, A. S., & Contenças, T. S .(2019). Avaliação dos indicadores de sarcopenia e de risco de quedas em idosos. Revista Brasileira de Fisiologia do Exercício
, 18 (2), 83-90. https://doi.org/10.33233/rbfe.v18i2.2870

Galvão, T. F., & Pansani, T. d. S. A. e. H. (2015). Principais itens para relatar Revisões sistemáticas e Meta-análises: A recomendação PRISMA.
Epidemiologia e Serviços de Saúde, 02(24), 335-342. https://doi.org/10.5123/S1679-49742015000200017

Gaspar, A. C. M., Mendes, P. A., Azevedo, R. C. de S., Reiners, A. A. O., & Segri, N. J. (2019). Quedas: conhecimentos, atitudes e práticas de idosos. Enfermagem Em Foco, 10(2). https://doi.org/10.21675/2357-707x.2019.v10.n2.1947

Giacomini, S. B. L., Fhon, J. R., & Rodrigues, R. A. P. (2020). Fragilidade e risco de queda em idosos que vivem no domicílio. Acta Paulista de Enfermagem, 33. https://doi.org/10.37689/acta-ape/2020ao0124

Layla, S., Francisco, J., Marques, H. Santos, A., Nascimento, C., & Rodrigues, P. (2019). Fatores de risco para quedas em idosos no domicilio: um olhar para a prevenção / Risk factors for falls in elderly homes: a look at prevention. Brazilian Journal of Health Review, 2(3), 1568–1595. https://brazilianjournals.com/ojs/index.php/BJHR/article/view/1390

Lemos, G. F., Ferreira, J. B., Santos, K. T., Reis, L. A. dos, & Morais, K. C. S. de. (2017). Fatores Associados a Quedas em Idosos de uma Unidade Básica de Saúde. Id on Line REVISTA de PSICOLOGIA, 11(38), 150–165. https://doi.org/10.14295/idonline.v11i38.884

Magalhães, J. L., & Silva, A. S. da. (2021). Atuação da equipe de enfermagem frente aos fatores de risco e prevenção de quedas na população idosa. Research, Society and Development, 10(6), e30510615846. https://doi.org/10.33448/rsd-v10i6.15846

Marinho, C. L., Nascimento, V., Bonadiman, B. S. R., & Torres, S. R. F. (2020). Causas e consequências de quedas de idosos em domicílio. Brazilian Journal of Health Review, 3(3), 6880–6896. https://doi.org/10.34119/bjhrv3n3-225

Mascarelo, A., Borges, N. C., Alves, A. L. S., Doring, M., & Portella, M. R. (2021). Condições visuais autorrelatadas e quedas em idosos rurais: um estudo de base censitária/ Self-reported visual conditions and falls in rural elderly: a census-based study. Brazilian Journal of Health Review, 4(1), 3960–3977. https://doi.org/10.34119/bjhrv4n1-314

Mendes, K. D. S., Silveira, R. C. d. C. P., & Galvão, C. M. (2019). Uso de gerenciador de Referências Bibliográficas na Seleção dos Estudos Primários em Revisão Integrativa. Rev. Texto e Contexto Enfermagem, 01(28), 01-13. https://doi.org/10.1590/1980-265X-TCE-2017-0204

Oliveira, S. R. N., Messias, F. M. de L., Cândido, J. A. B., Torres, G. M. C., Figueiredo, I. D. T., Pinto, A. G. A., Moreira, M. R. C., & Almeida, M. I. de. (2021). Fatores associados a quedas em idosos: inquérito domiciliar. Revista Brasileira Em Promoção Da Saúde, 34, 1–9. https://doi.org/10.5020/18061230.2021.10998

Oliveira, P. R. C., Rodrigues, V. E. S., Oliveira, A. K. L. de, Oliveira, F. G. L., Rocha, G. A., & Machado, A. L. G. (2021). Fatores associados à fragilidade em idosos acompanhados na Atenção Primária à Saúde. Escola Anna Nery, 25(4). https://doi.org/10.1590/2177-9465-ean-2020-0355

Oliveira, S. L. F. d., Francisco, T. d. J., Santos, H. M., César, A. N., & Lima, P. R. d. (2019). Fatores de risco para quedas em idosos no domicilio: um olhar para a prevenção. Brazilian Journal of health Review, 2(3), 1568-1595. https://doi.org/https://brazilianjournals.com/ojs/index.php/BJHR/article/view/1390

Puts, M. T. E., Toubasi, S., Andrew, M. K., Ashe, M. C., Ploeg, J., Atkinson, E., Ayala, A. P., Roy, A., Rodríguez Monforte, M., Bergman, H., & McGilton,
K. (2017). Interventions to prevent or reduce the level of frailty in community-dwelling older adults: a scoping review of the literature and international policies. Age and Ageing. https://doi.org/10.1093/ageing/afw247

Sá, G. G. de M., Silva, F. L., Santos, A. M. R. dos, Nolêto, J. dos S., Gouveia, M. T. de O., & Nogueira, L. T. (2019). Tecnologias desenvolvidas para a educação em saúde de idosos na comunidade: revisão integrativa da literatura. Revista Latino-Americana de Enfermagem, 27. https://doi.org/10.1590/1518-8345.3171.3186

Santos, F. dos, Lange, C., Llano, P. M. P. de, Lemões, M. A. M., Pastore, C. A., Paskulin, L. M. G., Costa, A. E. K. da, & Raymundo, J. L. P. (2019). Falls of elderly people living in rural areas: prevalence and associated factors. Revista Brasileira de Enfermagem, 72(suppl 2), 177–183. https://doi.org/10.1590/0034-7167-2018-0460

Soares, C. B., Hoga, L. A. K., Peduzzi, M., Sangaleti, C., Yonekura, T., & Silva, D. R. A. D. (2014). Integrative Review: Concepts And Methods Used In Nursing. Revista Da Escola de Enfermagem Da USP, 48(2), 335–345. https://doi.org/10.1590/s0080-62342014000020000020

Souza, A. (2017). Treino de propriocepção na prevenção de quedas em idosos frente a realidade do envelhecimento populacional. Revista Unifaema,
https://doi.org/http://repositorio.faema.edu.br:8000/jspui/handle/123456789/1275

Teixeira, D. K. S., Andrade, L. M., Santos, J. L. P., & Caires, E. S. (2019). Falls among the elderly: environmental limitations and functional losses. Revista Brasileira de Geriatria E Gerontologia, 22(3). https://doi.org/10.1590/1981-22562019022.180229

Trevisan, C., Veronese, N., Maggi, S., Baggio, G., Toffanello, E. D., Zambon, S., Sartori, L., Musacchio, E., Perissinotto, E., Crepaldi, G., Manzato, E., & Sergi, G. (2016). Factors Influencing Transitions Between Frailty States in Elderly Adults: The Progetto Veneto Anziani Longitudinal Study. Journal of the American Geriatrics Society, 65(1), 179–184. https://doi.org/10.1111/jgs.14515

Wana Borges Lima. (2018). Fatores associados a quedas em idosos da universidade da maturidade. Revista Saúde & Comunidade, 1(01), 27–36. https://periodicos.unespar.edu.br/index.php/saudeecomunidade/article/view/6314

Woo, M. T., Davids, K., Liukkonen, J., Chow, J. Y., & Jaakkola, T. (2017). Falls, Cognitive Function, and Balance Profiles of Singapore Community- Dwelling Elderly Individuals: Key Risk Factors. Geriatric Orthopaedic Surgery & Rehabilitation, 8(4), 256–262. https://doi.org/10.1177/2151458517745989

CHAPTER 41

Decision making when dealing with endodontic-periodontal lesions

10.56238/rsfohsv1-041

Rosana Maria Coelho Travassos
ORCID: https://orcid.org/0000-0003-4148-1288
University of Pernambuco, Brazil
E-mail: rosana.travassos@upe.br

Maria do Socorro Orestes Cardoso
ORCID: https://orcid.org/0000-0001-9866-0899
University of Pernambuco, Brazil
E-mail: socorro.orestes@yahoo.com.br

José Afonso Milhomens Filho
ORCID: https://orcid.org/0000-0002-7113-365
University of Pernambuco, Brazil
E-mail: afonso_milhomens@hotmail.com

Mônica Maria de Albuquerque Pontes
University of Pernambuco, Brazil
ORCID: https://orcid.org/0000-0001-5873-7847
E-mail: monica.pontes@upe.br

Vânia Cavalcanti Ribeiro da Silva
ORCID: https://orcid.org/ 0000-0003-1700-5214
University of Pernambuco, Brazil
E-mail: vania.silva@upe.br

Kattyenne Kabbaz Asfora
University of Pernambuco, Brazil
ORCID:https://orcid.org/0000-0002-7514-1444
E-mail: Kattyenne.Asfora@upe.br

ABSTRACT
This present work was aimed at evaluating the clinical knowledge of general practitioners (GP), attenting a specialization course on Endodontics in the cities of Recife - Brazil and João Pessoa - Brazil, as regards the endo-perio lesions, owing to the difficulties, noticed when stablishing their diagnosis and, therefore, when performing the therapeutic decision. On this purpose, a questionnaire with three case-reports, concerned with those lesions, was answered by a sample of 54 GPs. During the interviews, they were inquired on their possible diagnosis and treatment, by means of digitalized radiographies and case decriptions. The results revealed a great range of variation, even higher than what was expected, in reference to the diagnosis and proposed therapies, associated to a low frequency related to the right decision-making. In conclusion, the majority of the interviewed students does not retain the required scientific knowledge towards the studied subject.

Descriptors: Endodontics. Periodontics. Decision-making.

1 INTRODUCTION

Endoperiodontal lesions are defined in the scientific literature as pathological changes that compromise the pulp and periodontal tissues of the same dental element simultaneously, where there may or may not be a cause and effect relationship between the lesions. A pathological condition originating in one of the structures, if left without adequate treatment for a period of time, leads to the destruction of part of the adjacent structure, simulating a false origin of the lesion and making diagnosis difficult for the professional. (LASCALA; PAIVA, 1991, DE DEUS, 1992, RUIZ; MENDONÇA; ESTRELA, 2001, GUSMÃO, 2003, SANTIAGO; SOARES; PINTO, 2005)

Researchers and clinicians have long recognized the close relationship between the dental pulp and the periodontium. The interdependence of these two tissues is flagrant to the point that they are close and related since the embryonic stage, even with the same vascular supply. The anatomical interrelation of the periodontium and root canal system, through the natural communication routes between these tissues, such as the apical foramen, lateral and accessory canals, as well as the occasional communications between them, characterized

by perforations, fractures and dentinal tubules lacking the protection of the root cementum, may justify such a high occurrence of lesions involving these two tissues.

Neves; Barbosa (1994) performed a radiographic analysis of teeth with periodontal lesions, selecting 601 radiographs of teeth with healthy crowns. According to the results, 48.4% of the teeth presented periapical lesions associated with periodontal lesions, proving pulp involvement via periodontium. In view of the above, they suggested meticulous overall case evaluation when diagnosing and planning initially periodontal cases.

Microbiological similarities between infected root canals and advanced periodontitis confirm the possibility of cross infection in these cases. Figueiredo; Toledo; Salvador (2000) agreed with other authors, in their review of the literature, when they stated that in endoperiodontal lesions the microbiota of the root canal is more complex and pathogenic than when the lesion is purely endodontic. As an example, *Spirochetes are* rare organisms in the root canal system, but frequent in periodontal pockets, and are found in cases diagnosed as endoperiodontal lesions. Therefore, these should be considered as a single lesion, regardless of their origin.

Clinical signs such as periodontal pockets, suppuration, fistulas, swelling of marginal gingiva, tooth sensitivity to percussion, increased tooth mobility, and radiographic findings such as angular bone defects, for example, do not result exclusively from periodontal disease associated with plaque, but may also result from irritants present in the root canal system of the affected tooth. Often, the difficulties inherent in diagnosis generate controversy around the subject, leading to the classification as an endo-perio lesion of situations that are characteristically pulpal or periodontal, without any aspect of interrelationship.

Chang; Lin (1997) considered that endodontic lesions may simulate a periodontal lesion both clinically and radiographically as a result of the formation of lesions in the furcation region and drainage of abscesses arising from pulp necrosis through the periodontal ligament region. In these cases, the diagnosis should involve several tests to be made accurately, such as palpation, percussion and pulp sensitivity, a careful radiographic analysis and knowledge of the patient's medical and dental history, thus avoiding unnecessary treatments that may even harm the health of the dental element in question.

The true simultaneous occurrence of periodontal lesions and pulpal alterations, where there is no defined origin, is not frequent and its etiology is not fully known, being called Endo Periodontal Syndrome by some. This would be characterized by a set of determined and pathognomonic signs and symptoms of a particular disorder, such as the presence of localized periodontal lesion with deep pocket formation involving only one side of the root, mobility incompatible with bone loss or with the severity of the inflammatory response, and irreversible pulp alteration, described as inflammatory pulpopathy, occurring concomitantly. (CHAMBRONE, 1985, LASCALA; PAIVA, 1991, GUSMÃO, 2003)

Several classifications for endodontic-periodontal lesions are proposed in the current scientific literature, in general based on the etiology of these lesions, some being more referenced than others. However, none seems to be complete enough to be considered a standard classification for the subject, which leads to a divergence among professionals regarding the clinical diagnosis and treatment of these lesions.

Vakalis et al. (2005) conducted a pilot study to evaluate the effectiveness of the treatment protocol established for endo-perio lesions. To do so, they selected nine patients diagnosed with true endo-perio lesions and first performed endodontic treatment associated with scaling and root planing of the compromised dental elements. After one month the non-surgical periodontal treatment was repeated to favor the decontamination of the residual pockets. During the evaluation of the results they observed that, despite the limitation of this study, the treatment for these lesions prioritizing endodontics is effective, providing good clinical results and bone support gain in most teeth.

Knowing that the process of solving a clinical problem and the successful resolution of this problem is characterized by two major phases of decision making the designation of a diagnosis at a level of specificity appropriate for therapeutic considerations and the selection of a treatment that affects the problem in order to solve or alleviate it (NETO, 1998), we decided to analyze, with students of specialization courses in Endodontics in the cities of Recife and João Pessoa, the decision making - diagnosis and therapeutic paradigm - for lesions of endodontic-periodontal involvement, in order to verify what type of concept is being adopted by them in their daily clinical practice.

2 MATERIALS AND METHODS

This cross-sectional study was carried out in specialization courses in Endodontics of two Higher Education Institutions of the city of Recife, which are the University of Pernambuco - UPE and the Federal University of Pernambuco - UFPE, of a Class Entity of the city of Recife - Sindicato dos Odontologistas do Estado de Pernambuco - SOEPE, and of two Study Centers of the city of João Pessoa: the Núcleo de Estudos e Aperfeiçoamento Odontológico - NEAO and the Centro Odontológico Especializado - COESP, in the period from November 2005 to February 2006.

The population studied consisted of 60 dental surgeons, students of the selected courses. The choice of this population was due to the fact that they were general practitioners or with postgraduate degrees in other areas of dentistry, but with interest currently focused on endodontics, characterizing a convenience sample.

The students were invited to participate in the research and sign the Informed Consent Form (ICF). Students were explained the objectives of the study and were given all the necessary information to consciously decide about their participation. Students who did not agree to participate in the study and, consequently, did not sign the informed consent form, or were not present at the location of the study on the date scheduled for the research were excluded from the sample.

All data were collected by the author of the research in the selected institutions, by means of a personal interview, whose objective was to obtain information from the students about the diagnosis and therapy to be instituted for the cases presented. In the interview, the researcher used the standardized or structured type of questioning, conducting the questions through a questionnaire.

This questionnaire presented three case scenarios composed of a digitized radiograph and a description of the clinical aspect. Two questions were asked for each case: one about the clinical-radiographic diagnosis of the

lesion and another about the therapeutic paradigm of choice for the case. The questions were the same for the three case scenarios and were objective, with five response options for the diagnosis and four response options for the therapeutic paradigm.

CASE SCENARIO 1:

On clinical examination it was observed:

- Presence of pulp sensitivity - characteristic symptomatology of irreversible pulpitis
- Presence of a periodontal pocket involving the distal surface of the root

1) What is the clinical-radiographic diagnosis of this lesion?

a) Endodontic lesion
b) Periodontal lesion
c) Primary endodontic lesion with secondary periodontal involvement
d) Primary periodontal lesion with secondary endodontic involvement
e) True endo-perio lesion

2) Which therapy should be instituted?

a) Endodontic treatment
b) Periodontal treatment
c) Root decontamination + Endodontic treatment + Periodontal treatment
d) Root decontamination + Periodontal treatment + Endodontic treatment

CASE SCENARIO 2:

On clinical examination it was observed:

- Absence of pulp sensitivity, Pain on horizontal and vertical percussion, Presence of edema in the region of the alveolar mucosa, Absence of periodontal pocket, Absence of fistula

1) What is the clinical-radiographic diagnosis of this lesion?

a) Endodontic lesion
b) Periodontal lesion
c) Primary endodontic lesion with secondary periodontal involvement
d) Primary periodontal lesion with secondary endodontic involvement
e) True endo-perio lesion

2) Which therapy should be instituted?

a) Endodontic treatment

b) Periodontal treatment

c) Root decontamination + Endodontic treatment + Periodontal treatment

d) Root decontamination + Periodontal treatment + Endodontic treatment

CASE SCENARIO 3:

On clinical examination it was observed:

• Absence of pulp sensitivity, Presence of fistula, Presence of periodontal pocket of + 10mm on the distal surface of the distal root, Grade I mobility, Presence of horizontal bone resorption compatible with the patient's age

1) What is the clinical-radiographic diagnosis of this lesion?

a) Endodontic lesion

b) Periodontal lesion

c) Primary endodontic lesion with secondary periodontal involvement

d) Primary periodontal lesion with secondary endodontic involvement

e) True endo-perio lesion

2) Which therapy should be instituted?

a) Endodontic treatment

b) Periodontal treatment

c) Root decontamination + Endodontic treatment + Periodontal treatment

d) Root decontamination + Periodontal treatment + Endodontic treatment

Figure 1 - True endopereal lesion (scenario case 1)

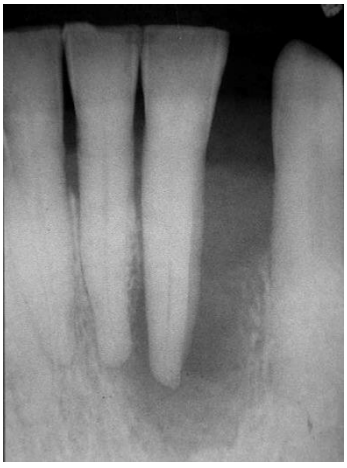


Figure 2 - Strictly endodontic lesion (scenario case 2)



Figure 3 - Primary endodontic lesion with secondary periodontal involvement (scenario case 3)



In the data analysis, the variables established in the methods of this study were created: Verify the prevalence of the correct clinical-radiographic diagnosis, as well as the correct treatment to be instituted for the cases scenarios.

3 RESULTS

Table 1 shows the results of the clinical-radiographic diagnosis and therapy of all 54 students participating in the study according to the scenario. This table shows that: in each case, the percentage of correct answers for the therapeutic diagnosis was higher than the corresponding percentage of correct answers for the clinical-radiographic diagnosis; the percentage of correct answers for the clinical-radiographic diagnosis was lower in case 1 (22.2%) and higher (59.3%) in case 2; the highest percentage of correct answers for the therapeutic diagnosis was recorded in case 2, while the percentage of correct answers in the other two cases were close. Significant differences between the percentages of correct and incorrect diagnoses were registered in the clinical-radiographic diagnoses of cases 1 and 3 and in the therapeutic diagnosis of case 2.

Table 1 - Evaluation of the results of the clinical-radiographic and therapeutic diagnoses, of all students according to the case scenario

Case scenario	Evaluation	Evaluation						p-value
		Right		Wrong		TOTAL		
		n	%	n	%	n	%	
1	Clinical-radiographic diagnosis	12	22,2	42	77,8	54	100,0	$p^{(1)} < 0.0001$*
	Therapeutics	31	57,4	23	42,6	54	100,0	$p^{(1)} = 0.2763$

2	Clinical-radiographic diagnosis	32	59,3	22	40,7	54	100,0	$p^{(1)} = 0.1736$
	Therapeutics	39	72,2	15	27,8	54	100,0	$p^{(1)} = 0.0011$*
3	Clinical-radiographic diagnosis	18	33,3	36	66,7	54	100,0	$p^{(1)} = 0.0002$*
	Therapeutics	32	59,3	22	40,7	54	100,0	$p^{(1)} = 0.1736$

(*) - Significant difference at 5.0%.
(1) - Using the chi-square test for equality of proportions .

Table 2 shows the results of decision making (radiographic clinical diagnosis and therapy) by case for the entire sample studied, being considered correct only in the case of correct diagnosis and therapy together. This table shows that the highest percentage (59.3%) of correct decision making was recorded in case 2 and the lowest (16.7%) in case 1. At a level of 5.0% significant differences were recorded between the percentages of right and wrong in cases 1 and 3 ($p < 0.05$).

Table 2 - Decision making assessment (Radiographic and therapeutic clinical decision making) according to the case scenario

Case scenario	Decision Making				TOTA	p-valu
	Right		Wrong			
1	1(		8:		0	$p^{(1)} < 0.0($
2	5!		4(		0	$p^{(1)} = 0.1$
3	2'		7:		0	$p^{(1)} = 0.0($

(*) - Significant difference at 5.0%.
(1) - Using the chi-square test for equality of proportions .

- Evaluation of Recife's student results

The results contained in Tables 3 and 4 refer to the 35 students from the city of Recife only. Table 3 analyzes the results of diagnosis and therapy, while Table 4 analyzes decision making (diagnosis + therapy together)

Table 3 - Evaluation of the results with the students in **Recife** according to the case scenario

Case scenario	Evaluation	Evaluation						p-value
		Right		Wrong		TOTAL		
		n	%	n	%	n	%	
1	Clinical-radiographic diagnosis	7	20,0	28	80,0	35	100,0	$p^{(1)} = 0.0004$*
	Therapeutics	20	57,1	15	52,9	35	100,0	$p^{(1)} = 0.3980$
2	Clinical-radiographic diagnosis	18	51,4	17	48,6	35	100,0	$p^{(1)} = 0.8658$
	Therapeutics	24	68,6	11	31,4	35	100,0	$p^{(1)} = 0.0280$*
3	Clinical-radiographic diagnosis	12	34,3	23	65,7	35	100,0	$p^{(1)} = 0.0630$

Therapeutics	22	62,9	13	37,1	35	100,0	$p^{(1)} = 0.1282$

(*) - Significant difference at 5.0%.
(1) - Using the chi-square test for equality of proportions .

Table 4 shows that: in each case, the percentage of correct answers for the therapeutic diagnosis was higher than the corresponding percentage of correct answers for the clinical-radiographic diagnosis; the percentage of correct answers for the clinical-radiographic diagnosis was lower in case 1 (20.0%) and higher (51.4%) in case 2; the highest percentage of correct answers for the therapeutic diagnosis was found in case 2, while the percentage of correct answers in the other two cases were similar (57.1% in case 1 and 62.9% in case 2). At a 5.0% significance level, significant differences were recorded between the percentages of correct and incorrect clinical-radiographic diagnosis in cases 1 and 3 and therapeutic diagnosis in case 2 ($p < 0.05$). Thus, Table 4 shows that among the Recife students the results of decision making (clinical-radiographic diagnosis and therapy) per case. This table shows that the highest percentage (51.4%) of correct decision making was recorded in case 2 and the lowest (17.1%) in case 1. At the 5.0% level significant differences were recorded between the percentages of right and wrong in cases 1 and 3 ($p < 0.05$).

Table 4 - Decision making assessment (Radiographic and therapeutic clinical decision making) according to the case scenario

Case scenario	Evaluation						p-value
	Right		Wrong		TOTAL		
	n	%	n	%	n	%	
1	6	17,1	29	82,9	35	100,0	$p^{(1)} < 0.0001$*
2	18	51,4	17	48,6	35	100,0	$p^{(1)} = 0.8658$
3	10	28,6	25	71,4	35	100,0	$p^{(1)} = 0.0112$*

(*) - Significant difference at 5.0%.
(1) - Using the chi-square test for equality of proportions .

4 DISCUSSION

The term endoperiodontal lesion is vague due to the fact that it does not differentiate between lesions that are primarily endodontic, primarily periodontal or lesions produced by undefined factors that together would characterize the so-called Endoperiodontal Syndrome or true endoperiodontal lesion. The development of these lesions has been attributed to the presence of numerous access routes between the pulp and periodontal tissues.

Histological observations show that the presence of intercommunications allows both the periodontal infection via pulp, characterizing a retrograde periodontitis, as the pulp infection via periodontium, giving rise to a picture of retrograde pulpitis (BENDER; SELTZER, 1972, LANGELAND; RODRIGUES; DOWDEN, 1974, BARKHORDAR; STEWART, 1990, KOBAYASHI et al., 1990, DEUS, 1992). However the first involvement cited is more commonly accepted by researchers, since there is a vast literature favoring this viewpoint.

Most authors (BARKHORDAR; STEWART, 1990, LASCALA; PAIVA, 1991, EHNEVID et al., 1993a, EHNEVID et al., 1993b, JANSSON et al, 1995, CHANG; LIN, 1997, WEINE, 1998, RUIZ; MENDONÇA; ESTRELA, 2001, GUSMÃO, 2003, SANTIAGO; SOARES; PINTO, 2005) concluded in their studies that the lack of preparation of these lateral and accessory canals can lead to the formation of periapical or periradicular lesions that, if detected and treated correctly will have their repair in a relatively short period of time; However, if not treated in a timely manner, they may lead to plaque and tartar accumulation on the external surfaces of the tooth, inducing the formation of a pathological periodontal condition in the patient, or, if the patient is already affected by generalized periodontal disease, these lesions of pulp origin may increase the degree of fiber disorganization, worsening the symptomatology, hindering the treatment of the marginal lesion and worsening its prognosis.

Ehnevid et al. (1993a) evaluated the results of periodontal treatment against pulpal pathology. When comparing the healing pattern of the periodontium after periodontal therapy of teeth with and without pulpal disease, they concluded that root infection evident as periapical radiotransparency may delay or impair periodontal healing.

In relation to retrograde pulpitis, there is a divergence of authors regarding the extent of pulp damage that may occur due to an untreated lesion in the supporting tissues adjacent to the compromised tooth. Langeland, Rodrigues and Dowden, 1974, Torabinejad and Kiger, 1985, Berg, Blomlof and Lindskog, 1990, Borba et al. 2002, among others, believe that while the nerve vascular bundle in the apical foramen region is not affected by the marginal periodontal lesion, severe and irreversible damage to the dental pulp will not occur, since in some studies conducted on this subject some foci of localized pulp inflammation, irregular dentin production, calcification and resorption were observed.

In controversy, research by Bender; Seltzer (1972) suggested that the presence of an associated condition between caries lesions and marginal periodontal disease has higher rates of painful symptoms compared to those free of periodontal disease, and worse prognoses for the patient's overall health, as well as the presence of periapical or periradicular radiolucent lesions in teeth with healthy crowns of patients with generalized periodontal disease was observed in a study of radiographic analysis, proving pulp involvement via the periodontium. (NEVES; BARBOSA, 1994)

Microorganisms characteristic of periodontal lesions were found in necrotic pulp tissue of teeth with healthy crowns, making it evident that in endoperiodontal lesions the microbiota of the root canal system is more complex and virulent than in purely endodontic lesions (KOBAYASHI et al, 1990, KEREKES; OLSEN, 1990, FIGUEIREDO; TOLEDO; SALVADOR, 2000) A study of induced periodontitis in animals also showed the presence of necrotic foci and hyaline degeneration in healthy teeth (SALLUM et al., 1993).

Some authors (SIMON; GLICK; FRANK, 1972, SOARES; BITTENCOURT; TAVARES, 1998, FAVIERI; PIACSER; FREITAS, 1999, LAMBERTI et al., 2000, MARTINS et al., 2004, ANAND; NANDAKUMAR, 2005) consider the true endodontic-periodontal involvement as being the one resulting from the coalescence of two isolated lesions in the same tooth, originating a single lesion.

The differential diagnosis between endoperiodontal lesions of pulpal origin and those of periodontal origin is not always easy, since in many cases patients present clinical signs and report symptoms compatible with both lesions. It is clear, therefore, that numerous clinical tests such as palpation, percussion and pulpal sensitivity, a careful radiographic analysis and knowledge of the patient's medical and dental history are necessary for a correct diagnosis to be made, as well as the most appropriate treatment for each case to be instituted and the prognosis of the case to become favorable. (PAUL; HUTTER, 1997, ROSSI, 2002)

The differential diagnosis of endoperiodontal lesions with root fractures, iatrogenic perforations and diseases of the pulp and periodontium alone must also be made with caution in order to minimize unnecessary treatments, which end up compromising the tooth in question (LINDHE, 1992, MORAES, 1996, CHANG; LIN, 1997, ZUZA; TOLEDO, 2001)

In this study, when performing a literature review on the topic of endodontic-periodontal lesions, we found that there is no single classification for these lesions. What happens are several classifications proposed over the years of research by several different authors, who generally relate their way of grouping these lesions to their etiology.

The most referenced classification in the literature, however, is the one proposed by Simon; Glick; Frank (1972), which classifies endodontic lesions into primary endodontic lesion, primary endodontic lesion with secondary periodontal involvement, primary periodontal lesion, primary periodontal lesion with secondary endodontic involvement and true endodontic lesion, where the latter would describe a clinical picture characterized by pulp necrosis and deep pockets, assuming that pulpal and periodontal lesions occur independently in the same tooth, progressing until they unify to produce a radiographic image where it is not distinguished which lesion is characterized as the cause and which would be characterized as the consequence. Authors such as De Deus (1992), Lindhe (1992), Paul; Hutter (1997), Lamberti et al. (2000), Arróniz (2003), Anand; Nandakumar (2005) adopt this classification.

Another classification that draws attention is the one proposed by Lascala and Paiva (1991), which in addition to describing the lesions considered involvements where there is a cause and effect relationship between the pathological conditions, highlights the definition of Chambrone (1985) for the so-called true endoperiodontal lesion as being characterized by a series of grouped and pathognomonic factors such as the presence of periodontal pocket, accentuated mobility not compatible with bone loss discernible on radiographs and inflammatory pulp disease, making it a clinical picture different from others. Corroborating this classification, Gusmão (2003) states that there are two types of combined pathology between periodontal and pulp tissues: The first, considered as involvement where there is a cause and effect relationship between the lesions, justified by the presence of the communication routes between the said tissues; and the second type of pathological relationship, this being infrequent, characterized by well-defined clinical signs, such as intense pulp pain caused by inflammatory pulpopathy, periodontal pocket and marked tooth mobility not compatible with the bone loss visualized by radiographic examination, there being a true fusion between the two lesions, making their diagnosis difficult.

Torabinejad; Trope, in 1997, classified these lesions in order to divide them into periodontal lesions of endodontic origin, periodontal lesions of periodontal origin, and true associated lesions that would present as two concomitant lesions on the same tooth and may communicate or not. One year later, Weine (1998) proposed a classification that related the signs and symptoms to the origin of the lesion, subdividing them into Class I, where the symptoms simulate, by clinical and radiographic observation, a periodontal disease, but are actually caused by inflammation and/or pulp necrosis; Class II, when the tooth has a pulp or periapical disease concomitant with a periodontal disease; Class III, when the tooth has no pulpal problem, but needs endodontic treatment associated with a root amputation, to achieve periodontal healing; and Class IV, representing the cases that simulate, by clinical-radiographic observation, a pulp or periapical disease, but that in reality characterize a periodontal disease.

In turn, some authors disagree regarding the classification, such as Ruiz; Mendonça; Estrela (2001), who suggested a distinct classification for endoperiodontal lesions based on their origin and according to the patient's risk for periodontal disease, since the author considered that the greater the periodontal involvement of the patient, against the endodontic, the worse the prognosis of the case. Dividing the endoperiodontal lesions into lesions of endodontic origin - redividing this to patients with local risk, systemic or both for periodontal disease, and patients at no risk for periodontal disease, and lesions of periodontal origin - being due to local risk factor, systemic or associated, and Walker (2001) who grouped in his classification lesions of endodontic origin that cause damage to the periodontium being these temporary or definitive with the denomination of endodontic lesion; To those of periodontal origin with pulpal repercussion or not, he calls periodontal lesion, and adds in his classification the iatrogenic lesions, usually endodontic as truly endoperiodontal lesions.

As a result of this divergence between authors on how to classify this type of associated lesion, the clinical difficulties of diagnosis become frequent, which leads dental professionals and students to consider this a difficult subject to understand, making the diagnosis and treatment decision variable issues, not based on scientific evidence.

Faced with this situation of difficulty in decision-making in cases of endoperiodontal lesions, this research sought to analyze what type of concept is being taken into consideration by current students of specialization in Endodontics. Thus, it was observed a lack of agreement between the diagnoses proposed by those surveyed for lesions presented in case scenarios, which can be justified by the variety of classifications for the same lesion, associated with a lack of knowledge on the subject.

When it comes to the treatment of these pathological conditions that relate the pulp to the periodontium, it is certain that the correct diagnosis will define the most appropriate treatment for each case, since it is very common to misclassify pulpal or periodontal conditions as endoperiodontal lesions.

For those in which it is observed characteristics of pulpal lesion only, but that presents periodontal repercussions, such as abscess drainage via sulcus, the authors generally state that it should only be performed a radical endodontic treatment and it is expected a repair of the picture in time compatible with the extension of the periodontal lesion, being therefore considered temporary and not justifying its classification as endoproperial

lesion. (LASCALA; PAIVA, 1991, DE DEUS, 1992, LINDHE, 1992, CHANG; LIN, 1997, PAUL; HUTTER, 1997, WEINE, 1998, LAMBERTI et al, 2000, ARRÓNIZ, 2003, ANAND; NANDAKUMAR, 2005) Based on this idea, this research analyzed the opinion of specialization students in Endodontics, presenting them with a case scenario of strictly endodontic lesion with temporary repercussion in the periodontium, and observed that 72.22% of respondents would only perform the endodontic treatment, however, 18.52% would associate the endodontic treatment with periodontal, which in this case would be considered unnecessary.

In cases of patients with generalized periodontal disease who, during or after treatment, show mild to moderate pulp sensitivity, it is also recommended that proservation be performed, sparing that tooth from pulp excision, which could become a negative factor for the reinsertion of periodontal ligament fibers, as noted by Lindhe (1992), Fachin; Luisi; Borba (2001), Walker (2001), Borba et al. (2002), and Arróniz (2003).

In cases of severe symptoms or detection of a picture of pulp necrosis associated with periodontal problem, the combined treatment is recommended by several researchers, (BENDER; SELTZER, 1972, LASCALA; PAIVA, 1991, NEVES; BARBOSA, 1994, WEINE, 1998, RUIZ; MENDONÇA; ESTRELA, 2001, FACHIN; LUISI; BORBA, 2001, WALKER, 2001, HAUEISEN; HEIDEMANN, 2002, ARRÓNIZ, 2003, VAKALIS et al., 2005) and should be initiated by Endodontics so that the endodontic lesion, when present, is cured and promotes maximum repair of periodontal fibers and structures before performing advanced periodontal treatment, since the prognosis of cases in general are related to the severity of periodontal disease that affects the patient.

In cases diagnosed as primary endodontic lesion with secondary definitive periodontal involvement, with formation of periodontal pockets by apical migration of plaque and tartar, the treatment of choice should also be combined, prioritizing once again the Endodontics to prevent recurrences of localized periodontitis and avoid unnecessary wear of the tooth structure in its external portion. (BARKHORDAR; STEWART, 1990, LASCALA; PAIVA, 1991, EHNEVID et al, 1993a, EHNEVID et al., 1993b, JANSSON et al., 1995, ABBOTT, 1998, HAUEISEN; HEIDEMANN, 2002, ARRÓNIZ, 2003, VAKALIS et al., 2005, BRITAIN et al., 2005)

In both cases cited (endo-perio lesion or perio-endo lesion) the initial periodontal treatment as supragingival root decontamination can be performed before endodontic treatment to better suit the oral environment and minimize bacterial contamination in the area to be treated. Advanced periodontal treatment can be initiated during the changes of intra-canal medication or at the end of endodontic treatment, this issue is at the discretion of the professional. In this regard, this study showed that 59.26% of the respondents agreed with this procedure.

In cases of true endoperiodontal lesions where the origin of the lesion is not defined, the combined treatment is also recommended by Lascala; Paiva (1991), Tseng et al. (1996), Abbott (1998), Soares; Bittencourt; Tavares (1998), Favieri; Piacser; Freitas (1999), Lamberti et al. (2000), Fachin; Luisi; Borba (2001), Gusmão (2003), Arróniz (2003), Martins et al. (2004), Vakalis et al. (2005), Anand; Nandakumar (2005), among other authors, emphasizing that intra-canal medication should be changed until periodontal

treatment is completed and the prognosis for the case is considered favorable, allowing obturation of the canal system. (ABBOTT, 1998)

Recent studies propose as periodontal surgical treatment the opening of a flap for root debridement associated with the use of an inorganic matrix of bovine bone to fill the bone defects caused by the lesion, and the adaptation of a resorbable collagenous membrane, justifying that the reinsertion of fibers and the bone gain in the marginal crest height reach values significantly higher than those reached in the treatment of only open scraping. (TSENG et al., 1996, BRITAIN et al., 2005)

The final sample was characterized by 54 students of Specialization in Endodontics, 33 of these in the city of Recife and 21 in the city of João Pessoa. The female gender was the majority, represented by 42 students and only 12 male students. The ages of the interviewees ranged from 23 to 66 years, with a mean of 27 years. Although 24.07% of the sample (13 students) correctly diagnosed the

Regarding the treatment decision for the cases presented to the students participating in this research, the authors observed that, in general, the professionals are aware that the treatment of endoperiodontal lesions should be performed in a combined manner, however they do not seem to be sure about the most indicated sequence to perform it. It was also verified the high frequency of unnecessary treatments, and also that most of the researchers were not able to correlate the correct diagnosis with the sequence of treatment indicated for each case.

For the case scenario 1, 24.07% of the respondents were successful in diagnosing the lesion presented as a true endo-perio lesion, and 57.41% indicated the combined endodontic and periodontal treatment for this lesion, however only 18.52% related the correct diagnosis with the treatment of choice indicated by the scientific literature. In the results of case scenario 2, it was found that slightly more than half of the respondents (59.26%) correctly associated diagnosis and treatment. And finally, for scenario case 3, only 27.77% of the students were successful in their decision making. This analysis of the results proves the lack of knowledge among professionals, students of the specialization courses selected for this research, regarding the theme addressed here.

That said, and in order to help clarify the issue for professionals, as well as in the teaching-learning process, the authors of this research suggest a classification for lesions of endodontic-periodontal involvement, based on the principle that strictly endodontic or periodontal lesions with temporary repercussions on adjacent tissue should not be part of the classification of endoperiodontal lesions, since, when treated alone, i.e., without associated treatment, there is complete repair of the injured structures.

In view of this, the endoperiodontal lesions would be classified as:

- Periodontal lesion of pulp origin - This is when, in cases of drainage of purulent secretion via the periodontal sulcus, the lack of endodontic treatment for a prolonged period of time favors the continuous deposit of plaque and tartar, promoting the onset or worsening of a periodontal process with formation of pockets and apical migration of the supporting structures.

- Endodontic lesion of periodontal origin - Characterized by irreversibly altered, or even negative, responses to pulp sensitivity tests on teeth free of caries or extensive restorations, in the face of a picture of generalized periodontal disease of the patient that justifies the involvement of large volume lateral canals or compression of the apical vascular-nerve bundle of the compromised tooth, leading to invasion of the healthy pulp tissue by periodontopathogenic bacteria and their toxic products.
- True endoperiodontal lesion - This is a rare lesion, of still unknown etiology, which presents well-defined clinical characteristics such as: Absence of caries or restorations in the compromised tooth, absence of evident occlusal trauma, presence of periodontal pocket on one side only, exaggerated dental mobility not compatible with bone loss and irreversible pulpitis symptoms. In these cases there is a true fusion between the two lesions, and it is not possible to identify a cause and effect relationship.

Regarding the treatment of these lesions, the authors suggest that it should be performed in an associated manner for all of them, always prioritizing Endodontics, in order to avoid recurrence of periodontal lesions and, consequently, unnecessary wear in the cementum of the dental element. Supragingival root decontamination can be performed prior to endodontic treatment in order to better adapt the oral environment for the following procedures. Once the largest possible extension of tissue has been repaired by obturation of the root canal system and regression of periapical lesions begins, the professional may indicate a conservative or more radical periodontal treatment, in this case, the adoption of surgical procedures.

5 CONCLUSIONS

In view of the results obtained in the present research, it seems fair to conclude that:

- Most of the students surveyed did not have the scientific knowledge to properly diagnose and therefore treat a case of a true endo-perio lesion.
- Regarding the strictly endodontic lesion, successful decision making was achieved by a large portion of the respondents.
- Faced with a primary endodontic lesion with secondary periodontal involvement, the students surveyed differed widely on the classification, and a minority adopted the correct decision making for the case.
- In the total group, the number of students surveyed who were successful in making the correct differential diagnosis between the three lesions presented and indicating the appropriate therapeutic paradigms according to the scientific literature was very low.

BIBLIOGRAPHIC REFERENCES

ABBOTT, P. Endodontic management of combined endodontic-periodontal lesions. **J N Z Soc Periodontol**, v.83, p.15-28, 1998.

ANAND, P.S.; NANDAKUMAR, K. Management of periodontitis associated with endodontically envolved teeth: a case series. **J Contemp Dent Pract**, v.6, n.2, may, 2005.

ARRÓNIZ, F.M. Diagnóstico y tratamiento endoperio. **RESPYN**, ed. Especial, n.7, 2003.

BARKHORDAR, R.A.; STEWART, G.G. The potencial of periodontal pocket formation associated with untreated accessory root canals. **Oral Surg Oral Med Oral Pathol**, v.70, n.6, p.769-72, dec, 1990.

BENDER, I.B.; SELTZER, S. The effect of periodontal disease on the pulp. **Oral Surg**, v.3, n. 3, mar, 1972.

BERG, J.O.; BLOMLOF, L.; LINDSKOG, S. Cellular reactions in pulpal and periodontal tissues after periodontal wound debridement. **J Clin Periodontol**, v.17, n.3, p.165-73, mar, 1990.

BORBA, S.M.C. et al. Diagnóstico clínico da sensibilidade pulpar em dentes com bolsas periodontais. **Rev Bras Cienc Saúde**, v.6, n.3, p.269-278, 2002.

BRITAIN, S.K. et al. The use of guided tissue regeneration principles in endodontic surgery for induced chronic periodontic-endodontic lesions: a clinical, radiographic, and histologic evaluation. **J Periodontol**, v.76, n.3, p.450-60, mar, 2005.

CHAMBRONE, L.A. Contribuição ao estudo clínico e histológico do envolvimento endo-periodontal em molares humanos. **Trabalho – mestrado – Faculdade de Odontologia USP**. p.83. São Paulo, 1985.

CHANG, K.M.; LIN, L.M. Diagnosis of an advanced endodontic-periodontic lesion: Report of a case. **Oral Surg Oral Med Oral Pathol Oral Radiol Endod**, v.84, p.79-81, 1997.

DE DEUS, Q.D. **Endodontia**. 5. ed. Ed. Médica e científica Ltda. Rio de Janeiro, 1992.

EHNEVID, H. et al. Periodontal healing in relation to radiographic attachment and endodontic infection. **J Periodontol**, v.64, p.1199-204, 1993(a)

EHNEVID, H. et al. Periodontal healing in teeth with periapical lesions. A clinical retrospective study. **J Clin Periodontol**, v.20, p.254-8, 1993(b).

FACHIN, E.V.F.; LUISI, S.B.; BORBA, M.G. Relação pulpo-periodontal: Considerações histológicas e clínicas. **Rev Fac Odontol Porto Alegre**, v.42, n.1, p.9, jul, 2001.

FAVIERI, A.; PIACSER, M.L.; FREITAS, R.M. Tratamento das lesões endoperiodontais: Revisão de Literatura e relato de caso. **Rev Periodontia**, v.8, n.1, jan/abr, 1999.

FIGUEIREDO, L.C.; TOLEDO, B.E.C.; SALVADOR, S.L.S. Microbiologia das lesões endoperiodontais. **JBE**, ano 1, n.3, out, 2000.

GUSMÃO, E.S. Inter-relação da Periodontia com a Endodontia – Importância do diagnóstico na tomada de decisão terapêutica. **Encarte Científico CRO-PE**, n.2, mar, 2003.

HAUEISEN, H.; HEIDEMANN, D. Hemisection for treatment of an advanced endodontic-periodontal lesion: a case report. **Int Endod J**, v.35, n.6, p.557-72, jun, 2002.

JANSSON, L. et al. The influence of endodontic infection on progression of marginal bone loss in periodontitis. **J Clin Periodontol**, v.22, n.10, p.729-34, 1995.

KEREKES, K.; OLSEN, I. Similarities in the microfloras of root canals and deep periodontal pockets. **Endod Dent Traumatol**, v.6, n.1, p.1-5, feb, 1990.

KOBAYASHI, T. et al. The microbial flora from root canals and periodontal pockets of non-vital teeth associated with advanced periodontitis. **Int Endod J**, v.23, n.2, p.100-6, mar, 1990.

LAMBERTI, P.L.R. et al. Interrelação endodontia-periodontia. **Rev Odontol Univ Santo Amaro**, v.5, n.1, p.8-12, jan/jun, 2000.

LANGELAND, K.; RODRIGUES, H.; DOWDEN, W. Periodontal disease, bacterial and pulp histopathology. **Oral Surg**, v.37, p.257-63, 1974.

LASCALA, N.T.; PAIVA, J.G. Considerações em torno das lesões pulpo-periodontais. In: PAIVA, J.G.; ANTONIAZZI, J.H. - **Endodontia**. 2. ed. Ed. Artes Médicas, 1991.

LINDHE, J. **Tratado de Periodontologia Clínica**. 2. ed. Ed. Guanabara Koogan. Rio de Janeiro, 1992.

MARTINS, A.V. et al. Aspectos importantes da inter-relação entre Endodontia e Periodontia: uma revisão da literatura. **JBE**, v.5, n.17, p.157-65, 2004.

MIYASHITA, H. et al. Impact of endodontic conditions on marginal bone loss. **J Periodontol**, v.69, n.2, p.158-64, feb, 1998.

MORAES, S.H. Diagnóstico e causas da fratura vertical da raiz. **Revista ABO Nasc**, v.4, n.2, abr/mai, 1996.

NETO, A.R. Raciocínio clínico – o processo de decisão diagnóstica e terapêutica. **Rev Ass Med Brasil**, v.44, n.4, p.301-11, 1998.

NEVES, S.C.; BARBOSA, S.V. Avaliação radiográfica de lesões endo-perio. **RGO**, v.42, n.2, p.84-86, mar/abr, 1994.

PAUL, B.F.; HUTTER, J.W. The endodontic-periodontal continuum revisited: New insights into etiology, diagnosis and treatment. **JADA**, v.128, nov, 1997.

ROSSI, G.H. Abscesos periodontales y periapicales. Su diagnóstico diferencial. **Rev asoc Odontol Argent**, v.90, n.1, ene/feb, 2002.

RUIZ, L.F.; MENDONÇA, J.A.; ESTRELA, C. Inter-relações entre a Endodontia e a Periodontia. In: ESTRELA, C.; FIGUEIREDO, J.A.P. **Endodontia, princípios biológicos e mecânicos**. 1. ed. Ed Artes médicas Ltda. São Paulo, 2001.

SALLUM, A.W. et al. Periodontite e lesões pulpares – interação através de canais acessórios nas regiões de bifurcação em molares de ratos. **Periodontia**, v.2, n.3, abr/out, 1993.

TORABINEJAD, M.; KIGER, R.D. A histologic evaluation of dental pulp tissue of a patient with periodontal disease. **Oral Surg Oral Med Oral Pathol**, v.59, p.198-200, 1985.

TORABINEJAD, M.; TROPE, M. Inter-relações endodônticas e periodontais. In: WALTON, R.; TORABINEJAD, M. **Princípios e Prática em Endodontia**. Cap.26, p.442-56. Ed. Santos. São Paulo, 1997.

VAKALIS, S.V. et al. A pilot study of treatment of periodontal-endodontic lesions. **Int Den J**, v.55, n.5, p.313-8, 2005.

WALKER, M.R. The pathogenesis and treatment o fendo-perio lesions. **CPD Dentistry**, v.2, n.3, p.91-5, 2001.

WEINE, F.S. **Tratamento endodôntico**. 5. ed. Ed. Santos. São Paulo, 1998.

ZUZA, E.P.; TOLEDO, B.E.C. A importância das fraturas radiculares verticais no diagnóstico diferencial em relação às lesões periodontais-endodônticas. **JBE**, v.2, n.6, p.216-223, jul/set, 2001.

CHAPTER 42

Reception and flow of patients with mental disorders in Primary Care: Experience report

10.56238/rsfohsv1-042

Letícia Beatriz Fonseca Barcelos
ORCID: https://orcid.org/0000-0002-8957-6393
Escola Superior de Ciências da Saúde, Brazil
E-mail: leticiafonsecab@gmail.com

Tatiany Cristine Silva
ORCID: https://orcid.org/0000-0003-0212-9863
Secretaria de Saúde do Distrito Federal, Brazil
E-mail: tatianycristines@gmail.com

Caroline Jonas Rezaghi Ricomini Nunes
ORCID: https://orcid.org/0000-0002-0979-3356
Secretaria de Saúde do Distrito Federal,, Brazil
E-mail: carolinericomini.res@escs.edu.br

ABSTRACT
Introduction: With the increase in the number of patients with mental disorders, the prevalence of care in health units rises. In this context, primary care professionals are responsible for welcoming and directing the flows of these users when necessary. Objective: To report the experience on the development and implementation of the booklet on reception and flows of these users as educational material for Primary Care Health professionals. Methods: This is a descriptive experience report of a resident of the Multiprofessional Family and Community Health Program (ESCS), where an intervention was carried out in a Health Unit located in the Federal District, following the assumptions of the Arch of Maguerez. Results and Discussion: Primary health care works as a gateway into the health system for users who have some psychological disorder, it is the privileged space for welcoming people who are in acute suffering and for building a longitudinal bond. It takes a constant exercise of self-assessment by professionals to avoid framing these users in stereotypes, always remembering that they are in a fragile situation and need to be taken care of, situations related to the field of mental health are among those that require the most effort from the team. for timely problem perception and decision making. Conclusion: The booklet has become a strategy that aims to carry out health education, which can be used as support material by any health professional assisting in the care of the user.

Keywords: Health education; Mental health; Teaching materials; Primary health care; Reception of patients with disorders.

1 INTRODUCTION

Health is defined by the World Health Organization as "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity" (Batista, 2020). Thus, the system must be prepared to meet the demands of the population and understand the social context in which it operates, and for this to happen, health professionals must seek ways to promote and prevent health (Cruz, 2021).

It is known that the paradigm of assistance within mental health carries with it historical traces of a health process directed to the centrality of psychiatric hospitals (Falcão, 2022). In this context, Law no. 10,216/2001, called the psychiatric reform law, emerges with recognition as a historical milestone that promoted the institution of the National Mental Health Policy (PNSM) in our country (Pitta, 2011), reverberating the guarantee of rights to family members and users of mental health services, such as the benefit of specialized treatment to their needs within the Unified Health System (SUS), protection against any form of abuse and violation of human rights and validation of treatment in therapeutic environments (Brazil, 2001).

According to the World Health Organization (WHO), the nomenclature disorder indicates the existence of a set of clinically recognizable symptoms or behaviors associated, in most cases, with suffering and interfering with personal function (Iacoponi, 1999). We can cite several types of disorders, such as mood disorders characterized by mania, bipolar disorder, depression, and others; neurotic disorders, which are related to stress and somatoform disorders (phobias, panic, obsession, compulsion, and severe stress), behavioral syndromes characterized by eating disorders, sleep disorders, sexual dysfunction, and substance abuse that do not produce dependence (Iacoponi, 1999).

The Pan American Health Organization (PAHO) commission stated that the mental health and well-being of millions of people have been severely affected by the pandemic and its aftermath. The WHO highlighted that during the first year of the pandemic, the global prevalence of anxiety and depression increased by 25%. An analysis in the region by PAHO also found that one-third of people suffering from COVID-19 were diagnosed with a neurological or mental disorder (PAHO, 2022).

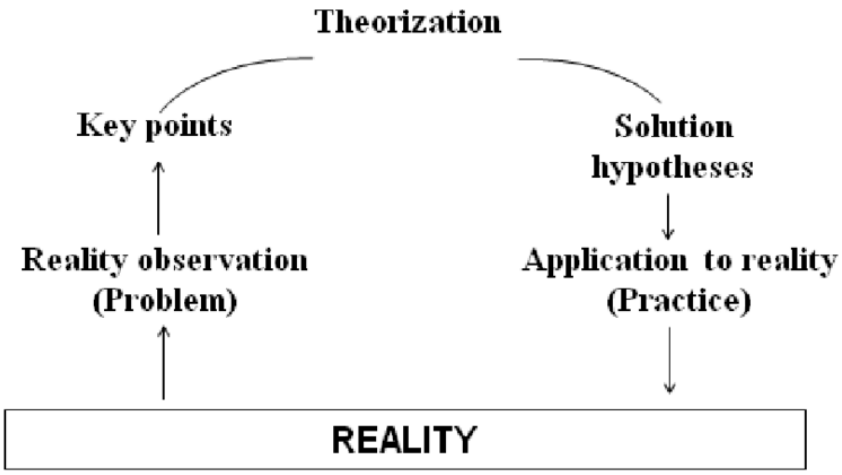
According to studies in Brazil, matrix support has proved to be active in Primary Health Care, regarding the definition of flows of these services, in addition to promoting joint and shared assistance. However, it is noted that there is a need for improvement in the preparation of professionals and in the processes of transformations of practices (Hirdes, 2015).

Given this and based on the experience of practical care scenario as a resident in a Basic Health Unit, located in the Federal District, we observed some gaps of health professionals related to the reception of people in mental distress, anxiety disorders, depression, self-mutilation, among others, and their referral flows to Psychosocial Care Networks, these gaps with these patients can impact on the provision of an adequate service and attention, as well as the level of satisfaction of the user. In this sense, the objective of this study was to report the experiences and observations of the local reality and develop a booklet in the format of an educational folder to improve the reception and interaction between the user and the service.

2 METHODOLOGY

This research was conducted by means of a descriptive experience report based on reality observation. This study presented the reality experienced by the resident when faced with the conduct of health professionals of the Family Health Strategy in a Basic Health Unit of the Federal District, which was transcribed following the assumptions of the Methodology of Problematization, with the application of the Arc of Maguerez through its five steps (Figure 1), which were developed from a cut of reality and returned to it (Ferreira, 2019).

Figure 1 - Schematic representation of Maguerez's Arc Method.



Source: Adapted from Bordenave and Pereira (Colombo, 2007).

The Arc of Maguerez method consists of a basic and important tool for applying the Problematization Methodology, so as to systematize the development of processes in an individualized manner, considering the reality in which the problem was observed. Thus, the teaching and learning objectives are achieved through the five stages (observation of reality and problem definition, key points, theorization, solution hypotheses, and application to reality), which strengthens the practice-theory-practice relationship in the context of the social reality (Ferreira, 2019; Borille, 2012).

All stages of this report occurred from June to July 2022 in a Health Care Unit of the Federal District. As an initial stage of the arch, observation of reality and elaboration of key points, we dialogued with professionals and managers of the health unit, located in the Federal District, seeking communication with the health professionals who work there to learn about the work routine and its demand flows.

It was observed that the professionals had no real knowledge of the function of the Psychosocial Care Network - RAPS and its flows, and ways of welcoming patients in crisis who demand the unit. Thus, it was defined as target audience the servers of the Health Unit, and the key points: Health Education, Mental Health, Reception of patients with disorders, Primary Care.

As a criterion for deepening the theme was performed the theorization from searches of scientific articles, technical notes linked to the Federal District, letter of mental health services of the West Health Region -DF and websites about the findings involving the key points, as well as reading of public policies related to the theme. However, there were limitations regarding mental health in Primary Care and reception of patients with disorders. After the readings, the solution hypotheses were elaborated and the actions were planned. In the context referring to the hypotheses of solution, data collection with psychologists, occupational therapists, and social workers that work in Primary Care and work with these patients on the theme were carried out, and, in view of the dialog with these professionals and recognizing this existing problematization, the proposal of the explanatory booklet was dialogued with the managers and local health professionals. After presenting the proposal referred to in the hypothesis to the management/professionals,

the application to reality was decided by common agreement through the production of a booklet in folder format to be the support material for a health education in the form of matriciamento meetings with each team with the specialists of the Extended Center for Family Health and Primary Care (Nasf-AB) and later to be delivered to the unit's employees.

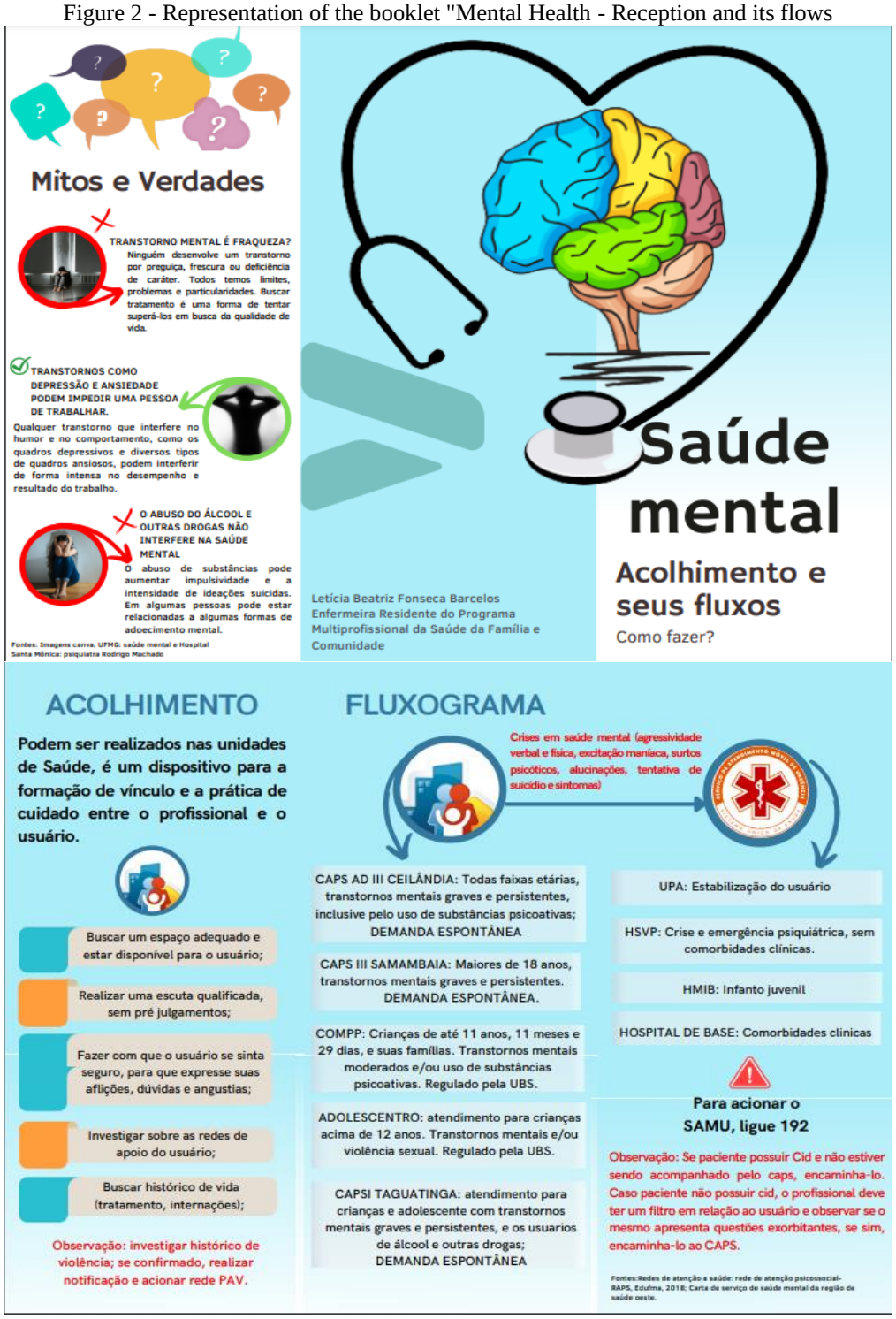
During the stages of construction of the booklet/folder, we sought to develop a material that would allow quick and easy to understand information for health professionals to perform a humanized embracement and focus on patients in crisis and demand the flow that the user needs at the moment. It is important to point out that through the observations of the experience the main doubts and recurring demands present in the unit were observed. This step was essential for guidance in the construction of the booklet, because the objective was not to replace an existing service or interfere in the ways of working of the servers, but to promote improvement in the cycle of reception and issuance of information to recipients seeking care, consequently, of the Psychosocial Care Network (RAPS) of the Federal District.

3 RESULTS AND DISCUSSION

The booklet was created in July, entitled "Mental Health - Reception and its flows", organized into topics: reception, flowchart, myths and truths. Its materialization was done in A4 paper, in color, with two pages (figure 2).

The application in the Unit was carried out during the Family Health team meetings and the Health Unit management team, with the following players: Doctors, Nursing Technicians, Nurses, Community Health Workers, Nursing Supervisor and Unit Manager, through matriciamento, which is a way to carry out shared continuing education in health with a view to comprehensiveness and resolvability of care, through interdisciplinary work. In Basic Health Care (BH) / Primary Health Care (PHC), the matriciamento can be formed through the relationship between Family Health Care teams (HF teams) and the Extended Family Health and Primary Care Centers (NASF-BH). Such actions are important strategies for the continuing education of Family Health Care teams, since the sharing of knowledge and practices promotes "learning by doing together" (Campos, 2007).

Figure 2 - Representation of the booklet "Mental Health - Reception and its flows



Source: Authors (2022)

The presentation of the booklet was carried out according to the distribution of issues, being made at first the presentation of issues that address mental disorders and reception of patients in situations of acute crises, in view of this, it was pointed out that the lack of understanding and knowledge about the conditions that promote mental illness, the existence of stigma and self-stigma are two major obstacles to social integration and full life in society. Thus, the person with severe mental disorder suffers not only from the disease itself, but also from the social stigma that segregates and denies opportunities for work and

independent living (Rocha, 2015), sometimes leading the individual to social isolation. This prejudice hinders the search for adequate treatment and follow-up in specialized care services (Neto, 2021).

Psychiatric disorders in our society are often seen as a sign of weakness or coolness, something that is in the realm of "choice", where the subject can choose or not to get sick (Rocha, 2015). This factor directly affects the life of the person who finds himself with problems related to Mental Health, whether in the treatment he receives, in his interpersonal relationships, or even in the care by the professionals involved in his treatment, increasing the burden of psychic suffering of the subjects (Silva, 2018), a situation also observed during the period of observation of the reality and acting in the scenario, which demonstrated the importance of the creation, presentation and distribution of the booklet.

Since Primary Health Care works as the entrance door to the Unified Health System for these individuals, it becomes the privileged space for welcoming the suffering person and building a longitudinal bond. The situations referring to the field of mental health are among those that require more effort from the team for the timely perception of the problem and decision making. Often, the user's complaint is not clearly expressed, or is masked by somatic symptoms, and will only be revealed through attentive listening by one of the professionals of the team (Brazil, 2013), who is willing to perform a qualified listening without pre-judgments, making the user feel safe and express their distress and anguish at the time.

Thus, it is necessary that professionals are prepared to provide this attention, avoiding a constant postponement in bringing to light the issue of psychological suffering, and a constant exercise of self-evaluation by professionals to avoid framing these users in stereotypes, always remembering that they are in a situation of frailty and need to be cared for (Silva, 2018). It is perceived the existence of other barriers, such as the territorial ones related to the distance of the services offered and the user's displacement to the institution; the waiting cycle for care in the services; the adaptation to the forms of organization of the institutions; the financial difficulties and the availability of time for treatment, in addition to the lack of professional training and specialized structures for the continuity of treatment (Cubas, 2018). Given the assumption and observation of the scenario, it was noted the paramount importance of professionals to follow the steps for the reception of users cited in the booklet.

In the second moment, we tried to present information that would allow orientation about the psychosocial network and its referrals, in such a way that the professional could easily understand how the service works and its target audience.

In an attempt to overcome the hospital-centric model, the psychiatric reform directs us to work with actions in the care of people with mental disorders that do not distance them from their social life in the territory (Lima, 2016).

Given this, the gm/ms decree no. 3088 of 23/12/2011 established the Psychosocial Care Network (RAPS) for the care of people with mental suffering or disorder and with needs arising from the use of crack cocaine, alcohol, and other drugs, within the Unified Health System (SUS), expands the concept of care, not focusing on only one unit, but expanding the offers of care by pointing new services, distributed

in (07) seven components: Basic Care, Specialized Psychosocial Care, Urgent and Emergency Care, Hospital Care, Transitional Residential Care, Deinstitutionalization Strategies and Psychosocial Rehabilitation. These components are made up by a cast of care points, among which the Psychosocial Care Centers (CAPS) stand out in all their modalities: CAPS I, CAPS II, CAPS III, CAPSi, CAPS AD, and CAPS AD III. All these components are linked to the Health Region in which the PHU is located, however, there are support points designated only to the Health Region and others to the entire territory of the Federal District, which can present a difficulty in directing the user to the appropriate place for follow-up, so the booklet can be used as a support material by the health professional.

In the Federal District, the RAPS is divided into different points of care: Adolescent Center, Center for Psychopedagogical Medical Orientation (COMPP) that are intended for the care of children and adolescents with mild or severe mental disorders, in Psychosocial Care Centers (CAPS), with its various modalities, distributed in 12 Administrative Regions: Riacho Fundo, Brazlândia, Recanto das Emas, Taguatinga, Samambaia, Santa Maria, Guará, Ceilândia, Paranoá, Itapoã, Sobradinho and Brasília, (Ministry of Health, 2011).

The CAPS in its different modalities are strategic points of care of RAPS: health services of open and community character constituted by a multidisciplinary team that acts under an interdisciplinary perspective. It provides care for people with severe and persistent mental disorders and people with needs arising from the use of crack cocaine, alcohol, and other drugs, in its territorial area, in intensive, semi-intensive, and non-intensive treatment regime (depending on the CAPS modality). The care, in the scope of the Psychosocial Care Center, is developed through the Individual Therapeutic Project, involving in its construction the team, the user, and his family, and the ordering of care will be under the responsibility of the Psychosocial Care Center and/or Primary Care, ensuring a permanent process of co-management and longitudinal monitoring of the case (University, 2018). Health professionals are sometimes unaware of the location where the care of a user in a certain phase of the life cycle, or a certain health condition, so in addition to the flow, information was introduced about the location of the point of support and its target audience.

In general, it was noted during the matriciamento that some professionals were unaware of the RAPS, how it works, its structure, and the network support points. Therefore, through the presentation of the booklet, the professionals were told about the services that are offered, the flow of reference and counter-reference to Basic Health Units, and the management of users, especially those in acute psychiatric crisis.

4 CONCLUSION

It is reflected that the production of this material and its application provided a strategy for conducting continuing education in health within the Basic Health Unit, in a dynamic, understandable and low-cost way. The professionals during the proposed intervention demonstrated a new look at the mental

health of the users, with a better understanding of how to perform the welcoming process with qualified and humanized listening and which are the RAPS flows that they can demand.

The digital version of this booklet is available from the coordination of the Multiprofessional Residency Program in Family and Community Health (PRMSFC), of the School of Health Sciences (ESCS), and can be requested by any health and education department of the Federal District and other states of the Brazilian federation as educational material open to the public.

It is suggested that further studies be developed for the validation, evaluation, and effectiveness of this booklet with Primary Health Care professionals.

REFERENCES

Batista, C. F. N. (2020). *Coordenação do projeto saúde mental em foco: ampliando o conhecimento sobre a temática* (4). Mafra, SC : Ed. da UnC.https://repositorio.unc.br:8443/xmlui/bitstream/handle/123456789/192/Saude_Mental_RNH.pdf?sequence=1&isAllowed=y

Brasil, Ministério da Saúde. (2013). *Caderno de atenção básica '' Acolhimento a demanda espontânea''*. II.bvsms.saude.gov.br/bvs/publicacoes/acolhimento_demanda_espontanea_queixas_comuns_cab28v2.pdf

Brasil,. Ministério da Saúde. Lei n. 10.216, de 6 de abril de 2001. *Dispõe sobre a proteção e os direitos das pessoas portadoras de transtornos mentais e redireciona o modelo assistencial em saúde mental.* Diário Oficial [da] República Federativa do Brasil, Brasília, DF: Ministério da Saúde. http://www.planalto.gov.br/ccivil_03/leis/leis_2001/l10216.htm

Borille, D. C., Brusamarello, T., Paes, M. R., Mazza, V. de A., Lacerda, M. R., & Maftum, M. A. (2012). A aplicação do método do arco da problematização na coleta de dados em pesquisa de enfermagem: relato de experiência. *Texto & Contexto - Enfermagem*, 21(1), 209–216. doi.org/10.1590/s0104-07072012000100024

Campos, G. W. de S., & Domitti, A. C. (2007). Apoio matricial e equipe de referência: uma metodologia para gestão do trabalho interdisciplinar em saúde. *Cadernos de Saúde Públic*a, 23(2), 399–407. doi.org/10.1590/s0102-311x2007000200016

Colombo, A. A. (2007). A Metodologia da Problematização com o Arco de Maguerez e sua relação com os saberes de professores. *Semina: Ciências Sociais E Humanas*, 28(2), 121. doi.org/10.5433/1679-0383.2007v28n2p121

Cruz, J. W. A., Santos, F. O. de A., Sales, V. B. dos S., Santana, L. N., Martins, S. S., Matos, H. S. de S., & Costa, M. R. de C. D. (2021). Arco de maguerez e educação em saúde sobre depressão em escolares: relato de experiência. *recisatec - revista científica saúde e tecnologia*, 1(2), e1210–e1210. doi.org/10.53612/recisatec.v1i2.10

Cubas, J. M., et al. (2018). "Fatores Que Interferem No Acesso Aos Serviços de Saúde Mental Por Crianças E Adolescentes. *Revista Brasileira Em Promoção Da Saúd*e, 31. doi.org/10.5020/18061230.2018.8642

Falcao, R. C. G. (2014). Cartilha Educativa: Possibilidades de caminhada no processo da reforma psiquiátrica Florianópolis (SC). *Universidade Federal de Santa Catarina.* https://repositorio.ufsc.br/xmlui/bitstream/handle/123456789/168565/Rosana%20de%20C%c3%a1ssia%20Guedes%20Falc%c3%a3o%20-%20psico%20-%20tcc.pdf?sequence=1&isAllowed=y

Ferreira, G. I. (2019). Formação profissional em Saúde: aplicação do Arco de Maguerez no processo de ensino-aprendizagem. Interface - *Comunicação, Saúde, Educação*, 23. doi.org/10.1590/interface.180020

Hirdes, A. (2015). A Perspectiva Dos Profissionais Da Atenção Primária à Saúde Sobre O Apoio Matricial Em Saúde Mental. *Ciência & Saúde Coletiva*, 20 (2), 371–382. doi.org/10.1590/1413-81232015202.11122014

Iacoponi, E. (1999). Classificação de Transtornos Mentais E de Comportamento Da CID-10 - Diretrizes Diagnósticas E de Tratamento Para Transtornos Mentais Em Cuidados Primários. *Revista Brasileira de Psiquiatria*, 21 (2), 132–132. doi.org/10.1590/s1516-44461999000200014

Lima, M., & Dimenstein, M. (2016). O apoio matricial em saúde mental: uma ferramenta apoiadora da atenção à crise. *Interface - Comunicação, Saúde, Educação*, 20, 625–635. doi.org/10.1590/1807-57622015.0389

Ministério da saúde. (2011). *Portaria nº 3.088, de 23 de dezembro de 2011*. https://bvsms.saude.gov.br/bvs/saudelegis/gm/2011/prt3088_23_12_2011_rep.html

Neto, J. B., et al (2021). O estigma da doença mental entre estudantes e profissionais de saúde. *Research, Society and Development*, 10 (3). doi.org/10.33448/rsd-v10i3.12899

Organização Pan-Americana Da Saúde (2022). *OPAS Estabelece Comissão de Alto Nível Sobre Saúde Mental E COVID-19 - OPAS/OMS*. https://www.paho.org/pt/noticias/6-5-2022-opas-estabelece-comissao-alto-nivel-sobre-saude-mental-e-covid-19

Pitta, A. M. F. (2011). Um balanço da reforma psiquiátrica brasileira: instituições, atores e políticas. *Ciência & Saúde Coletiva*, 16 (12), 4579–4589. doi.org/10.1590/s1413-81232011001300002

Rocha, F. L., Hara, C., & Paprocki, J. (2018). Doença Mental E Estigma. *Rev. Méd. Minas Gerais*, 25 (4), 590-596. doi.org/10.5935/2238-3182.20150127

Silva, T. C. M. F., & Marcolan, J. F. (2018). Preconceito aos indivíduos com transtorno mental como agravo do sofrimento. *Rev. Enferm. UFPE on Line*, 12 (8), 2089–2098. doi.org/10.5205/1981-8963-v12i8a234776p2089-2098-2018

Universidade Federal do Maranhão. UNA-SUS/UFMA. Redes de atenção à saúde: Rede de Atenção Psicossocial – RAPS/ Paola Trindade Garcia; Regimarina Soares Reis (Org.). - São Luís: *Edufma, 2018*. https://ares.unasus.gov.br/acervo/html/ARES/10279/3/Rede%20de%20Aten%c3%a7%c3%a3o%20Psicossocial%20-%20RAPS.pdf

CHAPTER 43

Cannabidiol: therapeutic perspectives in its topical use

10.56238/rsfohsv1-043

Matheus Neves dos Santos
Universidade Federal Rural do Rio de Janeiro, Pharmacy Course,
e-mail: theusns@gmail.com

Jaqueline Rocha Borges dos Santos
Universidade Federal Rural do Rio de Janeiro, Institute of Biological and Health Sciences, Department of Pharmaceutical Sciences,
e-mail: jaquelinerocha@ufrrj.br

Renata Barbosa Lacerda
Universidade Federal Rural do Rio de Janeiro, Institute of Biological and Health Sciences, Department of Pharmaceutical Sciences,
e-mail: renatalacerda@yahoo.com.br

Luciana Macedo Brito
Federal Rural University of Rio de Janeiro, Institute of Biological and Health Sciences, Department of Pharmaceutical Sciences, e-mail: lucianabrito@ufrrj.br

ABSTRACT
Compounds classified as phytocannabinoids were first discovered from the plant *Cannabis sativa*. Among these compounds is cannabidiol (CBD), a molecule characterized by not reproducing harmful psychoactive effects attributed to Δ9-Tetrahydrocannabidiol, which is the most abundant phytocannabinoid in the plant. CBD also has peculiarities for being a versatile molecule, presenting potential therapeutic property for some disorders and showing itself as an innovative agent in areas such as cosmetology and dermatology. Even though there are promising results of CBD as a bioactive molecule acting on the skin and skin appendages, the clinical evidence needs further investigation. In view of the above, the aim of this present study was to perform a literature review on the application of cannabidiol in topical formulations. To this end, a literature survey was conducted involving the topical application of CBD using databases and specific keywords. Based on the results presented, it was noted a supposed multifaceted action of CBD, acting on skin diseases of inflammatory nature, reducing sebum production, acting as a moisturizer, besides being a cytoprotector. CBD also acts on hair, inducing or preventing hair growth depending on concentration. Although there is an optimistic scenario regarding CBD as a bioactive compound in topical applications, caution is still needed, as many results are still inconclusive. Likewise, more research and a better understanding of how CBD acts on the skin and its appendages is needed.

Keywords: Cannabidiol, skin, skin disease, hair.

1 INTRODUCTION

1.1 CANNABIS SATIVA

Cannabis sativa, popularly known as marijuana, is a plant whose

The historical finding is millennial. Its use is dated back to pre-Christian times in China and India.

being used as textile fiber or even as medicine, besides being linked to religious rituals (LI, 1974; TOUW, 1981). More than 100 cannabinoids have been identified in a *C. sativa* plant, in addition to secondary metabolites of various chemical classes, such as flavonoids and terpenes (BORRILLE, 2016; HARTSEL *et al.*, 2016; MNEKIN & RIPOLL, 2021). This qualifies *C. sativa* as a unique plant, as many of its constituents can be categorized as a nutrient, dietary supplement, or herbal product (HARTSEL *et al.*, 2016). *C. sativa* is also cultivated for non-drug purposes, having wide application in the industrial sector,

with examples being the textile sector, the cosmetic and personal care sectors, as well as fiber production and the food business (CRINI *et al*., 2020).

In current times, where the Covid-19 pandemic is still a reality in the population, a study speculated the molecules extracted from *C. sativa* as allies in mitigating the disease, although further research is needed in combating the disease virus: SARS-CoV-2 (MAHMUD *et al*., 2021). Consumption of the plant through smoking was also evaluated in a given sample of volunteers

before and during the pandemic period, observing an increase in apathy and despondency

at the beginning of the pandemic in dependent users. This study demonstrated the negative impact that Covid-19 brought to mental health, where marijuana users were more vulnerable (SKUMLIEN *et al*., 2021).

The use of the plant is mainly known for its recreational purposes. However, its use has been associated with Cannabis Use Disorder or, in a more informal term, marijuana dependence. This disorder is configured by an unregulated use of the plant through smoking, which coincidentally leads to it being one of the most widely consumed drugs of abuse in the world. The harmful effects of the drug can be

related to a high concentration of Δ9-tetrahydrocannabidiol (THC), low concentration of cannabidiol (CBD) or both, causing symptoms such as psychotic disorder or withdrawal (ENGLUND *et al*., 2017; FORTI *et al*., 2019;).

When the issue involves adolescents, the rampant use of marijuana becomes even more problematic (WILSON *et al*., 2019; SKUMLIEN *et al*., 2021). Semaloglu and colleagues (2021), meanwhile, warn of the danger of chronic *C. sativa* consumption, associating it with impaired memory perception in young adults. It cannot be denied that the issues surrounding marijuana are controversial and many convictions are built mainly by lack of information and misunderstandings on the part of the media, in addition to extremism and partisanship from both political spectrums, where scientific data and research are placed in the position of supporting arguments. If on the one hand *C. sativa* is exclusively associated as a drug of abuse and its potential economic value in the industrial sector and its potential therapeutic value through phytocannabinoids are left aside, on the other hand it cannot be denied that its chronic and abusive use through smoking, especially when it comes to young people and teenagers, can cause evident adverse effects, generating distrust in part of the population. Thus, the debate around this issue becomes a long process, where a consensus on this issue still seems to be something far from being reached (VIDAL, 2009; MCGINTY *et al*., 2017; FORTI *et al*., 2019).

1.2 CANNABINOIDS

The term "cannabinoids" is commonly associated with *C. sativa*, because they are compounds that were initially found in this plant and, until now, are presented exclusively in it. However, this term has been extrapolated beyond the *C. sativa plant* since, over time, molecules synthesized by the human organism itself have been discovered that act on cannabinoid receptors, and there are also synthetic cannabinoid

products created in laboratories. The cannabinoids extracted from the *C. sativa* plant are called phytocannabinoids, endogenous cannabinoids are called endocannabinoids, and laboratory-developed cannabinoids are called synthetic cannabinoids (MARTIN *et al*., 1999; ELSOHLY & SLADE, 2005; ALVES *et al.*, 2012; BARRALES-CUREÑO *et al.*, 2022).

Among the cannabinoids found in the plant, THC and CBD are the most abundant. THC is known mainly for its psychoactive effects in its recreational use, while CBD appears to antagonize some harmful effects of THC, providing a "protective effect" against anxiety, for example (ZUARDI *et al*.,1982; NIESINK & VAN LAAR, 2013; RANG *et al.,* 2016). Synthetic cannabinoids attempt to mimic the effects of phytocannabinoids through molecular remodeling, also known by the English term *designer drugs* (ALVES *et al*., 2012).

The endocannabinoids are molecules secreted from the body itself, derived from fatty acids. The first molecules in this class to be discovered and that receive the most attention are N-araquidonoiletanolamine (AEA), also known as anandamide, and 2-araquidonoilglycerol (2-AG). They were found to act as ligands on receptors that phytocannabinoids like THC also act on, called cannabinoid receptors. These two molecules together with other endogenous cannabinoids have bioactive functions, acting physiologically on the endocannabinoid system. An atypical feature of endocannabinoids is that they are synthesized "on demand", rather than being pre-produced and stored in vesicles like other neurotransmitters (MARTIN *et al*., 1999; RANG *et al.,* 2016).

Following an optimistic view, phytocannabinoid-based drugs and synthetic cannabinoids are listed as possible adjuvants for the treatment of pain, even more of neuropathic origin. What contributes to the support of this point of view is the unique pharmacological profile, but not yet fully unveiled, and the apparent particular mode of action of these agents (LESSA *et al*., 2016). To support this argument, it is paramount that there is a control of these substances and a better understanding of the effects resulting from chronic use (ALVES *et al*., 2012; GUNDERSON *et al*., 2014).

Overall, some cannabinoid agents possess therapeutic properties and help to better understand the endocannabinoid system. In addition, the advancement in research will establish a better understanding of the molecular targets of cannabinoids, as well as provide validation of efficacy and safety in diseases of great importance, such as Alzheimer's and epilepsy (BARRALES-CUREÑO *et al*., 2022).

1.3 ENDOCANNABINOID SYSTEM

The endocannabinoid system is the junction of cannabinoid receptors, ligands and enzymes involved in metabolism. The receptors known so far are cannabinoid receptor type 1 (CB1) and cannabinoid receptor type 2 (CB2). The CB1 receptor is mostly found in areas of the central nervous system (CNS), but it can also be expressed in peripheral tissues, and its cellular localization is in presynaptic neurons. The effects that CB_1 mediates are similar to those of opioid receptors. The CB2 receptor, on the other hand, was initially linked to lymphoid tissue, mycroglia, and the immune system (RANG *et al*., 2016). After AEA and 2-AG

are taken up from the extracellular space, the enzymes responsible for metabolizing them are fatty acid amide hydrolase and monoacyl glycerol lipase, respectively (SAITO *et al*., 2010; RANG et *al.*, 2016).

The importance of the endocannabinoid system has been reported in studies, since the malfunction of this system has been associated with psychiatric disorders and mood disorders. The endocannabinoid system is also involved in pain, inflammation, and metabolic dysfunctions (SAITO *et al*., 2010; MELO REIS *et al*., 2021). One of the proposals for strengthening the endocannabinoid system, according to Melo Reis and collaborators (2021), is an active life through a healthy diet and physical exercise.

1.4 CANNABIDIOL

Cannabidiol is a phytocannabinoid known to have no psychoactive effects like THC and to have therapeutic properties. There are indications that CBD is a strong ally in the treatment of Cannabis Use Disorder. Conjunctively it has been reported as a neuropharmacological alternative, being tested as an anxiolytic and in psychotic conditions. (ZUARDI *et al.*, 2006; SCHIER *et al.*, 2011; FREEMAN *et al*., 2020)

CBD has also been described as a molecule with potential antioxidant and anti-inflammatory effects (ATALAY *et al*., 2019). Its multifunctionality extrapolates to the food area, being evaluated as a possible nutraceutical (MARTÍNEZ *et al*., 2020; IFTIZHAR *et al*., 2021). It is already a reality the research and preparation of formulations with cosmetic and cosmeceutical purposes having cannabinoids as pharmaceutical actives, showing positive effect on the skin (CASIRAGHI *et al*., 2020; ZAGÓRSKA-DZIOK *et al*., 2021). With CBD is no different, where studies evaluate the development and possibility of local administration of this phytocannabinoid with different presentation forms (MOMEKOVA *et al*., 2020; MOMEKOVA et *al.*, 2021; SHARKAWY *et al., 2021*; VANTI et *al., 2021*). Their evaluation in terms of skin permeation and tolerability are also objects of study, with an optimistic scenario (CASIRAGHI *et al*., 2020; MAGHFOUR *et al., 2021*).

1.5 LEGAL AND REGULATORY ASPECTS OF CBD

In Brazil, the first Resolution of the Collegiate Directorate (RDC) that treats CBD as a controlled substance was No. 17/2015. The publication, made by the National Health Surveillance Agency (ANVISA), states that CBD appears in the Ordinance of the Secretariat of Health Surveillance in conjunction with the Ministry of Health nº 344/98, fixed in List C1. In addition, RDC nº17/2015 imposes rules for the importation of CBD-based products on an exceptional basis. The imported product should have a THC content lower than that of CBD (BRASIL, 2015).

RDC No. 327/2019 establishes import regulations, as well as seeks to regulate the marketing, prescription, dispensation, and supervision of products derived from *C. sativa*. This Resolution also provides details regarding the concentration of THC in cannabis-derived products by saying that it cannot exceed 0.2%, consisting predominantly of CBD. The products can be prescribed when there are no other

therapeutic options available in the Brazilian market, being prescribed only by the physician directly responsible for the patient. In paragraph five of Article 10 it says that cosmetic, food and smoke producing products are not considered for medicinal purposes (BRASIL, 2019), so they are not allowed in the legislation. One of the most recent RDCs addressing this issue is No. 660/2022 which focuses on establishing criteria for the patient, or their legal proxy, to import the derived product, such as registering the individual with ANVISA through an electronic form (BRASIL, 2022). These previous reports show that the regulatory aspect of CBD and *C. sativa-derived* products is not a linear topic, being constantly updated. Based on RDC 327/2019, there is a list with 14 products approved by ANVISA, five of which are based on *C. sativa* extracts and nine are CBD-based (BRASIL, 2019). In contrast, a short time ago ANVISA authorized the marketing of three more cannabis-based herbal medicines through Resolution RE 527 on February 17, 2022 (ANVISA, 2022).

Recently, the political and judicial movements have been intense. On June 14, 2022, the Superior Court of Justice (STJ) granted authorization for the home cultivation of *cannabis for* medicinal purposes given to three patients, so that the CBD oil extracted from the plant *can* be used in the treatment of diseases such as epilepsy and anxiety. The case becomes curious because ANVISA, until then, has not regulated artisanal planting (STJ, 2022). The unprecedented decision, until then, opens doors for the continuation of the debate regarding the cultivation of the plant with medicinal bias that has been going on for years, since there is a Bill (PL) 399/2015 and that since then has been awaiting deliberation of an appeal by the Board of the House of Representatives. A last Special Commission regarding this PL with promotion of a vote in the House of Representatives was held in June 2021. The Commission approved the proposal for cultivation of *C. sativa* for medicinal purposes, but it has not yet proceeded to the Senate because there are appeals under review. The bill created in 2015 allows the cultivation of cannabis in Brazil, being exclusive for medicinal, veterinary, scientific and industrial purposes, however it presents some restrictive requirements; the bill also authorizes the production and marketing of products derived from industrial hemp, having cosmetics as an example (COMMISSION, 2021).

In the United States, the regulatory landscape for CBD-containing products is of equal complexity and is constantly changing. Contributing to this complexity are conflicting and divergent regulations at the federal and state levels, unresolved court decisions, and pending legislation. In the United States, hemp is considered a chemotype of *C. sativa* where the THC concentration does not exceed 0.3%; this information is crucial to know the legal status of CBD products in the country (CORRON & KNIGHT, 2018).

Although the FDA (*Food and Drug Administration*) prohibits the addition of CBD in food or supplements, there is no clear ban on the use of CBD in cosmetics. Cosmetic products with CBD in their composition can only be marketed if they comply with the regulations aimed at consumer safety, including labeling requirements. This prevents adulteration and counterfeiting, besides being a control on the level of THC. Despite this requirement, there is some lag in online enforcement, especially regarding incorrect labeling of CBD (CORRON & KNIGHT, 2018; FULTON & BLITZ, 2019).

2 MATERIALS AND METHODS

Since this is a literature review, a survey of scientific articles involving the topical application of CBD from the last eight years (from 2014 to 2022) was conducted. The databases used were: Scielo, through the site www.scielo.br; Google Academic, through the site scholar. google.com.br; Portal de Periódico CAPES, through the site www.periodicos.capes.gov.br. Among the articles, review articles, case reports, editorial letters, clinical research, and articles involving *in vitro* and *in vivo* experiments were selected. Articles in English were used. The key words used for the search started with *cannabidiol* as a base word and were accompanied by at least one of the following words: *skin*, *skin* disease, *hair growth*, *cosmetic*, cosmetology, dermatology
(*dermatology*).

3 RESULTS AND DISCUSSION

Fifteen articles were selected addressing the action of CBD and its purported effectiveness as a drug on the skin and skin appendages (Figure 1). The articles address results that vary both at the histological, cellular and molecular level, in addition to visibly speaking clinical improvements.

Figure 1 - List of articles citing CBD performance at the topical level

Year	Authors	Article Type	Subject
2014	Hello and collaborators	*In vitro* research	CBD acts as a sebostatic and anti-inflammatory agent in human sebocytes
2017	Hwang and co-workers	*In vitro* research	CBD can induce melanogenesis production in human melanocytes
2018	Chelliah and collaborators	Case Report	Topical use of CBD oil for epidermolysis bullosa in children
2019	Palmieri and collaborators	Clinical Research	CBD-enriched ointment on scars and inflammatory skin diseases
2020	Szabó and collaborators	*In vitro* research	CBD acts as a differential modulator in human hair growth
2020	Vincenzi and collaborators	Clinical Research	Efficacy and tolerability of a CBD-containing shampoo in the treatment of scalp inflammation
2020	Casares and collaborators	*In vitro* research	CBD induces antioxidant pathways in keratinocytes

2020	Baswan and collaborators	Literature review	Therapeutic potential of CBD in skin disorders and health
2021	Ikarashi and co-workers	*In vitro* research	The application of CBD provides a moisturizing effect by increasing cutaneous aquaporin-3
2021	Gohad and collaborators	Editorial Letter	CBD as a sunscreen protects keratinocytes and melanocytes
2021	Atalay and collaborators	*In vitro* research	Application of CBD to UVA and UVB irradiated rat skin
2021	Park and collaborators	*In vitro* research	CBD in models of alopecia by testosterone treatment
2021	Wójcik and collaborators	*In vitro* research	Observation of antiapoptotic effects in keratinocytes after ultraviolet irradiation
2021	Smith and Satino	Case Report	Hair regrowth with CBD-rich extract
2022	Gao and co-workers	Editorial Letter	CBD combined with aspartame significantly reduced atopic dermatitis

Of the selected articles, most addressed CBD acting on the skin (67%), then having hair as a target (27%), and there was one article addressing skin and hair (6%). From a subdivision in the articles, a multifaceted action of CBD can be observed, acting as an anti-inflammatory agent (26%), sebostatic (11%) or even as a moisturizer (5%); articles were also found correlating CBD as a cytoprotectant (32%), protecting the skin from internal oxidative stresses and external agents, such as ultraviolet radiation. Finally, one can observe its role in hair follicles (26%), acting for or against hair growth depending on the circumstance.

The presence of CB1 and CB2 receptors has already been described in several parts of the body, with their respective modulatory responses (AN *et al*., 2020). In the skin and its annexes it is no different, CB1 being preferentially found in the stratum spinosum and granulosum and CB2 in basal keratinocytes and in sebaceous and follicular epithelial cells (MARTINELLI *et al*., 2022). Both are found in

keratinocytes, cutaneous nerve fibers, melanocytes, sweat glands, and hair follicles, where they are involved in several functions such as skin barrier regulation, cell growth and differentiation, and inflammatory and immunological processes (BASWAN *et al*., 2020).

CBD has a low affinity for cannabinoid receptors. However, this does not prevent these receptors from being used in physiological and pathophysiological responses such as inflammation, for example, CB2 being the most requested cannabinoid receptor. Furthermore, CBD can mediate several molecular responses using multiple targets: it can act as an agonist at adenosine A2A receptors, which is a G-protein-coupled receptor (metabotropic receptor), thus mimicking the anti-inflammatory response of endogenous adenosine; it can also act as an agonist at the peroxisome proliferator-activated receptor gamma (PPAR-γ), which is a receptor found in the nucleus of cells. CBD will act as an antagonist at the G protein-coupled receptor 55 (GPR55) (SUNDA & AROWOLO, 2020). There is the transient potential receptor of vanilloid channels (TRPV), which is an ion channel subdivided into four families involved in perception and sensation of temperature, pain and itch, where CBD acts on this receptor (CATERINA, 2014; SUNDA & AROWOLO, 2020).

3.1 CBD IN THE SKIN

3.1.1 In skin diseases of an inflammatory nature

Through their study, Palmieri and colleagues (2019) observed the therapeutic effect of CBD on skin diseases of an inflammatory nature, where it was presented in the pharmaceutical form of an ointment. In addition to inflammatory diseases, the ointment aimed to treat skin scars. One patient used the ointment for three consecutive months to treat a scar resulting from a surgery to remove a cyst (Figure 2), with the application being done twice a day. The use of the ointment led to a visible improvement in several aspects of the skin, including the inflammatory symptoms. An important fact is that there was no irritant or allergic reaction to be reported by the patients during the treatment period. This can be configured as a non-invasive, safe and efficient alternative for the better well-being of patients with some skin diseases, mainly of inflammatory bias (PALMIERI *et al*., 2019).

Figure 2 - Scar before (A) and after (B) the application of the ointment. Source: Adapted from Palmieri *et al*., (2019, p. e96).



In the study conducted by Chelliah and colleagues (2018) A report of three cases was presented, being a six-month-old infant and two children aged three and ten years, where the use of topical CBD was suggested for a skin disease characterized as epidermolysis bullosa, where the failure of protein anchoring between the epidermis and dermis leads to skin fragility, causing scarring, blisters, and pain. Although this is an observational study and randomized, double-blind, controlled trials are still lacking to provide more reliable answers, this study became important because it pioneered the approach of topical CBD as a possible treatment for epidermolysis bullosa. Family members of all three patients noted fewer blisters and shorter healing time of the blisters in evidence, and two patients were able to discontinue analgesic medications involved in pain control (CHELLIAH *et al*., 2018). After a six-month treatment it was possible to observe an improvement in the appearance of the skin and a decrease in the blisters (Figure 3).

Figure 3 - Patient with epidermolysis bullosa before (A) and after (B) topical CBD treatment. Source: Chelliah *et al*., (2018, p. 3).

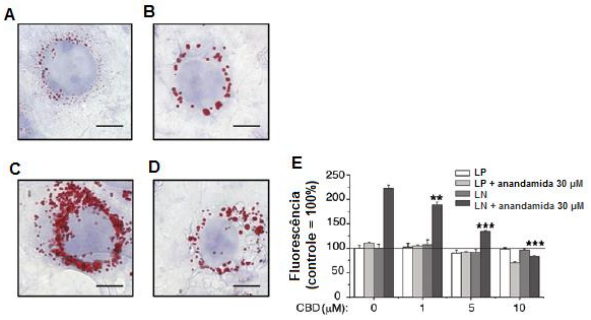


A more recent analysis showed a new treatment for atopic dermatitis, this being a randomized, double-blind, placebo-controlled pilot study. The treatment consisted of topical application of JW-100, a new formulation containing CBD combined with aspartame (GAO *et al*., 2022). Aspartame is commonly known to be a sugar substitute, but reports have testified this sweetener as an inducer of analgesic and anti-inflammatory activities in an animal model (KIM *et al*., 2015). JW-100 was able, after 14 days of use, to improve clinical appearance in patients with atopic dermatitis. Furthermore, the study suggests that there is a synergy in the combination of CBD and aspartame, causing a beneficial effect against this disease (GAO *et al*., 2022).

3.1.2 As a sebostatic agent

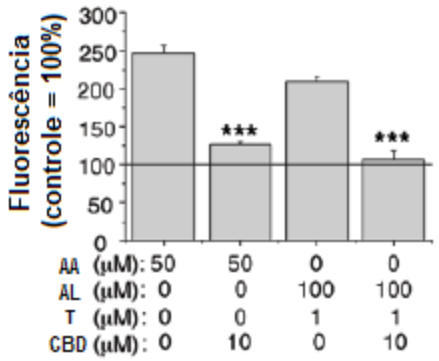
The action of CBD on human sebocytes in culture described by Oláh and colleagues (2014) is significant. In the study anandamide, an endocannabinoid, was observed as a lipogenic agent and CBD inhibited in *a* dose dependent manner the synthesis of neutral and polar lipids in *an in vitro* manner using sebocytes SZ95 (Figure 4).

Figure 4 - Semiquantitative lipid determination for control (A), 10 µM CBD (B), 30 µM anandamide (C) and 30 µM anandamide plus 10 µM CBD (D). Quantitative determination of lipid synthesis in the presence of polar lipids (LP), neutral lipids (LN) and 30 µM anandamide (E). Source: Adapted from Oláh *et al*., (2014, p. 3714).



CBD also proved versatile by inhibiting lipid synthesis via the arachidonic acid pathway or by inducing the combination of linoleic acid and testosterone (Figure 5). In addition, this phytocannabinoid suppressed the expression of Tumor Necrosis Factor alpha (TNF-α), an important cytokine involved in acne vulgaris. The lipostatic action was mediated by transient receptor potential vanilloid 4 (TRPV-4), an ion channel receptor, however the anti-inflammatory activity seems to be a process independent of this receptor (OLÁH *et al*., 2014).

Figure 5 - Lipid synthesis compared to group treated with arachidonic acid (AA) or linoleic acid (LA) and testosterone (T). Source: Adapted from Oláh *et al*., (2014, p. 3714).



CBD has lost its anti-inflammatory function by silencing the function of a gene called TRIB3. TRIB3 plays an important role in the inflammatory pathway by inhibiting nuclear factor kappa B (NF-kB). Even with silencing of this gene, the sebostatic function of CBD was not altered. Oláh and colleagues (2014) identified that increased intracellular cyclic adenosine monophosphate (cAMP) was a possible inducer of TRIB3. Finally, they proposed an axis of mediation of CBD's anti-inflammatory actions, where it initiated from Gs protein-coupled adenosine A2A receptors found in sebocytes. The A2A receptor tends to be the primary target of CBD, where cAMP is increased and the aforementioned processes eventually occur. One of the factors associated with the development of acne is the microbiological imbalance in the skin. CBD alone has not been reported as a microbial agent for *Cutibacterium acnes*, a bacterium associated with the development of acne (BASWAN *et al*., 2020).

3.1.3 As a moisturizing agent

Skin elasticity, as well as wrinkle formation, is associated with the amount of dermal water. In a senescent organism, it is expected that the dermal water content is decreased and consequently, there is a reduction in elasticity and wrinkle formation (GHADIALLY *et al*., 1995). Mice treated with CBD had a significant increase in dermal water content compared to control. The mechanism proposed in that study was that CBD increases the expression of aquaporin-3, a protein involved in intra- and extracellular water transport (IKARASHI *et al*., 2021). Besides aquaporin, other factors assist in the regulation of dermal hydration, with some examples being collagen and hyaluronic acid. The expression of genes related to auxiliary factors in hydration remained practically the same as in the control group after application of the 1% CBD solution for 14 days, showing that the phytocannabinoid in particular did not cause interference in these factors. However, when it came to aquaporin-3, the levels of *Aqp3* gene transcription and protein expression became increased after the solution application period. An important observation is that the concentration was taken into consideration, since the application of CBD at 3% caused the dermal water content in the mice to decrease, which did not happen at the 1% concentration (IKARASHI *et al*., 2021). Since CBD increased the expression of aquaporin-3 and this protein is an important molecule in water retention in the skin, then it was hypothesized that this mechanism might be involved in the effect of CBD on skin hydration. Although not conclusive, it is hypothesized that CBD increases aquaporin-3 through the activation of PPAR-γ in keratinocytes, which requires further study. These results may come in handy as a cosmetic product, which is expected in the future (IKARASHI *et al*., 2021).

In human patients, the CBD ointment described by Palmieri and colleagues (2019) also showed a moisturizing effect after 90 days of treatment, improving aspects in the skin such as elasticity levels. As found by Ghadially and colleagues (1995), elasticity is related to dermal water content. Therefore, improvement can be seen in the hydration level of the skin after treatment (PALMIERI *et al*., 2019).

3.1.4 Other possibilities for topical application

A case report not described in Table 1 was found in the literature, as this article did not describe a topical application of CBD on the individual but a pharmaceutical presentation in oral form. However, CBD has shown good results in patients with hyperhidrosis, i.e., individuals characterized by excessive sweating that can affect the palms, feet or armpits, causing social, emotional and professional damage (PLITIUK *et al*., 2022). Although it has been reported as oral intake, this study could be suggested as an object of study at the topical level.

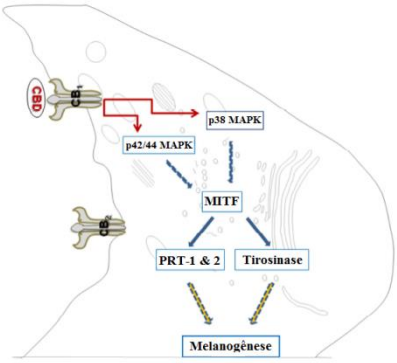
3.2 CBD AS A CYTOPROTECTANT

CBD has been shown in studies to be an antioxidant molecule, acting directly or indirectly on the redox system. The biological activity of this phytocannabinoid was to decrease oxidative stress in the body

and reduce reactive oxygen species (ROS) that are the cause of free radicals, by transforming these radicals into less reactive forms. They are involved in skin disorders and aging. Oxidative stress can result in chronic inflammation if left unchecked. Under normal physiological conditions, the skin activates several defense mechanisms to counteract ROS. These mechanisms are primarily regulated by PPAR-γ and nuclear factor erythroid related factor 2 (NFR2) (ATALAY *et al*., 2019; BASWAN *et al.*, 2020). NRF2 is a protein that acts as a transcription factor, meaning that it is able to influence gene expression and the transcription of other proteins. Among these are antioxidant proteins that protect the body against chronic oxidative stress, damage, and inflammation. NRF2 is a critical biochemical pathway for health, and is a known pathway of great importance in increasing the body's antioxidant defenses (HAHN *et al*., 2017).

External agents such as UVA and UVB radiation are, likewise, harmful to the human body. The skin is the tissue by which it is exposed to these radiations, and can lead to oxidative damage and, in more delicate cases, to the appearance of malignant neoplasms. Contact with sunlight and even therapies that use ultraviolet radiation are examples of exposure modes. CBD presented some alternatives by means of these external stressors (ATALAY *et al*., 2021; GOHAD *et al*., 2021). Hwang and colleagues (2017) showed the role of melanogenesis, which is nothing more than melanin biosynthesis, and its importance in protecting from external agents such as ultraviolet irradiation and oxidative stress inducers. Similarly, they sought to evaluate the activity of CBD in melanogenesis and its mechanism of action in melanocytes, which are cells through which the process of melanin biosynthesis occurs. The *in vitro* study showed the influence of CBD on melanogenesis by increasing the expression of microphthalmia-associated transcription factor (MITF) through the activation of p38 mitogen-activated protein kinase (MAPK) and p42/44 MAPK. The p38 MAPK and p42/44 MAPK are one of the signaling molecules involved in melanin biosynthesis, but only the two were induced by CBD. MITF plays a crucial role in regulating tyrosinase and tyrosinase-related protein (PRT) 1 and PRT 2, melanin precursors. CBD also showed CB1 receptor-dependent effects. The previously described processes are depicted in Figure 6. These findings suggest that CBD may have utility against external agents and may improve hypopigmentary skin conditions (HWANG *et al*., 2017).

Figure 6 - Proposed mechanism of CBD in melanogenesis. Source: Adapted from Hwang *et al*., (2017).



When it comes to UVA and UVB radiation, CBD proved to be the most photostable molecule among the observed phytocannabinoids, besides ensuring an efficient protection in human skin cells *in vitro* after

UVA irradiation (VACEK *et al*., 2021). CBD was also tested in a sunscreen formulation in order to observe its effects against UVB radiation. The molecule was recognized as cytoprotective in both melanocytes and keratinocytes at concentrations below 8 μmol/L. This pilot study showed the protective action of CBD on keratinocytes and melanocytes, suggesting that this phytocannabinoid in question may offer a beneficial additive effect and potentiate the action of sunscreen. Its solubility in oil would ensure good spreadability on the skin (GOHAD *et al*., 2021). Ultraviolet radiation can also be used in treatment of skin diseases such as psoriasis, for example. A study was proposed with the application of CBD in mice in order to analyze the response of the molecule in keratinocytes after ultraviolet exposure (ATALAY *et al*., 2021). Hemeoxygenase 1 (HMOX1) is an enzyme whose gene expression is stimulated by stress. This enzyme has antioxidant and anti-inflammatory properties. HMOX1 is targeted for positive regulation of NRF2 which, like PPAR-γ, acts to combat exaggerated levels of ROS, becoming harmful to the body if left unchecked (BASWAN *et al*., 2020). However, Atalay and collaborators (2021) proposed through their studies that the reduction of NRF2 induced by CBD may have a protective effect, since in in *vitro* experiments the prolonged and chronic activation of NRF2 was apparently related to the risk of developing neoplasms. Therefore, in the experiment developed by the authors, the decrease in NFR2 expression caused by CBD may indicate a cytoprotective effect in mice. It is also important to highlight that CBD has presented itself as a promising cytoprotective ally in the treatment of skin diseases where ultraviolet radiation is used as therapy (ATALAY *et al*., 2021). Wójcik and colleagues (2021) also reaffirm the antioxidant and anti-inflammatory effect of CBD and place it as a possible adjuvant in the integrated treatment of psoriasis, suggesting that the application of CBD ointment to skin lesions twenty-four hours after UVB exposure is beneficial. HMOX1 also appears to be negatively regulated by the transcription factor BACH1. The primary event leading to the induction of HMOX1 is the deactivation of BACH1. As stated earlier, this enzyme is stimulated by a variety of cellular stresses; this makes it a widely used biomarker of the body's response to ROS. A current postulate states that HMOX1 expression is controlled positively by NRF2 and negatively by BACH1, the latter having a dominant effect over the positive control; thus, BACH1 must be suppressed for NRF2 to stimulate HMOX1 expression. The enzyme HMOX1 is expressed in the epidermis and is associated with keratinocyte differentiation. This study evidenced BACH1 inhibition and a weak activation of NRF2 caused by CBD in human keratinocyte cells in *vitro*. Increased levels of HMOX1 were also seen in the epidermis of mice upon topical application of CBD, in addition to providing the expression of keratins involved in tissue repair. It was noted that CBD induced HMOX1 independent of NRF2 action, but BACH1 needs to be expressed. These mechanisms suggest that CBD may be useful in the treatment of skin affected by some oxidative or inflammatory stress (CASARES *et al*., 2021). Casares and colleagues (2021) warn of the pro-proliferative effects of CBD and urge caution, since psoriasis is characterized by an inflammatory condition with hyperploriferation of keratinocytes, causing thickening of the skin. More *in vivo* research is needed to better understand the issue.

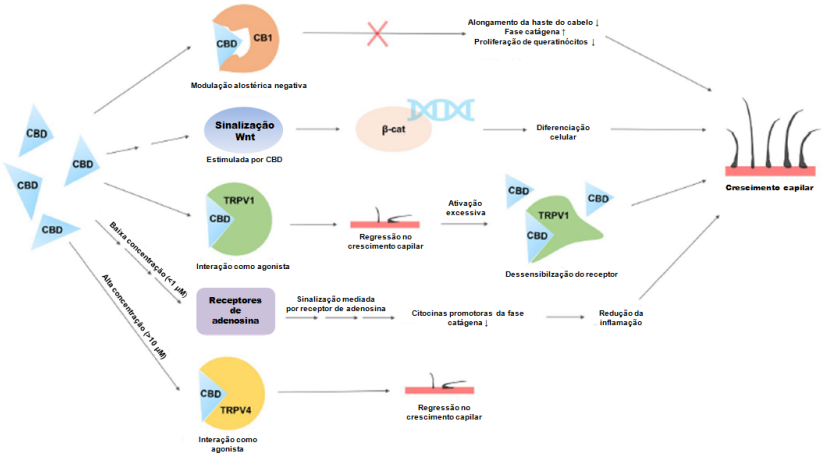
3.3 CBD IN HAIR

Hair, as well as hair follicles in general, has an intermittent growth, varying this discontinuity between growth phases and resting phases. The scalp has a growth phase that can last for several years, while the rest phase lasts for three months (JUNQUEIRA & CARNEIRO, 2013). Hair growth is configured in a cycle composed of three distinct phases: anagen, catagen and telogen. The anagen phase is the phase of hair development and growth; then there is the catagen phase where there is a transition period and the hair stops growing, detaching itself from the follicle base; the telogen phase is a period of apparent rest. In reality there is a metabolic recovery from the effects of the catagen phase. There is a resumption of the cycle returning to the anagen phase and a new follicle tends to grow as a reflection of the metabolic activities during the telogen phase (DAVIS, 1962; NIKFAR & JABERIDOOST, 2014). From an *in vitro* study, where hair follicles and keratinocytes obtained from dermatologically healthy individuals were used, the influence of CBD on hair growth was investigated. Applied at a concentration of 0.1 μM, CBD tended to induce hair shaft growth, but without modulating keratinocyte proliferation. However, at the concentration of 10 μM CBD stopped hair shaft production and led to the development of the catagen phase. This catagen-promoting effect may be activated through CBD signaling with TRPV-4 (SZABÓ *et al*., 2020). This information offered by Szabó and co-workers (2020) suggests that CBD may have distinct targets depending on concentration. At submicromolar concentrations, CBD was able to reduce the production of intrafollicular cytokines inducing the catagen phase through activation of adenosine receptors. Thus it may become useful as an alternative therapy in hair loss-associated problems of an inflammatory nature where there is excessive presence of these cytokines. Micromolar concentrations of TRPV-4-activating CBD, on the other hand, offer an attractive avenue as an inhibitor of unwanted hair growth as there are some disorders such as hirsutism and hypertrichosis, although there are as yet no specific studies citing the action of CBD in both of the aforementioned disorders. Androgenetic alopecia, known as baldness, was the subject of a case study with the intervention of topical CBD use. The study was conducted with individuals with alopecia, where a topical hemp formulation was used once a day for six months. The results showed that patients of both sexes performed well, with men doing slightly better. None of the patients reported significant side effects. One of the proposals for hair growth is CBD as a negative CB1 modulator, since stimulated CB1 in human hair follicles makes it difficult for hair to lengthen. It may also act as an agonist on the transient potential receptor vanilloid 1 (TRPV-1), which is also involved in the hair follicle growth cycle, desensitizing this receptor after excessive and continuous activation (TELEK *et al*., 2007; MULLER *et al*., 2019; SMITH & SATINO, 2021). The previously mentioned mechanisms are summarized in the illustration in Figure 9, developed by Talukder and Gupta (2021). In addition to these, there is still the Wnt/β-catenin pathway, not directly described by any author of the articles selected in Figure 1, but which represents somehow a corroboration of CBD as a potential bioactive molecule present in hair regression and growth episodes. The β-catenin-dependent Wnt signaling pathway, also known in the literature as the canonical pathway, is involved in many crucial functions in the body at the cellular level. Wnt, which is a

glycoprotein, will inhibit a trimeric complex that degrades β-catenin protein. The β-catenin will accumulate in the cytoplasm, being moved to the nucleus and will activate several target genes (GORDON & NUSSE, 2006; KOMIYA & HABAS, 2008).

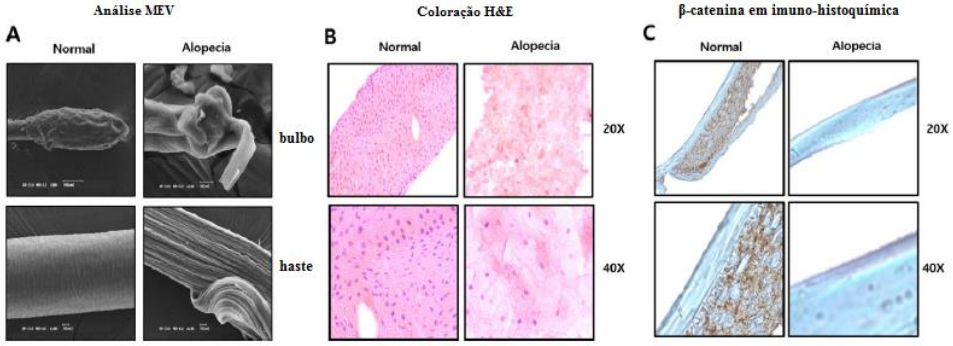
As for Figure 7, CBD will stimulate Wnt signaling which, in turn, will lead to the stabilization of β-catenin. This signaling aims to cause cell differentiation in the dermal region and consequently hair growth.

Figure 7 - Proposed mechanism for the action of CBD on hair. Source: Adapted from Talukder & Gupta (2021, p. 2709).



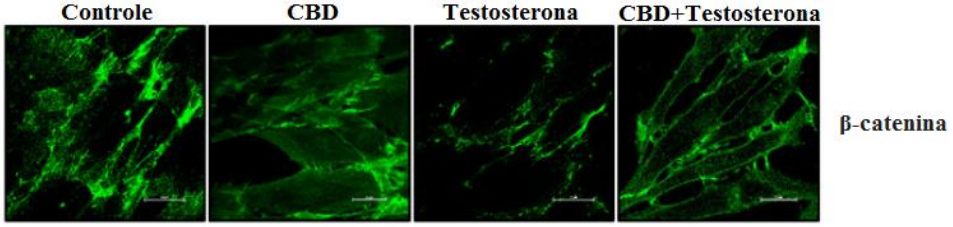
Another study evaluated alopecia as a model induced by testosterone (PARK *et al*., 2021), a steroid hormone present in higher concentrations in males. This hormone undergoes conversion to a more potent form, dihydrotestosterone (DHT), via the enzyme 5α-reductase. Although alopecia has a complex mechanism that is still not fully understood, observations imply that DHT plays an important role in the development of this pathology (TRÜEB, 2002). The intent of the study was to evaluate a possible mechanism of CBD regulation in this *in vitro* model, where hair from patients with alopecia was used. The model of the hairs with alopecia showed a low expression of β-catenin, giving a deformed appearance; meanwhile, the patients in the control group had a high expression of this protein in the hair shaft (Figure 8). This result suggests that β-catenin may be a great ally for the good condition of hair strands (PARK *et al*., 2021).

Figure 8 - The alopecia hair is deformed and does not express β-catenin. Scanning electron microscopy (SEM) analysis (A). Histological hematoxylin-eosin (H&E) staining (B). Expression of β-catenin measured in immunohistochemistry (C). Source: Adapted from Park *et al*., (2021, p. 70).



The phenomenon of decreased β-catenin expression by testosterone was restored after six-hour CBD pre-treatment in dermal papilla cells, which are cells covering the hair root (Figure 9). This implies a modulating effect of CBD on the progression of steroid hormone-induced alopecia, making it promising in the treatment of disorders such as male pattern baldness (PARK *et al*., 2021).

Figure 9 - Expression of β-catenin in dermal papilla cells. Source: Adapted from Park *et al*., (2021, p. 73).



Talukder and Gupta (2021) do not cite Park and co-workers (2021) in the assembly of the illustration represented in Figure 9, but they could fit the proposed mechanism, since they cite the presence of β-catenin and its favorable effect on hair growth. A shampoo formulation with CBD at 0.075% was also found, where its efficacy in individuals with psoriasis or seborrheic dermatitis, both pathologies associated with scalp inflammation, was evaluated. After applying the shampoo over a two-week period, there were significant improvements in symptoms and clinical aspects related to these two diseases, such as a reduction in inflammatory signs on the scalp, a decrease in redness of the skin, flaking, itching, and burning sensation. The product also obtained good compliance and satisfaction from the volunteers participating in the study. Importantly, CBD did not act alone, but in conjunction with other active ingredients present in the shampoo, in order to ensure a synergistic effect in the treatment (VINCENZI & TOSTI, 2020).

Despite the therapeutic potential, Baswan and colleagues (2020) draw attention to the danger of speculative science regarding the action of CBD in modulating skin and hair pigmentation and modulating hair growth. Because this is still an unknown topic, in-depth research is needed, as speculation can lead to inconvenient effects.

4 CONCLUSIONS

It is important to stress that cannabidiol should not be treated as a miracle molecule by common sense, although there is an academic consensus that this phytocannabinoid has undeniable therapeutic properties for some disorders and an optimistic scenario for other diseases, although it is a future still difficult to predict. Regarding CBD as a bioactive compound in topical, cosmetic and dermatological applications, there are studies where it is treated as an adjuvant therapy or a synergistic molecule; even many data are still in the pre-clinical stage and some results are still inconclusive. More research is needed in order to explore and validate its full potential as a drug acting on the skin as well as on its skin appendages. Given its varying receptor-to-receptor interactions, its mechanism of action is still a great challenge to be unraveled precisely. Therefore, a better understanding of how and by which pathways CBD acts is necessary, and a detailed and elucidated understanding of its mode of action is indispensable.

REFERENCES

ALVES, A. O.; SPANIOL, B.; LINDEN, R. Synthetic cannabinoids: emerging drugs of abuse. Archives of Clinmical Psychiatry, v. 39, n. 4, p. 142-148, 2012.

AN, D.; PEIGNEUR, S.; HENDRICKX, L. A.; TYTGAT, J. Targeting cannabinoid receptors: Current status and prospects of natural products. International Journal of Molecular Sciences, v. 21, n. 14, 2020.

ANVISA autoriza mais três produtos derivados de Cannabis. Agência Nacional de Vigilância Sanitária - Anvisa, 3 de março de 2022. Disponível em: https://www.gov.br/anvisa/pt-br/assuntos/noticias-anvisa/2022/anvisa-autoriza-maistres-produtos-derivados-de-cannabis. Acesso em: 14 de julho de 2022.

ATALAY, S.; GĘGOTEK, A.; WROŃSKI, A.; DOMIGUES, P.; SKRZYDLEWSKA, E. Therapeutic application of cannabidiol on UVA and UVB irradiated rat skin. A proteomic study. Journal of Pharmaceutical and Biomedical Analysis, v. 192, 2021.

ATALAY, S.; JAROCKA-KARPOWICZ, I.; SKRZYDLEWSKA, E. Antioxidative and Anti-Inflammatory Properties of Cannabidiol. Antioxidants, v. 9, n. 1, p. 21, 2019.

BARRALES-CUREÑO, H. J.; LÓPEZ-VALDEZ, L. G.; REYES, C.; CETINAALCALÁ, V. M.; VASQUEZ-GARCÍA, I.; DIAZ-LIRA, O. F.; HERRERACABRERA, B. E. Chemical Characteristics, Therapeutic Uses, and Legal Aspects of the Cannabinoids of Cannabis sativa: A Review. Brazilian Archives of Biology and Technology, v. 63, 2022.

BASWAN, S. M.; KLOSNER, A. E.; GLYNN, K.; RAJGOPAL, A.; MALIK, K.; YIM, S.; STERN, N. Therapeutic Potential of Cannabidiol (CBD) for Skin Health and Disorders. Clinical, cosmetic and investigational dermatology, v. 13, p. 927–942, 2020.

BEIGHTON, P. Congenital Hypertrichosis Lanuginosa. Archives of Dermatology, v. 101, n. 6, p. 669-672, 1970.

BORILLE, Bruna Tassi. Caracterização química da planta Cannabis sativa L. a partir de sementes apreendidas pela polícia federal no estado do Rio Grande do Sul. 2016. Tese (Doutorado em Ciências Farmacêuticas), Faculdade de Farmácia, Universidade Federal do Rio Grande do Sul, Rio Grande do Sul, 2016.

BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução de Diretoria Colegiada - RDC nº 17, de 6 de maio de 2015. Dispõe os critérios e os procedimentos para a importação, em caráter de excepcionalidade, de produto à base de Canabidiol em associação com outros canabinoides, por pessoa física, para uso próprio, mediante prescrição de profissional legalmente habilitado, para tratamento de saúde. Disponível em : https://bvsms.saude.gov.br/bvs/saudelegis/anvisa/2015/rdc0017_06_05_2015.pdf. Acesso em: 14 jul 2022.

BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução de Diretoria Colegiada - RDC nº 327, de 9 de dezembro de 2019. Dispõe sobre os procedimentos para a concessão da Autorização Sanitária para a fabricação e a importação, bem como estabelece requisitos para a comercialização, prescrição, a dispensação, o monitoramento e a fiscalização de produtos de Cannabis para fins medicinais, e dá outras providências. Diário Oficial da União, p. 194, 11 dez 2019. BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução de Diretoria Colegiada - RDC nº 660, de 30 de março de 2022. Dispõe os critérios e os procedimentos para a importação de Produto derivado de Cannabism por pessoa física, para uso próprio, mediante prescrição de profissional legalmente habilitado, para tratamento de saúde. Diário Oficial da União, p. 333, 31 mar 2022. CASARES, L.; GARCÍA, V.; GARRIDO-RODRÍGUEZ, M.; MILLÁN, E.; COLLADO, J. A.; GARCÍA-MARTÍN, A.; PEÑARANDO, J.;

CALZADO, M. A.; DE LA VEGA, L.; MUÑOZ, E. Cannabidiol induces antioxidant pahtways in keratinocytes by targeting BACH1. Redox Biology, v. 28, 2020.

CASIRAGHI, A.; MUSAZZI, U. M.; CENTIN, G.; FRANZÈ, S.; MINGHETTI, P.Topical Administration of Cannabidiol: Influence of Vehicle-Related Aspects on Skin Permeation Process. Pharmaceuticals, v. 13, n. 11, p. 337, 2020.

CATERINA, M. J. TRP Channel Cannabinoid Receptors in Skin Sensation, Homeostasis, and Inflammation. ACS Chemical Neuroscience, v. 5, n. 11, p. 1107-1116, 2014.

CHELLIAH, M. P.; ZINN, Z.; KHUU, P.; TENG, J. M. C. Self-initiated use of topical cannabidiol oil for epidermolysis bullosa. Pediatric Dermatology, v. 35, n. 4, p. 1-4, 2018.

COMISSÃO aprova proposta para legalizar no Brasil o cultivo de Cannabis sativa para fins medicinais. Câmara dos Deputados, 8 de junho de 2021. Disponível em: https://www.camara.leg.br/noticias/769630-comissao-aprova-proposta-para-legalizarno-brasil-o-cultivo-de-cannabis-sativa-para-fins-medicinais. Acesso em: 14 de julho de 2022.

CORRON, J.; KNIGHT, R. Regulatory Status of Cannabidiol in the United States: A Perspective. Cannabis and Cannabinoid Research, v. 3, n. 1, p. 190-194, 2018.

CRINI, G.; LICHTFOUSE, E.; CHANET, G.; MORIN-CRINI, N. Applications of hemp in textiles, paper industry, insulation and building materials, horticulture, animal nutrition, food and beverages, nutraceuticals, cosmetics and hygiene, medicine, agrochemistry, energy production and environment: a review. Environmental Chemistry Letters, v. 8, n. 5, p. 1451-1476, 2020.

CRIPPA, J. A. S.; ZUARDI, A. W.; HALLAK, J. E. C. Therapeutical use of the cannabinoids in psychiatry. Brazilian Journal of Psychiatry, v. 32, n. 1, p. 556-566, 2010.
DANTAS, C. Cannabis medicinal: o que é o sistema endocanabinoide e como a planta age no corpo. G1, 05 de junho de 2022. Disponível em: https://g1.globo.com/saude/noticia/2022/06/05/cannabis-medicinal-o-que-e-o-istemaendocanabinoide-e-como-a-planta-age-no-corpo.ghtml. Acesso em: 13 de junho de 2022.

DAVIS, B. K. Phases of the Hair-Growth Cycle. Nature, v. 194, p. 624, 1962.

ELSOHLY, M. A.; SLADE, D. Chemical constituents of marijuana: the complex mixture of natural cannabinoids. Life Sciences, v. 78, n. 5, p. 539-548, 2005.

ENGLUND, A.; FREEMAN, T. P.; MURRAY, R. M.; MCGUIRE, P. Can we make cannabis safer? Lancet Psychiatry, v. 4, n. 8, p. 643-648, 2017.

FORTI, M. D.; QUATTRONE, D.; FREEMAN, T. P.; TRIPOLI, G.; GAYERANDERSON, C.; QUIGLEY, H.; RODRIGUEZ, V.; JONGSMA, H. E.; FERRARO,L.; LA CASCIA, C.; LA BARBERA, D.; TARRICONE, I.; BERARDI, D.; SZÖKE, A.; ARANGO, C.; TORTELLI, A.; VELTHORST, E.; BERNARDO, M.; DEL-BEM, C. M.; MENEZES, P. R.; SELTEN, J. P.; JONES, P. B.; KIRKBRIDE, J. B.; RUTTEN, B. P. F.; HAAN, L.; SHAM, P. C.; OS, J. V.; LEWIS, C. M.; LYNSKEY, M.; MORGAN, C.; MURRAY, R. M. The contribuition of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): a multicentre case-control study. The Lancet Psychiatry, v. 6, n. 5, p. 427-436, 2019.

FREEMAN, T. P.; HINDOCHA, C.; BAIO, G.; SHABANM N. D. C.; THOMAS, E.; ASTBURY, D.; FREEMAN, A. M.; LEES, R.; CRAFT, S.; MORRISON, P. D.; BLOOMFIELD, M. A. P.; O'RYAN, D.; KINGHORN, J.; MORGAN, C. J. A.; MOFEEZ, A.; CURRAN, H. V. Cannabidiol for the treatment of

cannabis use disorder: Phase IIa double-blind placebo-controlled randomized adaptative Bayesian dose-finding trial. Lancet Psychiatry, v. 7, n. 10, p. 865-874, 2020.

FULTON, A.; BLITZ, S. O Uso de Canabidiol em Cosméticos. Cosmetics & Toiletries (Brasil), v. 31, p. 36-40, 2019.

GAO, Y.; LI, Y.; TAN, Y.; LIU, W.; OUADDI, S.; MCCOY, J.; KOVACEVIC, M.; SITUM, M.; STANIMIROVIC, A.; LI, M.; WAMBIER, C.; GOREN, A.; ZOU, Y. Novel cannabidiol aspartame combination treatment (JW-100) significantly reduces ISGA score in atopic dermatitis: Results from a randomized double-blinded placebo controlled interventional study. Journal of Cosmetic Dermatology, v. 21, n. 4, p. 1647-1650, 2022.

GHADIALLY, R.; BROWN, B. E.; SEQUEIRA-MARTIN, S. M.; FEINGOLD, K. R.; ELIAS, P. M. The aged epidermal permeability barrier. Structural, functional, and lipid biochemical abnormalities in humans and a senescent murine model. The Journal of Clinical Investigation, v. 95, n. 5, p. 2281-2290, 1995.

GOHAD, P.; MCCOY, J.; WAMBIER, C.; KOVACECIC, M.; SITUM, M.; STANIMIROVIC, A.; GOREN, A. Novel cannabidiol sunscreen protects keratinocytes
and melanocytes against ultraviolet B radiation. Journal of Cosmetic Dermatology, v. 20, n. 4, p. 1350-1352, 2021.

GORDON, M. D.; NUSSE, R. Wnt Signaling: Multiple Pathways, Multiple Receptors, and Multiple Transcription Factors. Journal of Biological Chemistry, v. 281, n. 32, p. 22429-22433, 2006.

GUNDERSON, E. W.; HAUGHEY, H. M.; AIT-DAOUD, N.; JOSHI, A. S.; HART, C. L. A survey of synthetic cannabinoid consumption by current cannabis users. Subst Abus., v. 35, n. 2, p. 184-189, 2014.

HAHN, G. F.; OLIVEIRA, J. R. de; BOCK, P. M. O papel do fator nuclear eritróide 2 relacionado ao fator 2 (Nrf2) no diabetes mellitus. Clinical and Biomedical Research, v.37, n. 3, p. 203-213, 2017.

HARTSEL, J. A.; EADES, J.; HICKORY, B.; MAKRIYANNIS, A. Cannabis sativa and Hemp. Nutraceuticals, p. 735-754, 2016.

HWANG, Y. S.; KIM, Y. J.; KIM, M. O.; KANG, M.; OH, S. W.; NHO, Y. H.; PARK, S. H.; LEE, J. Cannabidiol upregulates melanogenesis through CB1 dependent pathway by activating p38 MAPK and p42/44 MAPK. Chemico-Biological Interactions, v. 273, p. 107–114, 2017.

IFTIZHAR, A.; ZAFAR, U.; AHMED, W.; SHABBIR, M. A.; SAMEEN, A.; SAHAR, A.; BHAT, Z. F.; KOWALCZEWSKI, P. Ł.; JARZĘBSKI, M.; AADIL, R. M. Applications of Cannabis Sativa L. in Food and Its Therapeutic Potential: From a Prohibited Drug to a Nutritional Supplement. Molecules, v. 26, n. 24, p. 7699, 2021.

IKARASHI, N.; SHISEKI, M.; YOSHIDA, R.; TABATA, K.; KIMURA, R.;WATANABE, T.; KON, R.; SAKAI, H.; KAMEI, J. Cannabidiol Application Increases Cutaneous Aquaporin-3 and Exerts a Skin Moisturizing Effect. Pharmaceuticals, v. 14, n. 9, p. 879, 2021.

KIM, G. D.; PARK, Y. S.; AHN, H. J.; CHO, J. J.; PARK, C. S. Aspartame Attenuates 2, 4-Dinitrofluorobenze-Induced Atopic Dermatitis-Like Clinical Symptoms in NC/Nga Mice. Journal of Investigative Dermatology, v. 135, n. 11, p. 2705-2713, 2015.

KOMIYA, Y.; HABAS, R. Wnt signal transduction pathwyas. Organogenesis, v. 4, n. 2, p. 68-75, 2008. LESSA, M. A.; CAVALCANTI, I. L.; FIGUEIREDO, N. V. Derivados canabinóides e o tratamento farmacológico da dor. Revista Dor, v. 17, n. 1, p. 47-51, 2016.

LI, H. L. An archaeological and historical account of cannabis in China. Economic Botany, v. 28, n. 4, p. 437-448, 1974.

MAGHFOUR, J.; RIETCHECK, H.; SZETO, M. D.; RUNDLE, C. W.; SIVESIND, T. E.; DELLAVALLE, R. P.; LIO, P.; DUNNICK, C. A.; FERNANDEZ, J.; YARDLEY, H. Tolerability profile of topical cannabidiol and palmitoylethanolamide: a compilation of single-centre randomized evaluator-blinded clinical and in vitro studies in normal skin. Clinical and experimental dermatology, v. 46, n. 8, p. 1518–1529, 2021.

MAHMUD, M. S.; HOSSAIN, M. S.; AHMED, A. T. M. F.; ISLAM, M. Z.; SARKER, M. E.; ISLAM, M. R. Antimicrobial and Antiviral (SARS-CoV-2) Potential of Cannabinoids and Cannabis sativa: A Comprehensive Review. Molecules, v. 26, n. 23, p. 7216, 2021.

MARTIN, B. R.; MECHOULAM, R.; RAZDAN, R. K. Discovery and characterization of endogenous cannabinoids. Life Sciences, v. 65, n. 6-7, p. 573-595, 1999.

MARTINELLI, G.; MAGNAVACCA, A.; FUMAGALLI, M.; DELL'AGLI, M.; PIAZZA, S.; SANGIOVANNI. Cannabis sativa and Skin Health: Dissecting the Role of Phytocannabinoids. Planta Med, v. 88, n. 7, p. 492-506, 2022.

MARTÍNEZ, V.; DE-HOND, A. I.; BORRELLI, F.; CAPASSO, R.; DEL CASTILLO, M. D.; ABALO, R. Cannabidiol and Other Non-Psychoactive Cannabinoids for Prevention and Treatment of Gastrointestinal Disorders: Useful Nutraceuticals? International Journal of Molecular Sciences, v. 21, n. 9, p. 3067, 2020.

MCGINTY, E. E.; NIEDERDEPPE, J.; HELEY, K.; BARRY, C. L. Public perceptions of arguments supporting and opposing recreational marijuana legalization. Preventive Medicine, v. 99, p. 80-86, 2017.

MEDICINA Canabinoide é o curso de saúde mais procurado em EAD curta na USP. Exame., 16 de maio de 2022. Disponível em: https://exame.com/bussola/medicinacanabinoide-e-curso-de-saude-mais-procurado-em-ead-curta-na-usp/. Acesso em: 13 de junho de 2022.

MELO, L. A.; SANTOS, A. O. O uso do Canabidiol no Brasil e o posicionamento do Órgão Regulador.Cadernos Ibero-Americanos de Direito Sanitário, v. 5, n. 2, p. 43-55, 2016.

MELO REIS, R. A.; ISAAC, A. R.; FREITAS, H. R.; DE ALMEIDA, M. M.; SCHUCK, P. F.; FERREIRA, G. C.; ANDRADE-DA-COSTA, B. L. S.; TREVENZOLI, I. H. Quality of Life and a Surveillant Endocannabinoid System. Frontiers in Neuroscience, v. 15, p. 747229, 2021.

MNEKIN, L.; RIPOLL, L. Topical Use of Cannabis Sativa L. Biochemicals. Cosmetics, v. 8, n. 3, p. 85, 2021.

MOMEKOVA, D.; IVANOV, E.; KONSTANTINOV, S.; UBLEKOV, F.; PETROV, P. D. Nanocomposite Cryogel Carriers form 2-Hydroxyethyl Cellulose Network and Cannabidiol-Loaded Polymeric Micelles for Sustained Topical Delivery. Polymers, v. 12, n. 5, p. 1172, 2020.

MOMEKOVA, D.; DANOV, Y.; MOMEKOV, G.; IVANOV, E.; PETROV, P. Polysaccharide Cryogels Containing β-Cyclodestrin for the Delivery of Cannabidiol. Pharmaceutics, v. 13, n. 11, p. 1774, 2021.

MULLER, C.; MORALES, P.; REGGIO, P. H. Cannabinoids Ligands Targeting TRP Channels. Frontiers in molecular neuroscience, v. 11, p. 487, 2019.

NIESINK, R. J. M.; VAN LAAR, M. W. Does canabidiol protect against adverse psychological effects of THC? Frontiers in psychiatry, v. 4, p. 130, 2013.

NIKFAR, S.; JABERIDOOST, M. Hair. Encyclopedia of Toxicology, p. 813-815, 2014.

OLÁH, A.; TÓTH, B. I.; BORBÍRÓ, I.; SUGAWARA, K.; SZÖLLÕSI, A. G.; CZIFRA, G.; PÁL, B.; AMBRUS, L.; KLOEPPER, J.; CAMERA, E.; LUDOVICI, M.; PICARDO, M.; VOETS, T.; ZOUBOULIS, C. C.; PAUS, R.; BÍRÓ, T. Cannabidiol exerts sebostatic and antiinflammatory effects on human sebocytes. The Journal of clinical investigation, v. 124, n. 9, p. 3713–3724, 2014.

PALMIERI, B.; LAURINO, C.; VADALÀ, M. A therapeutic effect of cbd-enriched ointment in inflammatory skin diseases and cutaneous scars. La Clinica Terapeutica, v.
170, v. 2, p. e93-e99, 2019.

PARK, Y. J.; RYU, J. M.; NA, H. H.; JUNG, KIM, B.; PARK, J. S.; AHN, B. S.; KIM, K. C. Regulatory Effect of Cannabidiol (CBD) on Decreased β-Catenin Expression in Alopecia Models by Testosterone and PMA Treatment in Dermal Papilla Cells. Journal of Pharmacopuncture, v. 24, n. 2, p. 68-75, 2021.

PITLIUK, R.; COELHO, C. M. F.; FUCCI, T. P. P. C. S. Unexpected improvement of hyperhidrosis with cannabidiol. Einstein (São Paulo), v. 20, p. eRC5795, 2022.

RANG, H. P.; RITTER, J. M.; FLOWER, R. J.; HENDERSON, G. Rang & Dale: farmacologia. 8. ed. Rio de Janeiro: Elsevier, 2016.

SAITO, V. M.; WOTJAK, C. T.; MOREIRA, F. A. Exploração farmacológica do sistema endocanabinoide: novas perspectivas para o tratamento de transtornos de ansiedade e depressão? Brazilian Journal of Psychiatry, v. 32, n. 1, p 7-14, 2010.

SCHIER, A. R. M.; RIBEIRO, N. P. O.; SILVA, A. C. O.; HALLAK, J. E. C.; CRIPPA, J. A. S.; NARDI, A. E.; ZUARDI, A. W. Canabidiol, um componente da Cannabis sativa, como um ansiolítico. Revista Brasileira de Psiquiatria, v. 34, n. 1, p.
104-107, 2012.

SELAMOGLU, A.; LANGLEY, C.; CREAN, R.; SAVULICH, G.; CORMACK, F.; SAHAKIANS, B. J.; MASON, B. Neuropsychological performance in young adults with cannabis use disorder. Journal of Psychopharmacology, v. 35, n. 11, p. 1349-1355,
2021.

SHARKAWY, A.; SILVA, A. M.; RODRIGUES, F.; BARREIRO, F.; RODRIGUES, A. Pickering emulsions stabilized with chitosan/collagen peptides nanoparticles as green topical delivery vehicles for cannabidiol (CBD). Colloids and Surfaces A: Physicochemical and Engineering Aspects, v. 631, p. 127677, 2021.

SKUMLIEN, M.; LANGLEY, C.; LAWN, W.; VOON, V.; SAHAKIAN, B. J. Apathy
and Anhedonia in Adult and Adolescent Cannabis Users and Controls Before and During the COVID-19 Pandemic Lockdown. The international journal of neuropsychopharmacology, v. 24, n. 11, p. 859–866, 2021.

SMITH, G. L.; SATINO, J. Hair Regrowth with Cannabidiol (CBD)-rich Hemp Extract.
Cannabis, v. 4, n. 1, p. 53-59, 2021.

SPRITZER, M. Revisitando o Hirsutismo. Arquivos Brasileiros de Endocrinologia & Metabologia, v. 46, n. 2, p. 127-136, 2002.

STJ dá autorização para cultivo de maconha com fins medicinais. Exame., 14 de junho de 2022. Disponível em: https://exame.com/brasil/stj-da-autorizacao-para-cultivo-demaconha- com-fins-medicinais/. Acesso em: 14 de julho de 2022.

SUNDA, F.; AROWOLO, A. A molecular basis for the anti-inflammatory and antifibrosis properties of cannabidiol. The FASEB Journal, v. 34, n. 11, p. 14083-14092,2020.

SZABÓ, I. L.; LISZTES, E.; BEKE, G.; PAUS, R.; OLÁH, A.; BÍRÓ, T. The Phytocannabinoid (-)-Cannabidiol Operates as a Complex, Differential Modulator of Human Hair Growth: Anti-Inflammatory Submicromolar versus Hair Growth Inhibitory Micromolar Effects. Journal of Investigative Dermatology, v. 140, n. 2, p. 484-488, 2020.

TALUKDER, M.; GUPTA, A. K. Cannabinoids for skin diseases and hair regrowth. Journal of Cosmetic Dermatology, v. 20, n. 9, p. 2703-2711, 2021.

TELEK, A.; BÍRÓ, T.; BODÓ, E.; TÓTH, B. I.; BORBIRÓ, I.; KUNOS, J.; PAUS, R. Inhibition of human hair follicle growth by endo- and exocannabinoids. FASEB journal: official publication of the Federation of American Societies for Experimental Biology, v. 21, n. 13, p. 3534-3541, 2007.

TOUW, M. The religious and medicinal uses of Cannabis in China, India and Tibet. Journal of Psychoative Drugs, v. 13, n. 1, p. 23-34, 1981.

TRÜEB, R. M. Molecular mechanisms of androgenetic alopecia. Experimental Gerontology, v. 37, n. 8-9, p. 981-990, 2002.

VACEK, J.; VOSTALOVA, J.; PAPOUSKOVA, B.; SKARUPOVAS, D.; KOS, M.; KABELAC, M.; STORCH, J. Antioxidant function of phytocannabinoids: Molecular basis of their stability and cytoprotective properties under UV-irradiation. Free Radical Biology and Medicine, v. 164, p. 258–270, 2021.

VANTI, G.; GRIFONI, L.; BERGONZI, M. C.; ANTIGA, E.; MONTEFUSCO, F.; CAPRONI, M.; BILIA, A. R. Development and optimisation biopharmaceutical properties of a new microemulgel of cannabidiol for locally-acting dermatological delivery. International Journal of Pharmaceutics, v. 607, p. 121036, 2021.

VIDAL, S. A regulamentação do cultivo de maconha para consumo próprio: uma proposta de Redução de Danos. Em: NERY FILHO, A.; EDWARD, M.; TAVARES, L.A.; RÊGO, M. Toxicomanias: incidências clínicas e socioantropológicas. Salvador: EDUFBA; Salvador: CETAD, p. 61-96, 2009. Disponível em: https://books.scielo.org/id/qk/pdf/nery-9788523208820-05.pdf. Acesso em: 27 julho 2022.

VINCENZI, C.; TOSTI, A. Efficacy and Tolerability of a Shampoo Containing Broad- Spectrum Cannabidiol in the Treatment of Scalp Inflammation in Patients with Mild to Moderate Scalp Psoriasis or Seborrheic Dermatitis. Skin Appendage Disorders, v. 6, n. 6, p. 355-361, 2020.

WILSON, J.; FREEMAN, T. P.; MACKIE, C. J. Effects of increasing cannabis potency on adolescent health. Lancet Child Adolescent Health, v. 3, n. 2, p. 121-128, 2019.

WÓJCIK, P.; GĘGOTEK, A.; ŽARKOVIĆ, N.; SKRZYDLEWSKA, E. Disease- Dependent Antiapoptotic Effects of Cannabidiol for Keratinocytes Observed upon UV Irradiation. International Journal of Molecular Sciences, v. 22, n. 18, p. 9956, 2021.

ZAGÓRSKA-DZIOK, M.; BUJAK, T.; ZIEMLEWSKA, A.; NIZIOŁŁUKASZEWSKA, Z. Positive Effect of Cannabis sativa L. Herb Extracts on Skin Cells and Assessment of Cannabinoid-Based Hydrogels Properties. Molecules, v. 26, p. 802, 2021.

ZUARDI, A. W.; CRIPPA, J. A. S.; HALLAK, J. E. C.; MOREIRA, F. A.; GUIMARÃES, F. S. Cannabidiol, a Cannabis sativa constituent, as an antipsychotic drug. Brazilian Journal of Medical and Biological Research, v. 39, n. 4, p. 421-429,
2006.

ZUARDI, A. W.; SHIRAKAWA, I.; FINKELFARB, E.; KARNIOL, I. G. Action of cannbidiol on the anxiety and other effects produced by δ9-THC in normal subjects. Psychopharmacology, v. 76, n. 3, p. 245-250, 1982

CHAPTER 44

Feelings aroused during the COVID-19 pandemic in the elderly accompanied by the Family Health Strategy

10.56238/rsfohsv1-044

Mineia da Costa Figueiredo

João Maria Corrêa Filho

ABSTRACT

The present study aimed to analyze the feelings aroused during the covid-19 pandemic in the elderly who are accompanied by the Family Health Strategy. Observational, qualitative and descriptive study, developed with elderly people in the rural area of the municipality of Canto do Buriti-PI. The sample consisted of 18 elderly people and data collection took place in two stages: through a semi-structured questionnaire with results described in a table and a structured questionnaire with audio-recorded content, transcribed and analyzed in the IRaMuTeQ software. From the data collected, it was found that the participants had a mean age of 68 years, most were female, had not completed elementary school, had an income of up to two minimum wages, most were married, white and lived with up to three people. Through textual analysis, a dendrogram was generated with seven classes categorized by the researchers: (1) "concern about losing family members" (2) "concern about following restrictive measures" ; (3) "feelings aroused during the pandemic; (4) "emotions and perceptions of risk" (5) "behavioral changes imposed with the new routine" (6) "fear of getting infected" (7) "uncertainties generated by the pandemic". As for the word cloud, the most representative feeling was fear. It is concluded that deepening knowledge about changes in the mental health of the elderly is essential to reveal the impacts caused, their relationships and the intrinsic protective factors for the construction of essential guidelines and strategies in the prevention of mental illness.

Key-words: Elderly. Coronavirus infections. Mental health.

1 INTRODUCTION

Currently, population aging is part of a global panorama and represents a major challenge to society. The estimate for the next 30 years is that the number of elderly people worldwide will triple, reaching over 1.5 billion people in 2050 and surpass the number of young people aged 15 to 24 years (PAHO, 2022). In Brazil, according to the Statute of the Elderly, after the age of 60 the individual is considered elderly (Brazil, 2017).

This new reality gradually demands more modifications in Brazilian society in order to offer quality of life to the elderly and raise new standards of aging, besides requiring the creation of strategies, with the purpose of undoing the stigmas about old age (Silva, et al., 2020).

Aging is a natural, gradual, and dynamic process, with morphological, functional, and biochemical alterations that make the body more vulnerable to aggressions and deformities. The aging process increases the risk of several diseases, among them endocrine, cognitive, neuromuscular, psychic, cardiovascular, and skeletal diseases. This leads to an increase in the percentage of individuals with chronic diseases, reduced functional and cognitive capacity, and increased dependence (Silva, et al, 2017; Lenardt, et al, 2017).

Since the onset in the COVID-19 pandemic (a disease caused by the new coronavirus called SARS-CoV-2) in 2020, elderly people have been identified as being in a risk group (Moura, 2021). Sherlock, et al. (2020) point out that the risk of death from COVID-19 intensifies with age, with the majority of observed deaths occurring in people over the age of 60, especially those with chronic diseases, mainly cardiovascular diseases. The presence of associated comorbidities contributes significantly to the increase in this rate, and in Brazil it was found that 69.3% of deaths occurred in people over 60 years and of these 64% had at least one risk factor (Brazil, 2020).

Thus, the risk of contamination by the virus and the development of COVID-19 imposed preventive strategies as a way to control and reduce the transmission of Sars-CoV-2. Among the protocols produced and recommended for the safety of the world's population, social distancing and isolation stand out, in addition to the reinforcement of hygiene measures, such as the use of alcohol gel and hand washing (Hammerschmidt & Santana, 2020).

Although necessary to contain the spread of the pandemic, restrictive measures may increase the risk of adverse psychological consequences. This risk is intensified in longer quarantine periods and when there is fear of infection, frustration, boredom, inadequate supplies, inappropriate information, and financial loss (Brooks, et al., 2020).

In their study Lebrasseur et al. (2021) identified that negative psychological impacts are greater in people over the age of 60, known to experience loneliness, age discrimination, and excessive worry. This has been shown to increase the chances of negative experiences related to pandemic COVID-19 due to greater isolation and risk of complications than younger adults.

In addition, feelings of isolation or loss of social relationships have been shown to have implications for declining cognition, mood, sleep disturbances (Santini, et al. , 2020) symptoms of anxiety, depression (Jemal, et al., 2020), increased severity of agitation, loneliness, behavioral problems, irritability, and appetite disturbance (Roest, et al., 2020).

The pandemic scenario of COVID 19 brought uncertainties that have had repercussions in several sectors, with direct implications in the daily life and mental health of the population. Restrictive measures were adopted worldwide to contain the spread of the disease that generated emotional damage that may be more acute in the elderly due to the multidimensionality of aging and greater vulnerability.

In this perspective, to promote the health of the elderly during and after the pandemic, it is necessary to know how they experienced this period and the feelings aroused. This is important for the development of actions in the Family Health Strategy, which is the gateway to care and therefore has a greater possibility of preventing psychological illness and changing risk behaviors, favoring the development of resolutive strategies for health protection for more vulnerable groups and individuals. Observing this, the study aims to analyze the feelings aroused during the covid-19 pandemic in the elderly who are accompanied by the Family Health Strategy.

2 METHODOLOGY

Observational study, of qualitative approach and descriptive character, delineated in order to understand the feelings experienced during the pandemic and the meanings attributed to them. According to Marconi & Lakatos (2011), the qualitative methodology is concerned with analyzing and interpreting deep aspects, describing the complexities of human behavior. It provides more detailed analysis on investigations, habits, attitudes, behavior trends.

It is worth mentioning that the research was structured based on a cutout of a multicenter study prepared by the Research and Training Network of the Graduate Program in Family Health - PROFSAÚDE on COVID-19, entitled "Prevention and control of COVID-19: a multicenter study on the perception and practices in the daily life of medical-scientific orientations by the population of the territories covered by Primary Health Care".

This section was developed in the municipality of Canto do Buriti, located in the central south of the State of Piauí, with a territorial area of 4,325.642 km² and an estimated population of 21,326 inhabitants (IBGE, 2021).

Data collection took place in two stages, the first through an online questionnaire using the Google Forms platform, with structured, self-applied questions, with three cores of information: a) social, demographic, and economic characteristics; b) relationship with the UBS and use of services; c) sources of information, perception, and practices arising from the information/recommendations of the prevention and control measures of COVID 19.

This stage took place from January 2021 to June 2021 and was developed in person at the Basic Health Unit (BHU), with the help of the researcher to fill out the form using his cell phone or computer at the BHU.

In the second stage, dialogical interviews were conducted, mediated by a script about the strategies adopted at the individual, family, and collective levels to apply the prevention and control measures for COVID-19. To meet the objectives of this study another guiding question was added: What are the feelings aroused by the COVID 19 pandemic?

After the selection of users, they were invited to participate through home visits with the interviewer and the community health agent (CHA), and if they agreed, the interview was conducted. Thus, these took place in the community through a semi-structured script, with delivery of the printed Informed Consent Form (ICF), recorded on mp3 audio and following the saturation criterion, under the guidance of the interviewer. This stage took place from October 2021 to December 2021.

The sample was composed of 18 elderly people, 13 women and 5 men; this quantity took into account the data saturation method. Due to recurrent and/or redundant data, the sample size was sufficient for the research.

The sample was chosen by convenience, through people registered at the ESF Santa Maria (health team linked to the researcher), obeying the inclusion criteria: being over 60 years old, having attended the

UBS in the 90 days preceding the research, to better understand the experience of families in the territories attached in the pandemic period; agreeing to participate in the study and signing the ICF. As for the exclusion criteria, it was established that the participants could not be hospitalized or have reduced cognitive capacity, since this would make it difficult to understand and answer the survey. Another criterion would be refusal to participate.

The data were analyzed in two stages, the sociodemographic by means of descriptive statistics (frequency and percentage), described in a table produced by Microsoft Word, a word processor software that operates in the Windows environment and admits creating and editing documents. The second stage, started with the transcription of the interviews' content through Microsoft Word, the audiorecorded content was transcribed in its entirety, the text resulting from the transcription composed the corpus processed in the software Interface de R pourles Analyses Multidimensionnelles de Textes et de Questionnaires (IRAMUTEQ) 0.7 Alpha 2.3.3.1. It is worth mentioning that the transcribed text was prepared in textual corpus according to what was established for analysis in the IRaMuTeQ software.

The software IRaMuTeQ for its statistical rigor, developed in Python language, makes use of features provided by the statistical software R. For its various possibilities of analysis, uncomplicated interface, easy to understand, and especially for its free access, has been widely used in studies of human and social sciences, which have the symbolic content derived from textual materials as an important source of research data. Thus, it seeks to capture the structure and organization of the interviewees' speeches, thus being able to inform the relationships between the lexical worlds most used by the research participants (Camargo & Justo, 2013).

Through this IRAMUTEQ program multivariate analysis was performed by the Descending Hierarchical Classification (CHD), the text segments were categorized according to their respective vocabularies, and the set was divided according to the frequency of the reduced forms (vocabularies). From these matrix analyses the software sorted the data analysis into a CHD dendogram, which demonstrates the relationships between the classes (Camargo & Justo 2013). Through the program a word cloud was also generated, which groups the words and organizes them graphically according to their frequency. For Mariano et al. (2011) the words reveal characteristics of each interview, allowing to connect the studies and classify them.

The compatibility of processing the corpus in IRAMUTEQ was corroborated by the fact that the text has 476 forms (vocabularies) distributed in 1488 occurrences (total number of words contained in the corpus). As for the identification of the interviewees' speeches, their names were replaced by the letter I followed by numbers assigned at random to protect their identity.

For data analysis, we used the answers from question two of the semi-structured script (Appendix B) on the feelings aroused during the pandemic and the sociodemographic data contained in the structured script (Appendix A) on gender, color/race, education, income, and number of people living in the household.

The research is in accordance with the norms of Resolution No. 466/12 of the National Health Council (CNS), which regulates research involving human beings in Brazil. The number of the Certificate of Presentation for Ethical Appreciation (CAAE) is 4.444.329.

3 RESULTS

Eighteen elderly individuals followed-up by the Family Health Strategy participated in the study. From the description of sociodemographic data, it was observed that the participants had a mean age of 68 years. Most were female (n = 13; 72.2%), had incomplete elementary school education (n = 14; 77.8%), income of up to two minimum wages (n = 9; 50%), were married (n = 13; 72.2%), white (n = 13; 72.2%) and lived with up to three people (n = 16; 88.9%), as shown in Table 1.

Table 1 - Sociodemographic profile of the sample.

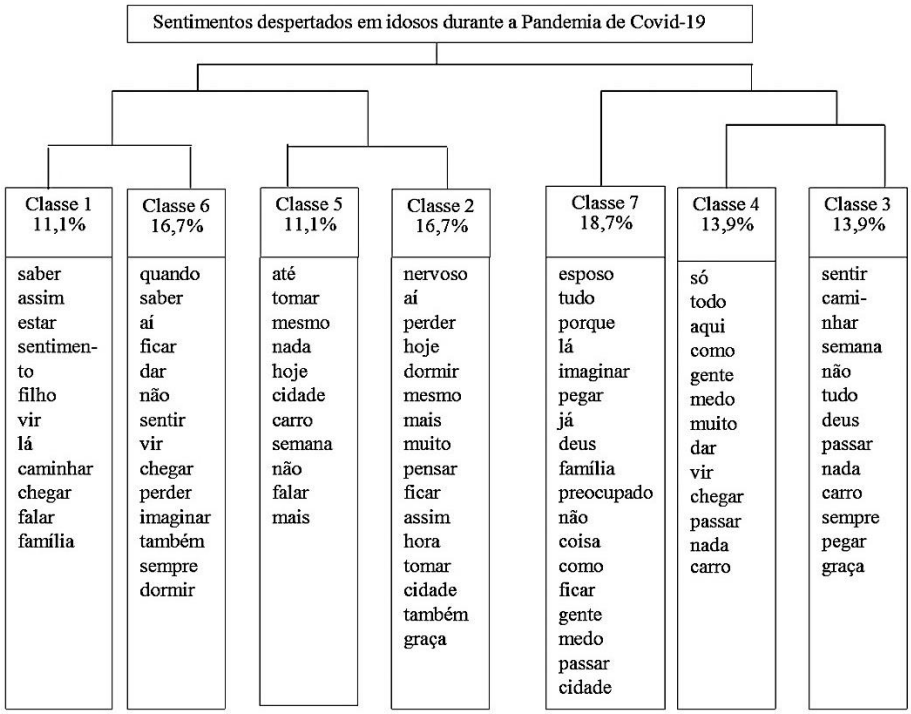
Variable	Categories	n	%
Sex	Female	13	72,2%
	Male	5	27,8%
Age Group	60 a 69	13	72,2%
	70 a 79	3	16,7%
	>80	2	11,1%
Education	Illiterate	3	16,7%
	Incomplete elementary school	14	77,8%
	Elementary school complete	0	0
	High school incomplete	0	0
	High school complete	1	5,5%
	Higher Education	0	0
Income	Up to 1 minimum wage	7	38,9%
	Up to 2 minimum wages	9	50%
	Up to 3 minimum wages	2	11,1%
	Up to 4 minimum wages	0	0
	>4 minimum wages	0	0
Marital status	Single	1	5,55%
	Married	13	72,2%
	Divorced	3	16,7%
	Widower	1	5,55%
	Stable Union	0	0
Race	White	13	72,2%
	Brown	2	11,1%
	Black	3	16,7%
	Indigenous	0	0

	Yellow	0	0
Numbers of people with whom they reside	0	1	5,55%
	1 a 3	16	88,9%
	4 a 7	1	5,55%
	8 a 10	0	
	>10	0	

Source: Authors

Figure 1 shows the dendrogram that presents the relations between the classes resulting from the descending hierarchical classification (CHD). IRAMUTEQ grouped the text corpus in 42 segments and, as recommended by the CHD, seven classes were obtained categorized nominally by the researchers through the relations of the words that appear in these classes and their insertions in the text segments. In a first partition, the corpus was divided by the software into two subcorpus, on one side, classes 1, 6 , 5 and 2, and on the other side, classes 7, 4 and 3. In a second moment, the first subcorpus was split in two, originating on one side classes 1 and 6 and on the other, classes 5 and 2. In a third moment, the second subcorpus was split in two, on one side class 7 and on the other, classes 4 and 3. In a fourth partition, the third subcorpus generated class 1 in opposition to 2 and the fourth subcorpus generated class 5 in opposition to 2. And finally the fifth subcorpus generated class 4 in opposition to 3, as shown in the figure below.

Figure 1 - Dendogram of the word classes about the feelings aroused in the elderly during the COVID-19 pandemic.



Source: Adapted by the authors after extraction from *IRAMUTEq* Software (2022)

The words presented in classes 1 and 6 refer to the concern about losing family members and the uncertainties generated with the pandemic; in classes 5 and 2 the vocabularies are related to the concern

about following the restrictive measures and behavioral changes imposed with the new routine; class 7 is related to the uncertainties generated with the pandemic; and finally classes 4 and 3 evoke the feelings, emotions, and risk perceptions coming with COVID-19.

3.1 CLASS 1: CONCERN ABOUT LOSING FAMILY MEMBERS

Class 1, formed by 11.1% of the words, referred to the concern about losing family members. The elderly reported fear of losing family members, especially when they lived far away, since they could not control their care. They showed impotence in face of the context experienced, since they were unable to travel to be with the family, due to restrictive measures and financial issues: "I was worried, I worried that it would happen to me, to them (daughters), or to the grandchildren, we couldn't take care of them, you know, only Jesus who heals, who gives everything" (I8).

Another relevant fact is that despite belonging to the risk group due to age and presence of comorbidities, the participants associated the fear of death with the need to take care of their spouse. Among themselves they protected themselves and determined who had a lower risk of getting sick and getting worse, so the older age or the presence of diseases determined who could risk/expose themselves more .

> I felt a lot of fear, but it was not so much for me. I was afraid, really afraid, I was afraid of him (husband) because he already has a lot of problems and I was also afraid of my family that lives in Brasilia that almost everything there caught it (coronavirus), thank God no one died, but almost everything caught it and I was worried here in time to get crazy and without being able to fix it because I could not even go there. Because if I went there I couldn't even visit, what would I see there (I10).

3.2 CLASS 2: CONCERN TO FOLLOW RESTRICTIVE MEASURES

Class 2, formed by 18.7% of the words referred to the concern with following restrictive measures. The research participants reported activities such as hand washing, mask use, and social distancing as measures to prevent themselves from SARS-CoV-2 infection. The elderly expressed in their speeches the need for changes in routine to adapt to the prevention strategies of COVID-19: "We were worried, two days worried, so much so that I leave here, get in the car with the mask, come and go, even if I spend the whole day I only take it off when I get here" (I6).

It was found that many interviewed have significantly reduced social contacts due to the restrictions set by the government. They reported having stopped doing activities such as shopping due to the need for social isolation and showed tension when going to the city to do the market or go to the bank to receive their retirement : "When there were many people, I didn't want to go to the city, but anyway I needed to go because my husband will be 96 years old now, there is no way to do it, I'm the one who solves everything, we have to go, preventing ourselves, but we were always afraid" (I18). "Right at the time that I do the fair I already leave the things there, pay the driver to bring them and come away [...]" (I9).

Unlike the urban population, the rural dwellers do not have banking applications and shopping delivery facilities like the people who lived in the city.

3.3 CLASS 3: FEELINGS AROUSED DURING THE PANDEMIC

Class 3, formed by 13.9% of the words, is related to the feelings aroused during the pandemic. The elderly reported that the emergence of the coronavirus brought fear, emptiness, tension, restlessness, consequence of the perception of the severity of the disease, adoption of restrictive measures such as isolation and social distancing, lack of information, fake news and excess of information. In the speeches, there was concern about themselves and their families, which affected their sleep, fear of visiting the city, but because they had to go to the city for unavoidable situations. There were also positive feelings such as empathy generated by the grief that many families faced.

> We got a little nervous, wondering why we have to think not only about ourselves, think about the human being, for God's sake we are all brothers, there is no one better than the other [...] Likewise a disease like this when it is killing a neighbor [...] we wonder, my God, how is this family not going through a time like this, we do not feel good because we are human beings (I7).

An important factor in the speech of one interviewee was belief, indispensable to the practice of resilience: "I clung to Jesus all the time to get us out of this pandemic vea" (I9).

The most prevalent feeling was fear, cited by most of the elderly, in the interviews its mention occurred twenty-seven times. The emergence of the new disease, with little information and no pre-existing treatment brought threats and awakened this feeling, important for protection but in excess can bring harm: "What I felt was a lot of fear, a lot of fear, who is not afraid of a dangerous disease like this ... right... God forbid" (I12). "Just a lot of fear, I was afraid to give (laughs). I was scared" (I9). "I became pensive, with a heavy head, heavy, and then I kept imagining, then I had a headache and kept imagining, when it was nighttime I couldn't sleep" (I16).

3.4 CLASS 4: EMOTIONS AND RISK PERCEPTIONS

Class 4, formed by 13.9% of the words refers to emotions and risk perceptions. The elderly experienced intense emotions and behavioral reactions such as nervousness, concern, stress, nostalgia, crying and strangeness due to the changes imposed by the protective measures and the vulnerability to the new virus. Such effects can be exacerbated by control policies imposed by isolation and that can sharpen the social withdrawal and relationship difficulties that are fundamental to balance emotions, deal with stress and remain resilient in difficult moments: "I feel nervous, a daughter of mine got sick with coronavirus in SP. My son got sick in Paraná and I gave a nervous breakdown that gave dysentery that was walking to the bathroom"(I3). "The feeling that I had was very strong, sometimes I was half nervous (laughs) with fear, there were times that I did not even sleep at night [...] when I was talking, tears started coming out of my eyes without me wanting to" (I15).

3.5 CLASS 5: BEHAVIORAL CHANGES IMPOSED WITH THE NEW ROUTINE

Class 5, formed by 11.1% of the words concerns the behavioral changes imposed with the new routine. The elderly brought in their speeches the need for change in routine to adapt to the prevention strategies of COVID-19, such as restricting the trips to the city, wearing masks and distancing themselves from people. They also showed surprise when visiting the city and noticing it without movement: "Boy, what I found very discarded in this thing is because it hid people a lot, people "hid" (dodged) [...], today you walk around the city and find an empty city, people are "hiding" (dodging) the movements" (I18).

Another point mentioned was the change in the way of greeting loved ones, which previously was through handshakes and hugs:

> Our conviviality was hugging people, talking by the hand. I don't even know how to explain it right, but I felt that it was a reason to distance myself, I felt vague, that I couldn't hug the people I love. I felt rejecting people and people rejecting me, knowing that this was the right thing to do, but I didn't feel good about moving away from people and them moving away from me. At these times we feel so many things that we can't even explain (I13).

3.6 CLASS 6: FEAR OF GETTING INFECTED

Class 6, formed by 16.7% of the words, referred to fear of getting infected. The interviewees reported fear of getting infected and dying, concern for themselves and loved ones. This shows that there was knowledge of the severity of the disease and the classification as a risk group, due to comorbidities, age group and the uncertainties about the treatment and course of the disease.

"I was really scared. A lot. I spent more than three months without stepping on the street, almost a year. After I took the vaccines I started to make my purchases, every month I go, but it is only every month, I make my purchases and go back [...]" (I9).

The fear of being contaminated threatens to aggravate the feelings of loneliness and can produce negative consequences for health in the long term: "I got emotional, I got scared, I spent, it seems like, two months with fear, with fear of dying or them dying (children), fear of the pandemic" (I2). "I felt that we thought that it was going to happen to us too, to get sick and the worst would happen. The emotion that I had, I was very nervous for a couple of days, then I calmed down more, then I lost more fear" (I1)**.**

Another important point evidenced in the statements is that the perception of belonging to the risk group increased the fear of getting infected, besides, there may be the aggravation of depression: "I get worried about my family, about myself, I'm already in my 60s, then I get nervous because I have depression, depression is sometimes strong" (I15).

3.7 CLASS: 7 UNCERTAINTIES GENERATED WITH THE PANDEMIC

Class 7, formed by 18.7% of the words, portrayed the uncertainties generated by the pandemic. The interviewees showed doubts in different aspects, such as prevention, treatment, emergence and effectiveness of vaccines, time of social isolation and linked to this the access to various sources of

information that were not always reliable: "It scared us a lot, even because we didn't know how to deal with this thing, we didn't know what to take, or who to ask for an explanation, not even the doctors themselves didn't know anything, so it left us very surprised, this is a truth, not only me but all of us" (I18). "Fear, fear and little understanding and as you say, many comments and the comment brings fear, right" (I4).

As a consequence negative emotions can increase and lead people to trust false data about COVID-19 more than scientific information.

3.8 WORD CLOUD

For a better visualization of the feelings aroused, the word cloud generated from the speeches of the participants was obtained. The word cloud diagram, so called, highlights the most frequent words in the text, in which the font size of each word is proportional to the number of times it was repeated. Figure 2 shows the word cloud.

Figure 2- Word cloud of feelings aroused in the elderly during the COVID-19 pandemic, at center fear.



Source: Extracted from *IRAMUTEq* software after data analysis (2022).

It was verified that the most representative feeling was fear (f = 27). This is a common reaction when faced with the unknown, the scenario of a disease that spread around the world and caused several deaths, impacted people's lives.

It is also verified through the word cloud analysis that the strongest associations with the new coronavirus are the negative words (coronavirus, get sick, fear, lose, die, disease, nervous, worry). Probably, this is due to the large number of daily deaths, lack of beds, uncertainties about treatment, duration of the pandemic, and news disseminated by the media.

4 DISCUSSIONS

The pandemic of COVID-19 established the need for the elderly to remain in their homes, since they were considered vulnerable to contamination and progression to severe forms of the disease, and with greater susceptibility to death. This induced the population and family members to make modifications in the context in which they live and in their lifestyles. Simultaneously, the primordiality in the development of health education actions and improvement in quality of life emerged due to the conjuncture assigned by COVID-19.

Thus, understanding how the elderly experienced social isolation and what feelings were aroused in the pandemic of COVID-19 offers subsidies for the development of humanized actions, which take into account the subjectivity of people, for care planning, in order to minimize the damage and reduce health risks. Moreover, this understanding shows the need for the construction of strategies after the pandemic that act on the mental health of individuals, preventing worsening of conditions and the appearance of alterations.

The first class refers to the concern about losing family members, exacerbated when they live far away. Therefore, in addition to the fear of losing family members, the distance and the lack of contact with family and friends contributed to the increase of negative impacts on the mental health of this public, a fact evidenced in the speech of the interviewees. An online and cross-sectional study conducted in Sweden with 1854 elderly people (higher prevalence of women) on the perception of information about COVID-19 and its implications on mental health, showed that participants were concerned about loved ones and that isolation and social distance affected mental health (Gustavsson & Beckman, 2020).

Corroborating research conducted in Finland with 103 elderly (prevalence of women), examined their experiences during the pandemic and brought evidence that the loss of a loved one caused psychological and physical symptoms and affected daily life (Kulmala, et al., 2021).

Thus, it is essential that in the construction of the care plan, this aspect be taken into account so that there is development of interventions to mitigate the negative repercussions (Gomes, et al., 2021).

The second class brought the concern about following the restrictive measures, the elderly participants of this study demonstrated knowledge of the recommendations of strategies for preventing infection with the COVID-19 virus and concern about following them. Having knowledge of how to prevent diseases is one of the expected fruits in population groups that have access to information, this information needs to be supervised and distributed in reliable media and by experts in the field (WHO, 2019).

In the speeches there is a tension when mentioning that the trips to the city were quick, only for essential matters, besides not removing the mask during the whole trip from home to the urban area. It is noteworthy that the majority of the population depends on freight cars to get around, and besides having specific days, they conform to the "paus de arara". This goes against the recommendations of distance, however, there was no other option.

In a group of elderly people interviewed in Sweden, it was evidenced that although most followed the recommendations, avoiding public crowds for example, almost one fifth said they did grocery shopping as usual, revealing a divergence between willingness and intention to follow the recommendations (Gustavsson & Beckman, 2020).

The third class describes the feelings aroused during the pandemic, the emergence of which brought psychological issues such as: fear of contracting the infection (for oneself and family members), fear of death (of oneself or family members), changes in sleep, concern related to daily provisions and with family members who live far away. Corroborating, in China in the face of the COVID-19 situation it was found that the elderly are impacted especially psychologically and emotionally as they experience age-related mortality risk, which leads to the emergence of negative emotions (Meng, et al., 2020; Qiu, et al., 2020).

Reaffirming this evidence, there have been negative effects on mental and physical health in the elderly during the COVID-19 pandemic and in the general population, which can lead to higher levels of anxiety and depression (Loyola, et al., 2020), as well as decreased sleep quality and increased sleep disturbances (Huang & Zhao, 2020). Furthermore, emotions such as fear and anger increase the rate of manifestation of symptoms characteristic of the disease and maintain high levels of anxiety and stress in this group (Shigemura, et al., 2019).

Garcia & Machado (2020) pointed out that there are peculiarities in the way the pandemic impacts the elderly, taking into account their health status. Previously to the pandemic, but in general, feelings of fear, sadness, anxiety, anguish, irritability, insomnia, stress and depression are associated.

For Emiliani, et al., (2020) the fear of losing, especially people, was related to mourning and coping, and the loss was also associated with living with friends, activities outside the confines of the home and closer relationships, and even a lost normality.

It was also found in this study that the elderly used spirituality, in God, demonstrating faith and hope, an important resilient manifestation in coping with social withdrawal and isolation, sustaining themselves in the belief, seeking alternatives to remain active and distracted. Lima & Pedroso (2019) revealed how spirituality contributes positively in the daily life of the elderly, concerning the coping with stressful circumstances, and therefore considered as a protective aspect to physical and mental health.

Ratifying this finding, Tavares (2020) brings the magnitude of spirituality as a path to a process of resignification, during life, in the processes of illness, rehabilitation, re-socialization, death, and bereavement.

Another positive feeling found was also empathy, when one interviewee mentions compassion when seeing grieving families. Melo, et al. , (2021) also mentions this feeling, even with the sphere of tension and crisis, several initiatives of solidarity and empathy were noted (exemplifying, helping people from risk groups). These attitudes manifest an intense social appeal, exalting the collective scope, as they help people cope with the impact of Covid-19 in the family sphere, reducing negative impacts.

Class four was formed by words that refer to negative emotions and risk perceptions. This is mainly due to the dissemination of information conveyed through the media, mostly negative related to COVID 19. News about number of deaths, worsening health status, lack of structure of health services, impossibility to say goodbye, and other factors. These issues are more aggravated in the elderly, for having the knowledge of the risks of death aggravated by age and presence of comorbidities.

Betsch, Wieler & Habersaat (2020) brought that conceptions of risk induce individual protective behaviors, however, antagonistically, the way people understand risk is not impreterably correlated with the actual threat.

Bavel and collaborators (2020) in their study on behaviors to support the response to the pandemic of COVID-19 brought that several factors can interfere in behavioral insights such as fear, perception of threat, disseminated news, social context, scientific communication, individual and collective interests, and stress caused by coping. Knowing these factors is of utmost importance to create strategies that direct the population to adopt the necessary actions to combat the spread of the virus.

Some of the manifestations indicated to mitigate these perceptions are education and management of common stress symptoms (sleep hygiene and relaxation), building protective measures, increasing truthful information, promoting resolving actions, and acting against stigmatization and segregation (Banerjee, et al., 2020).

The fifth class referred to the behavioral changes imposed by the new routine, the elderly participants in this study reported that they were complying with restrictive measures such as staying at home or going out as little as possible. Because they live in rural areas, the elderly stay away from crowds, and their houses are far apart from each other. This factor may have been protective in order not to exacerbate negative feelings and/or emotions, since in their daily lives they do not experience the hustle and bustle of the city.

It is understood that, along with protective measures, changes in the lifestyles of the population are necessary and that these modifications generate a reconfiguration in people's personal, economic, social, and cultural lives (Pavani et al., 2021).

Lebrasseur and others (2021) brought in their review about the impact of the pandemic and the associated isolation in the elderly and showed that decreased social life, less personal interactions and these changes had a negative effect on quality of life and increased rates of depression.

It is noteworthy that because they live in rural areas and because of their level of education, the participants in this study do not have access to the internet and technological resources such as video calls to communicate with family members or health support. These resources could be allied to positive mental health outcomes, however it was not possible to conclude if the absence brought harm. Results on social representations of the elderly on COVID-19 in São Paulo, proved positive aspects about the use of these technologies (Oliveira, et al., 2020).

It was found that for most of the elderly interviewed, the isolation process had repercussions on their living process, subjecting them to deal with issues involving aspects related to physical and psychological well-being. There were reports about the difficulties of moving to the city and shopping for indispensable supplies, solving banking issues, and also in the search for health services.

A qualitative study carried out with fourteen elderly people in Ceará showed that their experience of social isolation was characterized by feelings of anguish in the face of uncertainty and fear of dying, nostalgia for the extra-household routine, for living with family members, and for the activities performed before the pandemic (Gomes, et al., 2020).

Class six refers to the fear of getting infected, the elderly showed in their statements that they were afraid of the disease because they knew the severity and were aware of the susceptibility they had. Thus, fear arises from this context in which there is imminent risk of becoming ill.

A survey of 386 elderly people (66.9% women) to investigate the frequency and relationships between mental health indicators, beliefs, and attitudes towards the pandemic of covid-19, showed that while it is important to be aware of the risk and severity of the situation related to the pandemic, this is associated with poorer mental health (Ferreira, 2021).

Fear is the figurative component of objectification being anchored in psycho-emotional factors, because it was linked not only to the risk of contamination, but also to the risk of dying. For the elderly, the negative feelings and the sequelae of isolation were felt from two sides, the first adjacent to the spread of the virus, the risk of infection, attributing prevention measures and self-care, second because they originated the uncertainty about the future, insecurity, anxiety, restlessness and nervousness and caused psychosocial implications not yet measured in the long term (Coutinho, et al., 2022).

Class seven brought words that bring the uncertainties generated with the pandemic. There were in the reports doubts about the course of the disease, the therapy and even who to turn to, since they mention that not even health professionals had the information. In a medicalized society, facing a pathology without a medicine to cure it has become agonizing. In this bias, the importance of health promotion and disease prevention is reaffirmed.

Soon, one of the most stressful situations is the unpredictability of the situation and the uncertainty of when to control the disease and the severity of the risk. These, along with some analysis and misinformation, can increase concern among the masses (Bao, et al., 2020). According to similar epidemics and pandemics, in such cases, serious concerns such as fear of death (Xiang, et al., 2020).

This period of uncertainty and waiting can generate a lot of anxiety, insecurity, loneliness, and sadness, and should be used for each person to reinvent themselves, learning or improving social relationships and even experimenting with the digital world (Irigaray, 2020).

These feelings of uncertainty, as well as the limitations brought about by restrictive measures such as social isolation, sudden changes in future plans, and the abrupt separation from the individual's social or family environment, produce symptoms of anxiety and depression (Pereira, et al., 2020).

The reflections raised collaborate to direct actions in order to offer better care to the elderly, family members, caregivers and the community in order to promote psychological well-being and prevent illness. The panorama imposed by COVID-19 established an environment characterized by uncertainties, insecurity, and fear, besides bringing challenges that had repercussions especially on the elderly population, their families, and health professionals.

5 FINAL CONSIDERATIONS

The pandemic of COVID-19 generated negative outcomes such as fear, insecurity, emptiness, tension, restlessness, worry, stress, nostalgia, crying and sleep impairment that can cause a greater health risk to the elderly population. The elderly adopted the measures recommended by the health services and although this has generated changes in their way of living, the fact that they live in a rural area (far from the city) may have softened the impact of social isolation. The greatest impact was generated by the fear of getting sick and losing family members. We also found that the experience of the group studied was anchored in spirituality, empathy, and adaptation of the routine, added to the incorporation of strategies for disease prevention.

Regarding the feelings experienced by men and women, equivalence was noticed, in both men and women there are reports of concern and fear. A curious fact is that women showed more concern about their partner, taking greater risks due to greater exposure, justifying that they had greater vulnerability because of comorbidities or older age.

As with all scientific research, limitations were found, one of them being the difficulty in organizing the dialectical words in the form of feelings. In addition, although several studies show signs of anxiety, mood disorders, or sleep disturbances during the pandemic, in this study the participants' speeches were not enough to demonstrate whether the negative feelings triggered psychological disorders.

Although the results are solid and important for the construction of strategies to protect the mental health of the elderly in times of pandemic, studies with representative samples of this population in Brazil to map their mental health profile are urgent, since they are an important risk group for the pandemic. This is necessary to unveil the impacts caused, their relationships, and the intrinsic protective factors for the construction of guidelines and strategies essential for the prevention of mental illness.

It is suggested that this study be the basis for further research, using the same methodology, to understand how perceptions may change over time, especially in the post-pandemic period.

REFERENCES

Banerjee, D. (2020). The COVID-19 outbreak: Crucial role the psychiatrists can play. *Asian J Psychiatr*. 2020;50:102014. doi:10.1016/j.ajp.2020.102014

Bao, Y., Sun, Y., Meng, S., Shi, J., & Lu, L. (2020). 2019-nCoV epidemic: address mental health care to empower society. *Lancet.* 2020 Feb 22;395(10224):e37-e38. doi: 10.1016/S0140-6736(20)30309-3.

Bavel, J. J. V., Baicker, K., Boggio, P. S. *et al.* (2020). Usando a ciência social e comportamental para apoiar a resposta à pandemia do COVID-19. *Nat Hum Comportamento* 4, 460–471 (2020). doi: https://doi.org/10.1038/s41562-020-0884-z

Betsch, C., Wieler, L. H., Habersaat, K., & Cosmo, G. (2020). Monitoring behavioural insights related to COVID-19. *Lancet.* 2020;395(10232):1255-1256. doi:10.1016/S0140-6736(20)30729-7

Brasil. (2017). Estatuto do idoso: Lei no 10.741/2003.– Brasília: Senado Federal, Coordenação de Edições Técnicas, 2017. 40 p. Disponível em: https://www2.senado.leg.br/bdsf/bitstream/handle/id/530232/estatuto_do_idoso_1ed.pdf. Acesso em 02: ago 2022.

Brasil. (2020). Ministério da Saúde, Secretaria de Vigilância em Saúde. Boletim Epidemiológico 20. Disponível em: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/covid-19/2020/boletim-epidemiologico-no-20-boletim-coe-coronavirus.pdf/view. Acesso em jun 2021.

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet Infect Dis*, 395(10227), 912–920. doi: https://doi.org/10.1016/S0140-6736(20)30460-8

Camargo, B.V., & Justo, A. M. (2013). IRAMUTEQ: um software gratuito para análise de dados textuais. *Temas psicol.* vol.21 no.2 Ribeirão Preto dez. 2013. doi: http://dx.doi.org/10.9788/TP2013.2-16

Coutinho, M. P. L., Bolis, I., Sobrinho, E. P., Pinto, I. C. B. L., Oliveira, E. F. S. O., & Costa, J. (2022). Pandemia Covid-19 no contexto do idoso: estudo psicossociológico. *Research, Society and Development*, v. 11, n. 6, e28311628932, 2022 (CC BY 4.0) | ISSN 2525-3409 | doi: http://dx.doi.org/10.33448/rsd-v11i6.28932.

Emiliani, F., Contarello, A., Bondi, S., Palareti, L., Passini, S., & Romaiol, D. (2020). Social Representations of "Normality": Everyday Life in Old and New Normalities with Covid-19. *Papers on Social Representations, 29*(2), 9.1-9.36.

Ferreira, H. G. (2021). Relações entre crenças, atitudes e saúde mental de idosos na pandemia da Covid-19. *Rev. Psicol. Saúde* [online]. 2021, vol.13, n.1, pp. 187-201. ISSN 2177-093X. doi: http://dx.doi.org/10.20435/pssa.v13i1.1381.

Garcia, E. B., & Machado, L. M . (2020) Saúde mental e emocional das pessoas idosas em tempos de pandemia. Congresso Internacional Interfaces da Psicologia Aproximando distâncias 11, 12 e 13 de Novembro, 2020. Disponível em : https://www.ulbracds.com.br/index.php/interfaces/article/view/3004/345. Acesso em 20 jul 2022.

Gomes, M. A. C., Fernandes, C. S., Fontenele, N. A. O., Neto, N. M. G., Barros, L M.. & Frota, N. M. (2021) Vivência de idosos diante do isolamento social na pandemia da COVID-19. *Rev Rene.* 2021;22:e69236. doi: https://doi.org/10.15253/2175-6783.20212269236

Gustavsson, J., & Beckman, L. (2020). Conformidade às recomendações e consequências para a saúde mental entre idosos na Suécia durante a fase inicial da pesquisa on-line transversal COVID-19 Pandemia-A. *Int J Environ Res Saúde Pública* . 2020;17(15):5380. Publicado em 26 de julho de 2020. doi:10.3390/ijerph17155380

Hammerschmidt, K. S. A., & Santana, R. F. (2020). Saúde do idoso em tempos de pandemia COVID-19. *Cogitare Enferm.* 2020;25:e72849 [10p.].Disponível em : https://revistas.ufpr.br/cogitare/article/view/72849. Acesso em 10 maio 2022.

Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res* 2020;288:112954. https://doi.org/10.1016/j.psychres.2020.112954.

Instituto brasileiro de geografia e estatistica -IBGE (2021). Diponível em https://cidades.ibge.gov.br/brasil/pi/canto-do-buriti/panorama. Acesso 02 jun 2022.

Irigaray, T.Q. (2020). Cartilha para idosos para enfrentamento do Coronavírus(COVID19).Porto Alegre, RS: *EdiPUCRS.* https://editora.pucrs.br/livro/1437/

Jemal, K., Geleta, T. A., Deriba, B. S., & AWOL M. (2021). Anxiety and depression symptoms in older adults during coronavirus disease 2019 pandemic: A community-based cross-sectional study. *SAGE Open Med*. 2021;9:20503121211040050. Published 2021 Aug 19. doi:10.1177/20503121211040050

Kulmala, J., Tiilikainen, E., Lisko, I., Ngandu, T., Kivipelto, M., & Solomon, A. (2021). Personal Social Networks of Community-Dwelling Oldest Old During the Covid-19 Pandemic-A Qualitative Study. *Front Public Health*. 2021 Dec 24;9:770965. doi: 10.3389/fpubh.2021.770965.

Lebrasseur, A., Fortin-bédard, N., Lettre, J., Bussières, E. L., Best, K., Boucher, N., Hotton, M., Beaulieu-Bonneau, S., Mercier, C., Lamontagne, M. E., & Routhier F. (2021). Impact of COVID-19 on people with physical disabilities: A rapid review. *Disabil Health J*. 2021 Jan;14(1):101014. doi: 10.1016/j.dhjo.2020.101014.

Lenardt, M. H., Hammerschmidt, K. S. A., Barbiero, M. M. A., Carreira, L. Grden, C. R. B., Betiolli, S. E., & Kletemberg, D. F. (2021). Idosos distanciados da sociedade e o sentido da vida: cuidados direcionados ao risco de síndrome do idoso frágil. Enfermagem gerontológica no cuidado do idoso em tempos da COVID 19 - 3. Brasília, DF: *Editora ABEn;* 2021. (Série Enfermagem e Pandemias, 5). Disponível em: https://publicacoes.abennacional.org.br/wp-content/uploads/2021/04/e5-geronto3-cap10.pdf. Acesso 02 ago 2022.

Lima, R. R. C., & Pedroso, J. S. (2020). Suporte social da espiritualidade a idosos, vítimas de violência familiar. São Paulo, SP: PUC-SP: *Revista Kairós-Gerontologia, 22*(2), 303-320. Recuperado em 20 maio, 2020. doi: https://revistas.pucsp.br/kairos/article/view/46531/0.

Loyola, W., Rodríguez-Sánchez, I., Pérez-Rodríguez, P., Ganz, F., Torralba, R., Oliveira, D. V., & Rodríguez-Mañas, L. (2020). Impact of Social Isolation Due to COVID-19 on Health in Older People: Mental and Physical Effects and Recommendations. *J Nutr Health Aging*. 2020;24(9):938-947. doi: 10.1007/s12603-020-1469-2.

Marconi, M. A., & Lakatos, E. M. (2011). Metodologia Cientifica. 5º ed. São Paulo: *Atlas*, 2011 p. 269-279;

Mariano, A. M., Cruz, R. G., & Gaitán, J. A. (2011). Meta Análises como instrumento de pesquisa: uma revisão sistemática da bibliografia aplicada ao estudo das alianças estratégicas internacionais. Congresso Internacional de Administração - Gestão Estratégica: inovação colaborativa e competitividade. Ponta Grossa, UEPG, 2011.

Melo, C. F., Almeida, A. M. B., Lins, S. L. B., Aquino, S. D., Costa, I. M., & MORAIS, J. C. C. (2021). Giving Meaning to the Pandemic: What Do Brazilians Think About the New Coronavirus? *Trends in Psychology* (2021) 29:395–413. doi: https://doi.org/10.1007/s43076-021-00078-y.

Meng, H., Xu, Y., Dai, J., Zhang, Y., Liu, B., & Yang, H. (2020). Analyze the psychological impact of COVID-19 among the elderly population in China and make corresponding suggestions. *Psychiatry Res.* 289:112983. 10.1016/j.psychres.2020.112983

Moura, M. L. S. (2021). Idosos na pandemia, vulnerabilidade e resiliência. *Rev. Bras. Geriatr. Gerontol.* 2021;24(1):1-3.doi: http://dx.doi.org/10.1590/1981-22562021024.210060.

Oliveira, A. S.,Lopes, A. O. S., Santana, E. S., Gobira, N. C. M. S., Miguens, L. C. P., Reis, Luana A., & Reis, Luciana A. (2020).Representações sociais de idosos sobre a COVID-19: análise das imagens publicadas no discurso midiático. Revista Kairós-Gerontologia, 23(Número Temático Especial 28, "COVID-19 e Envelhecimento"), 461-477. https://revistas.pucsp.br/index.php/kairos/article/view/51564/33667.

Organização PAN-Americana de Saúde- OPAS (2022). Pandemia de COVID-19 desencadeia aumento de 25% na prevalência de ansiedade e depressão em todo o mundo. https://www.paho.org/pt/noticias/2-3-2022-pandemia-covid-19-desencadeia-aumento-25-na-prevalencia-ansiedade-e-depressao-em#:~:text=2%20de%20mar%C3%A7o%20de%202022,Mundial%20da%20Sa%C3%BAde%20(OMS).

Pavani, F. M., Silva, A.B., Olschowsky, A., Wetzel, C., Nunes, C. K., & Souza, L. B. (2021). Covid-19 e as repercussoes na saude mental: estudo de revisao narrativa de literatura. *Rev Gaucha Enferm.* 2021;42(esp):e20200188.doi: https://doi.org/10.1590/1983-1447.2021.20200188

Pereira, M., Oliveira, L. C., Costa, C. F. Y., Bezerra, C. M. O., Pereira, M. D., Santos, C. K. A., & Dantas, E. H. M. (2020). A pandemia de COVID -19, o isolamento social, consequências na saúde mental e estratégias de enfrentamento: uma revisão integrativa. *Revista Research, Society and Development* ; maio 2020. doi: http://dx.doi.org/10.33448/rsd-v9i7.4548

Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *Gen. Psychiatr.* 2020:e100213. 10.1136/j.gpsych.2020.e100213, PMID

Roest, H. G., Prins, M., Van Der Velden, C., Steinmetz, S., Stolte ,E., VanTilburg, T. G., & Vries, D. H. (2020). The Impact of COVID-19 Measures on Well-Being of Older Long-Term Care Facility Residents in the Netherlands. *J Am Med Dir Assoc*. 2020 Nov;21(11):1569-1570. doi: 10.1016/j.jamda.2020.09.007.

Santini, Z. I., Jose, P. E., Cornwell, E. Y., Koyanagi, A., Nielsen, L., Hinrichsen, C., Meilstrup, C., Madsen, K. R., & Koushede, V. (2020). Desconexão social, isolamento percebido e sintomas de depressão e ansiedade entre americanos mais velhos (NSHAP): um estudo longitudinal análise de mediação. *Lancet Saúde Pública*. 2020; 5 :62-70. doi: 10.1016/S2468-2667(19)30230-0.

Sherlock, P., Ebrahim, S., Geffen, L., & Mckee, M. (2020). Bearing the brunt of covid-19: older people in low and middle income countries. *BMJ* 2020; 368 :m1052 doi:10.1136/bmj.m1052. doi: https://doi.org/10.1136/bmj.m1052.

Shigemura, J., Ursano, R. J., Morganstein, J. C., Kurosawa, M., & Benedek, D. M. (2019). Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. *Psychiatry Clin Neurosci*. 2020;74(4):281-282. doi:10.1111/pcn.12988

Silva, I. A., Amorim, J., Carvalho, F. T., & MESQUITA, L. S. A. (2017). Efeito de um protocolo de Facilitação Neuromuscular Proprioceptiva (FNP) no equilíbrio postural de idosas. *Fisioter Pesqui*. 2017;24(1):62-67.

Silva, H. G., Nogueira, J. M., Junior, E. B. S, Coutinho, D. T. R., & Freitas, M. C. (2020). Representações sociais de mulheres idosas sobre o envelhecimento. *Revista de Enfermagem do Centro-Oeste Mineiro* 2020;10/3821. Disponível em: http://seer.ufsj.edu.br/index.php/recom/article/view/3821. Acesso: em 02 ago 2022.

Tavares, C. Q. (2020). Dimensões do cuidado na perspectiva da espiritualidade durante a pandemia pelo novo coronavírus (COVID-19). [Editorial]. *Journal Health NPEPS, 5*, 1-4. Recuperado em 20 maio, 2020, de: http://dx.doi.org/10.30681/252610104517.

World Health Organization-WHO (2019). Middle east respiratory syndrome coronavirus (MERS-CoV) https://www.who.int/news-room/fact-sheets/ detail/middle-east-respiratory-syndrome-coronavirus-(mers-cov)

Xiang, Y. T.,Yang, Y., Li, W., Zhang, Q., & Cheung, T. (2020). Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The lancet*,volume 7, edição 3, p228-229,01 de março de 2020: https://doi.org/10.1016/S2215-0366(20)30046-8 .

CHAPTER 45

Reflections on the mental health of the university student

10.56238/rsfohsv1-045

Vânia Regina Bressan
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG
Alternative
e-mail: vania.bressan@unifal-mg.edu.br

Lucélia Terra Chini
PhD, Nurse at the Nursing School, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Simone Albino da Silva
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Sueli de Carvalho Vilela
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Fábio de Souza Terra
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Adriana Olímpia Barbosa Felipe
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Cristiane Aparecida Silveira
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Dênis da Silva Moreira
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Mônica La Salette da Costa Godinho
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

Murilo César do Nascimento
Professor, School of Nursing, Universidade Federal de Alfenas (UNIFAL-MG), Alfenas-MG

ABSTRACT
Since the 2000s, the number of places and access to Brazilian universities has increased in Brazil. This growth in the university population has brought demands for greater diversity in relation to the socio-demographic characteristics of students, such as socio-economic vulnerability, issues related to gender, work situation, age, as well as objectives and expectations and other needs or difficulties presented by students, whether academic or emotional. The psychological suffering presented by university students can interfere with their academic development and contribute to retention and dropping out of the university. Moreover, this suffering has led university students to suicide attempts and to the act itself, contributing to the increase in mortality statistics among young people, demonstrated in recent years in Brazil and in the world. This has generated concern, not only from university managers, but also from health managers, workers, and researchers about the theme. However, the permanence policies for university students, in their majority, do not contemplate the academic, emotional, and institutional aspects that have a strong impact on the students' mental health, as well as on retention and dropout. We propose the expansion of the debate for a greater knowledge of the theme, adding the necessary scientific evidence to guide and improve actions for the prevention and promotion of health among college students and studies that bring contributions and impacts in the field of public and institutional policies for student assistance.

Key-words: Student Health. Mental Health. Higher Education. Health Promotion.

1 INTRODUCTION

Entering university is a period in which the young person distances himself from his family and friends and enters a new context that requires adaptations, new attitudes and responsibilities[1,2] .

Young people are entering academia at a stage of crisis, adolescence. The concept of crisis can refer

to social, historical, family, and personal aspects. In the psychosocial aspects, adolescence means the loss of some social and family roles and the acquisition of others, and may be marked by deep anguish and a temporary breakdown that is experienced as a threat and loss of psychological and social stability[3] . In the personal or biological aspects, the period is marked by chemical, biological, and physical changes, which bring about changes in mood and interpersonal relationships .[4]

Adolescence is also marked by a cultural construction that still undergoes numerous changes until postmodern times, which is observed by anxious behaviors related to sexual identity, body image, pressure of academic performance, digital influence[5] . Thus, entering university, while signaling an achievement, can become a critical period for young people, making them more susceptible to risky and unhealthy behaviors that can compromise both their health and quality of life.

During this period it is common to see changes in their lifestyles in relation to eating habits, sleep, physical exercise, consumption of alcohol, tobacco, and other drugs[4] . This new phase, as it involves changes and adaptation to a new reality, can generate anxieties and even influence academic performance[6]

According to a survey conducted in 2014 by the National Association of Directors of Federal Institutions of Higher Education[7] , approximately 80% of all undergraduate students of Federal Institutions of Higher Education have experienced emotional difficulties, which may have interfered with the undergraduate's academic life. These difficulties concern anxiety; persistent sadness; excessive shyness; fear/panic; insomnia or significant sleep alterations; feeling of helplessness/despair/despair; feeling of inattention/disorientation/mental confusion; eating problems (major changes in weight or appetite; anorexia; bulimia); discouragement/unwillingness to do things; feeling of loneliness; idea of death and suicidal thoughts.

The issue of psychological distress in university students has been a concern not only for university managers, but has also been the subject of scientific articles, meetings, debates and congresses in Brazilian universities[8] .

The literature points out high prevalence rates for anxiety and depression symptoms in college students, which may be even higher than those found in the general population. While the rate of common mental disorders in Brazilian adults is around 30%, varying according to the population studied and the methods used in the research, studies conducted with Brazilian college students indicate a range of common mental disorders from 18% to 45%. Common mental disorders are defined as mixed states of depression and anxiety, characterized by the presence of symptoms such as somatic complaints, difficulty to concentrate, forgetfulness, insomnia, fatigue, and irritability. Such conditions negatively affect people's lives and can be investigated using screening instruments .[9]

Research with college students points out several factors related to mental health that contribute to poor academic performance, including the high consumption of alcohol and other drugs, increased use of prescription drugs (benzodiazepines and amphetamines), anxiety attributed to academic performance, social stressors, financial problems, and adaptation in the university environment, as well as stress and

dissatisfaction with some characteristic of the course[1,6,10,11] .

A recent integrative review of national and international databases investigated the risk and protection factors for psychological distress among college students. The authors concluded that the characteristics of academic and relational life are those most associated with the presence of psychological distress among college students and also concluded that school violence, *hazing*, *bullying*, social discrimination among college students, pedagogical and curricular structures of courses should be further researched to understand their influence on young people and their negative effects on their health. Protective factors for psychological distress in college students include talking to friends, having leisure activities, feeling confident, positive affect, self-esteem, resilience, extroversion, being in control of life events and not being fatalistic, having high social support, having received and/or having support from parents, having communication and social skills, and social engagement. Students who are more involved in course activities and feel little pressure, have a sense of belonging and university integration, self-knowledge, and a sense of accomplishment of duties also have less psychological distress .[9]

Since the 2000s, public programs and policies have been implemented that have promoted the expansion of Brazilian universities, as well as increased the possibilities of access to free higher education. This growth of the university population has brought demands for greater diversity in relation to the socio-demographic characteristics of students, such as socioeconomic vulnerability, issues related to gender, work situation, age, as well as goals and expectations and other needs presented by students, whether academic or psychosocial[6] .

However, these access actions have not been accompanied by policies or programs aimed at permanence, good performance, and quality of life for university students. These, for the most part, are related to the distribution of financial aid to pay for food, housing, and transportation, among other expenses, but do not contemplate the academic, emotional, and institutional aspects that have a strong impact on the mental health of the students, as well as on retention and evasion[12] .

Furthermore, the National Plan for Student Assistance (PNAES) provides and proposes actions and services for the promotion, prevention, support and monitoring of students[13] . These actions are extremely important, because besides the frequent attempts of self-extermination among students, it is observed in the academic environment requests for withdrawal, enrollment locking and even evasion of undergraduate students, with justifications of emotional problems and even with diagnoses of anxiety, depression and other mental disorders.

Among the consequences of mental suffering in college students, suicide has been configured as a serious problem, contributing to the rise in mortality statistics in young people, demonstrated in recent years in Brazil and worldwide. According to the World Health Organization (WHO), suicide is a worldwide phenomenon. Over 800,000 people commit suicide every year and this number is expected to reach 1.6 million deaths in 2020 .[14]

However, it is believed that this number is underestimated by a factor of 20, due to underreporting

or lack of occurrence records in several regions of the world, because the subject is still considered a taboo in several cultures. Thus, suicide is responsible for more deaths than wars and murders occurring within a year, and for every suicide consummated, at least six people close to the deceased will have their lives deeply affected socioeconomically and emotionally[15] .

In Brazil, between 2002 and 2012, the growth of the suicide rate was 33.6%, higher than the growth of homicide rates, mortality rates in transport accidents and the growth of the Brazilian population in the same period. The phenomenon is more common among men and in Brazil is responsible for 3.7% of deaths among young people, subjects aged 15 to 29 years .[16]

According to the latest WHO report with data from 2012, in absolute numbers, Brazil ranks eighth worldwide with 11,821 deaths by suicide. Using age-standardized rates as a comparison indicator, Brazil ranks 113, with a rate of 5.8 suicides per 100,000 inhabitants .[14]

In view of the statistics, suicide is considered a public health problem that should be of great concern both to the authorities and to society in general[17] . Suicides by university students are common news in Brazil. Regardless of the region of the country where it occurs, the statistics of suicide among these young people is significant, considering the under-recording of cases .[8]

Risk factors for self-extermination for young college students are present at this time of life transition (leaving parents' home to attend university), stress, alcohol and drug abuse, as well as high academic demands, interpersonal loss (conflict with relative or boyfriend), physical and sexual violence in childhood, social isolation, depression, schizophrenia, feelings of hopelessness, availability of means, and histories of suicide attempts[8,18] .

Authors emphasize and suggest an in-depth discussion about curriculum. They argue that, for a lifelong education, solid foundations are necessary, and in this sense, the discussion about curriculum can enable a broad training, both technical and personal, intellectual, artistic, corporal, aesthetic, in short, aiming a complex training for life, thus meeting the complexity and demands of the globalized world[19] .

In addition, higher education must go beyond the aspects related to the professionalization of students, not only dealing with theoretical and technical curricular content. When analyzing research on the mental health of university students, it points out the importance of reviewing the pedagogical and curricular structures of courses .[9]

The role of the university in the personal, social, cultural, and psychological development of students must be recovered and discussed. It is necessary to think about the integral development of the university student, that is, the formation of conscious individuals, with social responsibilities and capable of exercising citizenship. Another aspect that we have to rescue is the integration of the student to the university context, which involves sharing values, attitudes, the feeling of belonging and participation. The student must feel part, together with the teaching and technical staff, of the daily work and the construction and transformation of the University. Therefore, it can be said that efforts are still needed to analyze other dimensions, especially the academic and institutional dimensions, and their new perspectives and

configurations.

Another aspect that deserves discussion is the lack of assistance to students outside their place of origin or residence. The student must be welcomed and recognized as a citizen, and feel that he or she belongs to the municipality he or she chose to attend the undergraduate course. In this way, the principles of universality and integrality of care of the Unified Health System (SUS) are rescued.

Thus, we shed light on this multifactorial and potentially investigative theme in order to increase the scientific evidence necessary to guide and improve actions of prevention and promotion of students' health and to bring contributions and impacts in the field of public and institutional policies of student assistance. Strategies are required to ensure, in fact, the democratization of higher education, as well as the confrontation and improvement in the quality of life of young university students in Brazil and other regions of the world.

REFERENCES

1. Wagner GA, Andrade AG de. Uso de álcool, tabaco e outras drogas entre estudantes universitários brasileiros. Arch Clin Psychiatry (São Paulo) [Internet]. 2008;35:48-54.

2. Assis, Aisllan Diego; Oliveira AGB. Vida universitária e Saúde Mental: Atendimento às demandas de saúde e Saúde Mental de estudantes de uma universidade brasileira. Cad Bras Saúde Ment [Internet]. 2010;2(4-5):159-77.

3. Pereira M, Sá M de C, Miranda L. Adolescência, crise e atenção psicossocial: perspectivas a partir da obra de René Kaës. Saúde em Debate [Internet]. 2013 Dec;37(99):664-71.

4. Berger KS. O desenvolvimento da pessoa: do nascimento à terceira idade. 9th ed. São Paulo: LTC; 2017. 666 p.

5. Lemos, Paula; Marback R. Identidade na adolescência: compreendendo a sua formação e repercussões. Semin Estud Produção Acadêmica [Internet]. 2017;16:235-45.

6. Silva, Érika Correia; Heleno MGV. Qualidade de vida e bem-estar subjetivo de estudantes universitários. Rev Psicol e Saúde. 2012;4(1):69-76.

7. Superior AN dos D das IF de E. IV Pesquisa do Perfil Socioeconômico e Cultural dos Estudantes de Graduação das Instituições Federais de Ensino Superior Brasileiras. In: Fórum Nacional de Pró-Reitores de Assuntos Comunitários e Estudantis. Uberlândia: Associação Nacional dos Dirigentes das Instituições Federais de Ensino Superior; 2016. p. 291.

8. Dutra E. Suicídio de universitários: o vazio existencial de jovens na contemporaneidade. Estud e Pesqui em Psicol [Internet]. 2012 Sep 1;12(3).

9. Graner KM, Ramos-Cerqueira AT de A. Revisão integrativa: sofrimento psíquico em estudantes universitários e fatores associados. Cien Saude Colet [Internet]. 2017;22(3).

10. Vilela SC, Pacheco AE, Carlos AL da S. Síndrome de Burnout e estresse em graduandos de enfermagem. Rev Enferm do Cent Oeste Min. 2013;3(3):780-7.

11. Chaves E de CL, Iunes DH, Moura C de C, Carvalho LC, Silva AM, Carvalho EC de. Ansiedade e espiritualidade em estudantes universitários: um estudo transversal. Rev Bras Enferm [Internet]. 2015 Jun;68(3):504-9.

12. Araújo CL, Bressan VR. Ações de promoção à saúde, atenção psicossocial e educacional como práticas de integração universitária. In: Conferencia Latinoamericana sobre el ABandono de la Educación Superior (VII-CLABES) [Internet]. Cordoba; 2017.

13. Brasil M da E. Decreto nº 7234 Estabelece o Programa Nacional de Assistência Estudantil. Diario Oficial da União. Brasilia; 2010 Jul 19;

14. World Health Organization. Preventing suicide: A global imperative. Washington, DC: World Health Organization; 2014. 92 p.

15. Ferreira Junior A. O comportamento suicida no Brasil e no mundo. Rev Bras Psicol. 2015;2:15-28.

16. Waiselfisz JJ. Mapa da Violência 2014: Os Jovens do Brasil. Flacso Bras Secr da Presidência da República Secr Nac Juv Secr Políticas Promoção da Igual Racial. 2014;190.

17. Fukumitsu KO, Provedel A, Kovács MJ, Loureiro ACT. Suicídio: uma análise da produção

científica brasileira de 2004 a 2013. Rev Bras Psicol. 2015;2(1):5-14.

18. Werneck GL, Hasselmann MH, Phebo LB, Vieira DE, Gomes VL de O. Tentativas de suicídio em um hospital geral no Rio de Janeiro, Brasil. Cad Saude Publica [Internet]. 2006 Oct;22(10):2201-6.

19. Rezer R, Cunha AC, Rocha DD da. A universidade contemporânea em "transformação": desdobramentos para a discussão curricular no ensino superior. In: Universidade do Minho, editor. Minho; 2014.

CHAPTER 46

Mortality trend in women outside the breast cancer screening age group from 2000 to 2019 in Brazil

10.56238/rsfohsv1-046

Beatriz Angieuski Camacho
ORCID: https://orcid.org/0000-0003-4027-2214
Unicesumar, Brazil
E-mail: beatrizzcamacho@gmail.com

Carolina Alves Terra Martins
ORCID: https://orcid.org/0000-0001-8059-554X
Unicesumar, Brazil
E-mail: ca.atm3@gmail.com

Rodolfo Dourado Bagano
ORCID: https://orcid.org/0000-0002-1152-1456
Unicesumar, Brazil
E-mail: rbaganod@gmail.com

Adriana Cunha Vargas
ORCID: https://orcid.org/0000-0002-8648-5322
Unicesumar, Brazil
E-mail: adriana.tomaz@docentes.unicesumar.edu.br

ABSTRACT
Breast cancer is the one with the highest incidence, prevalence and mortality rates among all neoplasms that affect women, with the exception of non-melanoma skin tumors. Aiming to analyze the mortality trend in women outside the breast cancer screening age group (ICD-10 C50), from 2000 to 2019 in Brazil. We present this exploratory time series study of deaths from breast cancer. All women residing in Brazil, between 15 and 49 years old, who died from ICD-10 C50 participated in the study. Data collected from DATASUS, and for the analysis of trends, the polynomial regression model was used. In the period, there were 62,519 deaths from breast cancer in women outside the screening range, among them, those who were married and with advanced education had a higher death rate, as well as in the South and Southeast regions. The trend was increasing in all regions of the country. We conclude that it is essential for the government to participate in containing this growth in deaths in search of alternatives that can both include more women and expand the age group in screening. It is also important to emphasize education and information on the subject, by women and health professionals, regarding the suspected signs and symptoms of breast cancer, as well as facilitating access to health services, extending working hours. services for women who work full-time.

Keywords: Breast cancer; Women's Health; Mortality.

1 INTRODUCTION

Breast cancer has the highest incidence, prevalence and mortality rates among all neoplasms affecting women, with the exception of non-melanoma skin tumors (Fayer et al., 2020). In 2018, there were about 2,088,849 new cases and 626,679 new deaths from breast cancer worldwide (WHO, 2018). In Brazil, in this same year 17,572 deaths caused by this neoplasm were recorded (INCA, 2020).

Cancer is a disease triggered by the disordered proliferation of cells, caused by mutations in genes that encode proteins that regulate the cell cycle (Bernardes et al., 2019). Two genes involved in maintaining the stability of deoxyribonucleic acid (DNA), and which have been linked to the development of the hereditary breast and ovarian cancer syndrome, are BRCA1 and BRCA2 (INCA, 2019).

A wide variety of histological and molecular types of in situ and invasive breast carcinomas have already been described in the literature, with the most common invasive histological type being unspecified infiltrating ductal carcinoma, identified in 70% to 80% of all breast tumors, followed by infiltrating lobular carcinoma, accounting for 5% to 15% of cases (INCA, 2019). Invasive type breast carcinoma constitutes a

group of malignant epithelial tumors that are able to cross the basal membrane of the terminal ductotubular unit, thus invading the stroma and can cause metastases (Brazil, 2013).

Timely investigation of suspicious breast lesions and periodic screening in asymptomatic women allow early diagnosis of the disease. Current Brazilian screening guidelines, established by INCA in 2015, advocate the provision of mammography for women aged 50 to 69 years, every two years (INCA, 2019). The Brazilian Society of Radiology (SBR) and the Brazilian Society of Mastology (SBM), recommend mammography between the ages of 40 to 74 years. (Oliveira, 2020; Urban et al., 2017). Other methods of diagnosing the disease include: clinical examination, ultrasonography, MRI, blood tests, radiography, scintigraphy, biopsy, cytopathological and histopathological tests, and BRCA1 and BRCA2 testing (dos Santos Soares et al, 2022.).

Importantly, late investigation of suspicious breast lesions is identified as one of the factors related to advanced stage, mainly due to difficulty in accessing health services (Tomazelli et al., 2018). In addition, lack of clarification about cancer warning signs and the perpetuation of myths about the disease are factors that can result in delayed diagnosis (Migowski, 2018). The challenge is not only the utilization of health services, but the utilization in an appropriate manner for adequate care for the different needs of each case (de Souza Marçal et al., 2022).

Once the diagnosis is confirmed, the Unified Health System (SUS) guarantees the start of free treatment in up to 60 days, or in a shorter period, depending on the therapeutic need of the registered case, is what determines Law No. 12,732 of the Presidency of the Republic, sanctioned in 2012 (Brazil, & Brazil, 2012).

A study done in Brazil pointed out that mortality rates between 1996 and 2013, showed an upward trend in the incidence and prevalence of breast cancer death among women aged 20 to 49 years (Rocha-Brischiliari et al., 2017). However, to the best of our knowledge, there is scarcity in the literature on the trend in mortality of women from breast cancer outside the screening age group.

Therefore, the aim of this paper is to analyze the trend of mortality in women outside the screening age group for breast cancer (ICD-10 C50) in the period from 2000 to 2019 in Brazil.

2 METHODOLOGY

This is an exploratory, time-series study of deaths from breast cancer. As Pereira A. S. et al. (2018), "the scientific method is a systematic work, in search of answers to the questions studied, it is the path one must follow to lead to the formulation of a scientific theory". Participants in the study included all women residing in Brazil, between 15 and 49 years old, who died from breast neoplasm.

Data collection was conducted from the Department of Health (DATASUS), the official portal of the Ministry of Health, which provides information that can be useful for contributing to objective analyses of health conditions, evidence-based decision making, and health project design (DATASUS, 2020). The inclusion criteria for the research were: women between 15 and 49 years old who died in the period from

2000 to 2019, residents in Brazil. The variables included were: year of death, age group, ethnicity, education and marital status.

To calculate mortality rates, deaths in the regions of Brazil between the years 2000 to 2019 were considered. These data were extracted from the Mortality Information System (SIM) and the Brazilian Institute of Geography and Statistics (IBGE), being consolidated in Brazil by region, according to sex, age group, and ICD-10 (C50). The data of the studied public had as source the IBGE, were made available by DATASUS, and captured by means of TABNET, which selected the resident population by sex and age group for the same period.

The ratio was determined between the number of deaths from breast neoplasm (ICD-10 C50) in women, divided by the female population in that year and place, obtained from demographic information from the 2000 Census, 2010 Census, and estimates for the years 2011 to 2019, multiplied by 100,000.

The data were computed in an Excel spreadsheet and subsequently organized according to the selected variables. For the trend analysis, the polynomial regression model was used, in which the rates were considered as dependent variables (y) and the years of study as an independent variable (x). The variable "year" was transformed into a centralized variable and the series was analyzed using a three-point moving average.

The polynomial regression models were tested as linear ($y = \beta0 + \beta1x1$) and quadratic ($y = B0 + \beta1x1 + \beta2x2$), considering the trend significant the one that obtains a p-value <0.05.

To choose the best dispersion analysis model, the value of the coefficient of determination (r2) was the residual analysis. When all criteria were significant for more than one model and the coefficient of determination was similar, the simplest model was chosen.

The present study followed the resolution of research ethics, but did not go through the approval of the Standing Committee on Research Ethics because it was based on public databases (http://datasus.saude.gov.br/).

3 RESULTS

In the period from 2000 to 2019, there were 62,519 deaths from breast cancer in women outside the screening range, i.e., 15 to 49 years of age, representing a mortality rate of 5.9. It is noticeable that over the years, the mortality rate among these women increased from 5.1 in the period 2000 to 2004 to 6.7 in the period 2015 to 2019, the most affected five-year period. The region with the highest mortality rate was the Southeast with 6.8, followed by the South with 6.6. The least affected region was the North, with a rate of 3.5.

In Brazil, regarding the total number of women, the most affected ethnic group was white (56%, n=34,219), followed by brown (31.3%, n=19,586) and black (7.8%, n=4,892). Among the regions, the most affected ones related to the white ethnic group were: South (86.3%, n=8,718), Southeast (60.3%, n=18,664), and Center-West (47.5%, n=2,065).

Regarding education, in Brazil, the most affected women were those with 8 to 11 years of schooling (25.3%, n=15,866), followed by "no education", with 23.3% (n=14,568), while the least affected were those with "no education" (2.8%, n=1,794). The region most affected by the deaths was the Southeast, with the schooling level of 8 to 11 years (26.4%, n=8,192).

Married Brazilian women (48%, n=29,995) were those who suffered the greatest number of deaths. Those declared to be single came next (33.4%, n=20,854) and legally separated came third, with 7.3% (n=4,555). Widows were the least affected in the country (3.1%, n=1,912).

Table 1 shows the rates of deaths from breast cancer in women in relation to the year and region of Brazil. And Table 2 shows in relation to the variables: ethnicity, education, and marital status.

Table 1 - Breast cancer mortality rate in women outside the screening range. Brazil 2021.

Ano	Norte		Nordeste		Sudeste		Sul		Centro-Oeste		Brasil	
	n	tx	n	tx	n	tx	n	tx	n	tx	n	tx
2000-2004	439	2,5	2187	3,4	6747	6,4	2223	6,2	792	4,6	12388	5,1
2005-2009	600	3,0	3225	4,5	7324	6,5	2383	6,3	959	4,9	14491	5,5
2010-2014	863	3,8	4059	5,3	7980	7,0	2667	6,9	1182	5,6	16751	6,1
2015-2019	1162	4,7	4561	5,7	8925	7,7	2827	7,2	1414	6,3	18889	6,7
TOTAL	3064	3,5	14032	4,7	30976	6,8	10100	6,6	4347	5,3	62519	5,9

Source: authors, 2021.

Table 2 - Identification data of women who died of breast cancer outside the screening range. Brazil 2021.

VARIÁVEL	NORTE		NORDESTE		SUDESTE		SUL		CENTRO-OESTE		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
ETNIA												
Branca	782	25,5	3990	28,4	18664	60,3	8718	86,3	2065	47,5	34219	56
Preta	143	4,7	1197	8,5	2871	9,3	399	4,0	282	6,5	4892	7,8
Amarela	8	0,3	52	0,4	156	0,5	15	0,1	16	0,4	247	0,4
Parda	2022	66,0	7662	54,6	7516	24,3	574	5,7	1812	41,7	19586	31,3
Indígena	17	0,6	18	0,1	16	0,1	7	0,1	5	0,1	63	0,1
Ignorado	92	3,0	1113	7,9	1753	5,7	387	3,8	167	3,8	3512	5,6
Total	3064	100	14032	100	30976	100	10100	100	4347	100	62519	100
ESCOLARIDADE												
Nenhuma	126	4,1	846	6,0	507	1,6	184	1,8	131	3	1794	2,8
1 a 3 anos	408	13,3	2065	14,7	3547	11,5	1403	13,9	490	11,2	7913	12,6
4 a 7 anos	705	23,0	2512	17,9	6353	20,5	2364	23,4	881	20,2	12815	20,5
8 a 11 anos	979	32,0	3158	22,5	8192	26,4	2410	23,8	1127	25,9	15866	25,3
12 anos e mais	492	16,0	1599	11,4	5141	16,6	1600	15,8	731	16,8	9563	15,3
Ignorado	354	11,6	3852	27,5	7236	23,3	2139	21,1	987	22,7	14568	23,3
Total	3064	100	14032	100	30976	100	10100	100	4347	100	62519	100
ESTADO CIVIL												
Solteira	1212	39,6	5481	39,1	10078	32,5	2694	26,7	1389	32,0	20854	33,4
Casada	1273	41,5	5871	41,8	15339	49,5	5489	54,3	2023	46,5	29995	48,0
Viúva	62	2,0	390	2,8	979	3,2	345	3,4	136	3,1	1912	3,1
Separada judicialmente	117	3,8	574	4,1	2718	8,8	816	8,1	330	7,6	4555	7,3
Outro	259	8,5	572	4,1	732	2,4	376	3,7	186	4,3	2125	3,4
Ignorado	141	4,6	1144	8,2	1130	3,6	380	3,8	283	6,5	3078	4,9
Total	3064	100	14032	100	30976	100	10100	100	4347	100	62519	100

Source: authors, 2021.

Regarding Table 1, we highlight a higher rate of breast cancer in the southeast and south, especially between 2010 and 2019. Regarding Table 2, we emphasize the high frequency of breast cancer in brown women in the north and northeast, and in the south and southeast, in white women. While in the Midwest there is a high rate in both brown and white women.

The polynomial regression analysis showed an increasing trend in breast cancer mortality in Brazil in women aged 15 to 49 years, and showed that the Southeast region, with the mortality rate at 6.86, and annual growth of 0.18, R2 = 0.93 and p = 0.006, was the most affected. The South region showed a rate of 6.65, with an annual growth of 0.14, R2 = 0.88 and p = 0.006. The North, showed a rate of 3.50, and an annual growth of 0.29, R2 = 0.98e p = 0.0. The Northeast region has a mortality rate of 4.73, with an annual growth of 0.31, R2 = 0.97 and p = 0.00. Finally, the Midwest region has a rate of 5.33, and an annual growth of 0.23,R2 = 0.96 and p = 0.001. The above data are compiled in Table 3 for better visualization.

Table 3 - Trend of breast cancer in the regions of Brazil in women outside the screening range. Quadratic model.

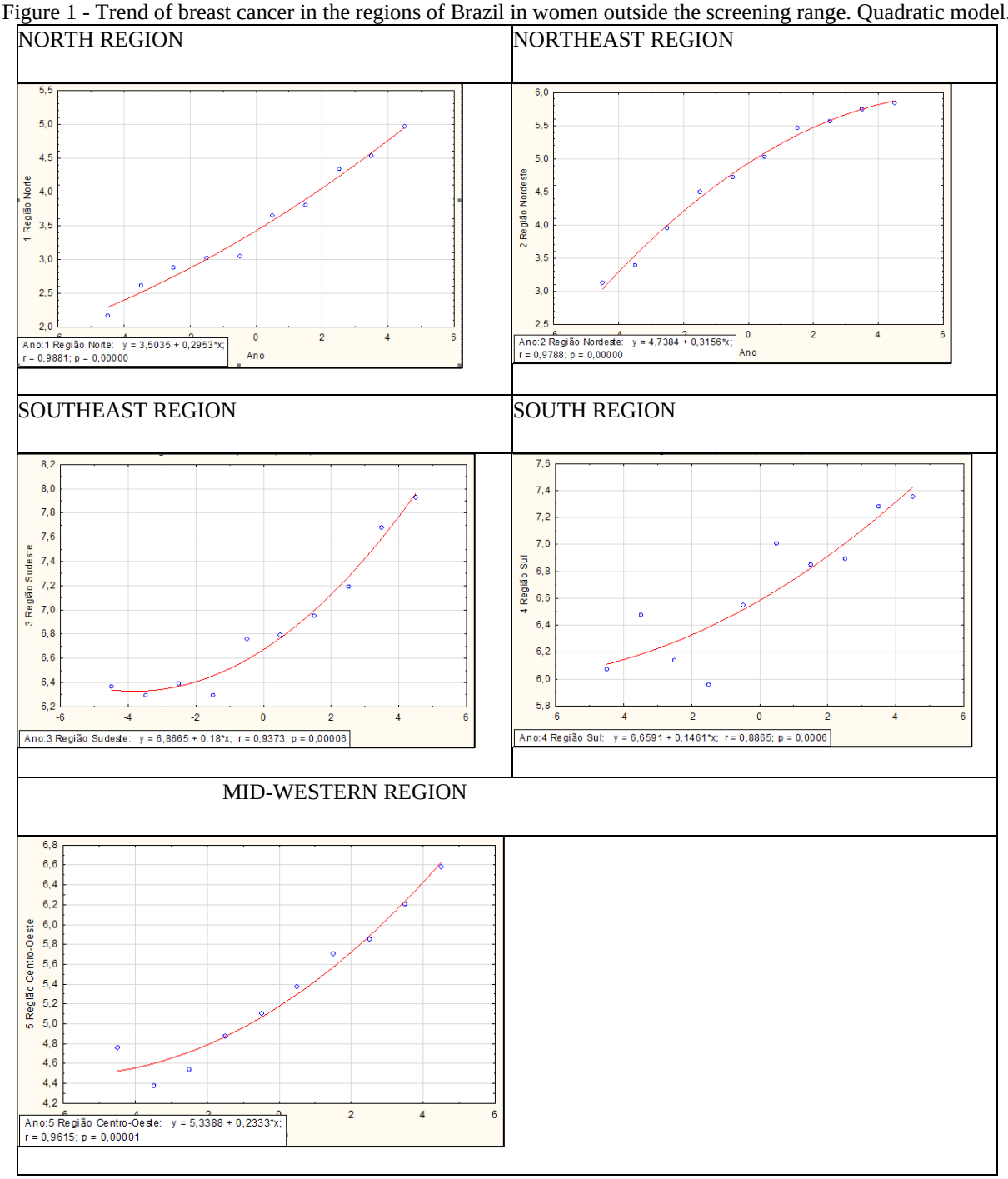
Região	15 a 49 anos			
	Modelo	R2	p	T*
Norte	y=3,5035+0,2953x	0,98	0,0	↑
Nordeste	y=4,7384+0,3156x	0,97	0,00	↑
Sudeste	y=6,8665+0,18x	0,93	0,006	↑
Sul	y=6,6591+0,1461x	0,88	0,006	↑
Centro-Oeste	y=5,3388+0,2333x	0,96	0,001	↑

Source: authors, 2021.

Table 3 shows the quadratic polynomial regression model for each state in Brazil, showing a tendency to increase in all cases.

Below, in Chart 1, is a visual correlation between the regions of Brazil, showing the high trend of screening in women outside the range recommended by the Ministry of Health.

Figure 1 - Trend of breast cancer in the regions of Brazil in women outside the screening range. Quadratic model.



Source: authors, 2021.

We emphasize in Figure 1, the exponential increase of breast cancer in women who are not in the recommended screening age group (50-69 years). Reinforcing the need to expand the coverage of screening for breast cancer.

4 DISCUSSION

In view of the fact that there is a scarcity of literature regarding the trend of mortality of women from breast cancer outside the screening age group in Brazil, the present work was carried out with the objective of compiling and analyzing the data provided by DATASUS, observing its trend in the last decades and projecting its curve for the following years.

The mortality rate observed in the Southeast region was the highest among all Brazilian regions. The state of São Paulo alone accumulated 16,049 deaths, equivalent to 51.8% of the region's total. This fact may be related to the high levels of psychological stress and overweight associated with the routine in large urban centers. Cormanique et al. (2015), corroborates this thought, pointing out that the chronic increase in cortisol levels leads to increased appetite and greater storage of lipids in adipose tissue. Such conditions are important risk factors for the development and aggressiveness of breast neoplasia and lower survival of patients.

In addition, we found a predominance of white (56%) and married (48%) women who died, an epidemiological profile also evidenced by Rocha- Brischiliari et al. (2017) in their study involving Brazilian women aged 20 to 69 years. Such characteristics are consistent with the profile of Brazilian women in this age group in the Southeast and South regions, which had the highest mortality rates in the analyzed period.

A higher pattern of deaths was observed among Brazilian women with schooling from 8 to 11 years (25.3%), followed by the category "ignored" (23.3%), with a difference of only 2%. Added to this is the fact that schooling "none" had a national rate of only 2.8%, and the category of 1 to 3 years, 12.6%, contrary to other data in the literature that associate lower socioeconomic factors with higher mortality rates (Duarte, 2020). Some hypotheses can be drawn to try to explain this phenomenon, such as, for example, the fact that many women with low schooling fall within the "ignored" category, or the fact that the study covered the years 2000 to 2019, leaving out the previous decades, when the schooling of Brazilian women was significantly lower.

Analyzing the graphs, we see a noticeable trend of increasing mortality in all Brazilian regions, particularly more accentuated in the Southeast and South regions. Another serious problem is the large number of young women going to death in our country for a disease that benefits greatly from an early diagnosis (Tomazelli et al., 2018), a fact that draws attention to the need for immediate action by the public authorities. A study conducted by Santos et al. (2019), involving health managers, highlighted the main barriers in the early detection of breast cancer: low adherence of professionals, disorganization of services, and conflict with the guidelines of medical societies. Scarce financial resources was the least cited barrier by managers.

Our research has some limitations: the investigation and collection was done by consulting a public online database, and it is possible that some information is incorrectly compiled. However, when researching mortality trends for breast cancer in Brazil, a country of extensive territorial dimensions, it is essential to observe the nuances between changes in this causality. One must also respect the fact that the collection of secondary data can be a source environment of sensitive information, information that is effective for ecological studies in our country as an exclusive source of available mortality data.

It is of fundamental importance to highlight the lack of articles on the trend of deaths from breast cancer among Brazilian women outside the screening range recommended by the Ministry of Health. There are still little studied nuances that permeate this large number of deaths and that should be further

investigated by academia, such as: screening tests performed and their frequency, the most prevalent histopathological type among the age groups, and the availability of access to health care for young women living in the interior of the country. In this way, we will be able to make a more comprehensive analysis of the situation, allowing more precise and targeted interventions to the real problems.

5 CONCLUSION

In view of the above, we conclude that mortality from breast cancer among young Brazilian women has shown a tendency to increase in recent years in all Brazilian regions. The participation of the government in the containment of this growth of deaths is essential, seeking alternatives that can both include more women and expand the age range of screening.

In addition, it is necessary to consider several factors, analyzing the conditions of each region and the current guidelines of medical societies, aiming at better planning and care for early detection of breast cancer. It is also important to emphasize education and information on the subject, both by women and health professionals, about the signs and symptoms of suspected breast cancer, as well as facilitating access to health services, extending the hours of care for women who work full time.

Therefore, the importance of awareness movements, such as Pink October, is highlighted, since many women are diagnosed in this period and start early treatment, and thus increase the chances of survival and better quality of life.

For future articles, we suggest comparing the data obtained with greater risk factors for the development of breast cancer, in addition to broadening the time range studied, so it may be proposed to extend the screening even further, depending on the predisposition of women to the neoplasm.

REFERENCES

Bernardes, N. B., de Sá, A. C. F., de Souza Facioli, L., Ferreira, M. L., de Sá, O. R., & de Moura Costa, R. (2019). Câncer de Mama X Diagnóstico/Breast Cancer X Diagnosis. ID on line. Revista de psicologia, 13(44), 877-885.

Brasil. Ministério da Saúde. (2013) Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Controle dos Cânceres do Colo do Útero e da Mama. 2ªed. Brasília, DF (Cadernos de Atenção Básica, n. 13).

Brasil, & Brasil. (2012). Lei nº 12.732, de 22 de novembro de 2012. Dispõe sobre o primeiro tratamento de paciente com neoplasia maligna comprovada e estabelece prazo para seu início. Diário Oficial da União.

Cormanique, T. F., Almeida, L. E. D. F. , Rech, C. A., Rech, D., Herrera, A. C. S. A., & Panis, C. (2015). Estresse psicológico crônico e seu impacto no desenvolvimento de neoplasia mamária agressiva. einstein (São Paulo), 13(3), 352-356. https://doi.org/10.1590/S1679-45082015AO3344

DATASUS (2020). Departamento de informática do SUS. http://www2.datasus.gov.br/DATASUS/index.php?area=02.

de Souza Marçal, R. T., & Vaz, C. T. (2022). Tratando o câncer de mama em tempos de COVID-19: uma revisão integrativa. Research, Society and Development, 11(10), e252111032915-e252111032915.

dos Santos Soares, C. J., dos Santos, A. W., Oliveira, G. S., dos Santos, A. V. A., Souza, K. C., & de Lira Silva, M. (2022). Relevância das medidas preventivas para o diagnóstico precoce de câncer de mama. Research, Society and Development, 11(7), e28311730003-e28311730003.

Duarte, D. D. A. P., Nogueira, M. C., Magalhães, M. D. C., & Bustamante-Teixeira, M. T. (2020). Iniquidade social e câncer de mama feminino: análise da mortalidade. Cadernos Saúde Coletiva, 28, 465-476.

Fayer, V. A., Guerra, M. R., Nogueira, M. C., Correa, C. S. L., Cury, L. C. P. B., & Bustamante-Teixeira, M. T. (2020). Controle do câncer de mama no estado de São Paulo: uma avaliação do rastreamento mamográfico. Cadernos Saúde Coletiva, 28, 140-152.

INCA (2019). A situação do câncer de mama no Brasil: síntese de dados dos sistemas de informação. Instituto Nacional de Câncer - INCA. Recuperado de: <https://www.inca.gov.br/publicacoes/livros/situacao-do-cancer-de-mama-no-brasil-sintese-de-dados-dos-sistemas-de-informacao>.

INCA (2020). Estatísticas de câncer. Instituto Nacional de Câncer - INCA. Recuperado de: <https://www.gov.br/inca/pt-br/assuntos/cancer/numeros/>.

Migowski, A., Silva, G. A., Dias, M. B. K., Diz, M. D. P. E., Sant'Ana, D. R., & Nadanovsky, P. (2018). Diretrizes para detecção precoce do câncer de mama no Brasil. II-Novas recomendações nacionais, principais evidências e controvérsias. Cadernos de Saúde Pública, 34, e00074817.

Oliveira, L. S. D. (2020). Mortalidade feminina por câncer de mama no Brasil nos anos de 2000 a 2017: tendência e perfil sociodemográfico.

Pereira, A. S., Shitsuka, D. M., Parreira, F. J., & Shitsuka, R. (2018). Metodologia da pesquisa científica.[e-book]. Santa Maria. Ed (pp. 3-9). UAB/NTE/UFSM. Disponível em: https://repositorio. ufsm. br/bitstream/handle/1/15824/Lic_Computacao_Metodologia-Pesquisa-Cientifica. pdf.

Rocha-Brischiliari, S. C., Oliveira, R. R. de, Andrade, L., Brischiliari, A., Gravena, A. A. F., Carvalho, M. D. de B., & Pelloso, S. M. (2017). The Rise in Mortality from Breast Cancer in Young Women: Trend Analysis in Brazil. PLOS ONE, 12(1), e0168950. https://doi.org/10.1371/journal.pone.0168950

SANTOS, R. O., Ramos, D. N., & Migowski, A. (2019). Barreiras na implementação das diretrizes de detecção precoce dos cânceres de mama e colo do útero no Brasil. Physis: Revista de Saúde Coletiva, 29.

Tomazelli, J. G., Girianelli, V. R., & Silva, G. A. (2018). Mulheres rastreadas para câncer de mama: acompanhamento por meio dos sistemas de informações em saúde, 2010-2012. Epidemiologia e Serviços de Saúde, 27.

Urban, L. A. B. D., Chala, L. F., Bauab, S. D. P., Schaefer, M. B., Santos, R. P. D., Maranhão, N. M. D. A., ... & Camargo, H. S. A. D. (2017). Recomendações do Colégio Brasileiro de Radiologia e Diagnóstico por Imagem, da Sociedade Brasileira de Mastologia e da Federação Brasileira das Associações de Ginecologia e Obstetrícia para o rastreamento do câncer de mama. Radiologia Brasileira, 50, 244-249.

WHO. (2020). Cancer today. Website of World Health Organization (WHO). <https://gco.iarc.fr/today/home>

WHO. (2018). Data visualization tools for exploring the global câncer burden in 2018. Website of World Health Organization (WHO). <https://gco.iarc.fr/today/data/factsheets/cancers/20-Breast-fact-sheet.pdf>

CHAPTER 47

Anemia and its implications in the interpretation of glycated hemoglobin levels in institutionalized elderlies

10.56238/rsfohsv1-047

Andréa Timóteo dos Santos Dec
PhD in Medicine (Hematology) from Universidade Federal de São Paulo, Brazil Institution: Universidade Estadual de Ponta Grossa
Address: Avenida General Carlos Cavalcanti, 4748, Uvaranas, Ponta Grossa-PR, Brazil
ZIP CODE: 84030-900
e-mail: andclean@gmail.com

Andressa de Lima Godoi Zardo
Medicine by Faculdade Evangélica do Paraná (currently Mackenzie), Brazil
Residency in Internal Medicine at Santa Casa de Misericórdia de Ponta Grossa, Brazil and Residency in Geriatrics at Hospital Santa Casa de Curitiba, Brazil
Institution: Instituição de Longa Permanência para Idosos - ILPI (Asilo
São Vicente de Paulo - Ponta Grossa
Clinivita Clinic, Ponta Grossa
Office Address: Rua Coronel Bittencourt, 462, Centro, Ponta Grossa-PR, Brazil
ZIP CODE: 84010-290
e-mail: a.delimagodoi@gmail.com

Margarete Aparecida Salina Maciel
PhD in Biological Sciences from Universidade Estadual Paulista (Rio Claro), Brazil Institution: Universidade Estadual de Ponta Grossa
Address: Avenida General Carlos Cavalcanti, 4748, Uvaranas, Ponta Grossa-PR, Brazil
ZIP CODE: 84030-900
e-mail: mmaciel2020@gmail.com

Stella de Bortoli
PhD in Toxicology and Toxicological Analysis from Universidade Federal de São Paulo, USP, Brazil
Institution: Universidade Estadual de Ponta Grossa
Address: Avenida General Carlos Cavalcanti, 4748, Uvaranas, Ponta Grossa-PR, Brazil
ZIP CODE: 84030-900
e-mail: stellabortoli@gmail.com

ABSTRACT
Among the chronic non-communicable diseases observed in the elderly population, diabetes mellitus (DM) can be highlighted. The measurement of fasting blood glucose and HbA1c are used for the diagnosis and monitoring of diabetic patients. Several factors can interfere with the measurement of HbA1c, including anemia. Anemia can be a common condition in the elderly. This study aimed to carry out a survey on the presence of anemia in a group of institutionalized elderly people and to discuss as a result the interpretation of glycemic levels, obtained by measuring HbA1c. A cross-sectional, descriptive and quantitative study was carried out based on the analysis of laboratory data of 73 residents in a Long-Term Care Facility for the Elderly (LTCF) in Ponta Grossa - Paraná, during the year 2019. The occurrence of anemia among those looking for DM was 44.4%, higher than that described in the literature. Data analysis made it possible to observe the interference of anemia in the examination of HbA1c. Thus, the screening of hemoglobin values to detect anemic conditions together with the measurement of AbA1c is extremely important for a correct interpretation of glycemic control. Understanding the mechanisms that lead to anemia associated with DM can contribute to better management of elderly patients, avoiding the complications of the disease and increasing mortality

Descritores: Diabetes Mellitus, Anemia; Hemoglobin A Glycated; Aged; Techniques Laboratory Clinics.

1 INTRODUCTION

Among the chronic non-communicable diseases (NCDs) observed in the elderly population, diabetes mellitus (DM), hypertension, lipodystrophy, mental illnesses, and anemia, among others, can be highlighted. These conditions lead to health decline if not kept stable.

According to the report of the national health survey conducted in 2019 by the Brazilian Institute of Geography and Statistics, the higher the age group, the higher the percentage of DM in the population, which ranged from 0.6%, for those aged 18 to 29 years, to 21.9%, for those aged 65 to 74 years. For those aged 75 years or older, the percentage was 21.1% (IBGE, 2020).

Among people with DM, it was also investigated in this report which health complications presented because of the disease, according to the time of diagnosis. Both for those who had been diagnosed with DM for less or more than 10 years, the most frequent complications were cardiovascular (7.2%), renal (9.5%), and ophthalmological (29.3%) (IBGE, 2020).

According to the Brazilian Diabetes Society Guidelines (2019-2020), DM consists of a metabolic disorder characterized by hyperglycemia, resulting from deficiency in insulin production and/or its action, causing long-term clinical complications (SBD, 2019a). The adequate glycemic control allows preventing acute crises and reducing the risk of late complications such as retinopathy, nephropathy, neuropathy, and vascular diseases.

The glycated hemoglobin test (HbA1c) gained recognition in DM control after clinical studies of the Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS) in the 1990s. These studies showed that maintaining HbA1c below 7% in diabetics considerably decreased the risk of chronic complications of DM (SUMITA, 2012).

The dosage of HbA1c allows you to know the patient's glycemic levels during the last three to four months and monitor them properly (COBAN; OZDOGAN; TIMURAGAOGLU, 2004). Compared to the oral glucose tolerance test, which is the gold standard of DM diagnosis, HbA1c testing is rapid and minimally affected by physiological and pharmacological conditions. HbA1c levels also reflect the progression of diabetic microvascular lesions (GUO et al. , 2019).

As a diagnostic test, the dosage of HbA1c was only possible through the intense work of the National Glycohemoglobin Standardization Program (NGSP), started in 1996, with the aim of standardizing the different assay methods and making HbA1c results comparable. This standardization aligned the DCCT and UKPSD studies and included the development of a reference method by the International Federration of Clinical Chemistry - IFCC (LITTLE; ROHLFING, 2013).

The International Expert Committee (2009), an International Committee of Experts, composed of members of the American Diabetes Association (ADA), the European Association for the Study of Diabetes (EASD) and the International Diabetes Federation (IDF), finally in 2009 indicated HbA1c testing for diagnosis, recommending HbA1c values $\geq$ 6.5% for the diagnosis of DM.

HbA1c, although an indirect measure of glycemic levels, has the advantage of not relying on fasting for its dosage and showing less variability on a daily basis (SBD, 2019a).

Some factors, however, may interfere in the dosage of HbA1c such as: the labile fraction, hemolysis, dyslipidemias, hemoglobinopathies and the presence of anemia, and may not reflect the plasma levels of glucose (COBAN; OZDOGAN; TIMURAGAOGLU, 2004). Even with the standardization of HbA1c dosage, the interference of some clinical conditions still persists, such as hemoglobinopathies, anemia and uremia, severe hypertriglyceridemia with levels above 2,000 mg/dL, and hyperbilirrhumenia with levels above 50 mg/dL. Similarly, studies point out that HBA1c results can be influenced by factors such as age, ethnicity, diet, medications, and alcoholism (GUO et al., 2019; SBD, 2019a).

It is common for diabetic patients to have anemia with or without kidney damage. The reduction in renal function leads to a decrease in the synthesis of growth factor by the kidney and the consequent low concentration of serum erythropoetin, which culminates in a decrease in the production of red blood cells and finally anemia (KEANE; LYLE, 2003; RITZ, 2005). The World Health Organization defines anemia as "a state in which the hemoglobin concentration of the blood is abnormally low as a result of a deficiency of one or more essential nutrients, whatever the origin of that deficiency" (WHO, 1975). Thus, anemia that decreases the half-life of RBCs, such as hemolytic anemia, or anemia that reduces the number of RBCs, such as in erythropoietin deficiency, will decrease the true value of HbA1c. On the other hand, iron, folic acid, or vitamin B12 deficiency anemias can cause a real increase in HbA1c (BROOKS, et al. , 1980; HANSEN et al. , 1990; MORALES, 2020).

Thus, HbA1c measurement may not be reliable in the presence of anemia, especially in the elderly, whose peculiarities require individualized strategies that take into account their physical and mental state and life expectancy, both in the diagnosis and follow-up of DM (BRASIL, 2006).

In this context, this work aimed to survey the presence of anemia in a group of institutionalized elderly people and discuss the implications on the interpretation of glycemic levels, evaluated by HbA1c dosage.

2 METHODOLOGY

The study was cross-sectional, descriptive, and quantitative in nature and was conducted from the analysis of laboratory data from individuals residing in a Long-Stay Institution for the Elderly (ILPI) in Ponta Grossa, Paraná, during 2019. All individuals who concomitantly performed fasting blood glucose (FG), HbA1c, and complete blood count (CBC) tests were included in the study, regardless of the number of times they performed the tests.

The samples collected in the ILPI, in the morning, were sent to the University Laboratory of Clinical Analysis (LUAC) of the State University of Ponta Grossa (UEPG), for processing and analysis, following the laboratory protocols.

The CBC was performed from whole blood, collected in tubes containing the anticoagulant Ethylenediaminetetraacetic Acid (EDTA) and analyzed in an electric impedance cytometer Hemacounter 60 - Hemogram® . From this exam, the data of hemoglobin in the blood (Hb) were used, having as reference for Hb values < 12.0 g/dL for women and < 13 g/dL for men.

GJ dosage was performed in fluorinated plasma (blood collected in tubes containing the anticoagulant Sodium Fluoride/EDTA) and using the enzymatic method. The HbA1c dosage was performed from whole blood collected in tubes containing EDTA and the immunoturbidimetric inhibition method was used for the quantitative determination of HbA1c. Both determinations were performed in an automated device for biochemical analysis CT 300i (Wiener La. Group®). The HbA1c calculation followed the DCCT and NGSP standardization, and the following formula was used to express the results:

$$HbA1c\ (\%) = 91.5 \times \frac{HbA1c}{Hb} + 2.15$$, where Hb is the value of blood hemoglobin.

For discussion purposes the GJ and HbA1c values used in this study followed the criteria adopted by the Brazilian Diabetes Society Guidelines 2019-2020 and the ADA (SBD, 2019a).

The subjects were divided into two groups (non-DM and DM) according to prior diagnosis of DM and the samples distributed within the groups.

The data were organized in spreadsheets and analyzed by descriptive statistics (Microsoft Office Excel program).

The study was approved by the Research Ethics Committee of UEPG, opinion no. 2.745.328/2018.

3 RESULTS

A total of 73 individuals between the ages of 57 and 98 (74±9) years participated in the study. Of these 51 (69.9%) did not have DM, and 22 (30.1%) did. Ninety-six samples were analyzed,

The non-DM group was composed of 60 (62.5%) samples, and the DM group was composed of 36 (37.5%). The mean serum glucose and HbA1c levels of these groups can be seen in table 1.

Table 1 - Fasting glucose, glycated hemoglobin and blood hemoglobin levels in samples from residents of a Long-Stay Care Institution for the Elderly in Ponta Grossa-PR

Groups	G J (mg/dL) M (±S)	HbA1c (%) M (±S)
No DM (n = 60)	93,0 (±13,0)	5,8 (±0,8)
DM (n = 36)	128,0 (±37,0)	6,8 (±1,3)

Being: GJ - fasting blood glucose; HbA1c - glycated hemoglobin, M - mean; S - standard deviation; Non-DM - non-diabetic individuals; DM - diabetic individuals.

Source: Own authorship (2019)

In the non-DM group the GJ values ranged from 72.0 to 119.0 mg/dL with a mean of 93 mg/dL (±13) and in the DM group the range was 60.0 to 225.0 mg/dL with a mean of 128.0 mg/dL (±13.0).

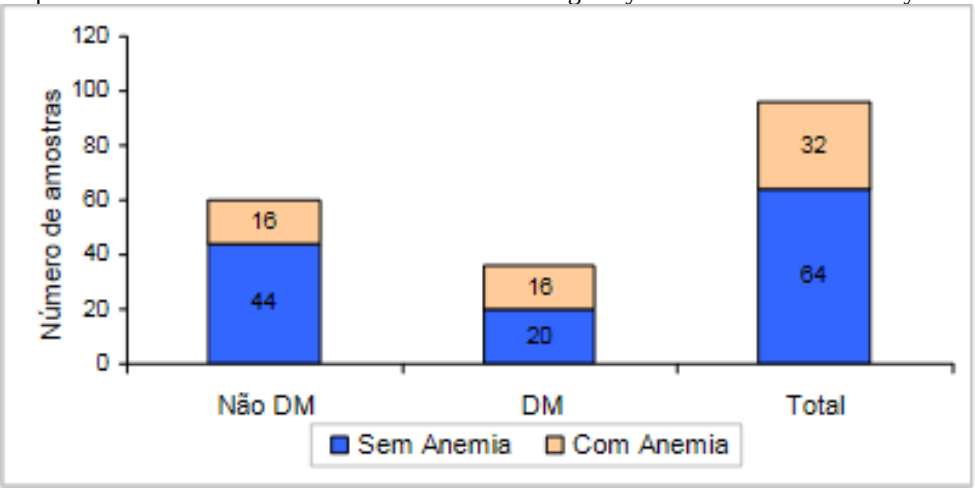
Regarding HbA1c dosages, the non-DM group presented values ranging from 4.5 to 9.0%, with a mean of 5.8% (±0.8), with 46.7% of the results corresponding to values normal (< 5.7%), 40.0% consistent with pre-diabetes values (between 5.7 and 6.4%) and 13.3% with DM values □□6.5%). In the DM group, the results of the dosages showed values ranging from 4.9 to 10.0%, with a mean of 6.8% (±1.3). Of the total of 36 samples, 15 (41.7%) showed values ≥ 7.0%.

The analysis of the Hb values obtained from the CBC is shown in figure 1. In it we can observe the relation between the quantity of samples from individuals without and with anemia.

It was noted that among the samples from the non-DM group, the rate of anemia was 26.7% (16/60).

Among the samples from the DM group, the rate of anemia was 44.4% (16/36), higher than that of the non-DM group. For both groups, the occurrence of anemia was 33.3%.

Figure 1 - Relation between the number of samples that, by hemoglobin determination, presented normal results or the presence of anemia in the groups without and with diabetes of residents of a Long-Stay Institution for the Elderly in Ponta Grossa-PR



Hemoglobin values - (Hb) used to characterize the presence of anemia - Men = Hb < 13 g/dL, Women = Hb < 12 g/dL.
Source: Own authorship (2019)

The values obtained for Hb and HbA1c in the samples of individuals who were anemic in the two study groups are shown in table 2.

Table 2 - Average values of blood hemoglobin and glycated hemoglobin in samples of anemic, non-diabetic, and diabetic individuals, residents of a Long-Stay Institution for the Elderly in Ponta Grossa-PR

Gender/Group	Hb (g/dL) M (±S)	HbA1c (%) M (±S)
Male/Non DM	9,8 (±2,2)	5,6 (±1,0)
Female/Non DM	10,6 (±1,4)	5,7 (±0,5)
Male/MD	11,5 (±1,4)	6,9 (±1,7)
Female/DM	11,2 (±0,7)	6,4 (±1,0)

Where: Hb - blood hemoglobin; HbA1c - glycated hemoglobin; M - mean; S - standard deviation
Source: Own authorship (2019)

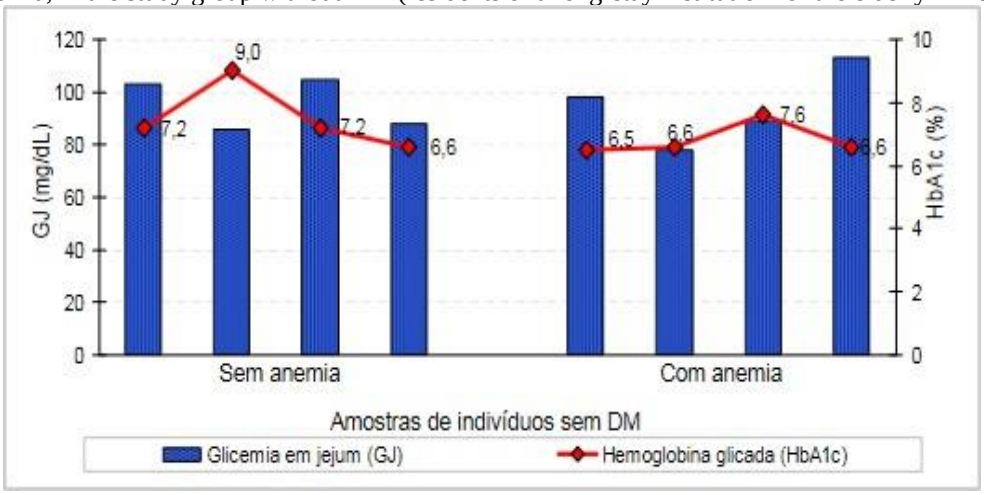
Considering the samples of non-DM individuals, Hb dosage values ranged from 6.4 to 12.8 g/dL, mean 9.8 g/dL (±2.2) and from 8.0 to 11.8 g/dL, mean 10.6 g/dL (±1.4), respectively, for males and females. HbA1c values ranged from 4.5 to 7.6%, mean 5.6% (±1.0) among males, and from 5.1 to 6.5, mean 5.7% (±0.5) among females.

Among the DM group samples, Hb dosage values ranged from 9.9 to 12.7 g/dL, mean 11.5 g/dL (±1.4) among males, and from 10.0 to 11.9 g/dL, mean 11.2 g/dL (±0.7) among females. HbA1c values ranged from 4.9 to 9.6%, mean 6.9% (±1.7), and from 5.2 to 8.3%, mean 6.4% (±1.0) among males and females, respectively.

GJ and HbA1c values in the elderly follow the same diagnostic criteria for other age groups. However, for DM follow-up the target Hba1c value, which is less than 7.0%, can be relaxed by taking into account individual characteristics of each patient (SBD, 2019a;b).

Figure 2 shows that among the 44 samples of non-DM individuals without anemia, four had HbA1c values higher than expected (Hb < 6.5%), representing 9.3% (4/44) of the total samples. Among the 16 non-DM samples with anemia, four showed values higher than 6.5% representing 25.0% of them (4/16).

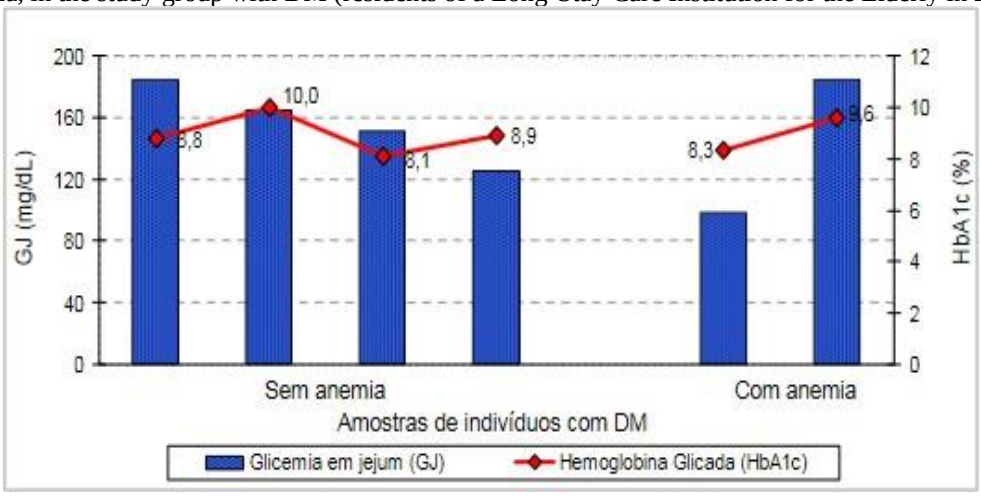
Figure 2 - Comparison between fasting blood glucose and glycated hemoglobin dosages in eight samples, considering the absence or presence of anemia, in the study group without DM (residents of a long-stay institution for the elderly in Ponta Grossa)



Source: Own authorship (2019)

In the DM group, composed of 36 samples, we observed 20 samples without anemia. Among these, four samples showed values of HbA1c □.0% (higher than expected for diabetic elderly) representing 20.0% of the total samples analyzed (4/20). Among the 16 diabetic samples with characteristic signs of anemia, two showed values higher than 8.0%, i.e., 16.7% (2/16) of the total samples (Figure 3).

Figure 3 - Comparison between fasting glucose and glycated hemoglobin dosages in six samples, considering the absence or presence of anemia, in the study group with DM (residents of a Long-Stay Care Institution for the Elderly in Ponta Grossa- PR)



Source: Own authorship (2019)

Analyzing the four samples of individuals without anemia, it was found that in two cases the HbA1c did not seem to reflect plasma glucose. One sample had a HbA1c value of 10.0% with a GJ of 165.0 mg/dL, and another had a HbA1c value of 8.9% and a GJ of 125.0 mg/dL, a percentage of 50.0% of the results.

In all samples with the presence of anemia, HbA1c dosage resulted in values above the expected

plasma glucose levels. One of them with HbA1c of 8.3% and GJ of 99.0mg/dL and the other with 9.6% and GJ of 185mg/dL.

4 DISCUSSION

It can be observed that in the non-DM group, GJ values ranged from normal values (< 100 mg/dL) to pre-diabetes (between 100 and 125 mg/dL), according to the Brazilian Diabetes Society Guidelines 2019-2020 (SBD, 2019). With increasing age, blood glucose values tend to rise, and the onset of type 2 DM is frequent, starting in the fourth decade of life. There is a great influence of environmental factors that include eating habits and sedentary lifestyle, in addition to genetic factors and comorbidities such as hypertension and dyslipidemia. Added to these factors is the aging process itself that can contribute to beta cell dysfunction, with lower insulin production and insulin resistance that results and body changes such as decreased lean mass and increased fat mass, especially in the abdominal region, among other changes (SBD, 2019a). In the studies by Franco et al. (2019) an increase in the proportion of altered GJ and HbA1c tests was observed with increasing age, with the frequency being higher among men.

In the DM group there was a wide variation of blood glucose values, showing that in this group glycemic control was not always achieved. In situations where blood glucose is uncontrolled, other factors such as weight, blood pressure, sedentary lifestyle, and inadequate diet should be observed (BRASIL, 2013).

As described earlier, in addition to the GJ values, the HbA1c measurement is used both in diagnosing and monitoring the diabetic patient, as it reflects the amount of plasma glucose averaged over the previous three or four months.

The hemoglobin types found in adults include hemoglobin A (HbA) (95-98%), hemoglobin A2 (HbA2) (2-3%), and fetal hemoglobin (HbF) (1%). In addition, HbA0, HbA1a1, HbA1a2, HbA1b and HbA1c are subtypes of HbA that can be identified by electrophoresis. HbA1c represents 70-90% of HbA1 and is the glycated form of HbA1. It results from a process by which glucose irreversibly binds to hemoglobin by glycosylation of the N-terminal beta chain of proline. Thus, HbA1c reflects the average glucose concentration in plasma, and is influenced by 50% of the glucose values of the last month, 25% to the previous month, and the other 25% to the previous two months (GUO et al. , 2019; SBD, 2019a).

In the non-DM group, it was observed that the mean HbA1c values ranged from normal values to values considered diagnostic for DM. However, it is known that for diagnostic purposes, laboratory changes not consistent with clinical symptoms should be confirmed in a new sample (SBD, 2019a). In many cases, the form of presentation of DM may be atypical, especially in the elderly. The discovery of DM may occur incidentally after a test unrelated to a suspected DM, by an intercurrent disease such as an infection, or by a clinical complication of DM, manifested in the long term. Still, other causes involving the neurological system, dehydration, and osmolar alteration, among other conditions, may be involved (BRASIL, 2006).

In the DM group, HbA1c values, as well as those of GJ, showed a wide range of variation reflecting

a good glycemic control for most samples, with only six samples showing values above 8.0%. In the present study, the goal of HbA1c < 8.0% was established in the analysis because the samples came from residents of an NICU with a mean age of 74 ± 9 years, with different degrees of functionality, several comorbidities and using polypharmacy. According to the Brazilian Diabetes Society Guidelines 2019-2020, for disease control HbA1c values < 7.0% are recommended, but for the elderly this control may be less strict. In frail, institutionalized elderly or those with limited economic and/or social conditions there may be difficulty in maintaining glycemic control and thus HbA1c values < 8% may be tolerated (SBD, 2019a). Thus, the glycemic target can be established according to the clinical condition of each elderly person, their independence, clinical conditions and life expectancy trying to preserve as much as possible the existing functionality, nutrition and avoiding complications of DM, preventing sarcopenia and hypoglycemia. The latter is related to increased risk of cognitive changes, including dementia and cardiovascular events (SBD, 2019b).

The rate of HbA1c formation is generally linear at a certain level of plasma glucose and the renewal rate of red blood cells affect the level of HbA1c (GUO et al., 2019). Conditions that decrease the average lifespan of red blood cells are responsible for the false decrease in HbA1c dosing results such as hemolytic anemia and blood loss recovery (NGSP, 2019).

Thus, diseases or physiological conditions that alter the number of circulating red blood cells must be considered when evaluating HbA1c values. A decrease in the number of red blood cells, or in the amount of hemoglobin within them, leads to a condition described as anemia.

Anemia is characterized by a shorter red cell life span, reduced hemoglobin concentration, and compensatory hyperplasia. All of these factors exert significant changes in HbA1c production (GUO et al., 2019).

The amount of hemoglobin inside the red blood cells is one of the criteria indicating the presence of anemia. In this study, in the DM group anemia was observed in 44.4% of the samples analyzed, while in the non-DM group the presence of low hemoglobin was 26.7% (Figure 1; Table 2). In the total number of samples, summing both groups, the rate of anemia observed was 33.3%. This data is important, especially in the interpretation of the HbA1c value, which suffers interference in anemic patients in view of the use of the value of blood hemoglobin in the calculation of HbA1c, by the methodology adopted in this study.

An integrative review study on anemia in the elderly found a wide range in the prevalences and etiologies of anemia, but especially among hospitalized and institutionalized elderly, the prevalence of anemia was high, as was the risk of mortality. In institutionalized individuals the chance of developing anemia reached almost 40.0% and the main causes were nutritional deficiency and chronic disease (MILAGRES et al., 2015).

Figure 2 shows that in the samples of the non-DM group the HbA1c results were affected, showing elevations not consistent with the GJ values presented, being more frequent in samples that presented anemia in relation to those that did not (23.5% versus 9.3%).

In the DM group (figure 3) the influence of the presence of anemia on HbA1c dosages was higher (100.0% versus 50.0%). However, the number of samples was low and therefore this data cannot be generalized. Furthermore, it is known that the GJ determination represents a point and current blood glucose data, while the HbA1c determination represents the average blood glucose in a longer determined time frame. In the situations presented in the DM group, besides the influence of anemic states, the higher value for HbA1c may have occurred due to peaks of hyperglycemia that increase the average blood glucose. For example, if the patient always maintained the mean plasma glucose value as presented in the GJ, the expected value for Hba1c would be close to 5.0% for a GJ of 99.0 mg/dL and 8.0% for a GJ of 185.0 mg/dL. However, it is known that the glycemic variation over the period evaluated by HbA1c can have a wide range of variation and it is difficult to determine exactly how much that variation represented. In these cases, frequent capillary monitoring using a glucometer is very useful, as is continuous glucose monitoring, because calculating the coefficient of variation can help detect peaks of hypoglycemia or hyperglycemia. Often, the ideal HbA1c value is achieved at the expense of frequent hypoglycemia on a daily basis (SBD, 2019a).

Similarly, observing the results of the samples of DM individuals without anemia, which are: HbA1c of 10.0% with GJ of 165.0 mg/dL and HbA1c of 8.9% with GJ of 125.0 mg/dL, it can be said that the elevated HbA1c results are not consistent with the GJ values, and may be associated with hyperglycemia peaks among other interfering factors.

In cases of elevated HbA1c, one should also consider drug interference such as the chronic use of salicylates and phenobarbital, which elevate the reactivity of glucose to hemoglobin, and also the clinical condition of renal failure (SBD, 2019a). These situations are frequent among the institutionalized elderly. Regarding chronic renal failure in patients with DM, HbA1c results are still controversial (NGPS, 2019).

This reinforces the importance of careful analysis of the factors that may be interfering with your HbA1c results when monitoring DM patients or diagnosing the disease. A study that evaluated the agreement between GJ and HbA1c levels showed good agreement between these methods for the diagnosis of DM (Franco et al., 2019). However, in the cited study, the situation of disease follow-up and the presence of anemia were not contemplated.

Anemia is a common condition among diabetic patients and its prevalence varies among ethnic groups. Chen et al. (2013) analyzed 1,441 Chinese patients with DM and observed a 22.8% prevalence of anemia. The anemic group was significantly older, with a mean age of 70.9 ± 11.4 years versus the non-anemic group with a mean age of 62.9 ± 11.6 years. In addition, it noted that diabetic patients with normal hemoglobin levels had a significantly higher mean HbA1c level than those who were anemic (7.4 ± 1.4% vs 7.3 ± 1.4%; p= 0.003).

A study of 1054 diabetics identified 132 anemic subjects (12.5%). Health status was worse in those with anemia, 47% had periods of illness or were feeling unwell, compared to 28% of those without anemia. Tiredness and lethargy were more pronounced in those with anemia, 74% felt tired and lethargic more often

compared to 52% of those without anemia (STEVENS; O'DONOGHUE; LAMEIRE, 2003). Other studies that also studied institutionalized elderly population reported the prevalence of anemia between 29.0 and 38.0% (MACEDO et al., 2011; NAKASHIMA et al. , 2012; SILVA et al., 2016).

The occurrence of anemia among diabetic samples observed in this study was higher than that found in the literature (44.4%). Although in this study the causes of anemia observed in the groups were not investigated, the high occurrence observed in the DM group may be associated with the large number of comorbidities, mostly NCDs, present in the individuals studied.

Anemia of renal origin and due to iron deficiency and its complications are the most studied among the anemias associated with DM.

Reduction in HbA1c levels has been observed in diabetic patients with renal macroalbuminuria. Anemia is a complication of chronic kidney disease now recognized as one of the first components of diabetic nephropathy (CHEN et al. , 2013). It is also considered one of the most common causes of end-stage renal disease. Thus, anemia is an important indicator of kidney disease, although most patients with DM are rarely tested for anemia (STEVENS; O'DONOGHUE; LAMEIRE, 2003).

Much has been discussed about glycemic control and the value of HbA1c in chronic renal failure in diabetics, due to the complexity of factors involved, and for this reason different studies with contradictory action of this factor are found, attributing increase or decrease of this dosage. Even though it is possible to evaluate the interference of carbamylated hemoglobin, HbA1c seems to underestimate glycemic control in dialysis, a fact that suggests further studies (NGPS, 2019).

In iron-deficiency anemia an increase in the substance malondialdehyde was observed, which was related to increased glycation of hemoglobin and consequent elevation of values in HbA1c dosage independently of plasma glucose levels (NGPS, 2019). In contrast, anemia without iron deficiency can lead to a decrease in HbA1c values (ENGLISH et al. , 2015; GUO et al. , 2019).

This phenomenon can cause confusion and difficulty in assessing HbA1c values and their contribution to the diagnosis and follow-up of DM. Thus, the types and degrees of anemia can have a significant impact on the reliability of HbA1c (ENGLISH et al. , 2015).

Attard et al. (2015) analyzed Chinese nutrition survey data and found that men, with iron deficiency, had an increased relative risk of being diagnosed with pre-diabetes using HbA1c dosing alone, when compared to using HbA1c and GJ.

Other studies showed inconsistent results and did not observe increased HbA1c values in iron deficiency (CAVAGNOLLI et al., 2015; GROSSMAN et al., 2016; AKKERMANS et al., 2018). These inconsistent findings may be due to the use of different methods for measuring HbA1c. Therefore, large-scale global studies should be conducted using standardized and verified measurement methods (GUO, et al. 2019).

Contrary, to what is observed with iron-deficiency anemia, the presence of large amounts of vitamins C and E have been described as inhibitors of the hemoglobin glycation process, producing falsely

decreased HbA1c results (SUMITA, 2012).

Other vitamin deficiencies such as Vitamin B12 or folate promote increased RBC survival causing falsely elevated HbA1c values (SUMITA, 2012). They have also been related to falsely increased values of

HbA1c some hemoglobinopathies, the presence of chemically modified hemoglobin such as carbamylated hemoglobin, associated with uremia and acetylated hemoglobin, associated with the use of high doses of acetylsalicylic acid, and also other conditions that promote an increase in the number of red blood cells and/or the hematocrit value (COSTA et al., 2018, SUMITA, 2012).

Hemoglobin variants lead to inconsistent results in the different methods used for HbA1c measurement, as they affect the glycation process. In 2011, the World Health Organization (WHO) highlighted that worldwide, hemoglobin heterogeneity affected HbA1c measurements. Although hemoglobin variants have low prevalence, caution is recommended when interpreting HbA1c values in such cases (GUO et al., 2019; NGPS, 2019).

No cases of variant hemoglobin diagnosis were reported in the elderly in the present study.

It is worth noting situations that can promote falsely decreased HbA1c such as bone marrow disorders due to radiation, toxins, fibrosis, tumors, medications, hemorrhage, chronic kidney disease with erythropoetin deficit, among others (COSTA et al., 2018).

In addition to the clinical implications that the presence of anemia may entail on HbA1c dosing results, it has been considered a risk factor for cardiovascular disease (CVD) in diabetic patients (CHEN et al., 2013). Diabetic individuals with anemia but no previous CVD have similar mortality risks as surviving CVD with diabetes but no anemia (GUO et al., 2019).

Systematic screening for anemia in diabetic patients will help identify a subgroup of people highly vulnerable to complications. Currently, people with DM are routinely screened for cardiovascular disease, not anemia, while both convey similar mortality risk (GUO et al., 2019).

Thomas et al. (2003) proposed that when HbA1c is ordered, the hemoglobin level should automatically follow, so that the physician can critically evaluate the laboratory test results.

The present study addressed the presence of anemia and its influence on the results of HbA1c dosage in the elderly. This test is recommended in the diagnosis and control of DM. The lack of research on the causes of anemia in the individuals studied, as well as the comorbidities present, may have compromised the understanding of the interfering in the results of HbA1c. In addition, the elderly studied are from an ILPI, which characterizes a convenience sample and, thus, the results are restricted to the elderly with similar characteristics. However, the results reported in this study suggest new lines of investigation in the use of the HbA1c test in the elderly and alert to the prevalence of the condition of anemia, especially in institutionalized and/or frail.

5 CONCLUSIONS

This study worked with samples of institutionalized individuals and allowed the observation of the interference of several factors in the HbA1c test, besides those already described in the literature, which deserve to be better studied, such as comorbidities and the type of anemia present.

The occurrence of anemia among samples of individuals in the DM group was higher than that described in the literature so far. However, this occurrence for the total group of elderly individuals studied was within the values cited by other studies with institutionalized individuals.

Thus, understanding the mechanisms that lead to anemia associated with DM may contribute to better management of the elderly patient, especially in relation to DM, due to the higher risk of complications and mortality.

Considering the interference of the presence of anemia on HbA1c levels and its high frequency in elderly individuals, the screening of Hb values is of utmost importance for the correct interpretation of blood glucose control and contributes to an adequate clinical intervention and, ultimately, increased life expectancy with quality for the individuals.

THANKS

The authors are grateful to the Long-stay Care Institution for the Elderly, its residents and professionals, and to the University Laboratory of Clinical Analysis - LUAC of the State University of Ponta Grossa, which allowed and contributed to this study.

REFERENCES

AKKERMANS, M. D. et al. Iron status and its association with HbA1c levels in Dutch children with diabetes mellitus type 1. Eur J Pediatr, v. 177, p. 603–10, Feb. 2018.

ATTARD, S. M. et al. Implications of iron deficiency/anemia on the classification of diabetes using HbA1c. Nutr Diabetes, v. 5, p.166, June 2015.

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Envelhecimento e saúde da pessoa idosa. Brasília: Ministério da Saúde, 2006.192 p. il. (Série A. Normas e Manuais Técnicos) (Cadernos de Atenção Básica, n. 19).

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Estratégias para o cuidado da pessoa com doença crônica: diabetes mellitus. Brasília: Ministério da Saúde, 2013.160 p. il. (Cadernos de Atenção Básica, n. 36).

BROOKS, A. P. et al. Iron deficiency and glycosylated haemoglobin A1. Lancet, Reino Unido, v. 19, n. 2, p. 141, July 1980.

CAVAGNOLLI, G.; PIMENTEL, A. L.; FREITAS, P. A.; GROSS, J. L.; CAMARGO, J. L. Factors affecting A1C in non-diabetic individuals: Review and meta-analysis. Clin Chim Acta, v. 445, p. 107–14, May 2015.

CHEN, C. X.; LI, Y. C.; CHAN, S. L.; CHAN, K. H. Anaemia and type 2 diabetes: implications from a retrospectively studied primary care case series. Hong Kong Med J, v. 19, n.3, June 2013.

COBAN, E.; OZDOGAN M.; TIMURAGAOGLU, A. Effect of iron deficiency anemia on the levels of hemoglobin A1c in Non-diabetic Patients. Acta Haematol, Suíça, v. 112, n. 3, p. 126-8, Aug. 2004.

COSTA, A. S.; RAMALHO, A.; LIMA, M.; BITOQUE, A. When HbA1c is not enough: a case of Baltimore Hemoglobin. Rev Bras Med Fam Comunidade, Rio de Janeiro, v.13, n. 40, p.1-6, Jan-Dez 2018.

ENGLISH, E.; IDRIS, I.; SMITH, G.; DHATARIYA, K.; KILPATRICK, E. S.; GARRY JOHN, W. The effect of anaemia and abnormalities of erythrocyte indices on HbA1c analysis: a systematic review. Diabetologia, v. 58, n.7, p. 1409-1421, July 2015.

FRANCO, L. F. et al . Glicemia de jejum de pacientes da rede pública de saúde na região sul de São Paulo: correlação com hemoglobina glicada e níveis lipídicos. Rev Bras Epidemiol, São Paulo, v. 22, e190058, nov. 2019.

GRAM-HANSEN, P; ERIKSEN, J.; MOURITS-ANDERSEN, T; OLESEN, L. Glycosylated hemoglobin (HBA1c) in iron and vitamin B12 deficiency. J Intern Med, Manila - Philippines, v . 227, n. 2, p. 133-6, Feb.1990.

GROSSMAN, A.; GAFTER-GVILI, A.; SCHMILOVITZ-WEISS, H; KOREN-MORAG, N.; BELOOSESKY, Y.; WEISS, A. Association of glycated hemoglobin with hemoglobin levels in elderly nondiabetic subjects. Eur J Intern Med, v. 36, p. 32–35, Dec. 2016.

GUO, W.; ZHOU, Q.; JIA, Y.; XU, J. Increased Levels of Glycated Hemoglobin A1c and Iron Deficiency Anemia: A Review. Med. Sci. Monit., v. 25, p. 8371-8378, Nov. 2019.

IBGE. Pesquisa nacional de saúde: 2019: informações sobre domicílios, acesso e utilização dos serviços de saúde: Brasil, grandes regiões e unidades da federação. IBGE, Rio de Janeiro, 2020.

INTERNATIONAL EXPERT COMMITTEE. International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. Diabetes Care, USA, v. 32, n.7, p.1327–1334, July 2009.

KEANE, W., F.; LYLE, P. A. Recent advances in management of type 2 diabetes and nephropathy: lessons from the renal study. Am J Kidney Dis, USA, v. 41, n. 3, suppl., p. 22 – 25, Mar. 2003.

LITTLE, R. R.; ROHLFING, C. L. The long and winding road to optimal HbA1c measurement. Clin Chim Acta, v. 418, p. 63-71, Mar 2013.

MACÊDO, V. F.; CORREIA, L. O.; SCORALICK, F. M.; PIAZZOLLA, L. P., MACÊDO , D. L. S. Prevalence of anemia in nursing home for the aged in Brasilia/DF. Geriatr Gerontol Aging, Rio de Janeiro - RJ, v. 5, n. 4, p.214-219, out.-dez. 2011.

MILAGRES, C. S.; FRANCESCHINI, S. C. C.; PRIORE, S. E.; LIMA. L. M.; Ribeiro, A. Q. Prevalência e Etiologia da anemia em idosos: uma revisão integral. Medicina (Ribeirão Preto); v. 48, n. 1, p. 99-107, fev. 2015.

MORALES, P. S. Quais condições clínicas podem interferir no resultado da hemoglobina glicada? Portal PebMed. Disponível em: https://pebmed.com.br/quais- condicoes-clinicas-podem-interferir-no-resultado-da-hemoglobina-glicada/. Acesso em: 09 set. 2020.

NAKASHIMA, A. T. A.; MORAES, A. C. F. de; AULER, F.; PERALTA, R. M. Anemia prevalence and its determinants in Brazilian institutionalized elderly. Nutrition, v. 28, n. 6, p. 640-3, June 2012.

NGSP. National Glycohemoglobin Standardization Program - Web site. Factors that interfere with HbA1c test results. Updated 8/21/2019, 2019. Disponível em: http://www.ngsp.org/factors.asp. Acesso em: 31 Mar 2021.

OMS. Organização Mundial de Saúde. Lucha contra la anemia nutricional, especialmente contra la carência de hierro: Informe ADI/OIEA/OMS. (Série de Informes Técnicos Nº 580), Genebra, OMS, 71 p., 1975.

RITZ, E. Managing anaemia and diabetes: a future challenge for nephrologists. Nephrol Dial Transplant, v. 20, suppl. 6, p. 21-25, June 2005.

SBD. SOCIEDADE BRASILEIRA DE DIABETES. Diretrizes da Sociedade Brasileira de Diabetes 2019-2020. Rio de Janeiro: Clannad, 2019a.

SBD. SOCIEDADE BRASILEIRA DE DIABETES. Posicionamento Oficial SBD nº 07/2019 - Abordagem da pessoa idosa com diabetes 2019/2020. Rio de Janeiro: Clannad, 2019b.

SILVA, E. C. da et al. Factors Associated with Anemia in the Institutionalized Elderly. PLoS ONE, v. 11, n. 9,e0162240, Sept. 2016. Disponível em: https://doi.org/10.1371/journal.pone.0162240. Acesso em: 15 abr. 2021.

STEVENS, P. E.; O'DONOGHUE, D. J.; LAMEIRE, N. R. Anaemia in patients with diabetes: unrecognised, undetected and untreated? Curr Med Res Opin, v. 19, n. 5, p. 395-401, Sept. 2008.

SUMITA, N. M. As interferências e limitações metodológicas na dosagem da hemoglobina glicada (A1c). J Bras Patol Med Lab, v. 48, n. 5, p. 312-3, out. 2012.

THOMAS, M. C. et al. Unrecognized anemia in patients with diabetes: a cross-sectional survey. Diabetes Care, USA, n. 26, v. 4, p. 1164-69, Apr. 2003.
eletrônica Enfermería actual em Costa Rica. Edição 36. p. 4-15.

CHAPTER 48

Use of psychoactive substances among nursing students

10.56238/rsfohsv1-048

Marília Nunes de Andrade
Nursing student at the Centro Universitário Dinâmica das Cataratas, Brazil
E-mail: mariliaandrade2021@hotmail.com

Wesley Martins
PhD in Sciences from Universidade de São Paulo. Professor at the Centro Universitário Dinâmica das Cataratas and at Universidade Estadual do Oeste do Paraná, Brazil
E-mail: wesley.martins@udc.edu.br

ABSTRACT
This study aims to carry out an integrative review of the literature about anxiety in nursing students and the use of anxiolytic drugs. It has a descriptive and qualitative character, carried out by analyzing studies available on the Scientific Electronic Library Online portal (SciELO), MEDLINE database via PubMed and Google Scholar. The research took place in September 2022. The articles were selected according to the terms: "psychoactive substances", "nursing", "students" and "psychotropics", with the help of the Boolean operator 'AND'. The selected articles were published between the last five years (2018 to 2022), fully available for free, exclusively in the Portuguese language. Seventeen articles that met the inclusion criteria were selected and analyzed. Data were analyzed descriptively, identifying the psychoactive substances and motivations listed in each article. In the studies addressed, alcohol was the psychoactive substance most used by nursing students. The main motivations described were: influence from friends, need for social inclusion, extensive workload, relationship difficulties, fear and anxiety. Intervention is necessary, through educational measures, to elucidate the risks of using psychoactive substances, especially alcohol and illicit drugs, as these lead to changes in sleep, concentration, damage to the nervous system and changes in behavior. Briefly nursing students, with the noble profession focused on care, attention to health and safety of patients.

Keywords: Nursing Students; Mental health; Psychoactive Agents; Psychoactive Substance Abuse; Psychotropics.

1 INTRODUCTION

When students are approved to enter higher education, they go through neurological, psychological and physiological transformations due to the passage from adolescence to adulthood. The change of environment, routine, stressful factors, intensification of studies, exposure to different teaching methodologies, social relationship difficulties, distance from family and friends, and financial problems may represent situations that lead to physical, mental, and socioemotional impairment, impacting academic life. This is remarkably confirmed by the estimate that 8 to 15% of undergraduates present some type of psychiatric disorder during their academic training, especially anxiety (SILVA et al., 2021; SANTOS and SPÓSITO, 2022).

Nursing students experience situations in their academic practice, encountering the process of illness, suffering, and death of patients. Such experiences can trigger anguish and stress, which can evolve into disorders related to anxiety and depression. Besides the psychological pressures, competitiveness, and insecurity about the professional future, which comes mainly from the devaluation and the growing number of professionals available in the market. Therefore, in the academic environment, it is common to present

signs and symptoms indicative of stress, distress, fear and anxiety (LELIS et al., 2020; PUSCH et al, 2021).

Psychoactive substances promote alterations in the brain's biochemical mechanisms and mental function. These substances can cause arousal, sedation, or disturbance, impacting on disorders in behavior, mood, sleep, attention, memory, speech, gait, and thought content. Psychoactive drug use is a public health problem with major social, economic, and physical, mental, and biopsychosocial health impacts. The consumption of illicit drugs may be associated with the ease and proximity of access within the academic environment, with alarming rates, such as: the consumption of marijuana, the most consumed illicit drug in the world, with prevalence of 13.8% among college students, per year in Brazil; also highlighting cocaine among college students, with prevalence of 3.0% (REGNE et al., 2020; MACEDO et al., 2020).

Many college students go through multifactorial experiences that contribute to the consumption of psychoactive substances, whether licit, such as anxiolytics, which act on the Central Nervous System, or illicit, such as marijuana, cocaine, and crack. Psychoactive substances or psychotropics act to control anxiety and depression, but their abuse can lead to chemical dependence and undesirable adverse events. Thus, this study aims to conduct an integrative literature review on the use of psychoactive substances among nursing students (SILVA et al., 2021; SANTOS and SPÓSITO, 2022).

2 METHODOLOGY

This is an integrative review study, which allows the construction of a broad analysis of the literature, contributing to discussions about the use of psychoactive substances in nursing students, as well as reflections on the conduct of future studies. The research was carried out by means of studies available at the *Scientific Eletronic Library On line* (SCIELO) portal, in the MEDLINE database via PubMed and Scholar Google. The following descriptors were used: "psychoactive substances", "nursing", "students" and "psychotropic drugs", with the help of the Boolean operator 'AND', fully available for free, with a time frame between 2018 and 2022, in Portuguese.

The criteria established as inclusion in this research were: complete and original articles made freely available in these previously established databases; having been published in the last five years, that is, between 2018 and 2022; present with the selected descriptors; presenting framing in the theme: "presence of psychoactive substance use and having data exclusively and/or isolated from undergraduate nursing students.

As exclusion criteria, we used: studies with publication date less than 2018; publication in abstracts; articles made available in a non-free form or only fragments of the article; articles containing general data of health academics, escape from the theme (such as not containing the description of psychoactive substances); as well as, monographs, theses and dissertations, duplicate studies and congress annals.

To construct this integrative literature review, we chose to adopt the steps established by Gil's (2010) method. The steps used will be described below:

1st: Identification of the research topic and hypothesis for the integrative research design;

2: Establishing criteria for the inclusion and exclusion of studies in the literature;

3rd: Definition of the information to be extracted from the selected studies/categorization of the studies;

4th: Evaluation of the studies;

5th: Interpretation of the results and;

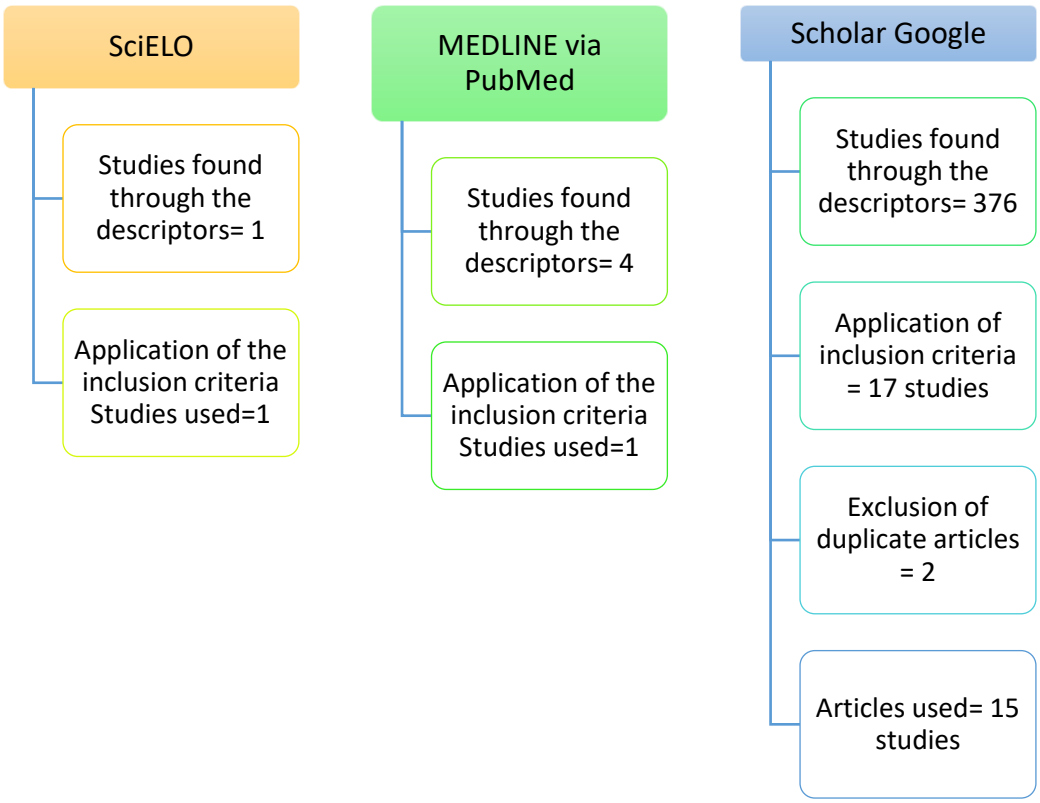
6th: Presentation of the review/synthesis of knowledge.

After selection by filters and identification of the articles in the databases, the abstracts, methodologies, and results of the selected articles were read to verify that they fit the theme, the relevance of the study, and the relationship with the guiding theme. Only then, were the seventeen studies selected for intergral reading and summarization, according to flowchart 1.

We used one (1) article from SciELO, one (1) article from MEDLINE with the PubMed search engine, and three (15) articles from Google Scholar, totaling 17 articles. It is worth noting that the descriptors for the search in SciELO and MEDLINE were identical: "psychoactive substances", "nursing", "students" and "psychotropic drugs", with the help of the Boolean operator 'AND', fully available for free, with a time frame between 2018 and 2022, exclusively in Portuguese.

For the search in Scholar Google, the filters were used: time between 2018 and 2022; search in pages in Portuguese and the phrase "Use of psychoactive substances in nursing students", only with the objective of refining the studies found. To exclude articles with parallel descriptors, the articles were selected by title and after filtering, reading of the abstracts. Since this is an integrative literature review study, this study did not undergo the analysis of the Ethics Committee on Research Involving Human Beings (CEP), since no individualized data was collected, however, the researcher is committed to respect all ethical and legal issues governed by the resolutions CNS 466/2012 and CNS 510/2015.

Flowchart 1 - Selection of studies according to inclusion criteria, filters and application in the databases



Source: Research databases, 2022.

3 RESULTS AND DISCUSSION

Table 1 contains the enumeration of the articles and their data used for this study. Among the data are number (just to facilitate discussion of the studies), title, authors and year, journal of publication, and objective(s) of the studies.

For this integrative review article, seventeen (n=17) articles containing the theme addressed, present in the aforementioned research bases, were used.

Table 1- Distribution of articles located in the SciELO portal and MEDLINE and Scholar Google databases.

Art (T)	Title	Authors/Year	Magazine	Objective(s)
01	Consumption of alcoholic beverages, tobacco and illicit drugs among nursing undergraduate students	Macêdo TTS, et al 2020	REVISA	To describe the consumption of alcoholic beverages, tobacco and illicit drugs among newcomers undergraduate nursing students
02	Associations between alcohol use and sociodemographic profile of undergraduate Nursing and Nutrition students	Nunes BSM, et al, 2021	SMAD, Revista Eletrônica Saúde Mental Álcool e Drogas	To verify the pattern of alcohol use among undergraduate nursing and nutrition students at a public university and possible associations between sociodemographic variables
03	Risk perception and drug use among university nursing students, Arequipa, Peru	Urday-Concha F, et al, 2019	Revista Enfermería Actual	To make a first approximation about the prevalence of life, information, perceptions and risk behaviors regarding licit, illicit and drug use, according to gender, in nursing students
04	Psychoactive substance use by nursing students: literature review	Regne GRS, et al, 2020	Saúde em Redes	Idenify the state-of-the-art scientific evidence on psychoactive substance use among nursing students.

05	Nursing students' knowledge and use of psychoactive substances	Fernandes MA, et al, 2020	Cuidado é fundamental	To evaluate the consumption and knowledge about psychoactive substances of nursing students from a public university.
06	Nursing students: use of medications, psychoactive substances and health conditions	Sousa BOP, et al, 2020	Revista Brasileira de Enfermagem	To evaluate the use of psychoactive drugs without prescription and its associations with substance use and health aspects among nursing students
07	Correlation of psychoactive substance use with signs of anxiety, depression and stress in nursing students	Pires PLS, et al, 2019	Revista de Atenção a Saúde de São Caetano do Sul	To evaluate the associations between problematic use of alcohol and other drugs, stress, anxiety and depression in nursing students
08	Tobacco and alcohol use and health behaviors among nursing students	Silva ACT, et al, 2021	AV enfermagem	To evaluate the association between attitudes, health behaviors, and tobacco and alcohol use in a group of nursing students.
09	Drug consumption and knowledge about its consequences among undergraduate nursing students	Souza J, et al, 2018	Texto e Contexto em Enfermagem	To analyze the pattern of psychoactive substance use and knowledge of the consequences of alcohol, marijuana, and cocaine use of undergraduate nursing students in their first and final year.
10	The Phenomenon of Drugs from the Perspective of Nursing Students: Profile of Consumption, Attitudes and Beliefs	Magalhaes LSP, et al, 2018	Escola Anna Nery	To describe and analyze the profile of drug use and abuse among 1st and 5th year undergraduate nursing students and to investigate their attitudes and beliefs towards drugs and users
11	Association between binge drinking and tobacco use among nursing students	Sousa BOP, et al, 2018	Revista Eletrônica de Enfermagem	The study aimed to evaluate alcohol use in the bingeing pattern and its association with tobacco in nursing students.
12	Consumption of Alcoholic Beverages Among Nursing Students	Pereira JA, et al, 2018	Revista Contexto & Saúde	To identify the profile of nursing students from a Higher Education Institution who drink alcoholic beverages, how often this occurs and to identify the relationship between the consumption of alcoholic beverages and factors sociodemographic.
13	Implications of depressive and anxiety disorders in the lives of nursing students	Espindola MF, et al, 2020	Enfermagem Revista	To investigate the implications of depressive and anxiety disorders in the lives and relationships of nursing students; to identify the basic human needs affected among the participants
14	Licit drug use among nursing students and the chemical dependency process: a literature review	Bauduina ET, et al, 2021	Revista de Trabalhos acadêmicos	To learn about licit drug use among nursing students and the relationship to chemical dependence.
15	Influence of drug use on full attention among nursing students	Seleghim MR, et al, 2020	Revista Brasileira de Enfermagem	To verify the association of the presence of drug use with the dimensions of mindfulness in a population of nursing technical education students.
16	Consumption of alcoholic beverages among nursing students of a university center	Fernandes MA, et al, 2019	SMAD, Rev. Eletrônica Saúde Mental, Álcool e Drogas	Investigating the pattern of alcohol consumption among nursing students at a University Center
17	Fatigue and alcohol use by undergraduate nursing students	Silva NDO, et al, 2021	SMAD, Rev. Eletrônica Saúde Mental, Álcool e Drogas	To analyze the use of alcohol on a binge drinking pattern and the levels of fatigue in undergraduate nursing students at the Federal University of Uberlândia

Source: elaborated by the authors, 2022.

The articles were numbered from 1 to 17 only to facilitate the identification of the articles at the time of discussion. Article 01, entitled "Consumption of alcoholic beverages, tobacco and illicit drugs among university students in the nursing area", developed by Macedo and other authors, published in 2020.

The authors conducted a descriptive study, with 119 entrants from a public university in Salvador, Bahia, Brazil, evaluated by the Alcohol Use Disorder Identification Test (AUDIT) questionnaire, and found results with a predominance of women, social class C, black race/color and single for substance use. Of the public evaluated, 17.6% were passive smokers, 55% used alcoholic beverages, with 33.2% drinking more than five doses on one occasion.

For Macedo, et al. (2020), the excessive consumption of alcoholic beverages, tobacco and illicit drugs brings disorders in personal, family and social aspects, with statistics in traffic accidents and violence. Alcohol is the most consumed substance by young people in Brazil, followed by tobacco, marijuana, and stimulants. The young are moved by curiosity, novelty, fun or pleasure, sometimes influenced by advertising, media, and invitation from friends and family. The media passes on the image of alcoholic beverages associating them with pleasure, beauty, success, power and satisfaction, being a stimulus to their use.

In addition to these factors, other reasons for students to consume psychoactive substances, as pointed out by Macedo et al (2020) are: obstacles in adapting to the demands of the course, distance from family members, beginning of adulthood, increased responsibilities, high workload required in the course, failure, stress, feelings of anxiety in expectation of future jobs, fear and difficulties of interaction in social environment and relationships. The indiscriminate use of alcoholic beverages causes psychological suffering, favoring unprotected sexual activities and an increase in the incidence of chronic diseases.

Article T2, authored by Nunes, et al. (2021), brings as its theme the associations between alcohol use and sociodemographic profile of undergraduate Nursing and Nutrition students. A descriptive-exploratory study was conducted at a public university in São Paulo, Brazil, with 170 students, 91 of whom were nursing students enrolled from the first to the last year of the course, and 79 nutrition students. The Alcohol Use Disorder Identification Test (AUDIT) was applied, as in the study by Macedo et al., (2020), to verify the pattern of alcohol consumption. The AUDIT is composed of 10 objective questions that allow answers with pre-established weights, ranging from zero to four. The sum of the weight of each question indicates the classification of individuals in the pattern of alcohol consumption: 0 to 7 - moderate drinking, 8 to 15 risk drinking, 16 to 19 harmful use, and 20-40 - possible alcohol dependence.

The results showed a prevalence of alcohol use of 80% of the students, 77% of the academics did not see a problem in drinking, only 13.5% never used alcohol, 59.41% consumed 5 or more doses of alcohol on a single occasion (binge drinking), 44% of the academics ever felt guilt or remorse after drinking, and there were blackouts in 56.47% of the students, despite the alarming data, 53.5% showed a low-risk pattern of alcohol use.

The T3 article titled "Risk perception and drug use in university nursing students, Arequipa, Peru" was written by Urday-Concha, et al. (2019). Of 86 third-year nursing students at a private university in the metropolitan area of Arequipa, a prevalence of 84.4% on alcoholic beverages, 62.8% on tobacco, 19.8% on tranquilizers, 17.1% on marijuana use, and 4.6% on cocaine was perceived. The results showed a large

problem of licit, illicit and medicinal drug consumption among university students.

For these authors, there has been a gradual increase in the prevalence of drug use at some point in life, among which alcohol, tobacco, marijuana, and stimulants stand out. The main motivations for using psychoactive substances are: curiosity, fun, pleasure, being with a partner or friends, social interaction, and belonging to a peer group. There is an emergency in the development of strategies for health promotion and prevention of psychoactive substance use in nursing among future professionals, aiming to establish healthy lifestyles to ensure a better quality of life in the population.

The article T4 entitled "Use of psychoactive substances by nursing students: literature review", by Regne et al. (2020), from a search in the Virtual Health Library Portal (VHL), in 17 articles about the use of psychoactive substances in nursing students. This study identified the following motivations for substance use: stress, psychological suffering, overload in academic life, anxiety, irritability, social interaction, media influence, financial problems, and belonging to a social group.

In the studies by Regne et al. (2020), the most cited psychoactive substances were alcohol, caffeine, tobacco, marijuana and anxiolytic drugs. Suffering and stress occur due to concerns about instability in the job market, professional performance, and unemployment after graduation, put pressure on the student, and may be a predisposing factor to the use of psychoactive substances.

The article T5, authored by Fernandes and other authors, 2020, was published in the online journal Cuidado é Fundamental, entitled "Knowledge and consumption of psychoactive substances by nursing students". The authors aimed to evaluate the consumption and knowledge about psychoactive substances of nursing students from a public university. The research was conducted at a federal public university in northeastern Brazil, with a sample of 125 nursing students, of majority age. The study revealed the use of substances of highest incidence, the first identified was alcohol, with 80% prevalence, followed by hypnotics and sedatives, with 12%, marijuana (11%) and tobacco (10%). It is noteworthy that 85% of the study population was between 17 and 25 years old, affirming the idea of how young people are affected by psychoactive substances.

In the study by Fernandes et al., 2020 (T5), the factors related to the consumption of psychoactive substances by college students cited are dissatisfaction with interpersonal relationships, search for acceptance and avoid social isolation. For these authors, emotional demands stimulate the search for psychoactive substances for the relief of social pressure, which can lead to problems and damage to the users' nervous system, damage to health, and also social impacts.

In this same study, relevant issues about the population studied were addressed. According to the authors of article T5, college students are a heterogeneous public, however, in the area of knowledge of undergraduate nursing one works to help other lives, but students are exposed to situations and experiences that may or may not favor abuse

and the multiplicity of drug use and its risks. Undergraduate nursing students should be encouraged to take health education actions for the prevention of irrational use of psychoactive substances, including

chemical dependence, observing flaws in the curricula of courses, for not addressing the aforementioned theme.

The article T6 entitled "Nursing students: use of medications, psychoactive substances, and health conditions", authored by Sousa and authors, 2020, published in the Brazilian Journal of Nursing, aimed to evaluate the use of psychoactive medications without prescription and their associations with the use of psychoactive substances and health aspects among nursing students. The authors found a percentage of 79.2% use of psychoactive drugs without prescription, with a predominance of monthly consumption. Among nursing students, the use of psychoactive drugs was associated with alcohol use, binge drinking, smoking, and use of illicit drugs.

Such a study is extremely relevant because it reveals a common problem among nursing students, the abuse of psychoactive drugs without a prescription. More than half of the students used psychoactive drugs without medical prescription in the last year, with monthly use. The causes for this use cited were: ease of access, misinformation about the reactions of the drugs, and low perception of the harmfulness of using these substances. The authors mention self-medication by nursing students, without medical prescription, with high prevalence and state that in their study the abuse of non-prescription drugs occurred at some point during graduation, usually due to anxiety.

For Sousa et al., 2020, in addition to non-prescription psychoactive drugs, alcohol, tobacco, and marijuana were prevalent. The excessive use of tranquilizers/sedatives were motivated by anxiety and difficulty sleeping. The use of these substances can lead to chemical dependence, increased threshold of tolerability of these substances by the body, leading to the need for increasingly higher doses, with a greater likelihood of developing adverse drug reactions and desired side effects. With special attention to the use of amphetamines used to increase wakefulness, motivation, improvement in academic performance, and cognitive aspects such as learning and memory.

The article T7 by Pires and other authors, 2019, in Revista de Atenção a Saúde de São Caetano do Sul, entitled Correlation of psychoactive substance use with signs of anxiety, depression, and stress in nursing students, aimed to evaluate the associations between the use of alcohol and other drugs, with stress, anxiety, and depression in nursing students. The study was conducted with 202 nursing students from a public university in Minas Gerais, Brazil. Screening tests for involvement with alcohol, cigarettes and other substances, and stress, depression and anxiety scales were applied.

The risky use of alcohol, tobacco, and marijuana were the substances most commonly used by nursing students and commonly associated with stress, depression, and anxiety at severe levels. Depression was correlated with alcohol, tobacco, and marijuana use, as well as stress was associated with alcohol and/or marijuana use and anxiety with marijuana. For the authors of article T7, depression, stress, and anxiety are the highly prevalent mental illnesses among the surveyed academics. The risk factors most described for the use of psychoactive substances were: difficulty in developing clinical practice, accumulation of

academic activities, preparation of the end-of-course assignment, time management, and concerns with professional training.

According to Pires et al., 2019, there is a strong association between substance use, depression, anxiety, and stress. It is essential to make institutional, family, and interpersonal efforts to minimize the main causes of the development of mental disorders among nursing students. Insecurity, interaction and communication difficulties, knowledge limitations, demands for good academic performance, financial problems, and transition from the family environment to the university environment are important predictors and should be addressed as a way to promote mental health and prevent drug use among young college students, with strategies for education and welcoming of nursing students.

The article T8 entitled "Tobacco and alcohol use and health behaviors among nursing students" was published by the authors Silva et al, 2021, in the journal Avances en enfermería, with the objective of evaluating the association between attitudes, health behaviors, and tobacco and alcohol use in a group of nursing students. This study was very specific about the use of psychoactive substances, in accordance with the national prevalence in college students, that is, higher prevalence of alcohol and tobacco.

The study by Silva et al, 2021, was conducted with 182 undergraduate nursing students in São Paulo, Brazil, being applied the Alcohol Use Disorders Identification Test-C (AUDIT-C), Fagerström Test for Nicotine Dependence (FTND), Questionnaire on Attitudes and Health Behaviors (CACS), and Patient Health Questionnaire-2 (PHQ-2), resulting in inappropriate health behaviors, with alcohol consumption exceeding 50% of academics in the past month, and identification of experimental use of illicit drugs and tobacco. Excessive alcohol consumption represented deficits in self-care. The behavioral health attitudes in the study were associated with the use of psychoactive substances and highlight the need for interventions promoting well-being and a healthy lifestyle for nursing students.

Article T9 is entitled "Drug consumption and knowledge about its consequences among undergraduate nursing students", written by Souza and authors, 2018, in the journal Text and Context in Nursing. The main objective of the study was to analyze the pattern of psychoactive substance consumption and knowledge of the consequences of alcohol, marijuana, and cocaine use of undergraduate nursing students in the first and last year of the course.

The convenience sample consisted of 141 students, aged 18 years or older, and the Alcohol, Tobacco and Other Substance Use Screening Questionnaire (ASSIST) and the questionnaire on knowledge of the consequences of alcohol, marijuana and cocaine use developed by the group of researchers of the Inter-American Drug Abuse and Control Commission (CICAD) in partnership with the Centre for Addiction and Mental Health (CAMH) were applied. ASSIST assessed the pattern of alcohol and other drug use, and CICAD measured students' knowledge of the consequences of alcohol, marijuana, and cocaine use in relation to the negative effects on the biopsychosocial sphere.

The results of T9 revealed the consumption of psychoactive substances. In 84.4% of the students there was use of alcohol and/or illicit drugs ever in their lives, 57.2% used only alcohol, 26.7% used alcohol

and some illicit substance, and only 15.6% had never tried psychoactive substances in their lives. There was no association between the first and last year of the undergraduate nursing course and the use of alcohol, marijuana, and cocaine at some time in life.

As for the consequences of alcohol, marijuana and cocaine use, the students obtained good knowledge about the substances, in 86.5% they obtained more than half of correct answers for alcohol, 68.8% for marijuana and 76.6% for cocaine. The good level of knowledge presented by students, including first-year students, suggests that such knowledge was not built in the university environment, but probably throughout life experiences or through prevention strategies in the media or basic education schools.

Another prominent factor in article T9 refers to the onset of psychoactive substance use. College students are in a situation of vulnerability to experimental use, which leads to potential risk for maintenance, increased frequency and/or concomitant use with other drugs, was also identified in this study. For the authors, the use of psychoactive substances can lead to the development of physiological, psychological, and social harm and represents a risk factor for accidents with motor vehicles, intoxication, violence, sexual abuse, unprotected sexual intercourse, and poor academic performance.

The article T10 is entitled "The phenomenon of drugs from the perspective of nursing students: profile of consumption, attitudes and beliefs", by Magalhaes and other authors, published in the year 2018, in the journal of the Anna Nery School. This article had as its main objective "To describe and analyze the profile of drug use and abuse among 1st and 5th year undergraduate nursing students and to investigate their attitudes and beliefs towards drugs and users".

Methodologically, the article T10 carried out the study with 160 students belonging to the Federal University of Rio de Janeiro State, who answered the instruments: ASSIST and NEADA FACULTY SURVEY, finding as results, the prevalent use of alcohol, as the most used drug in the last three months, present in 69.4% of the 1st year academics and in 80% of the 5th year students. The students believed to have adequate basic education about drugs, but presented prejudice and negative attitudes towards drug users. The pattern of drug use among students and the unpreparedness to assist users reinforce the need to review and reformulate content and practices on the use of psychoactive substances by nursing students.

For Magalhaes et al., 2018, it is necessary to know the beliefs and attitudes of students to collect information about the real interpretation of academics of experiences with drugs and their users. University students are in a process of professional identity construction and knowledge about the perception of studies leads to information to develop strategies to prevent the irrational use of these substances. The students' beliefs can determine the type of attitude, positive or negative, of the students, besides directing care to drug users, effective assistance, safety, and guarantee nursing actions according to public policies, humanitarian actions and respect to citizenship.

Article T11 was published in the year 2018, in the Electronic Journal of Nursing, with the title "Association between alcohol consumption in the binge pattern and tobacco in nursing students", by the authors Sousa, et al, 2018. The study aimed to evaluate the use of alcohol in the bingeing pattern and its

association with tobacco in nursing students. The study was developed with 182 students, applying the Alcohol Use Identification Test - Consumption (AUDIT C) and Fagerström Nicotine Dependence Test (FTND). Of the participants, 48.9% were classified in the binge drinking pattern, i.e., they were associated with frequency of alcohol use, dose of consumption, and frequency of use of five or more doses on a single occasion.

The pattern of smoking was associated with the time of smoking after waking, number of cigarettes per day, morning consumption, smoking at any time of the day, prohibition situations, and cases of illness. Binge smoking was associated with the frequency and dose of alcohol and tobacco use. Binge drinking can be defined as heavy use in a single episode until blood alcohol concentrations reach 0.08g/dL, equivalent to the consumption of five or more doses for men and four or more doses for women, taken within two hours.

According to Sousa et al., 2018, knowledge about the prevalence and pattern of alcohol and tobacco consumption in the university context makes it possible to understand the effects on nursing students. The National Curriculum Guideline that guides nursing education advocates that "nurses should be competent in caring for their own physical and mental health and seek their well-being as citizens." However, negligence in self-care by the future health professional can encourage the community to assume behaviors that generate health risks, making early identification of problems associated with alcohol and tobacco use, collective awareness, and the search for intervention strategies aimed at undergraduate students essential.

The article T12 "Consumption of Alcoholic Beverages Among Nursing Students", authored by Pereira and authors, 2018, in the Context & Health Journal, aimed to identify the profile of students in the Nursing course of a Higher Education Institution who make use of alcoholic beverages, how often this occurs, and to identify the relationship of alcoholic beverage consumption with sociodemographic factors.

Pereira et al., 2018, identified 83.1% of students have a preference for the company of friends who do not make any restrictions regarding the exaggerated consumption of beverages. Friends' influence is one of the motivating factors for drinking, followed by curiosity, family influence, and drinking by mistake. 67.6% of the students reported that there were no changes after entering the university.

In article T12, the signs and symptoms most reported by students were: joy, animation and good mood, showing the association of alcoholic beverage to positive effects according to the perception of the students. However, thirst, headache, sleepiness, urinary incontinence, lower inhibition, and instability of emotions were also listed, showing potentially harmful effects on social life, negative impacts on life goals, relationships, financial problems, work, and health.

According to Pereira et al., 2018, alcohol is an addictive drug, capable of altering the individual's mental state, and can lead them to senseless acts, problems with family and society. Alcohol abuse is associated with other psychiatric conditions, such as personality changes, depression, bipolar affective disorder, anxiety, and even suicide. In the study, about 65% of the students reported regret after drinking alcoholic beverages. According to the authors, the level of regret is directly proportional to making

decisions and choices that allow them to avoid this outcome, a fact that represents a warning strategy about the potential negative consequences of behavior through the use of alcohol and other psychoactive substances.

Article T13 was developed by Espíndola and other collaborators, entitled "Implications of depressive and anxiety disorders in the lives of nursing students", published in the journal Enfermagem Revista, in the year 2020. This article calls attention to the association of depressive and anxiety disorders, in the period of the Covid-19 pandemic, the academics, upon finishing their graduation, would already be being absorbed by the labor market, with the high demand for health professionals in the pandemic period, worldwide. However, there were questions about how anxiety already affects individuals since their training process at university.

Espíndola et al., 2020, aimed to investigate the implications of depressive and anxiety disorders in the life and relationships of nursing students, as well as to identify the basic human needs affected among the participants. The study, despite having been conducted with a small sample in a nursing school in the South region of Brazil, identified depressive and anxiety disorders among the students, the main ones being: eating disorders, changes in sleep and rest, decreased physical activities and leisure, sudden distance from family and friends, and stress, associating the demands of the university to severe impacts on health, being essential activities that promote well-being, physical and mental health.

The authors of article T13 focus on the feelings experienced when entering university and the changes at the beginning of adulthood, such as frustrations, fears and anguish. The distance from the family, demands in the studies, numerous tests and exams, excessive workload, difficulty in social interaction, economic factors, among others, compromising mental health, since the academics have greater responsibilities compared to high school. Nursing is a career dedicated to care and in the training process there is no approach to self-care, avoiding feelings of uncertainty, fear, anguish and insecurity, triggers of anxiety and depression.

Health does not mean absence of disease, but rather a set of factors that involve physical and mental well-being, self-care, education, socioeconomic conditions, and other factors. According to the World Health Organization (WHO), the concept of health is described as "a state of complete physical, mental, and social well-being and not merely the absence of disease and illness," the conception of health is related to historical, cultural, political, economic, technical, and scientific processes, in addition to being influenced by dominant classes and systems globally (AMARO and ASSUNÇÃO, 2019).

For Gaino and other authors, 2018, mental illness should be assessed individually, in a singular manner, in order to contemplate the concrete implications of psychic suffering in the daily lives of individuals. Care and judicious evaluation with mental health is indispensable from the student sphere, since the approach should include discussions about mental health in current times, expanding the fields of knowledge, technical work and public health policies, with a broad definition, but essential to the care of academics and educational, avoiding the abuse of pasicoactive substances.

Article T14 is entitled "Licit drug use among nursing students and the process of chemical dependence: a literature review", developed by Bauduina, et al, 2021, and published in the Journal of Academic Works Universo Belo Horizonte, in the year 2021. The authors had as their main objective to know the use of legal drugs among nursing students and their relationship with chemical dependence.

For Bauduína and other authors, 2021, based on the systematic review of the literature, led to relevant results between the years 2010 and 2020. According to the authors, the consumption of psychoactive substances was on the rise in the time frame of the research, due to easy access to legal drugs, the process of social acceptance and cultural integration, generating the trivialization of alcohol and tobacco consumption by students. In the study by Bauduína et al. alcohol was the drug most susceptible and subject to chemical dependence, introduced in adolescence due to curiosity, sociocultural environment, feeling of belonging and inclusion and acceptance by friends and family, tension in the studies, however, the use of these substances leads to serious problems in memory and learning of students.

Titled "Influence of drug use on full attention among nursing students", conducted by Seleghim and other authors, in 2020, the T15 study was published in the Brazilian Journal of Nursing and had as its main objective "to verify the association of the presence of drug use with the dimensions of full attention in a population of students of technical education in nursing". The experimental research was carried out with In this study, 135 students of both genders, aged 18 years or older participated, by convenience sample, and the screening tests for involvement with Alcohol, Tobacco and Other Substances (ASSIST), and the Questionnaire of the Facets of Mindfulness (FFMQ-BR) were applied.

The authors of T15 emphasized the importance of each test, since the ASSIST instrument is a questionnaire about the use of psychoactive substances: tobacco, alcohol, marijuana, cocaine, stimulants, sedatives, inhalants, hallucinogens, and opiates, according to the frequency of use in life and in the last three months, problems of use, concern about the use by people close to the user, problems in the execution of tasks, unsuccessful attempts to reduce or stop the use of substances, compulsion, and injecting use, with a score of 0 to 20. The FFMQ-BR measured the levels of mindfulness according to the degree of agreement in the concept of mindfulness.

In the study of T15, alcohol (74.6%), tobacco (44%), and marijuana (8.8%) were the substances most reported among the students. As for the level of full attention, the sample showed a regular level of full attention, being considered by the authors as satisfactory, referring to not affecting individuals with internal feelings and thoughts. The positive association between having used drugs recently and the ability to not react to internal experiences is consistent with the mindfulness posture and allows the exit from the automatic mode to a conscious response even when faced with the use of psychoactive substances.

The T16 article entitled "Alcohol consumption in nursing students of a university center" was derived from a research conducted by Fernandes and other authors, in 2019 and was published in SMAD, Revista Eletrônica Saúde Mental, Álcool e Drogas, under the main objective of Investigating the pattern of alcohol consumption in nursing students of a University Center. For this exploratory study, the

methodological design consisted of 372 nursing students from a University Center, in May 2014, by means of the questionnaire and the AUDIT scale.

The information contained in article T16 describes the profile of consumption, frequency and distribution of alcohol consumption among nursing students. The students' questioning showed that the first contact with alcohol occurred at friends' houses, in 49.7% of the students, by a friend's offer, in 53.8%, with beer use, in 54.8%, and without interference in daily life, in 61.8%. The result of the AUDIT scale showed that 44% of the students were classified in Zone II, i.e., alcoholic beverage consumption indicated as risky use.

For the authors Fernandes, et al., 2019, the frequency of alcohol consumption among students is alarming. Although about 58% report sporadic use, not drinking weekly, alcohol consumption is harmful to health and is correlated with traffic accidents, risky behavior, and is a motivating factor for chemical dependence and/or use of other drugs. Another report described refers to the direct relationship between friends' influence on alcohol consumption, because there is some psychological pressure from friends to use alcohol, representing a risk factor.

Article T17 was entitled "Fatigue and alcohol use by undergraduate nursing students", was written by Silva and other authors, in 2021, and published in SMAD, Revista Eletrônica Saúde Mental, Álcool e Drogas, with the objective of analyzing alcohol use in the binge drinking pattern and fatigue levels in undergraduate nursing students at the Federal University of Uberlândia. The methodology included 202 students studying Nursing at a public university in the state of Minas Gerais. The undergraduates underwent the AUDIT test to identify binge drinking. Fatigue was assessed by the Dutch Fatigue Scale, developed by Tiesinga, Dassen and Halfens and published in 1998. The DUFS scale measures fatigue, defined as "an oppressive and sustained feeling of exhaustion and diminished capacity to perform physical and mental work at the usual level", through agreement on a Likert-type scale.

In the study by Silva et al., 2021, 66% of the students reported a binge pattern, or use of 5 or more doses of alcoholic beverages in a single event (within 2 hours). In the DUFS scale, there was a mean (3.64) in the DUFS 5 variable, highlighting the "need to rest more", followed by the DUFS 2 variable: "need more energy to cope with daily tasks", with a value of 3.20. The mean fatigue found was 22.48, which indicates that fatigue is present and with significant intensity, which can cause harm to undergraduates, in 70.3% of the university students interviewed and associated with alcohol.

According to article T17, the abuse of alcohol and other psychoactive substances can lead to chemical dependence and numerous damages to the health of users and requires a broad socioeconomic, psychological and even political approach. The young in the academic field represent the audience most prone to alcohol consumption, because they are influenced by friends, receive influence from advertisements and merchandising with encouragement to use alcohol, passing the image of leisure, satisfaction, joy and success by the use of this substance, increasing the likelihood of use, associated with

independence and sense of freedom for being outside the family circle, in search of social integration, consuming licit and illicit drugs.

All articles investigated in this study refer to the use of psychoactive substances among nursing students and deserves special attention, with a high incidence of alcohol, tobacco and marijuana, present in numerous articles addressed, and requires the development of public policies capable of promoting education and self-care among these students of a course focused on caring for others and health care. The perception of the students is not altered by exposure to knowledge, many have access to information and have extensive knowledge about the use of psychoactive substances and their harmful effects, however, there is still a high percentage of consumption of alcohol and other drugs.

Another factor that deserves attention is addressed in the study by Paiva et al., 2020, about the prevalence of smoking among health academics. Foz do Iguaçu, Paraná, represents a triple border space and is also home to one of the largest Arab colonies in Brazil, and this fact reflects in the prevalence of hookah in circle of friends and family as a form of social interaction. However, the hookah, as well as the cigarette, has nicotine-based essences and other substances harmful to the respiratory tract. The study by Paiva shows a high prevalence of hookah among health academics, highlighting the hookah as the second main form of tobacco use in Brazil, finding the prevalence of use in 92.8% of students once in their lives, where 61.5% believe that the water pipe does not cause damage when compared to cigarettes, but is more harmful than cigarettes.

Still on the study of Paiva et al., 2020, the exposure of tobacco to high temperatures due to charcoal burning, a session of shisha, lasts about 60 minutes and is equivalent to the consumption of 119 liters of smoke, corresponding to 4x more nicotine, 60 to 100 x more tar and 15x more carbon monoxide than the traditional cigarette. Carbon monoxide in high concentrations can lead to intoxication, headaches, nausea, fainting, and loss of consciousness. Despite the risks, the hookah has high acceptance due to social interaction, the presence of aromas, flavors, false beliefs of harm to health and addiction, such as the belief that the water in the hookah container filters out impurities, making it less harmful to the smoker's health.

4 FINAL CONSIDERATIONS

The use of psychoactive substances was present in all articles covered in this study, with a high prevalence of alcohol, tobacco, and marijuana. However, anxiolytics, sedatives, and illicit drugs were also observed. Knowledge about the harmful effects of alcohol and other psychoactive substances, including drug use, did not prevent the use of such substances by nursing students. The motivating factors are peer influence, stress, anxiety, depression, and other factors related to social environment, economic, and school performance. The influence of friends and the need to belong to the social environment lead many young people to alcohol consumption, and many studies have described high percentages of binge drinking, or the consumption of 5 or more doses in a single event within 2 hours. It is essential to develop public policies and educational strategies aimed at health students, especially in the nursing course.

REFERENCES

Amaro, A.G.; Assunção, V.K. (2019). Saúde e bem-estar nos ODS: Problematizando os conceitos de saúde e doença a partir do diálogo entre saberes. *ACENO, Revista de Antropologia do Centro-Oeste*. Dossiê Temático: Nos contornos do corpo e da saúde – entre temas, problemas e perspectivas. Agosto a dezembro de 2019. v. 6, n. 12, p. 247-264.

Bauduína, T.E, et al. (2021). Uso de drogas lícitas entre estudantes da enfermagem e o processo de dependência química: uma revisão de literatura. *Revista de Trabalhos acadêmicos – Unidade Belo Horizonte.* v. 5, n. 1, p. 1-2.

Espíndola, M.F. et al. (2020). Implicações dos transtornos depressivos e de ansiedade na vida de estudantes de enfermagem. *Enfermagem Revista.* v. 23, n. 1, p. 1-18.

Fernandes, M.A., et al. (2019). Consumo de bebidas alcoólicas em estudantes de enfermagem de um centro universitário. *SMAD, Revista Eletrônica Saúde Mental Álcool E Drogas*. v. 15, n. 2, p. 38-44.

Fernandes, M.A., et al. (2020). Conhecimento e consumo de substâncias psicoativas por estudantes de enfermagem. *Revista Online de Pesquisa Cuidado é fundamental*. jan/dez 12: 878-882.

Gaino, L.V., et al. (2018). O conceito de saúde mental para profissionais de saúde: um estudo transversal e qualitativo. *SMAD, Revista Eletrônica Saúde Mental, Álcool e Drogas.* Abr.-Jun.; v.14, n.2, p. 108-116.

Gil, A.C. (2017). *Como Elaborar Projetos de Pesquisa*. 6 ed: Atlas.

Macedo, T.T.S., et al. (2020). Consumo de bebida alcoólica, tabaco e drogas ilícitas em ingressantes universitários da área de enfermagem. *REVISA*. v. 9, n. 1, p. 77-88.

Magalhães, L.S.P., et al. (2018). O Fenômeno das drogas na perspectiva dos estudantes de enfermagem: perfil do consumo, atitudes e crenças. *Escola Anna Nery*. v. 22, n. 1: e20170205.

Nunes, B.S.M, Barbosa, G.C., Domingos, T.S. Associações entre uso de álcool e perfil sociodemográfico de universitários de Enfermagem e Nutrição. (2021). *SMAD, Revista Eletrônica Saúde Mental Álcool E Drogas*. v. 17, n. 2, p. 72-81.

Paiva, M.O., et al. (2020). Prevalência do uso de narguilé entre universitários da área da saúde. Revista de Medicina (São Paulo). julho-agosto. v. 99, n. 4, p. 335-341.

Pereira, J.A., et al. (2018). Consumo de Bebidas Alcoólicas entre Estudantes de Enfermagem. *Revista Contexto & Saúde*. v. 18, n. 34, p. 1-8.

Pires, P.L.S., et al. (2019). Correlação do uso de substâncias psicoativas com sinais de ansiedade, depressão e estresse em estudantes de enfermagem. Revista de Atenção em Saúde, São Caetano do Sul, v. 17, n. 61, p. 38-44.

Regne, G.R.S., Tavares, M.L.O., Reinaldo, A.M.S. (2020). Uso de substâncias psicoativas por estudantes de enfermagem: revisão da literatura. *Revista Saúde em Redes*. v. 6, n. 2, p. 223-234.

Seleghim, M.R., Gherardi-Donato, E.C.S. (2020). Influência do uso de drogas na atenção plena entre estudantes de enfermagem. *Revista Brasileira de Enfermagem*. v. 73, n. 1: e20170773.

Silva, N.D.O., Machado, G.F., Junqueira, M.A.B. (2021). Fadiga e uso de álcool por graduandos do curso de Enfermagem. *SMAD, Revista Eletrônica Saúde Mental Álcool E Drogas*. v. 17, n. 2, p. 82-91.

Silva, A.C.T., et al. (2021). Consumo de tabaco e álcool e comportamentos de saúde entre estudantes de enfermagem. *AV enfermagem.* v. 40, n. 2, p. 82-94.

Sousa, B.O.P., et al. (2018). Associação entre consumo de álcool no padrão binge e tabaco em estudantes de enfermagem. *Revista Eletrônica de Enfermagem.* v. 20, a. 36, p. 1-10.

Sousa, B.O.P., et al. (2018). Estudantes de enfermagem: uso de medicamentos, substâncias psicoativas e condições de saúde. *Revista Brasileira de Enfermagem.* 73(Suppl 1): e20190003.

Souza, J., et al. (2018). Consumo de drogas e conhecimento sobre suas consequências entre estudantes de graduação em enfermagem. *Texto e Contexto em Enfermagem.* v. 27, n. 2: e5540016.

Urday-Concha, F., et al. (2019). Percepção de riscos e uso de drogas em estudantes de enfermagem universitária, Arequipa, Peru. *Revista eletrônica Enfermería actual em Costa Rica.* Edição 36. p. 4-15.

CHAPTER 49

SLEEP: influence of nutrition and physical activity

10.56238/rsfohsv1-049

Leonardo Pereira da Silva
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Alex Araujo do Nascimento
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Domingos Fares Ferreira Brito
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Edilma da Silva Soares
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Amanda Bárbara da Silva Guimarães
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Ana Maria Siqueira Neiva
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Pedro Gabriel Dias Coêlho
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Diandra Carvalho de Sá Noleto
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Vanessa Lima Nolêto
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.

Marcos Antonio do Nascimento
Physiology, Nutrition and Exercise Study Group (FiNEx), Cnpq, Physical Education Degree, Universidade Estadual do Maranhão. São João dos Patos, MA, Brazil.
Graduate Program in Physical Education, Universidade Federal do Maranhão, São Luís, MA, Brazil.
E-mail: marcosdonascimento@professor.uema.br

ABSTRACT
The study of sleep has been applied to the most varied ages and situations, seeking to understand the factors that can positively or negatively interfere in the nights of sleep, as well as how poorly slept nights can negatively influence people's lives. The objective of this chapter is to carry out a narrative review of the articles in the literature, focusing on the phases of sleep, their variation according to growth, and how physical activity and nutrition can help in its good progress. More and more, sleep deprivation factors, whether pathological or not, have shown harmful effects on people's health, both at a younger age and in later life. Knowing non-pharmacological procedures for treating sleep disorders, or diseases caused by these disorders is necessary, and can be a valuable adjuvant aid in combating these problems.

Keywords: apnea, aerobic exercise, healthy eating.

1 INTRODUCTION

Sleep is a fundamental biological process for human beings. During this process, the homeostasis of organic activities and the consolidation of memory occur. Thus, it corresponds to a brain activity consisting of divergent stages in which physiological, biochemical and behavioral mechanisms are involved (MULLER, GUIMARÃES, 2007).

An extremely necessary process for life, sleep is equivalent to a phase of adjustment of the physiological activities of the human body (POZA *et al.*, 2020). Thus, having a good quality of sleep is essential for health, since toxin acrisolation factors occur during this process, being essential for the immune, cardiovascular, reproductive and endocrine systems (CAVALHEIRI *et al.*, 2021). Sleep also acts on cognitive functions, triggering mechanisms capable of fixing information storage processes in the memory, which is essential for the body's balance (AFOLALU, RAMLEE, TANG, 2018).

Thus, it is important to point out that under normal conditions, it is possible to notice two divergent sleep states: *rapid eye* movement (REM), in which rapid eye movements occur, and *non-rapid eye* movement (NREM), in which these eye movements do not occur (BERRY *et al.*, 2012). Thus, in a normal human being, NREM sleep and REM sleep intersperse periodically throughout the night, repeating on average every 100 minutes (min), from 5 to 6 cycles per night (CARSKADON, DEMENT, 2011).

The phase in which dreams occur, memory consolidation, and deep rest marked by intense brain activity is what is called REM sleep. NREM sleep, on the other hand, presents 4 stages in degrees of sleep depth. Stage I is characterized by a phase called transition between being alert and falling asleep, thus initiating superficial sleepiness. In stage II, there is the characterization of a sleep that is considered light, in which the body temperature and heart rate gradually decrease. Consequently, stage III marks the beginning of what is considered a deep state of sleep. In stage IV, hormones linked to the growth phase and the restoration of cells and organs are released (FERNANDES, 2006).

Studies on sleep have evolved both procedurally and clinically, through the recording of brain waves exposed by the electroencephalogram (EEG) exam, allowing in an objective way to understand the intrinsic and extrinsic aspects between relaxed wakefulness and sleep. With that, by virtue of the knowledge acquired, it was possible to observe that throughout the 20th century, entering the 21st century, polygraphic records were developed to document the physiology and medicine of sleep (FERNANDES, 2006).

Given this development of knowledge about sleep in the scientific field, the study by Lima *et al.*, (2022) reports an association between poor quality sleep and non-transmissible chronic diseases (NCDs). Possible explanations are related to changes in the levels of hormones that regulate appetite (leptin and ghrelin), favoring obesity and hormonal changes, as well as the increase in the stress hormone, cortisol, resulting from constant poor sleep. Another harmful factor, is sleep deprivation, which can increase the response to stress levels, blood pressure, and cardiovascular risk (LAO *et al.*, 2018).

The concept of sleep quality can be described when the individual carries with them, complications to sleep and or maintain sleep; when they wake up too early in the morning and can no longer sleep; how revitalized the person feels after waking up; and the individual's own apprehension about the effectiveness of their sleep (ROPKE *et al.* , 2018).

According to Zanetti (2007), there are a number of factors that contribute to reduce the quality of sleep in humans, ranging from psychological, social, environmental changes, and other aspects such as the

use of medication, smoking, alcohol consumption, and drinks containing caffeine, which can reduce the quality of sleep and thus generate the so-called Sleep Disorders (SD).

Tessaro and Navarro-Pertenella (2015) state that SD are any alterations that affect the circadian cycle and the biological clock, which are two sleep regulatory processes. SDs encompass an extensive range of clinical conditions with the skillful competence to negatively interfere with all organs and systems in our body, and specifically the cardiovascular system (DRAGER *et al*., 2018).

Currently we have the Obstructive Sleep Apnea Syndrome (OSAS), Restless Legs Syndrome (RLS) and Insomnia among the main DS most common in society (CORRÊA *et al*., 2014). Besides these, there are also frequent disorders such as: insufficient sleep and sleep phase delay (ALVES, 2012). It is known that the diagnosis and treatment of the disease are constantly left aside, either by the misinformation of doctors, or by the non-adherence of patients to treatment (FABER, FABER, FABER, 2019).

Among the most common disorders we have, we can mention OSAS, which is marked by repeated events, consisting of more than five per hour, of partial or complete blockage of the upper airways (UAW) during the period in which the individual sleeps, which incites airway obstruction (apnea) or reduction (hypopnea), although there is still the maintenance of inspiratory efforts (HUON, GUILLEMINAULT, 2017). Also according to the author, an occurrence of apnea, by definition, needs to remain for at least 10 seconds, and is most often associated with hypoxia and sleep disharmony.

The preponderant manifestations that occur during sleep list snoring, respiratory paralysis, sleep fragmentation, inducing the disabling daytime injuries, such as too much daytime sleepiness, cognitive modifications, and morning headache (CAMPOSTRINI *et al.* , 2014).

OSAS is aggregated to several comorbidities, such as: cardiovascular diseases, diabetes, metabolic syndrome and presents common predisposing factors such as obesity, being male and age above 40 years (ROPKE *et al*., 2018). For Faber, Faber, Faber (2019), there are several factors linked to the emergence and worsening of OSAS and, according to him, body changes that collaborate to the decrease of oropharyngeal space are among the most important.

However, when the individual has difficulty initiating and/or maintaining sleep, or when he/she does not sleep sufficiently to maintain mental and physical well-being throughout the day, thus compromising his/her daily activities, we have the diagnosis of insomnia (POYARES *et al.* 2003).

Some authors argue that insomnia affects human beings in all periods of life, however, it is more frequent after a certain age, more specifically, after 65 years of age, and the complaints and diagnoses of this disorder are more common (SÁ, MOTTA, OLIVEIRA, 2007).

It is also worth mentioning that the presence of insomnia may be linked to situational reasons, such as trips, hospitalization or even new and strange places, which may cause changes in schedules and/or routines (SA, MOTTA, OLIVEIRA, 2007). Besides it is known that antihypertensives, anticholinergics, bronchodilators, and other drugs can be linked to the appearance of insomnia (ANCOLI-ISRAEL; COOKE, 2005).

There has been increasing evidence denoting that insomnia, due to its high prevalence has become an important public health problem, moreover, it has a strong association with medical and psychiatric comorbidities (BURMAN, 2017) and also, according to Rocha and Martino (2010), has stress as one of its major causers.

Experts point out that the treatment for insomnia should begin with non-pharmacological measures, such as changes in habits, sleep hygiene, and physical exercises (RAMAKRISHNAN; SCHEID, 2007).

Considered a neurological disorder of movements associated with sleep in which during sleep, patients present characteristic movements of the legs that can be associated with waking up, PIS has increased prevalence with age and is higher in women. In patients who develop symptoms before the age of 40, family history is common (NETO, 2016).

The symptoms vary considerably in frequency, from less than once a month or year to daily, and in severity, from mildly annoying to disabling. Symptoms can also remit for several periods. There are four criteria for considering a diagnosis of PIS: a desire to move the legs (usually accompanied by uncomfortable sensations in the legs); temporary relief with movement; onset or worsening of symptoms during rest; and worsening or onset of symptoms at night (FRAGOSO *et al*., 2011).

A good sleep hygiene, along with the practice of physical exercises, the interruption of aggravating drugs after medical orientation; the consumption of products that contain caffeine and alcoholic beverages, help combat this disorder (ALOE *et al.* , 2007).

According to the Brazilian Society of Pediatrics (SBP), sleep hygiene involves behavioral, environmental and other sleep-related factors that can affect everything from sleep initiation to sleep maintenance. Inadequate sleep hygiene is associated with problems sleeping and the total amount of sleep.

In this way, sleep hygiene aims to use psychoeducational strategies in order to establish a routine of healthy habits and eliminate both environmental and behavioral factors that interfere with the quality of sleep.

Among the measures that can be adopted for a better quality of sleep, we can mention doing physical exercises at times far from bedtime; eating light meals at night; avoiding products that contain tobacco, alcohol, and caffeine (coffee, yerba mate infusion, "cola" drinks, and even guaraná) or any substance that has an action on the central nervous system before going to bed; making sure that the bed, the mattress, and the temperature of the room are pleasant; keeping regular bedtime and wake-up times; using the room only for sleeping; and keeping it dark and quiet (MARTINEZ *et al.* , 2008).

2 SLEEP IN CHILDHOOD, ADOLESCENCE AND ADULTHOOD

When the individual is still a newborn, he sleeps about 16 to 18 hours a day, alternating cycles of wakefulness and sleep every 3 to 4 hours, distributed between day and night, approximately 50% of this period is dominated by REM sleep (CANANI, SILVA, 1998).

At around six months, the baby sleeps for up to six consecutive hours. At this stage two long periods of sleep occur during the night, interspersed with a brief awakening for feeding. Gradually the waking period consolidates, becoming longer and predominant during the day (COONS, 1987).

Between 2 and 6 years of age, there is a decrease in REM sleep episodes, with a predominance in the second half of the night, together with a prolongation of the sleep cycle (CANANI, SILVA, 1998). At about 5 years of age, stages 3 and 4 of REM sleep reach their maximum duration, this event occurs until the end of 10 years of age, when a rapid decline will occur in order to reach adult patterns consolidating around 20 years of age (KAHN, FISHER, EDWARDS, 1973).

With the expansion of the creation of equipment and machines, fruits of the industrial revolution, the human being began to have more comfort and ease in performing tasks. This condition caused changes in human behavior, for example, the decrease in physical activities (OWEN *et al.* , 2010).

In adolescents and adults this situation ends up being more noticeable since during this phase more responsibilities and new professional and personal perspectives arise, and when faced with a high quantity of tasks to be accomplished, the quantity and quality of sleep ends up being affected (DINIZ *et al.*, 2020).

Sleep-related disorders occur with great frequency, and the causes and the real extent of their damage claim greater attention. Changes in sleep pattern and quality can affect people at a very early age, causing children of different ages to face consequences ranging from poor school performance to compromised physical and mental health.

In relation to the disorders that affect children, we have insomnia that presents behavioral characteristics and can be defined in two main types, sleep onset disorder due to inadequate associations and the disorder due to lack of establishing limits. The first is linked to infants who can only sleep with some object or under some circumstance requiring parental intervention. The second type covers children in the preschool and school years, because at this time parents should direct their children's bedtime, setting some limits, but they may give in if the child refuses to go to sleep for some reason (AMERICAN PSYCHIATRIC ASSOCIATION, 2014).

In adolescence, bad nights of sleep affect the health and healthy development of adolescents. What causes this poor quality of sleep in this public are changes in sleep patterns due to biological and environmental factors, such as very late bedtimes, phase delay and improper sleep hygiene. Thus, in this age group, insomnia is associated with mental health problems and poor school performance (BRUNI, ANGRIMAN, 2015).

These authors, Bruni and Angriman (2015), also highlight some aspects that predispose to insomnia such as birth order that is related to first-born and only child; positive family history; temperament (mood variability); maternal depression and caregivers' behavior (picking up the baby on the lap right upon waking will promote longer latency time) among others.

The different causes and factors associated with insomnia are listed in the following table:

Causes and/or precipitating factors of insomnia according to age group

AGE RATE	CAUSES
Infant	Sleep onset disturbance by inappropriate associations Food Allergies Gastroesophageal reflux Infant colic Excessive nighttime fluid intake Acute otitis media or other infectious diseases Chronic Diseases
2-3 years	Sleep onset disturbance by inappropriate associations Fear Separation anxiety from parents Prolonged naps or naps at inappropriate times Acute infectious diseases Chronic Diseases
Pre-school and school	Disorder due to lack of establishing boundaries Fear Nightmares Acute infectious diseases Chronic Diseases
Teenager	Sleep hygiene problems Phase Delay Psychiatric comorbidities (anisedade, depression, ADHD) Family, school pressure Sleep Disordered Breathing Movement disorders Acute infectious diseases Chronic Diseases

Source: Nunes and Bruni, 2015

With advancing age, the human being presents a reduced ability to sleep, with interference in the duration of normal sleep, which contributes to the onset or worsening of diseases (RAM *et al.* , 2010).

In adulthood, many challenges are imposed, employment, family, studies, lifestyle, can alter the sleep pattern, and chronic sleep deprivation has been shown to be harmful to health, being associated with various physiological problems and diseases (LESSA *et al.*, 2020).

According to Paruthi *et al.* (2016), adult people who reported sleeping less than 7 hours per day were more likely to report worse overall health than those who sleep more than 7 hours, also reporting worse quality of life related to exercise and mental health.

Sleep deprivation is associated with several alterations, among them: changes in psychomotor performance, memory consolidation, mood regulation, moral reasoning, appetite, and immune function regulation. Thus, the identification of abnormal patterns and their control can contribute greatly to a longer life with greater longevity and quality of life. Understanding how food and physical activity can help in the fight against SD is totally necessary and important.

3 INFLUENCE OF PHYSICAL ACTIVITY ON SLEEP QUALITY

The Ministry of Health defines physical activity as any body movement performed in different tasks occurring caloric expenditure (BRASIL, 2021). These activities are performed at different times such as: leisure, work at home and even when commuting from home to school/work.

On the other hand, physical exercise is defined as planned physical activities, structures with different purposes in favor of health improvement, aesthetics among other purposes (BRASIL, 2021). Thus, it is understood that all physical exercise is a physical activity, but not all physical activity is a physical exercise, because the structuring and planning of exercise performed by a physical education professional differentiates both practices.

Both physical activity and physical exercise performed with an adequate frequency have health benefits (DIAS *et al.* , 2020). Physical activity promotes benefits to physical fitness, improves flexibility and blood circulation. On the other hand, physical exercise has the same benefits as physical activity, however, it becomes more effective with its structure and can be a non-pharmacological solution in the treatment and prevention of various chronic diseases such as diabetes mellitus type II, bad cholesterol, heart disease and improvement of sleep quality (BRASIL, 2021).



Source: Image from the WHO Physical Activity Recommendation Guide document (2020).

In the Table below are recommendations from the World Health Organization (WHO, 2020) for physical activity, considering age groups and also some physical limitations and clinical health situations.

WHO GUIDELINES FOR PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR		
Variables	**Minutes/Day**	**Frequency/Weekly**
II. Children and Adolescents (5 to 17 years old)	At least 60 minutes	At least 3 times
II. Adults (18 to 64 years old)	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	At least 2 days a week

III. Elderly (65 years or older)	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	At least 2 to 3 days weekly
IV. Pregnant and postpartum women	At least 150 minutes per week	At the individual's discretion
V. Adults and Elderly with chronic diseases (18 years or older)	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	On at least 2 or 3 days a week
VI. Adults (18 years or older) with disabilities	150 to 300 minutes of moderate activity or 75 to 150 minutes of vigorous activity	On at least 2 or 3 days a week

Source: adapted by the authors of this study: WHO (2020).

For children under the age of 5 the World Health Organization (WHO, 2020) suggests some recommendations for physical activity, sedentary behavior, and sleep, present in the table below:

RECOMMENDATIONS FOR 24 HOURS OF PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, AND SLEEP FOR CHILDREN UNDER 5 YEARS OF AGE			
Variables	**PHYSICAL ACTIVITY**	**SCREEN TIME**	**GOOD QUALITY SLEEP**
Infants (less than 1 year old) should:	At least 30 minutes	0 minutes of sedentary time on screens at this age is recommended	They should get 14-17h (0-3 months old) or 12-16h (4-11 months old) of good quality sleep, including naps
Children from 1 to 2 years old should:	At least 180 minutes of physical activity	0 minutes of sedentary screen time is advised for 1-year-olds and no more than 60 minutes for 2-year-olds	It is recommended to get 11 to 14 h of good quality sleep, including naps, with regular sleeping and waking times
Children 3-4 years old should:	At least 180 minutes of which at least 60 minutes of moderate to vigorous intensity	60 minutes maximum	It is suggested to have 10-13h of good quality sleep, which may include naps, with regular sleeping and waking times.

Source: created by the authors of this study: WHO (2019).

The quantity/quality of sleep in children, adolescents and in adults is a parameter of great importance that has been studied by science for many years, because there are many factors that can have an association with good or bad sleep quality (NATIONAL SLEEP FOUNDATION, 2022; MILLER *et al.* , 2018).

A healthy sleep depends on several factors, such as the number of hours of sleep, the time at which we lie down and the sleep environment (SOCIEDADE PORTUGUESA DE PEDIATRIA, 2017). Children and adolescents need to have a greater amount of sleep, because they are individuals who are in the growth phase and through sleep occurs the release of hormones such as growth hormone (GH) that is essential in

the process of increasing their height and many other important physiological actions in the physical and mental development of these subjects (HERMES, NUNES, MELO, 2022; SILVA *et al.* , 2021).

For children, adolescents and adults being physically active and having a healthy lifestyle is a relevant factor for a good quality of life, since obesity, sedentary lifestyle and ways of eating can interfere with the quantity and quality of sleep (MILLER *et al.* , 2018). Insulin resistance, type II diabetes mellitus, acute myocardial infarction, are also risks associated with physical inactivity and sleep debt (DONGA *et al.* , 2010).

In recent years, Brazil has experienced an economic crisis that has leveraged the increase of socioeconomic inequality in the country (FILHO, 2017). Amidst these economic setbacks, people with low financial status usually face difficulties in accessing the practice of physical activity properly prescribed and monitored by a physical education professional (SMETANINA *et al.* , 2015). These factors cause the practice of regular physical activity to be lower in low-income people (FERREIRA; ANDRADE, 2021).

The research by SILVA *et al.* (2021) on the practice of physical activity in Brazilians identified that almost 50% of the participants practiced exercises outdoors and without guidance from a physical education professional. It is believed that the high percentage of the practice of outdoor physical activity and without the guidance of a physical education professional is due to the financial condition, because many cannot afford to pay this professional to guide them on the frequency and how to exercise correctly.

In addition to economic factors, the advancement of technology today has led to a lazy lifestyle in many people who spend many hours sitting at work, at home watching TV or using social networks and do not seek to have an active life by regularly practicing physical activity (VASCONCELLOS *et al.* , 2022). It is important to note that the inappropriate use of social networks such as facebook, Instagram, WhatsApp during the night before bedtime can cause sleep disturbances that reflect in the performance of the human being at work, study, sexual relationship and in other aspects (EVERS *et al.* , 2020).

Several studies, such as Andrade, Pedrosa (2016) and Peng *et al*. (2022), show that regular exercise, in addition to improving physical fitness, is an excellent non-pharmacological intervention that improves sleep efficiency in humans. However, the time and frequency with which exercises are practiced are also points that can have an influence on the quantity and quality of sleep in humans.

There are several types of physical exercise practices and aerobic exercise is one of them that was the objective of the study by Andrade, Pedrosa (2016) who evaluated the role of physical exercise in obstructive sleep apnea obtaining the following results: Volunteers who participated in a predominantly aerobic exercise program had a reduction in disease state and daytime sleepiness, thus improving their sleep efficiency and oxygen consumption.

Besides aerobic exercise, the practice of Pilates has also shown benefits to the quality of people's sleep, as shown in the research Corazza *et al*. (2022), in which after 26 sessions of Pilates, improvements in the participants' sleep efficiency and other health variables such as strength, flexibility, mental alertness, and body awareness were identified.

The research by Pancotto, Tome, Esteves (2021) identified a significant influence of swimming practice on sleep and quality of life in the study participants. From a simple walk outdoors to the practice of planned and properly prescribed exercises are actions that cause metabolic and physiological changes and adaptations in the human body, which present benefits to the quality of people's sleep (SILVA *et al.* , 2019).

In this sense, the rush of people, especially in large Brazilian cities, is a factor that has caused an increase in stress, anxiety, depressive feelings, inadequate diet, sedentary lifestyle and, consequently, all of this can cause excessive loss of sleep, insomnia, and fatigue, damaging the sleep of individuals (SEJBUK *et al.*, 2022).

In today's capitalist society, night work has become increasingly common (BRUM *et al.*, 2015). It is estimated that more 7.5% of Brazilian workers perform their function during the night (COSTA *et al.* , 2021). Such fact, offers several risks to the mental, physical and social health of people who are harmed with sleep loss, which in turn deregulates several essential physiological mechanisms in human health (SUN *et al.* , 2018).

Andrade, *et al* (2017), when investigating whether absenteeism in industry is associated with shift work and sleep problems, concluded that sleep was related to workers' absence, and employees with high perceived stress missed more work because of health problems. It was also observed that workers with sleep disorders were twice as likely to miss work compared to workers who had good sleep quality (ANDRADE *et al.* , 2017). It is assumed that the high rate of stress and sleep disorders is a consequence of the high demand of tasks at night work.

The work overload with alternating shifts and sleepless nights causes an increase in stress and consequently a greater release of the hormone cortisol into the bloodstream, which can cause daytime sleepiness in people (SIMÕES, MARQUES, ROCHA, 2010). Physical effort during the night shift is associated with poor quality of sleep, compared to workers who practice less physical effort during this period of work (MARQUEZE, SILVA, MORENO, 2009).

Throughout the previous paragraphs studies such as by MILLER *et al.* (2018) and DONGA *et al.* (2010) have made noticeable the beneficial influence of regular physical activity/exercise on the quality of sleep of people at different ages. It is worth noting that these parameters are intertwined with negative factors arising from socioeconomic aspects and capitalistic actions. Moreover, the importance of creating public policies that help people increase their physical activity practice, care with the quantity and quality of sleep becomes essential, in the face of several evils that have caused interference in these variables leading to a worsening in the quality of human life.

4 INFLUENCE OF NUTRITION ON SLEEP QUALITY

Sleep is considered an essential modulator of metabolic functioning, including energy metabolism, glucose regulation, and even appetite. Information on the effects of sleep duration and food intake has

increased in recent years (POT, 2018). While there is evidence that sleep affects food intake, diet, and specific foods, dietary patterns may also impact sleep, necessitating further investigation (BEEBE *et al.*, 2013).

Cao *et al.,* (2016) point out that the high blood glucose index caused by the exacerbated consumption of carbohydrates has been observed and more often associated with a rapid onset of sleep in young people considered healthy. As for the protein intake, it is related to the difficulty in getting to sleep and, consequently, is associated with the problem of keeping the various systems of the body in balance in order to fall asleep. The minimum fiber intake and the high intake of saturated fat and sugar correlate to a softer sleep with more rises in young and middle aged adults.

Even in childhood, it is very important that the quality of sleep is observed by the individual's caregivers, considering that children usually do not express such symptoms related to lack of sleep, hiding such disorders. It is essential to identify any sleep disorders in childhood, in order to design strategies that promote sleep quality, preventing complications such as overweight (GONZAGA *et al.* , 2016).

Sleep plays a crucial role in the homeostasis of the body. Its association with weight development in childhood and adolescence, and its association with weight gain, has generated great interest. There is increasing evidence in favor of an influence of lack of adequate sleep on weight gain. It is evidenced that sleep deprivation acts as a factor in the risk of overweight/obesity, developing a role in sympathetic activation and increase of catecholamines, and cortisol by activation of the hypothalamic-pituitary-adrenal axis and increase of interleukins and TNF by activation of the inflammatory cascade (EL HALAL, NUNES, 2019).

Furthermore, according to El Halal, Nunes (2019), the association between shorter sleep duration and risk of overweight and obesity is well established for all pediatric age groups. Insufficient sleep duration due to height growth deficit is also added.

On the other hand, studies show that food intake shortly before bedtime can have a negative influence on sleep quality (FRANK *et al.*, 2017). Micronutrient intake is directly related to sleep habits and patterns. Crispim *et al.*, (2007) shows that deficiencies in vitamin B1, folate, iron, magnesium, phosphorus, selenium and zinc are associated with shorter sleep duration, while the absence of calcium and alpha-carotene is associated with difficulty sleeping.

5 Final considerations

The sleep pattern changes with the passing of the years, with a greater space for wakefulness during adulthood. Its deprivation can lead to sleep disorders and, consequently, to an individual's health, such as the various problems reported in this chapter.

Physical exercise has proven to be an adjuvant factor in fighting diseases and consequently a good quality of sleep, having as an ally nutrition, which has also proven to be essential to fight obesity, NCDs, and especially to improve the quality of sleep.

Therefore, with all the problems that SD can cause in people's lives, changes in lifestyle habits such as exercise and a healthier diet can go a long way toward more restful nights of sleep and a healthier, longer life.

REFERENCES

AFOLALU, Esther F.; RAMLEE, Fatanah; TANG, Nicole K.y. Effects of sleep changes on pain-related health outcomes in the general population: a systematic review of longitudinal studies with exploratory meta-analysis. **Sleep Medicine Reviews**, v. 39, p. 82-97, jun. 2018. http://dx.doi.org/10.1016/j.smrv.2017.08.001. Disponível em:https://pubmed.ncbi.nlm.nih.gov/29056414/. Acesso em: 17 out. 2022.

ALOE, F. *et al*. Síndrome das pernas inquietas: diagnóstico e tratamento. opinião de especialistas brasileiros. **Arquivos de Neuro-Psiquiatria**, v. 65, n. 3, p. 721-727, set. 2007. http://dx.doi.org/10.1590/s0004-282x2007000400035.

ALVES, B. **Distúrbios do sono | Biblioteca Virtual em Saúde MS**. Disponível em: <https://bvsms.saude.gov.br/disturbios-do-sono/>.

AMERICAN PSYCHIATRIC ASSOCIATION. Manual diagnóstico e estatístico de transtornos mentais (DSM-5). Porto Alegre: Artmed; 2014.

ANCOLI-ISRAEL, S; COOKE, JR. Prevalence and Comorbidity of Insomnia and Effect on Functioning in Elderly Populations. **Journal Of The American Geriatrics Society**, v. 53, n. 7, p. 264-271, jul. 2005. Wiley. http://dx.doi.org/10.1111/j.1532-5415.2005.53392.x.

ANDRADE, FMDD; PEDROSA, RP. "The role of physical exercise in obstructive sleep apnea." **Jornal brasileiro de pneumologia0: publicação oficial da Sociedade Brasileira de Pneumologia e Tisilogia**, v. 42, n.6, novembro de 2016. doi:10.1590/S1806-37562016000000156. Disponível em: https://pubmed.ncbi.nlm.nih.gov/28117479/. Acesso em 15 de outubro de 2022.

ANDRADE, RD; *et al*. Absenteísmo na Indústria está Associado com o Trabalho em Turnos e com Problemas no Sono. **Cienc Trab.**, Santiago , v. 19, n. 58, p. 35-41, abr. 2017 . Disponível em <http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-24492017000100035&lng=es&nrm=iso>. Acessoo em 16 oct. 2022. http://dx.doi.org/10.4067/S0718-24492017000100035.

BEEBE, Dean W; SIMON, Stacey; SUMMER, Suzanne; HEMMER, Stephanie; STROTMAN, Daniel; DOLAN, Lawrence M.. Dietary Intake Following Experimentally Restricted Sleep in Adolescents. **Sleep**, v. 36, n. 6, p. 827-834, 1 jun. 2013. Oxford University Press (OUP). http://dx.doi.org/10.5665/sleep.2704. Disponível em: https://pubmed.ncbi.nlm.nih.gov/23729925/. Acesso em: 15 out. 2022.

BERRY RB; *et al.* The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications, Version 2.0. Darien (IL): **American Academy of Sleep Medicine**, 2012. Disponível em: http://arkansas-sleep.squarespace.com/s/Brooks-Scoring-Manual-Updates-1-19-17.pdf. Acesso em: 22 de jan. 2022.

BRASIL. Ministério da Saúde. Exercício Físico x Atividade Física: você sabe a diferença? Julho de 2021. Disponível em: https://www.gov.br/saude/pt-br/assuntos/saude-brasil/eu-quero-me-exercitar/noticias/2021/exercicio-fisico-x-atividade-fisica-voce-sabe-a-diferenca. Acesso em 16 de outubro de 2022.

BRUM, MCB; *et al.* "Shift work and its association with metabolic disorders." ***Diabetology & metabolic syndrome,*** v. 7. May de 2015. doi:10.1186/s13098-015-0041-4. Disponível em: https://pubmed.ncbi.nlm.nih.gov/25991926/. Acesso em 16 de outubro de 2022.

BRUNI, OLIVIERO; ANGRIMAN, MARCO. L'insonnia in eta evolutiva. **Medico e Bambino**, v. 34, n. 4, p. 224-233, abr. 2015.

BURMAN, D. Sleep Disorders: Insomnia. **FP essentials**, v. 460, p. 22–28, 1 set. 2017.

CAMPOSTRINI, D; *et al.* Síndrome da Apneia Obstrutiva do Sono e Doenças Cardiovasculares. **Revista Neurociências**, v. 22, n. 01, 6 maio 2014. Universidade Federal de Sao Paulo. http://dx.doi.org/10.4181/rnc.2014.22.930.11p

CANANI, Simone F; SILVA, Fernando AAJ. A evolução do sono do feto ao adulto: aspectos respiratórios e neurológicos. **J. pediatr**, n. 74, v. 5, p. 357-64, 1998.

CARSKADON, MA, DEMENT, WC. (2011). **Monitoring and staging human sleep**. In M.H. Kryger, T. Roth, & W.C. Dement (Eds.), Principles and practice of sleep medicine, 5th edition, (pp 16-26). St. Louis: Elsevier Saunders.

CAO, Yingting; WITTERT, Gary; TAYLOR, Anne; ADAMS, Robert; SHI, Zumin. Associations between Macronutrient Intake and Obstructive Sleep Apnoea as Well as Self-Reported Sleep Symptoms: results from a cohort of community dwelling australian men. **Nutrients**, [S.L.], v. 8, n. 4, p. 207, 8 abr. 2016. MDPI AG. http://dx.doi.org/10.3390/nu8040207. Disponível em: https://pubmed.ncbi.nlm.nih.gov/27070639/. Acesso em: 10 out. 2022.

CAVALHEIRI, Jolana Cristina; *et al*. Qualidade do sono e transtorno mental comum em equipe de enfermagem hospitalar. **Rev. Latino-Am. Enfermagem**, [*s. l*], v. 29, n. , p. 1-13, 2021. Disponível em: https://www.scielo.br/j/rlae/a/psrzDVpyRfnpcVyR7hfJWtP/?format=pdf&lang=pt. Acesso em: 17 out. 2022.

CORAZZA, ST; *et al*. Combinação do Mat Pilates e Tai Chi Chuan na melhoria da qualidade do sono em idosos. Educ. fís. cienc., Ensenada , v. 23, n. 3, e192, 2021. Disponível em: <http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S2314-25612021000300192&lng=es&nrm=iso>. accedido en 27 oct. 2022. http://dx.doi.org/https://doi.org/10.24215/23142561e192.

CORREA, KM; *et al*. Frequência dos distúrbios do sono em mulheres na pós-menopausa com excesso de peso / obesidade. **Rev. Bras. Ginecol. Obstet.** , Rio de Janeiro, v. 36, n. 2, fevereiro de 2014. https://doi.org/10.1590/S0100-72032014000200008

COSTA, AS; *et al*. Trabalho noturno e pressão arterial: um estudo com foco nas doses de exposição. ***Revista Brasileira de Saúde Ocupacional.*** São Paulo. v,47. setembro de 2021. Disponível em: https://www.scielo.br/j/rbso/a/rsnt3PdjwZ4ymr5PRTTCDsm/?lang=pt#. Acesso em 16 de outubro de 2022.

COONS S. Development of Sleep and Wakefulness During the First 6 Months of Life. In Guilleminault C (ed): **Sleep and Its Disorders in Children.** New York: Raven Press; p. 17-27, 1987.

CRISPIM, Cibele Aparecida; *et al*. Relação entre sono e obesidade: uma revisão da literatura. **Arquivos Brasileiros de Endocrinologia & Metabologia**, v. 51, n. 7, p. 1041-1049, out. 2007. Disponível em: http://dx.doi.org/10.1590/s0004-27302007000700004. Acesso em: 16 out. 2022.

DIAS, TG; *et al.* Nível de atividade física no lazer em adultos paulistanos: uma análise de tendência de 2006 a 2016. **Revista Brasileira de Epidemiologia**, v. 23. outubro de 2020. Disponível em: https://www.scielo.br/j/rbepid/a/tSBP8pVQ9Nzt9HZnKLPsJXp/?format=html&lang=pt. Acesso em 21 de outubro de 2022.

DINIZ, Lucas Nogueira *et al*. A influência da atividade física no sono e desempenho acadêmico. **Revista Eletrônica Acervo Saúde**, v. 12, n. 10, 31 out. 2020. http://dx.doi.org/10.25248/reas.e5000.2020.

DONGA, E; *et al.* "A single night of partial sleep deprivation induces insulin resistance in multiple metabolic pathways in healthy subjects." ***The Journal of clinical endocrinology and metabolismo***. United States. v. 95,6. Jun 2010. doi:10.1210/jc.2009-2430. Disponível em: https://pubmed.ncbi.nlm.nih.gov/20371664/. Acesso em 21 de outubro de 2022.

DRAGER, Luciano F. et al. 1º Posicionamento Brasileiro sobre o Impacto dos Distúrbios de Sono nas Doenças Cardiovasculares da Sociedade Brasileira de Cardiologia. **Arquivos Brasileiros de Cardiologia,** v. 111, n. 2, p. 290-340, 2018. Acessado em 28 Outubro 2022. Disponível em: <https://doi.org/10.5935/abc.20180154>. ISSN 1678-4170. https://doi.org/10.5935/abc.20180154.

El HALAL, CS; NUNES, ML. Desenvolvimento do sono e peso-altura**. J Pediatr**. 2019;95:S2-S9.

EVERS, K; *et al.* "Investigating the relation among disturbed sleep due to social media use, school burnout, and academic performance." ***Journal of adolescence.*** v. 84. Oct de 2020. doi:10.1016/j.adolescence.2020.08.011. Disponível em: https://pubmed.ncbi.nlm.nih.gov/32920331/. Acesso em 15 de outubro de 2022.

FERNANDES, Regina Maria França. O SONO NORMAL. **Medicina (Ribeirão Preto)**, v. 39, n. 2, p. 157-168, 30 jun. 2006. Universidade de São Paulo, Agência USP de Gestão da Informação Acadêmica (AGUIA). http://dx.doi.org/10.11606/issn.2176-7262.v39i2p157-168. Disponível em: https://www.revistas.usp.br/rmrp/article/view/372. Acesso em: 17 out. 2022.

FABER, J; FABER, C; FABER, AP. Obstructive sleep apnea in adults. **Dental Press Journal Of Orthodontics**, v. 24, n. 3, p. 99-109, jun. 2019. http://dx.doi.org/10.1590/2177-6709.24.3.099-109.sar.
FERREIRA, CS; ANDRADE, FB. Desigualdades socioeconômicas associadas ao excesso de peso e sedentarismo em adolescentes brasileiros. **Ciência & Saúde Coletiva,** v,27. n,10. março de 2021. Disponível em: https://www.scielosp.org/article/csc/2021.v26n3/1095-1104/#. Acesso em 15 de outubro de 2021.

FILHO, FHB**.** A crise econômica de 2014/2017. **Estudos Avançados,** v,36. Abril de 2017. Disponível em: https://www.scielo.br/j/ea/a/BD4Nt6NXVr9y4v8tqZLJnDt/?lang=pt#. Acesso em 15 de outubro de 2022.

FRAGOSO, YD; *et al.* Restless legs syndrome and multiple sclerosis: a brazilian multicenter study and meta-analysis of the literature. **Arquivos de Neuro-Psiquiatria**, v. 69, n. 2, p. 180-183, abr. 2011. http://dx.doi.org/10.1590/s0004-282x2011000200007.

FRANK, Sarah; *et al*. Diet and Sleep Physiology: public health and clinical implications. **Frontiers In Neurology**, v. 8, p. 1-8, 11 ago. 2017. Frontiers Media SA. http://dx.doi.org/10.3389/fneur.2017.00393. Disponível em: https://pubmed.ncbi.nlm.nih.gov/28848491/. Acesso em: 13 out. 2022.

GONZAGA, Nathalia Costa; *et al*. **Qualidade do sono e síndrome metabólica em crianças e adolescentes com sobrepeso ou obesidade**. 2016. Disponível em: https://www.scielo.br/j/rn/a/7FMJxRRNJsb5qm4ZDzFwtdb/?lang=en. Acesso em: 20 out. 2022.

HERMES, FN; NUNES, EEM; MELO, CMD. Sono, estado nutricional e hábitos alimentares em crianças: um estudo de revisão. **Revista Paulista de Pediatria,** v. 41. setembro de 2022. Disponível em: https://www.scielo.br/j/rpp/a/zXLgpDGSZB4sXZwQzhZdVBK/?lang=pt#. Acesso em 21 de outubro de 2022.

HUON, LA; GUILLEMINAULT, CA Succinct History of Sleep Medicine. **Sleep-Related Breathing Disorders**, p. 1-6, 2017. S. Karger AG. http://dx.doi.org/10.1159/000470486.

KAHN, E; FISHER, C; EDWARDS, A. Twenty-four hour sleep patterns: comparison between 2- to 3-year-old and 4- to 6- year-old children. **Arch Gen Psychiatry,** p. 29- 380, 1973.

LAO, Xiang Qian; *et al*. Sleep Quality, Sleep Duration, and the Risk of Coronary Heart Disease: a prospective cohort study with 60,586 adults. **Journal Of Clinical Sleep Medicine**, v. 14, n. 01, p. 109-117, 15 jan. 2018. American Academy of Sleep Medicine (AASM). http://dx.doi.org/10.5664/jcsm.6894. Disponível em: 10.5664/jcsm.6894. Acesso em: 18 out. 2022.

LESSA, Ruan Teixeira, *et al*. A privação do sono e suas implicações na saúde humana: uma revisão sistemática da literatura. **Revista Eletrônica Acervo Saúde / Electronic Journal Collection Health**, v.Sup., n.56, p. 1-10, 2020.

LIMA, Margareth Guimarães; *et al*. Associação do autorrelato de problemas no sono com morbidades e multimorbidades segundo sexo: pesquisa nacional de saúde 2019. **Epidemiologia e Serviços de Saúde**, v. 31, n. 1, p. 1-13, 2022. http://dx.doi.org/10.1590/ss2237-9622202200007.especial. Disponível em: https://www.scielo.br/j/ress/a/xzZD8QSRbvNs7FCTFqYkdpw/abstract/?lang=pt#. Acesso em: 18 out. 2022.

MARQUEZE, EC; SILVA, MJD; MORENO, CRDC. Qualidade de sono, atividade física durante o tempo de lazer e esforço físico no trabalho entre trabalhadores noturnos de uma indústria cerâmica. **Revista Brasileira de Saúde Ocupacional,** v,47. junho de 2009. Disponível em: https://www.scielo.br/j/rbso/a/WdJJy87RcgZVydXfZTW58wJ/abstract/?lang=pt#. Acesso em 16 de outubro de 2022.

MARTINEZ, D; *et al.* "Diagnosis of circadian rhythm sleep disorders." **Jornal brasileiro de pneumologia: publicacao oficial da Sociedade Brasileira de Pneumologia e Tisilogia,** v. 34, n. 3, p. 173-80, 2008. doi:10.1590/s1806-37132008000300008

MILLER, MA; *et al*. "Sleep duration and incidence of obesity in infants, children, and adolescents: a systematic review and meta-analysis of prospective studies." ***Sleep,*** v. 41, n. 4., 2018. doi:10.1093/sleep/zsy018. Disponível em: https://pubmed.ncbi.nlm.nih.gov/29401314/. Acesso em 21 de outubro de 2022.

MÜLLER, Mônica Rocha; GUIMARÃES, Suely Sales. Impacto dos transtornos do sono sobre o funcionamento diário e a qualidade de vida. **Estudos de Psicologia (Campinas)**, v. 24, n. 4, p. 519-528, dez. 2007. http://dx.doi.org/10.1590/s0103-166x2007000400011.

NATIONAL SLEEP FOUNDATION. How much sleep do we really need? 2022. Disponível em: https://www.sleepfoundation.org/how-sleep-works/how-much-sleep-do-we-really-need. Acesso em 21 de outubro de 2022.

NETO, B. R. A. **Síndrome das pernas inquietas**. 2016. Disponível em: http://www.medicinanet.com.br/conteudos/revisoes/6831/sindrome_das_pernas_inquietas.htm. Acesso em: 19 out. 2022.

NUNES, Magda Lahorgue; BRUNI, Oliviero. Insomnia in childhood and adolescence: clinical aspects, diagnosis, and therapeutic approach. **Jornal de Pediatria**, v. 91, n. 6, p. 26-35, nov. 2015 DOI: https://doi.org/: http://dx.doi.org/10.1016/j.jped.2015.08.006.

ORGANIZAÇÃO MUNDIAL DA SAÚDE. 2020. Diretrizes da OMS para atividade física e comportamento sedentário: num piscar de olhos. **WHO guidelines on physical activity and sedentary behavior: at a glance.** ISBN 978-65-00-15021-6 (versão digital). Disponível em: https://apps.who.int/iris/bitstream/handle/10665/337001/9789240014886-por.pdf. Acesso em 16 de outubro de 2022.

OWEN, Neville *et al*. Sedentary Behavior: emerging evidence for a new health risk. **Mayo Clinic Proceedings**, [S.L.], v. 85, n. 12, p. 1138-1141, dez. 2010. Elsevier BV. http://dx.doi.org/10.4065/mcp.2010.0444.

Paruthi S,*et al*. Recommended Amount of Sleep for Pediatric Populations: A Consensus Statement of the American Academy of Sleep Medicine. **Journal of Clinical Sleep Medicine**, n. 12, v. 6, p. 785-6, 2016.
PANCOTTO, HP; TOME, CA; ESTEVES, AM. Influência da prática de natação no sono e na qualidade de vida de pessoas com deficiência visual**. Revista Brasileira de Medicina do Esporte**, v. 27, p. 179-183, 2021. Disponível em: https://www.scielo.br/j/rbme/a/CyLkmxkgMy99t8MyWC7MZ6b/abstract/?lang=pt. Acesso em 25 de outubro de 2022.

PENG, J; *et al*. "Effects of Exercise on Patients with Obstructive Sleep Apnea: A Systematic Review and Meta-Analysis." **International journal of environmental research and public health**, n. 19, 2022. doi:10.3390/ijerph191710845. Disponivel em: https://pubmed.ncbi.nlm.nih.gov/36078558/. Acesso em 15 de outubro de 2022.

POT, Gerda K. Sleep and dietary habits in the urban environment: the role of chrono-nutrition. **Proceedings Of The Nutrition Society**, v. 77, n. 3, p. 189-198, 2018. Cambridge University Press (CUP). http://dx.doi.org/10.1017/s0029665117003974. Disponível em: https://pubmed.ncbi.nlm.nih.gov/29065932/. Acesso em: 19 out. 2022.

POZA, JJ; PUJOL, M; ORTEGA-ALBÁS, JJ; ROMERO, O. Melatonina en los trastornos de sueño. **Neurología**, v. 37, n. 7, p. 575-585, 2022. Elsevier BV. http://dx.doi.org/10.1016/j.nrl.2018.08.002. Disponível em: https://pubmed.ncbi.nlm.nih.gov/30466801/. Acesso em: 17 out. 2022.

POYARES, Dalva *et al*. I Consenso Brasileiro de Insônia, **Sociedade Brasileira do Sono e Federação Latino Americana das Sociedades de Sono**. São Paulo: 2003.

RAM S, SEIRAWAN H, KUMAR SKS, CLARK GT. Prevalence and impact of sleep disorders and sleep habits in the United States. **Sleep Breath,** n. 14, v. 1, p. 63-70, 2010.

RAMAKRISHNAN, K; SCHEID, DC. Treatment options for insomnia. **American Family Physician**, v. 76, n. 4, p. 517–526, 2007.

ROPKE, LM; *et al*. Efeito da atividade física na qualidade do sono e qualidade de vida: revisão sistematizada. **Archives Of Health Investigation**, v. 6, n. 12, 2018. Archives of Health Investigation. http://dx.doi.org/10.21270/archi.v6i12.2258.

ROCHA, MCP; MARTINO, MMF. De. O estresse e qualidade de sono do enfermeiro nos diferentes turnos hospitalares. **Revista da Escola de Enfermagem da USP**, v. 44, n. 2, pp. 280-286, 2010. Disponível em: <https://doi.org/10.1590/S0080-62342010000200006>. Acesso em 15 out. 2022.

SÁ, RMB; MOTTA, LB; OLIVEIRA, FJ. INSÔNIA: prevalência e fatores de risco relacionados em população de idosos acompanhados em ambulatório. **Revista Brasileira de Geriatria e Gerontologia**, v. 10, n. 2, p. 217-230, 2007. http://dx.doi.org/10.1590/1809-9823.2007.10027.

SEJBUK, M; *et al.* "Sleep Quality: A Narrative Review on Nutrition, Stimulants, and Physical Activity as Important Factors." **Nutrients**, v. 14, 2022. doi:10.3390/nu14091912. Disponível em: https://pubmed.ncbi.nlm.nih.gov/35565879/. Acesso em 15 de outubro de 2022.

SILVA, IC; *et al.* Prática de atividade física em meio à pandemia da COVID-19: estudo de base populacional em cidade do sul do Brasil. **Ciência & Saúde Coletiva,** v. 27, n.10, 2021. Disponível em: https://www.scielosp.org/article/csc/2020.v25n11/4249-4258/#. Acesso em 15 de outubro de 2022.

SILVA, RA; *et al*. Avaliação das características do sono em crianças e adolescentes portadores de diabetes melito tipo 1. **Revista Paulista de Pediatria**, v. 40, 2021. Disponível em: https://www.scielo.br/j/rpp/a/4zH3NTPTTfJw9yQnvtZFPXk/abstract/?lang=pt. Acesso em 21 de outubro de 2022.

SILVA, RPD; *et al*. Efeitos do exercício nos sintomas do sono em pacientes com apneia obstrutiva do sono. **Jornal Brasileiro de Pneumologia**, v. 45, 2019. Disponível em: https://www.scielo.br/j/jbpneu/a/jBbdmbdhXPSM5jR7X8JDDMy/?lang=pt&format=html. Acesso em 27 de outubro de 2022.

SIMÕES, MRL; MARQUES, FC; ROCHA, ADM. Work in Rotating Shifts and its Effects on the Daily Life of Grain Processing Workers. **Revista Latino-Americana de Enfermagem,** v.30, 2010. Disponível em: https://www.scielo.br/j/rlae/a/L3QYqyDhWMfy6BGNjsHsrSy/?lang=en#. Acesso em 16 de outubro de 2022.

SMETANINA, N; *et al.* "Prevalence of overweight/obesity in relation to dietary habits and lifestyle among 7-17 years old children and adolescents in Lithuania." **BMC public health**. England. vol. 15 1001. 1 Oct. 2015. doi:10.1186/s12889-015-2340-y. Disponível em: https://pubmed.ncbi.nlm.nih.gov/26429124/. Acesso em 15 de outubro de 2022.

Sociedade Portuguesa de Pediatria. **Recomendações sps-spp: prática da sesta da criança nas creches e infantários, públicos ou privados.** 2017. p. 2-8. Disponível em: https://www.spp.pt/UserFiles/file/Noticias_2017/VERSAO%20PROFISSIONAIS%20DE%20SAUDE_RECOMENDACOES%20SPS-SPP%20SESTA%20NA%20CRIANCA.pdf. Acesso em 21 de agosto de 2022.

SUN, M; *et al.* "Meta-analysis on shift work and risks of specific obesity types." Obesity reviews*:* an official journal of the International Association for the Study of Obesity, v. 19, n. 1, 2018. doi:10.1111/obr.12621. Disponível em: https://pubmed.ncbi.nlm.nih.gov/28975706/. Acesso em 16 de outubro de 2022.

TESSARO, MM; NAVARRO-PETERNELLA, FM. Sleeping effects in the quality of life of women with insomnia. **Fisioterapia em Movimento**, n. 28, p. 693-700, 2015.

VASCONCELLOS, MB; *et al.* Mudanças na obesidade, comportamento sedentário e inatividade física, entre 2010 e 2017, em adolescentes. ***Journal of Physical Education***, v. 32. janeiro de 2022. Disponível em: https://www.scielo.br/j/jpe/a/B89Pgbwcc98z4cQ3WvTNSvt/. Acesso em 21 de outubro de 2022.

ZANETTI MC, LAVOURA TNL, MACHADO AA. **O treinamento desportivo e a qualidade de sono de atletas profissionais**. http://www.efdeportes.com. **Revista Digital - Buenos Aires,** v. 12, n. 110, 2007.

CHAPTER 50

Acute transverse myelitis in puerperal women

10.56238/rsfohsv1-050

Patrícia Leite Brito
Federal University of Amazonas\Brazil
pleitebrito@hotmail.com

Taiane Bentes Kimura
Federal University of Amazonas\Brazil.
taibkimura@gmail.com

Henrique Bacellar
Federal University of Amazonas\Brazil.
henribacel@hotmail.com

ABSTRACT
Transverse myelitis is a pathology, whose etiology is associated with autoimmune or infectious diseases, which directly affects the spinal cord, coursing with motor, sensory and acute or subacute dysfunction9. We report a case of a 32-year-old multiparous woman who, after the first postpartum day, reported pain and paresthesia in the lumbar and lower limbs with progressive worsening. Patient started clinical investigation, with orthopedic causes ruled out, together with the neurology and neurosurgery team. She underwent magnetic resonance imaging of the thoracic and lumbar spine where infectious neuropathy was evidenced at L4-L5. Patient was transferred to a referral hospital where Mycobacterium tuberculosis was evidenced as the cause and, when performing a rapid test for SARS-CoV-2, it was positive.

1 INTRODUCTION

Acute Transverse Myelitis (TM) is an inflammatory or infectious condition considered rare due to an incidence of 1-4 cases per million/year. A condition that affects the motor and sensory pathways of the spinal cord and may lead to loss of strength in the lower limbs, paresis and paresthesia of ascending progression11. Its condition usually presents with low back pain, sudden onset paresthesia and symptoms of the autonomic system such as urinary and fecal urgency or constipation, but may vary according to the affected site1. It affects both genders and in a bimodal way, reaching ages of 10-19 years and 30-39 years12, and has a wide spectrum of etiologies ranging from idiopathic or associated with other diseases such as: multiple sclerosis, ischemia, autoimmune and tissue diseases connective tissue, viruses, bacteria, and intra- or extra-axial neoplasms13. The diagnosis can be made through imaging tests such as magnetic resonance imaging or assessment of cerebrospinal fluid pleocytosis14. Treatment consists of the administration of steroids, plasmapheresis and glucocorticoids, depending on the etiology[3]. The prognosis varies from remission of the condition to the evolution of paraplegia or death from respiratory failure or neck injury15.

The present work aims to present a clinical case of acute transverse myelitis in a puerperal patient.

2 CASE REPORT

Patient, 32 years old, G4PN3A0, in a stable relationship, manicurist, seeks care at a maternity hospital with a complaint of “fluid loss for 23 days”. On examination, blood pressure was 150x100 mmHg, single fetus, longitudinal, cephalic, back to the left, BCF 142 bpm, without uterine dynamics. Routine requested for preeclampsia, serology (HIV, HBsAg, Anti HCV and VDRL) and obstetric Doppler

ultrasound. Proteinuria (+) and other tests without changes were evidenced, as a conduct, hospitalization was requested. The patient progresses to vaginal delivery and, on the first postpartum day, there is a report of pain complaints in the lower limbs (LL) evolving over the days with intense pelvic pain and progressive paresthesia. Start using Methyldopa 500 mg 1x a day, cephalexin 500 mg, analgesia and anti-inflammatory drugs. On the fifth day of hospitalization, an orthopedic cause is ruled out through specialist evaluation. On the eighth day of hospitalization, the patient reports intense pain that disables ambulation, associated with constipation. On the twelfth day, the patient still complains of severe pain in the lower limbs and lumbar region, which is evaluated by neurology, which describes it as “shock” pain, starting in the third trimester of pregnancy, but the patient was able to carry out their daily activities, with worsening in the puerperium. The examination reveals hypotrophy and hypotonia of the lower limbs and magnetic resonance imaging of the thoracic and lumbar spine is requested. In the conduct, gabapentin and amitriptyline were added for pain management.

Figure 1 - Magnetic resonance imaging of the lumbar and sacral spine showing an abscess between L4 and L5.

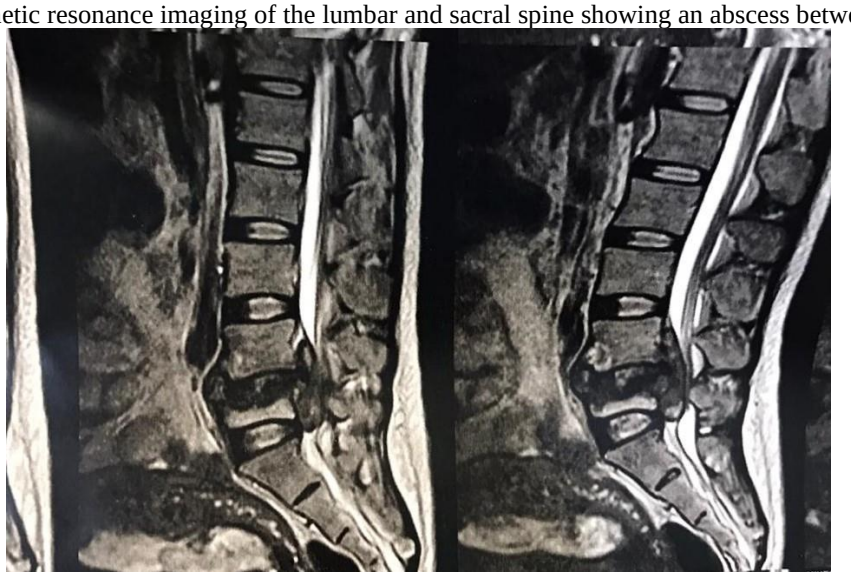


Figure 2 - X-ray of the lumbar and sacral spine showing an abscess between L4 and L5.



On the twentieth day of admission, clinical neurology evaluation was performed after magnetic resonance imaging found an extensive inflammatory/infectious process in L4-L5 with extension to the spinal canal causing stenosis of nerve roots. Transfer to a tertiary hospital for follow-up with neurology and neurosurgery was suggested. A rapid test for Sars-Cov-2 was performed and the result was positive. The patient did not report any respiratory symptoms in the maternity ward. In the tertiary hospital, a sample of the spinal cord injury was collected, where Mycobacterium tuberculosis was evidenced in the rapid molecular test. Currently, the patient is in the process of recovery, with partial improvement of movements and motor and sphincter sensitivity.

3 DISCUSSION

Cases of Transverse Myelitis due to Tuberculosis are rare or little reported in the scientific community8. It is necessary to take into account the immunological changes that occur during pregnancy, a cohort study carried out in Sweden evaluated the increased risk of activating tuberculosis during pregnancy and came to the conclusion that, despite the result showing a significant increase in activation in the postpartum period and pregnancy, it is also necessary to assess the incidence of TB due to the continuous risk of renewed exposure6. Immunosuppression that occurs in pregnancy to prevent rejection of the fetus is believed to trigger a selective suppression of cell-mediated immunity and progressively compromise lymphocytic reactivity towards the purified tubercle protein derivative. In the postpartum period, there is a rebound lymphocytic response, called immunorestitution, and this contributes to an increase in the severity of postpartum tuberculosis symptoms5.

4 CONCLUSION

Acute incomplete transverse myelitis (ATM) is an acute inflammatory disease of focal origin in the spinal cord, with numerous clinical manifestations that occur due to neural dysfunction of the motor, sensory and autonomic pathways that pass through the compromised region. Its etiopathology is still not well understood, and it may be a clinical manifestation of several diseases, but there is a correlation with the immunological component. The case presented is important for its rarity and for being a puerperal patient, with an insidious, acute and disabling condition, which compromised the quality of life, physical and mental health of the woman in her special and long-awaited moment of life. The prevalence of this disease is 1 to 4 cases per million inhabitants per year, and the incidence is up to 0.003%. It can affect patients of any age group, but there is a predominance of the 10-19 and 30-39 age groups. Despite being a rare pathology, it should enter the differential diagnosis when the patient presents suggestive symptoms, and the evaluation by the specialist, directs and leads to an effective diagnosis and specific treatment, minimizing the sequelae of the disease. The diagnosis is based on the clinical findings, after a complete neurological examination and on Imaging exams through Magnetic Resonance of the spine, which usually identifies and locates the lesion, in addition to ruling out local compressive and traumatic phenomena. Blood tests may suggest infectious causes, hypovitaminosis, HIV infection, among others. Lumbar puncture is also an important test, and helps to rule out other infectious causes, and to show the agent involved, which in the case in question is due to the high incidence of infection with the bacterium Mycobacterium tuberculosis or Bacillus of Koch (BK), in the Amazon region, in northern Brazil. Treatment depends on the specific etiological cause, and aims to improve symptoms and preserve the patient's quality of life, depending on the complications and sequelae involved, which can be temporary or permanent. in the case in question, it is due to the high incidence of infection with the bacterium Mycobacterium tuberculosis or Bacillus of Koch (BK), in the Amazon region, in northern Brazil.

REFERENCES

1) 1 Vol XX 2011 - Nascer e Crescer Magazine - Hospital.pdf, [s.d.]; MARTÍNEZ et al., [n.d.]; ROMAN; KERR, 2003

2) Sampaio M.J., Garrido A., Oliveira M.J., Vilan A., Almeida R., Cunha J. Acute transverse myelitis: Acute transverse myelitis. Acute transverse myelitis. 2011; 01:01-03.

3) Scott TF, Frohman EM, De Seze J, Gronseth GS, Weinshenker BG; Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Evidence-based guideline: clinical evaluation and treatment of transverse myelitis: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Neurology. 2011 Dec 13;77(24):2128-34. doi: 10.1212/WNL.0b013e31823dc535. Epub 2011 Dec 7. PMID: 22156988.

4) 1 Vol XX 2011 - Nascer e Crescer Magazine - Hospital.pdf, [n.d.].

5) CHENG, V.C.C. et al. Peripartum Tuberculosis as a Form of Immunorestitution Disease. Eur J Clin Microbiol Infect Dis, v. 22, p. 313–317, 2003.

6) JONSSON, J. et al. Increased risk of active tuberculosis during pregnancy and postpartum: a register-based cohort study in Sweden. [n.d.].

7) MARTÍNEZ, C. et al. Case Review Transversal Mielitis Clinical Analysis Abstract. [s.l: s.n.].

8) ORTEGA-ROSALES, A.; DELGADO-TORRES, N.; BURNEO-ROSALES, C. A rare neurological complication of tuberculosis: Transverse myelitis. IDCases, v. 17, 1 Jan. 2019

9) RODRÍGUEZ, Y. et al. Guillain–Barré syndrome, transverse myelitis and infectious diseasesCellular and Molecular Immunology, 2018. Available at: <www.nature.com/cmi>. Accessed on: 19 jun. 2020

10) ROMAN, G.C.; KERR, D. Proposed diagnostic criteria and nosology of acute transverse myelitis [6] (multiple letters). Neurology, v. 60, no. 4, p. 730–731, 2003.

11) West TW. Transverse myelitis--a review of the presentation, diagnosis, and initial management. Discov Med. 2013 Oct;16(88):167-77. PMID: 24099672.
12) Martínez, Cecilia & Médica, Mena & Moreno Cortes, Eider & Álvaro, Muriel & Mauricio, Ocampo. (2018). Transverse Myelitis Clinical Analysis and Case Review. Risaralda Medical Journal. 24. 139-142. 10.22517/25395203.9386.

13) Martins, Leticia & Fernandes, Mariana & Amanda, Raquel & Gotardo, Tassia & Geralda, Tatiliana & Kashiwabara, Kashiwabara. (2020). ACUTE TRANSVERSE MYELITIS: LITERATURE REVIEW ACUTE TRANSVERSE MYELITUS LITERATURE REVIEW. BJ Kines-National Journal of Basic & Applied Sciences. 30. 89-94

14) Scott TF, Frohman EM, De Seze J, Gronseth GS, Weinshenker BG. Evidence-based guideline: clinical evaluation and treatment of transverse myelitis. Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Neurology 2011;

15) PEREIRA, S.L.A; Prospective Study of Longitudinally Extensive Transverse Myelitis: analysis of clinical, laboratory and imaging factors. The original version is available at the FMUSP Library – São Paulo 2012eferences

1) 1 Vol XX 2011 - Nascer e Crescer Magazine - Hospital.pdf, [s.d.]; MARTÍNEZ et al., [n.d.]; ROMAN; KERR, 2003

2) Sampaio M.J., Garrido A., Oliveira M.J., Vilan A., Almeida R., Cunha J. Acute transverse myelitis: Acute transverse myelitis. Acute transverse myelitis. 2011; 01:01-03.

3) Scott TF, Frohman EM, De Seze J, Gronseth GS, Weinshenker BG; Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Evidence-based guideline: clinical evaluation and treatment of transverse myelitis: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Neurology. 2011 Dec 13;77(24):2128-34. doi: 10.1212/WNL.0b013e31823dc535. Epub 2011 Dec 7. PMID: 22156988.

4) 1 Vol XX 2011 - Nascer e Crescer Magazine - Hospital.pdf. , [n.d.].

5) CHENG, V.C.C. et al. Peripartum Tuberculosis as a Form of Immunorestitution Disease. Eur J Clin Microbiol Infect Dis, v. 22, p. 313–317, 2003.

6) JONSSON, J. et al. Increased risk of active tuberculosis during pregnancy and postpartum: a register-based cohort study in Sweden. [n.d.].

7) MARTÍNEZ, C. et al. Case Review Transversal Mielitis Clinical Analysis Abstract. [s.l: s.n.].

8) ORTEGA-ROSALES, A.; DELGADO-TORRES, N.; BURNEO-ROSALES, C. A rare neurological complication of tuberculosis: Transverse myelitis. IDCases, v. 17, 1 Jan. 2019

9) RODRÍGUEZ, Y. et al. Guillain–Barré syndrome, transverse myelitis and infectious diseasesCellular and Molecular Immunology, 2018. Available at: <www.nature.com/cmi>. Accessed on: 19 jun. 2020

10) ROMAN, G.C.; KERR, D. Proposed diagnostic criteria and nosology of acute transverse myelitis [6] (multiple letters). Neurology, v. 60, no. 4, p. 730–731, 2003.

11) West TW. Transverse myelitis--a review of the presentation, diagnosis, and initial management. Discov Med. 2013 Oct;16(88):167-77. PMID: 24099672.

12) Martínez, Cecilia & Médica, Mena & Moreno Cortes, Eider & Álvaro, Muriel & Mauricio, Ocampo. (2018). Transverse Myelitis Clinical Analysis and Case Review. Risaralda Medical Journal. 24. 139-142. 10.22517/25395203.9386.

13) Martins, Leticia & Fernandes, Mariana & Amanda, Raquel & Gotardo, Tassia & Geralda, Tatiliana & Kashiwabara, Kashiwabara. (2020). ACUTE TRANSVERSE MYELITIS: LITERATURE REVIEW ACUTE TRANSVERSE MYELITUS LITERATURE REVIEW. BJ Kines-National Journal of Basic & Applied Sciences. 30. 89-94

14) Scott TF, Frohman EM, De Seze J, Gronseth GS, Weinshenker BG. Evidence-based guideline: clinical evaluation and treatment of transverse myelitis. Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Neurology 2011;

15) PEREIRA, S.L.A; Prospective Study of Longitudinally Extensive Transverse Myelitis: analysis of clinical, laboratory and imaging factors. The original version is available at the FMUSP Library – São Paulo 2012

CHAPTER 51

The facilities and contributions of point of care technology in the hospital environment

10.56238/rsfohsv1-051

Marlene Simões e Silva
Nurse
E-mail: enfermeiramarlene12@gmail.com

Liene de Fátima Carvalho
Nurse
E-mail: lienebrasil@hotmail.com

Hilma Keylla de Amorim
Nurse
E-mail: hilmaamorim30@gmail.com

Pablo Raphael de Freitas
Nurse
E-mail: pabloraphael_freitas@hotmail.com

Milena Vaz Sampaio Santos
Nurse
E-mail: milena.sampaio@ebserh.gov.br

Carolina Costa Pinto
Nurse
E-mail: enfa.carol1979@gmail.com

Juliane Guerra Golfetto
Nurse
E-mail: juliane.golfetto@ebserh.gov.br

Hirlla Karla de Amorim
Pharmacist
E-mail: hirlla20@hotmail.com

Emanoel Rodrigo Melo dos Santos
Pharmacist
E-mail: emanoel.santos@ebserh.gov.br

Rita de Cássia Almeida Sales
Nurse
E-mail: rita.nefro@hotmail.com

ABSTRACT
The aim of this study was to highlight the advantages and contributions brought by the point of care exams, pointing out the current consensus on this theme. A literature review was carried out, which will be elaborated through data collection carried out from secondary sources, through a bibliographic survey. The search for primary documents was carried out through the Scielo database, the Virtual Health Library (VHL) and PubMed. As inclusion criteria, the period from 2011 to 2021 was delimited, accepting full publications or only their published abstracts. Only articles published in Portuguese and English were accepted, without exception. The descriptors to be used were, namely: Point of care; Technology; Diagnosis. Through the bibliographical survey carried out, it was possible to conclude that the point of care technology is extremely important, even essential for determining the definitive and confirmatory diagnosis of a series of pathological and clinical conditions in the daily routine of hospital care, especially. This technology should be increasingly encouraged in practice, considering not only the fact that it allows for an early diagnosis, but also because it provides a better prognosis for those cases considered more serious, contributing to the saving of lives.

Keywords: Point of Care. Diagnosis. Quality management.

1 INTRODUCTION

The healthcare market is in constant transformation, involving scientific research, increasingly efficient and autonomous equipment, new treatments, innovations in information technology to create predictive algorithms for chronic diseases, and patient population management.

More and more resources and devices have been created in order to contribute in a more decisive way to facilitating and improving the quality of the services provided, especially in the hospital environment, where excellence and quality are always the priority.

The creation of technological devices and computerized tools can also represent an important contribution to the promotion of a more humanized and efficient assistance, adding value to all involved and contributing significantly to the provision of quality services in a highly competitive market.

Thus, the technological and systematized tools at the service of health sciences should be analyzed and, when their efficiency is verified, they should be put into practice in routine activities performed at the hospital level. An important resource developed in recent decades was the development of the so-called *point-of-care* (POC) tests, which have as their main objective to perform diagnoses more quickly and efficiently (DUSSE et al, 2012). The objective of this study is to highlight the advantages and contributions brought by *point-of-care* tests, pointing out the consensus on this issue today.

2 METHODOLOGY

This is a literature review study, which will be developed through data collection from secondary sources, by means of a bibliographic survey. The steps, which will enable the operationalization of the review, will begin with the search for primary documents, through the *Scielo*, Virtual Health Library *(VHL)* and *PubMed databases*.

The inclusion criterion was delimited to the period 2011 to 2021, accepting publications in their entirety or only their published abstracts. Only articles published in Portuguese and English, without exception, will be accepted. The descriptors to be used will be: *point of care*, technology, diagnosis.

The exclusion criteria to be used will be articles published outside the period and that are not related to the approach. The reading of the material will initially be exploratory through the abstracts of the articles, followed by selective reading by the content and then analytical, aiming at the identification of information and synthesizing it through summaries to provide a partial report on the theme under study. The data from each study will be extracted, presented, and finally discussed, with a conclusion at the end.

3 RESULTS AND DISCUSSION

Leal et al (2013) stated that a proper preoperative evaluation is critical to optimize the respective procedure for each patient, reducing risks and costs.

Arienzo et al (2019) stated that rapid and accurate diagnosis is essential to ensure timely and effective therapy. In the case for example of urinary tract infection diagnostic tests, along with culture-based reference methods, several point-of-care tests for early detection of UTIs have been developed.

Phillips et al (2019) highlighted that healthcare professionals who have access to *point-of-care* testing are increasingly requesting the same POC test performance they expect from the laboratory. With the introduction of the Cobas®Liat instrument, highly sensitive molecular diagnostic tests can be performed closer to the patient in CLIA-free POC settings.

Crocker et al (2014) stated that *point of care* laboratory testing offers reduced response time and can promote operational efficiency improvements. In these authors' study, after implementing *POCT*, there

was a 21% reduction in tests requested per patient; an 89% reduction in follow-up calls and phone calls and 85%, respectively; 61% decrease in patient revisits. It was concluded that *POCT* can significantly improve operations with reduced costs through improved practice efficiency.

According to Schiling (2015), in Canada, the use of *POC* testing during stabilization of patients prior to inter-hospital transfer was calculated to result in substantial time savings. Also, in the US, the implementation of *POCT* resulted in a 20% decrease in admissions to the chest pain unit and simultaneously substantial savings. In the cardiac observation unit, the introduction of troponin *POC* testing reduced length of stay, decreased admission rates, and resulted in fewer costly procedures, with a 25% savings in costs per patient. In cardiothoracic surgery with high use of expensive blood products and coagulation factor concentrate, the introduction of the coagulation measurement by *POC* testing resulted in savings of 56%.

Bollinger and Tanaka (2017) consider that *POC* coagulation testing enables rapid clinical decisions in hematologic interventions and, when used in conjunction with an appropriate transfusion algorithm, can reduce the use of blood products and potentially complications associated with blood transfusion

Nunes et al (2016) cited that *point-of-care* ultrasonography (*POCUS)* occupies a propedeutic role of increasing importance in clinical diagnosis. In general, clinicians have demonstrated an ability to obtain images that allow them to answer simple, typically binomial questions. The integration of these images with the clinical history and physical examination findings has improved clinicians' management of patients.

Physicians are showing interest in *POCUS*, and some medical schools, particularly in the US, have already introduced ultrasonography into their undergraduate curricula. In Brazil, the Medical School of the Federal University of Juiz de Fora (FAMED/UFJF) is developing a pioneering initiative involving the structured and horizontal incorporation of *POCUS* in the medical school curriculum.

Schiling (2014) stated that the use of *POC* systems allows rapid analysis of blood samples especially in emergency units, bringing numerous advantages. In this study, the potential economic impact of using the *iSTAT POC* system in an emergency unit of a university hospital was analyzed. As results, it was observed that the use of *POC* resulted in direct savings per analysis of US$111 for each patient. The average delay between *POC* and laboratory results was 48.5 ± 28.67 minutes. This is equivalent to 32,333 work hours per year. Emergency department personnel bills for a cost of $1.5 per patient per minute. The time saved by the *POC* translates into a potential savings of $72.75 per patient. Based on 40,000 patient visits per year in our emergency department, $7,350,000 can be saved by the rigorous use of *POC*.

The authors concluded that the use of *POC* can produce a large economic impact to the emergency unit if all potential savings are realized. Considering the potential savings in wait times, *POC* can also increase patient safety and satisfaction, and help alleviate overcrowding in these hospital units.

Phillips et al (2019) cited in their study that as more sensitive tests become available, there is concern about contamination of instrumentation due to improper handling, mistakes made during processing, or environmental contamination.

According to Schiling (2015), in the neonatal ICU, the *POC* test has been shown to reduce costs per patient by 8.3% as a result of reduced core laboratory tests and fewer transfusions. In the pediatric emergency room, the introduction of the *POC* test for human respiratory syncytial virus detection in patient triage was significantly changed, bringing faster therapeutic decisions as well as isolation procedures for such to the extent that significant capacity could be released during epidemic periods, with large savings as a consequence.

Aljadi et al (2019) cited that flow cytometry-based basophil activation test (BAT) is used for the diagnosis of allergic response. However, flow cytometry is time-consuming, requiring skilled personnel and complicated processing, which has limited its use in the clinic. The authors presented a new microfluidic-based immunoaffinity *BAT (miBAT)* method. It was concluded that this device is capable of isolating basophils directly from whole blood for activation and detection on chip. The new *miBAT* method awaits validation in larger patient populations to evaluate performance in diagnosing and monitoring patients with point-of-care allergies.

Lusignan et al (2019) highlighted that point-of-care testing *(POCT)* for influenza promises to provide real-time information to influence clinical decision making and improve patient outcomes. *Public Health England* published a toolkit to aid the implementation of these tests in the UK National Health Service. The authors conducted a feasibility study to evaluate the implementation of influenza *POCT* in primary care as part of a sentinel surveillance network. A mixed methods study was conducted to compare sampling rates in practices that use *POCT* and current virology *swab* practices that do not use *POCT*, and to understand the issues and barriers to implementing influenza POCT in primary care workflows.

Six practices were recruited and data collection was started on March 11, 2019. In addition, 312 *swab* samples were collected at the time of protocol submission, which was 32.5% (312/960) of the expected sample size. In addition, 68 samples were positive for influenza, which was 20.1% (68/338) of the expected sample size. It was concluded that the implementation of *POCT* in primary care is of great feasibility and practitioners' opinions on the use of influenza *POCT* in primary care, including its impact on primary care workflows.

Barcellona et al (2017) stated that oral anticoagulant therapies with the anti-vitamin K (AVK) drugs, warfarin, acenocoumarol, and fenprocume, are employed for primary and secondary antithrombotic prophylaxis in patients with venous thromboembolism, atrial fibrillation, and mechanical heart valves. Telemedicine and telecare can provide significant help in managing this therapy by allowing patients to perform the test at home or elsewhere with a handheld device, i.e. point-of-care testing *(POCT)*, and send the result to a thrombosis care (TC). Patients can receive dose adjustment sent back by the CT. The effectiveness of this type of management is equal to or greater than traditional *VKA* monitoring in terms of hemorrhagic and thrombotic events.

Cost analysis with a 10-year horizon reveals that both self-testing and self-management are inexpensive tests. In a study by Nunes et al (2016) the authors sought to present the results of skill

development for the use of *point-of-care* ultrasound *(POCUS)* in Nephrology. A total of 9 residents, 4 from Nephrology and 5 from clinical medicine, attended a 16-hour theoretical-practical ultrasound course. Ultrasound topics related to the urinary tract, lung, heart, blood vessels, renal biopsy, and central venous catheter insertion were covered.

The evaluation consisted of cognitive tests (CT) of multiple choice and image association before and after the course and practical evaluation of skills in generating ultrasound images and performing procedures by the Structured Examination of Clinical Skills *(OSCE)*. All residents completed the course. A significant improvement in knowledge was observed when comparing the scores obtained by the residents before and after the multiple choice and image association CT. Also, it was observed that the evaluation of the residents' competence through the *OSCE*, except for the lung station, was considered very good. It was concluded that a *POCUS* course in Nephrology of only 16 hours, not limited to urinary tract topics, enables the development of skills in imaging and performing nephrological procedures. The curriculum developed can serve as a model for learning the *POCUS* in Nephrology, thus contributing that for the training of the use of ultrasonography (US) by non-radiologists has increased and stems from the need for the physician to integrate "new" clinical information to the diagnostic process. Discussions regarding the need for pre-surgical complementary exams have been increasing in recent years.

We can attribute this increase in discussions due to an observance and understanding of the exaggerations often made around the demand for tests that only increase hospital costs, delay the performance of procedures, increase the demand for services, and can also interfere with patient safety.

Thus, what we observe is, in fact, a process of rationalization of the exams, in a worldwide trend observed nowadays, as the studies selected here could prove.

Many of the tests that were required in the preoperative period until recently are not indispensable, and can be avoided except in specific clinical cases.

There was also a consensus that, as a rule, the clinical evaluation, through a detailed anamnesis, is essential and allows the patient to be offered the lowest surgical risk possible.

Corroborating with the view of Guerra et al (2012), it is true that a well-detailed clinical examination is essential and indispensable, and also enough to reduce the amount of preoperative exams by up to 60%. The same view was defended by Leal et al (2013) and Giordano et al (2009) who also agreed that an adequate preoperative evaluation is essential to optimize the respective procedure for each patient, reducing risks and costs.

Point-of-care tests are part of this context, and are considered in practice as an important tool for faster and more accurate diagnosis of a multitude of diseases and clinical conditions that, in most cases, require early and rapid intervention.

Through this bibliographical survey it became evident that the advantages in the practice of *point of care* testing are numerous, and there is no way to think of medicine today without associating it with the use and development of currently available methods of *point of care* diagnosis.

In our understanding, the technology and the preparation of professionals for the correct use of these tools must be stimulated and carried out more and more, thus guaranteeing a better prognosis for patients based on a precise and fast diagnosis, with lower costs for hospitals and patients, advantages that the point of care technology provides and that are its great differential.

4 Conclusion

Through the literature survey carried out, it is possible to conclude that *point-of-care* technology is extremely important, even essential, for determining the definitive and confirmatory diagnosis of a series of pathological and clinical conditions in daily hospital care, especially. This technology should be increasingly encouraged in practice, in view not only of the fact that it allows an early diagnosis, but also because it enables a better prognosis for those cases considered more serious, contributing to saving lives.

REFERENCES

ALJADI, Z.; KALM, F.; RAMACHANDRAIAH, H.; NOPP, A.; LUNDAHL, J.; RUSSOM, A. Microfluidic immunoaffinity basophil activation test for point of care allergy diagnosis. J. Appl. Lab. Med., 4(2):152-163, 2019.

ARIENZO, A.; CELLITTI, V.; FERRANTE, V.; LOSITO, F.; STALIO, O.; MURGIA, L.; MARINO, R.; CRISTOFANO, F.; ORRÚ, M.; VISCA, P.; DI SOMMA, S.; SILVESTRI, L.; ZIPARO, V.; ANTONINI, G. A new point-of-care test for the rapid detection of urinary tract infections. Eur. J. Clin. Microbiol. Infect. Dis., 2019.

BARCELLONA, D.; FENU, L.; MARONGIU, F. Point-of-care testing INR: an overview. Clin. Chem. Lab. Med., 55(6):800-805, 2017.

BOLLINGER, D.; TANAKA, K.A. Point of care coagulation testing in cardiac surgery. Semin. Thromb. Hemost., 43(4):386-396, 2017.

CROCKER, J.B.; LEE-LEWANDROWSKI, E.; LEWANDROWSKI, N.; BARON, J.; GREGORY, K.; LEWANDROWSKI, K. Implementation of Point-of-Care Testing in an Ambulatory Practice of an Academic Medical Center. Am J Clin Pathol;142:640-646, 2014.

DUSSE, L.M.S.; OLIVEIRA, N.C.; RIOS, D.R.A.; MARCOLINO, M.S. RNI Point of care test (POCT): esperança ou ilusão? Revi. Bras. Cirurg. Cardiovasc., 27(2):296-301, 2012.

GIORDANO, L.A.; GIORDANO, M.V.; GIORDANO, R.O.S. Exames pré-operatórios nas cirurgias ginecológicas eletivas. Femina, 37(1), 2009.

GUERRA, M.E.; PEREIRA, C.S.; FALCÃO, D.P.; SIGWALT, M.F.; SKINOVSKY, J. Análise da relevância dos exames laboratoriais pré-operatórios solicitados em cirurgias eletivas em um hospital universitário. Rev. Med. Res.; 14 (1): 47-53, 2012.

LEAL, F.P.; SILVA, A.P.; OLIVEIRA, E.S. Avaliação pré-operatória: exames complementares de rotina? Brazilian Journal of Surgery and Clinical Research, 4(1):49-55, 2013.

LUSIGNAN, S.; HOANG, U.; LIYANAGE, H.; YONOVA, I.; FERREIRA, F.; DIEZ-DOMINGO, J.; CLARK, T. Feasibility of point-of-care testing for influenza withing a national primary care sentinel surveillance network in england: protocol for a mixed methods study. JMIR Res. Protoc., 8(11):141, 2019.

NUNES, A.A.; PAZELI JUNIOR, J.M.; RODRIGUES, A.T.; TOLLENDAL, A.L.S.V.; EZEQUIEL, O.S.; COLUGNATI, F.A.B.; BASTOS, M.G. Desenvolvimento de competências para o uso da ultrassonografia point-of-care em Nefrologia. J. Bras. Nefrol., 38(2):209-214, 2016.

PHILLIPS, J..; McCUNE, S.; FANTZ, C.R.; ENGSTROM-MELNYK, J.; OSIECKI, J.C. Assay integrity of a PCR influenza point of care test remains following artificial system contamination. J. Appl. Lab. Med., 4(3):422-426, 2019.

SCHILING, U.M. Time is Money—the Economic Impact of Point of Care on the Emergency Department of a Tertiary Care University Hospital. Point of Care;13: 21–23, 2014.

SCHILING, U.M. The economic benefits of point-of-care testing. HHE Article Martin Schilling 038655 Rev A 03/15, 2015.

CHAPTER 52

Revenge Porn and the Body Exposed in Superior Court of Justice Decisions

10.56238/rsfohsv1-052

Adriana Espíndola Correa
Adjunct Professor of Civil Law at the Federal University of Paraná, linked to the Department of Civil Law and Civil Procedural Law of the Legal Sciences Sector. PhD in Social Relations Law from the PPGD/UFPR (2009). Master in Law from the same Post-Graduation Program (2002). Coordinator of the Research Group on Law, Biotechnology and Society - BIOTEC/UFPR
E-mail: adaecorrea@gmail.com

Alice De Perdigão Lana
Master's degree from the Federal University of Paraná Law School (UFPR). Graduated from the same school.
E-mail: aliceplana@gmail.com

ABSTRACT
The aim of this article is to analyze the judicial decisions of the Superior Court of Justice (STJ) regarding "revenge porn", in the context of civil liability, in order to understand the different framings of the female body and sexuality in these decisions. Based on the understanding of law as a discursive practice, we mobilize feminist theoretical constructions to reflect on legal discourses about the body and the feminine, and to investigate their power in the processes of objectification and subjectivation of women. The analysis of the rulings shows that the violence suffered by the exposed women is translated, in legal terms, as a violation of personality rights, notably privacy, honor, image and protection of personal data. This leads to a certain concealment of the body in legal discourses, even when confronted with the generified body of the exposed woman. The comprehension of "revenge porn" as one of the forms of materialization of gender and sexuality policies, which define behaviors that are acceptable or not, allows us to approach the issue in a way that implies, more directly, body and gender.

Keywords: Revenge porn; body; non-consensual dissemination of intimate images; gender-based violence.

1 INTRODUCTION

Numerous discourses dispute the definitions of the body. The non-consensual dissemination of intimate images on the internet - also known in English-speaking literature as *revenge porn*[1] , by the acronym NCII (*non-consensual intimate images*) and by the term *image-based sexual abuse* - is one of the phenomena that constructs the most diverse social representations of the body, while it discursively constructs it (Citron, 2019).

The so-called "revenge porn" (Faria *et al.* , 2015) can be understood as a mechanism of conformation of women's bodies, as a reiterated practice, to which these bodies are continuously exposed. By imbricating problematics of gender, technology, power, and (violations of) privacy and consent, the analysis of *revenge*

[1] The terms *revenge porn*, "revenge porn," or "revenge porn," in defining the act as revenge or revenge, should be subject to criticism - for they assume that some action by the woman previously gave rise to the retaliation. However, it is around these names that the discussion centers. It is counterproductive to abandon the locutions around which most studies of the act develop. Thus, this paper will make use of the usual terms throughout the text, but prioritizing the term "non-consensual dissemination of intimate images," in order to emphasize that the exposure of others' intimacy cannot be taken as mere reaction, and the term "image-based sexual abuse," which highlights the sexual abuse character of this violence (McGlynn, 2017, p. 26).

porn allows us to question the ways in which legal discourse produces power effects in the construction of female bodies (Maddocks, 2018).

The readings made by the Judiciary regarding the body (or the attempts to cover it up) are especially interesting, precisely because they demonstrate how the Law operates in its daily disputes. One possible path, chosen by this article, is to investigate the positioning for the cases of non-consensual dissemination of intimate images in the judicial decisions of the Superior Court of Justice (STJ)[2] , in its articulation with the legal regulation of the body. By thinking about the legal frameworks of these cases, we aim to explore their consequences in the processes of subjectivation of women victims of these practices.

This analysis of the decisions of the Brazilian Superior Court is based on the understanding of law as a discursive practice, with power effects (Foucault, 1977). Thus, understanding the different framings of the female body and sexuality in these judicial decisions allows us to investigate their power in the processes of objectification and subjectivation of women.

In the law applied in the courts, the most diverse categories, such as body and person, are almost always treated as something pre-constituted and ahistorical. For a more accurate legal reading, it is necessary to look at the processes of subjectivity construction: when creating something for the legal world, it is also created socially and materially. The creation/exclusion of the body in law constructs the body in the world (Hyde, 1997, p. 82). In this sense, legal technique is a powerful ontological operator that effectively constructs the world to which its provisions refer (Beviláqua, 2010, p. 22). It is from these understandings that the judgments will be analyzed.

The social importance of the subject is also undeniable. According to *SaferNet*, in 2018 and 2019, the topic "exposure of intimate images" was the most sought after in the guidance given by the entity, ahead of topics such as *cyberbullying* and virtual fraud. In 2018 alone, the organization oriented 669 people (of these, 440 women) who were victims of the exposure of intimate images. In 2019, there were 467 orientations on the same subject, again staying ahead of topics such as *cyberbullying* and problems with personal data (both with 343 orientations)[3] . Such indications demonstrate the seriousness of this violence.

Although it is difficult to work with fully comprehensive numbers because of the very characteristics of NCII (such as the feeling of shame that prevents all women from seeking help) and the absence of a comprehensive statistical study, the available data justify the need to understand revenge pornography as it relates to the women affected.

It further reinforces the naming of *revenge porn* as violence: it is not because it occurs on the internet that it is "less real" - and this is repeatedly demonstrated in the impacts on the lives of the women exposed. The differentiation between *online* and *offline increasingly* makes less and less sense, particularly when research looks at social relations and legal responses (Valente *et al.*, 2016, p. 9).

---

[2] The analysis was restricted to the STJ to shed light on the positioning of the Brazilian Superior Court in relation to NCII, given that this Court is composed of jurists of legal knowledge exceptionally recognized by their peers. For this reason, no decisions from first or second level courts were analyzed. Such analysis, equally important, would require new research.

[3] More data available at < https://helpline.org.br/indicadores/>. Accessed on: 29 Apr. 2020.

Five clippings guided the research. The first is temporal: decisions were surveyed since 1988, when the STJ was created. The territorial cutout, in turn, encompasses the entire Brazilian territory, due to the Court's jurisdiction. Although events on the Internet often involve several countries and are a challenge in discussions about sovereignty, the analysis made here, by focusing on the decisions of the STJ and seeking to understand the reading of the Brazilian judiciary on the case, will not enter this field.

The third cut is legal: we chose to focus on civil, rather than criminal, liability, precisely because the issue of privacy and consent is encompassed in the rights of personality, part of civil law.

The fourth is conceptual: only cases of non-consensual dissemination of intimate images were searched, that is, the sharing, without the consent of the person exposed, of intimate photos and videos. It does not matter, for this definition, by whom the material was produced or if it was initially sent to a specific person. With these two delimitations, the analysis of commercial pornography, sexual exploitation and child pornography (involving children up to twelve years old, according to art. 2 of the Child and Adolescent Statute) is excluded. Furthermore, even acknowledging the importance of the theme, we will not analyze pornography in its broad sense, in the sense of image exploitation for consumption, so as not to extrapolate the debate on privacy and consent.

The last cutout is gendered: the research focuses on exposed women. This fact is justified by data from the Brazilian organization *SaferNet*, which has an orientation service on crimes and violations of human rights *online* and has already assisted more than thirty thousand people. According to data made available by the entity, updated from 2012 to 2019, 1,486 women sought guidance because of cases of intimate exposure. In the same period, only 528 men resorted to the entity for the same reason. The number of advice sought by women was approximately three times higher.

The research developed in the book *O corpo é o código* (Valente *et al.* , 2016, p. 32), which thoroughly analyzed 90 judicialized cases of non-consensual dissemination of intimate images, 54 civil and 36 criminal, also demonstrates the seriousness of the issue and its marked gender bias. In the civil suits, in only 5 of the 54, the victim of the exposure is a man. In the criminal actions, only one (Valente *et al.* , 2016, p. 55).

Furthermore, the impacts are reduced when there is non-consensual dissemination of intimate images involving men[4] - when not positive for the life of the exposed man, whose sexual activity is seen more as a merit than something embarrassing.

Based on these five methodological clippings, to perform this analysis, searches were conducted in the *online* case law database of the Brazilian Superior Court of Justice with the terms "revenge pornography," "revenge pornography," "pornographic exposure," "revenge pornography" and the combinations "pornographic images" and "internet"; "intimate images" and "internet"; "privacy" and "internet" and "nudity"; and "privacy" and "internet" and "nude". Sixteen results were found, which were

[4] Within the confines of heteronormativity. The few famous cases of men harmed by dissemination of intimate images are of involvement in homosexual relationships or other sexual practices perceived as deviant (Pilkington, 2010).

filtered according to the five clippings indicated. A good part of the results dealt with a different theme, such as pedophilia[5] . After filtering, three judgments met the search criteria and were selected for critical analysis. The method of analysis of the decisions focuses on how the legal framings of the decisions, at the same time that they construct subjectivities, promote the erasure of the body. In the case of NCII, this action is also related to the covering up of a specific body: the body of women.

The course of the article begins with an exposition of the Brazilian normative framework that regulates the phenomenon, followed by the presentation of three judgments of the STJ - the only ones found that deal with NCII. Next, a problematization of the notions of body in Law is carried out, in order to understand its importance for the legal framework of the non-consensual dissemination of intimate images. Finally, we address the construction of the body in Law and how its concealment is structural to legal thought.

From this analysis, we resume the rulings to show the erasure of the body in Law and its replacement by terms such as "privacy", "honor", "personal data", among others. By neutralizing the body and sexuality, implicated in the NCII, the gender violence imbricated in these practices is also masked. It can be argued that body, in the legal environment, is governed by ambiguous, multiple and fluid, but not at all disinterested statutes, as the focus on individual self-determination, decontextualized, facilitates the individual accountability of the women affected.

2 FRAMEWORK OF THE NCII IN LAWS AND COURT DECISIONS

In private law, there is no exhaustive legal regulation of non-consensual dissemination of intimate images. The most direct reference, in the civil scope, is in art. 21 of the Marco Civil da Internet (Law No. 12,965/2014), which establishes the subsidiary liability of internet application providers in cases of "violation of intimacy resulting from the dissemination, without authorization of its participants, of images, videos or other materials containing scenes of nudity or sexual acts of a private nature.

There is also specific protection for non-consensual dissemination of intimate images in the Child and Adolescent Statute (ECA - Law No. 8069/1990), after the reform brought by Law No. 11829/2008, which sought to improve the fight against the production, sale and distribution of child pornography, as well as criminalize the acquisition and possession of such material and other conduct related to pedophilia on the Internet. With the reform, a series of articles were inserted in the Statute that seek to combat the dissemination of pornographic material related to pedophilia (arts. 240, 241, 241-A, 241-B and 241-C),

[5] The low number of results in the STJ may be indicative of several elements: shame, on the part of the exposed woman, of judicializing and exposing to public judgment something so intimate; resolution through the conclusion of agreements (judicial or extrajudicial); option for technological solutions rather than legal solutions (such as hiring technology companies to search and take down these images); the delay for a judicial case to reach the STJ, coupled with the fact that this form of internet violence is relatively recent; among others. These possibilities are only indicated here, as they are not the purpose of this article. In addition, the lack of a single term to refer to the term makes academic and jurisprudential research on the act difficult.

including montages and simulations. The protection is limited to images involving children or adolescents, and is not a general rule for *revenge porn*.

In the criminal sphere, two laws of 2018 began to regulate the phenomenon. Law No. 13,718/2018 includes, in the Criminal Code, art. 218-C ("Disclosure of a rape scene or a scene of rape of a vulnerable person, a scene of sex or pornography"), which typified the disclosure, by any means, of video and photo of sex scenes or nudity or pornography without the consent of the victim, in addition to the disclosure of rape scenes, with the purpose of revenge or humiliation. There is an increase of the penalty up to two thirds if the crime is committed by a person who maintains or has maintained an intimate affective relationship with the victim, such as boyfriend, girlfriend, husband or wife. It is worth pointing out that, according to § 2 of the same article, there is no crime when the agent practices the conduct described in the *main section of* this article in a journalistic, scientific, cultural or academic publication, using resources that make it impossible to identify the victim, with the exception of his/her previous authorization, in case the victim is of legal age.

Law No. 13,772/2018, in turn, recognizes that the violation of a woman's intimacy constitutes domestic and family violence, and criminalizes the unauthorized recording of nude scenes or sexual or libidinous acts of an intimate and private nature, in order to criminalize *revenge porn*. This law included art. 216-B in the Penal Code, which criminalizes the act of producing, photographing, filming, or recording, by any means, a scene of nudity or sexual or libidinous act of an intimate and private nature without the authorization of the participants (penalty of 6 months to 1 year of detention and a fine). The same penalty applies to the production of montages that include a person in a scene of nudity or intimate sexual or libidinous act.

The same law amends subitem II of the *caput of* Article 7 of the Maria da Penha Law (Law 11.340/2006), to include, among the forms of psychological violence, "violation of intimacy. This change is important because it inserts the non-consensual dissemination of intimate images and other forms of violation of intimacy within the protective list of the Maria da Penha Law. This increases the chances that such an act will be understood, both legally and socially, as the gender violence that it effectively is.

Finally, there is Law No. 12,737/2012, known as Carolina Dieckmann Law, because part of its rapid approval was attributed to the controversy arising from the hacking of the actress' computer, which had intimate pictures leaked *online*. The law amended the Penal Code to typify computer crimes, among them the invasion of computers to obtain data and information.

The approach taken here, however, aims to understand how the body reaches the courts under private law, not criminal law, in cases of compensation for moral damages resulting from the dissemination of these images, through civil liability. Criminal law, however, is relevant to the regulation of the matter in the civil sphere, since it establishes an important criterion of illegality and violation of rights.

The most recent judgment, which will be referred to hereinafter as Judgment 1, was heard on May 19, 2020. It is Special Appeal No. 1.735.712/SP, reported by Minister Nancy Andrighi. It is the case of a

woman who had intimate photos disclosed by an ex-boyfriend on social networks. The Court's final decision was to order Facebook to pay twenty thousand reais to the plaintiff for keeping the content *online*, even after several notifications. There is no record that the ex-boyfriend, responsible for the disclosure of the photos, has been sued in the civil sphere. The rapporteur, in the decision, states that "the woman victim of revenge porn knows that her intimacy was unduly disrespected and, equally, its unauthorized exposure is humiliating and flagrantly violates her personality rights" (Brazil, 2020, p. 13).

The second judgment analyzed, issued on 19.03.2018, and reported by Minister Nancy Andrighi, is Special Appeal No. 1.679.465/SP, referred to below as Judgment 2. It concerns the disclosure of intimate images of a teenager, without her consent, after the theft of her cell phone's memory card by a classmate. Google was ordered to remove the URLs from circulation, based on article 21 of the Brazilian Civil Rights Framework for the Internet. In its reasoning, the judgment recognizes that "this type of exposure represents a serious violation of personality rights" (Brazil, 2018, p. 15).

In her vote, the minister underlines the gender cut and characterizes NCII as a violence against the sexual rights of women, especially adolescents, indicating research that shows that "a large part of the events involving revenge pornography have as victims adolescents between twelve and sixteen years old" (Brasil, 2018, p. 11). The minister points out that this violence, even if it is not borne exclusively by women, is "especially practiced against them, reflecting a gender issue, culturally constructed in society" (2018, p. 12).

The last judgment, Special Appeal No. 1.445.240/SP, published on 22.11.2017, hereinafter referred to as Judgment 3, had Justice Luis Felipe Solomon as rapporteur. The factual situation object of the decision occurred at a university party in 2002, in which there were small rooms made of siding, decorated with pillows, called "love corners," so that guests "could feel at ease and do whatever they pleased." The rooms were guarded by security guards, to ensure the couples' privacy.

The plaintiff was performing sexual acts with her partner in one of these small rooms and was surprised by camera *flashes*, but both were prevented, by the security guard, from reaching the person who made the records. A few days after the party, the photographs were published on the Internet, reaching enormous repercussion and being the subject of reports in magazines and television programs.

The woman exposed, a minor at the time, filed a claim for damages against the author of the photographs and against one of the people responsible for disseminating the photos on the Internet, who received the photos by *email* and began to post them on his *website* and *blog*, identifying the couple and making offensive comments about the author, such as "fucking slut" and "little whore". During the course of the process, an agreement was reached with the author of the photos. The part of the process that reached the Superior Court was in relation to the compensation set for the person responsible for the disclosure on the internet.

The vote of the reporting minister, followed by the majority, decided to increase the amount owed by the person responsible for the disclosure of the photos to 130 minimum wages. In the decision, the

minister relates the right to intimacy and private life, protected by the Magna Carta, with the power of the person to remove certain aspects of his life from public scrutiny[6] .

The overruling vote, reported by Justice Marco Buzzi, although also framing the issue in terms of violation of privacy and honor, limited the discussion to the *quantum of* compensation and presented a divergence from the vote of the reporting justice, to fix a lower amount of compensation due to the victim.

In his explanation of vote, which followed the dissenting vote of Justice Marco Buzzi, Justice Raul Araújo presents a very significant rationale, as he starts from the assumption that there would have been concurrent guilt of the exposed woman - in his view, "she is not even that much of a minor" - who "risks so much intimacy in an environment that is not a couple's bedroom - but a cubicle of half a wall, mere siding" (Brazil, 2017, p. 21). For the minister, "there was no violation of safe, intimate space. The victim couple was exposed practically in public" (Brazil, 2017, p. 21). Still, he asserted that he only failed to dismiss the appeal because the defendant, responsible for disseminating the photos, sought "really harm those people portrayed beyond what, to some extent, they gave fit" (Brazil, 2017, p. 21).

The argument was dismissed by the ruling, which shows that the plaintiff's privacy was not violated because of the "precariousness of the structure, but, on the contrary, by the commissive act of one of the defendants" (Brazil, 2017, p. 18) - the "love corners" existed precisely to keep those acts private, as occurs with booths in public bathrooms and fitting rooms in stores.

The vote of Minister Maria Isabel Gallotti, who followed the rapporteur, refers to the "offense to the right to privacy and harmful and injurious exposure of pictures of the author" (2017, p. 28). It points out that the defendant managed four *websites*, having created one specifically to disseminate, comment and receive news about the fact.

The exposition of these rulings, in itself, already raises several questions, but before analyzing them in more detail, it is essential to point out and understand the glaring absence that pervades the three legal documents: there is no mention of the body of the exposed woman.

3 THE ELUSIVE PRESENCE OF THE BODY IN LAW

In order to discuss revenge pornography, it is necessary to talk about the body. After all, it is a violence that stems primarily from the non-consensual exposure of a body. Therefore, it may seem strange to talk about the "elusive presence of the body in Law" if we are dealing, precisely, with an exposed body. In this item, however, we seek to draw attention precisely to the fact that, in the decisions analyzed above and in legal discourses in general, however, the body, curiously, almost does not appear. The impacts on exposed women are translated, in legal terms, in several other terms: moral, patrimonial, or existential damages; violation of the right to privacy, protection of personal data, image or honor.

[6] There is doctrinal divergence in the distinction between intimacy, private life and privacy. Here we use, in line with Danilo Doneda, the term *privacy*(with meaning derived from the Anglo-Saxon expression privacy) as an umbrella term, which includes intimacy and private life (Doneda, 2006).

Law, in fact, does not present a stable definition of the body: it is almost always referred to by analogies and parallels that remove it from its concrete and contextual materiality, as Alan Hyde exposes in his book *Bodies of law* (1997).

The tension established between subject and body, its material substratum, is constitutive of modern law. The legal personality, the identity of the subject, has nothing to do with his body, with its concrete materiality. The very invention of the body in modernity provokes, in fact, a mutation in the conception of person (Le Breton, 2011, p. 104), to the extent that the body is now conceived as its extension, the object of its rights and powers.

The human body is taken, then, as the physical dimension of the subject of law (Gediel, 2006, p. 171). It enters the modern legal scene already with this floating status between person and thing (Esposito, 2016, p. 84) and occupies the ambiguous place of being attached to a person and being the object of rights and legal relations - in which it appears as the holder.

It seems that the body, in Law, can be glimpsed through its fragments, as in a kaleidoscope - but not entirely. Its references, in the most diverse cases, are always mediated: the autonomy of will of the woman who chooses to abort or not, the availability of the donor's blood, the dignity of the corpse, the moral and honor injured by the non-consensual dissemination of intimate images... These issues, despite having the body at their core, pass over corporeality.

This is noticeable in the three judgments analyzed: there is no mention of the term "body" in any of them. It is referred to by terms such as privacy, intimacy, morality, image, intimate sphere, private life, intimate life, honor, safe space, and countless others, but it is never revealed.

This dissociation is already present in the construction of the category of personality rights, in the passage from the 19th to the 20th century, as a kind of subjective right that falls upon the very attributes of the person (Gediel, 2000, p. 29). The invention of personality rights by jurists includes in the sphere of legally protected goods "personality elements" that are linked to "a subject in his capacity as a singular person" (Rigaux, 1990, p. 607), which include, in general, "the body, physical integrity and life, but also social qualifications" (Rigaux, 1990, p. 613).

Personality rights, to some extent, can be thought of as substitutes for the body, as its translation into the world of law - without it needing, namely, to occupy a place in this world, and without the risk of shuffling its founding structures, such as the separation between persons and things (Esposito, 2016, p. 91). In other words, if personality rights include the body in the legal world, through its "attributes," they also do so through strategies for its erasure. Personality rights aim to protect exactly what they are named after: the attributes of personality. In this, the body is excluded. The body goes out of the scene and the personality rights come in.

The entrance of the body into Law is marked, then, by these distinct discursive constructions, not always compatible and assimilable to each other. Although the Law does not establish the body as an object of autonomous subjective right, it recognizes the self-determination of the subject over his or her bodily

sphere and grants it legal protection from its "projections": the right to privacy, to bodily integrity, to image, to the protection of personal data, among others. And these are ways of constituting it in the legal sphere.

With regard to NCII, the unauthorized exposure of female bodies is identified as a violation of personality rights, as can be seen from the reasoning in Ruling 1: "The woman victim of revenge porn knows that her intimacy has been unduly disrespected" (Brazil, 2020, p. 13).

Similarly, when analyzing Judgment 2, one can see that the decision is focused on the specifics of Internet privacy violation and the role of search engines. Frequently, in the text of the decision, body exposure is replaced by the term image exposure, as seen in the passage "unauthorized dissemination of image in full, partial nudity or media depicting sexual act" (Brazil, 2018, p. 15).

Ruling 3 similarly does not refer to the body exposed, but rather to "the set of activities that form her intimate circle"; "intimate sphere"; "private life"; "manifestations that are normally subtracted from the knowledge of people outside the circle of intimacy"; "exposure of facts of the intimate life of the appellant"; "violation to the intimacy and image of people"; "violation to the intimacy, privacy and honor of the victim" (Brazil, 2017).

The object is transfigured into the representation of the object; we do not speak of person or body, but of image and privacy. In other words, the body enters the legal world through these mediations: image protection, identity, and social representation. And, in them, it also fades away.

The dogmatic formulations of the right to image are, in this sense, enlightening. The right to image is conceived as a right to protection against the illegitimate representation of the physical aspects of the person (portrait-image), as well as its social representation (attribute-image) (Bodin de Moraes, 2010, p. 136). Thus, it turns to the protection of the person against unauthorized disclosure of his projection in mechanical reproduction, and today, especially digital; and, simultaneously, to the protection of personal identity (Pontes de Miranda, 2000, p. 31; Rigaux, 1990, p. 628).

In a classic article on the subject in Brazilian Law, Antônio Chaves addresses the issue in an exemplary manner, by stating that the right to image cannot be based on the body. And he resorts to the Italian jurist Adriano de Cupis to explain that violation of the image keeps the body intact, but affects the individual reserve of the person and the "spiritual demand for isolation" (Chaves, 1972, p. 52)[7] .

The same can be seen in the constructions about the right to privacy, whose object and extent of legal protection are largely shaped by the holder himself, who consents, or not, that certain aspects are made public (Mota Pinto, 1993, p. 508). Furthermore, the right to privacy encompasses the protection of a space of freedom to make decisions about the body, sexuality itself, and the most varied decisions of existential nature (Rigaux, 1990, p. 20-21).

[7] In the same sense: SOUZA, Carlos Affonso Pereira de. Contours of the right to image. *Revista Trimestral de Direito Civil - RTDC*, v. 4, n. 13, p. 33-71, jan./mar. 2003. The image, according to Teffé (2018, p. 101), translates the exteriorization of the human personality, mediating the person and society. For the jurist, the right to image relates to three concepts: individuality (because it individualizes the human being, reflecting his personality and identifying him visually), psychophysical integrity (expressed by the body, actions and characteristics) and recognition (allows third parties to recognize him).

From the axis of the right to image and privacy, the debate regarding consent is essential to understand the legal treatment of revenge pornography - after all, it is the absence of consent of the exposed person the main characteristic that differentiates it from commercial pornography. It is the consent that inserts the disclosed image on the axis of licitude or illicitness (Castro; Sydow, 2017).

The concept of subject consent constitutes, in fact, the common point in the way Law regulates the relationship of the person with his organic body, with the immaterial elements of his personality, as well as with the data that can be associated with it. The recognition and expansion of the person's self-determination over his body, its social and virtual representations constitute the Law's common response to the impacts of technological and social interventions linked to the techno-scientific acceleration of the last decades.

In this sense, the fruitful development of personality rights in the second half of the 20th century, linked to the techno-scientific acceleration, especially of information technologies (Martins, 2006), and the emphasis on the right to protection of self-determination and dignity of the person in the postwar period (Rigaux, 1990, p. 18-19), does not eliminate the ambivalence of the presence of the body in Law; on the contrary, it deepens it.

Exemplary of this process is the change in the legal concept of privacy, initially understood in the *zero-relationship* paradigm (Shils, 1996), in the sense of absence of communication between a subject and others, in the "person-information-secret" axis (Rodotà, 1995, p. 102). With technological development and the central importance of information in our society, this right becomes related to the power of control over the flow of one's personal information (Rodotà, 1995, p. 122) and determine the construction of one's own private sphere (Doneda, 2006, p. 24), structuring itself on the axis "person-information-circulation-control".

Taking into consideration the fact that, in recent decades, the sharing of personal data, in practice, is a presupposition of participation in fundamental social interactions, the formulation of a right that includes the power to determine how to participate in society is verified, both in the theoretical production of law and in legal regulation (Mayer-Schönberger, 1998, p. 228-229). Thus, the figure of an autonomous right to the protection of personal data is created, founded on the idea of informational self-determination, which goes beyond the conformation of the right to privacy.

There is a bet on the individual's consent as a legal response, which is being updated, but not abandoned. Without ignoring the practical difficulties for the concrete exercise of these individual choices (Doneda, 2011, p. 98), the trend today is the adjectivation of consent - which must be informed, free, unequivocal, with determined purposes, specific and express (Bioni, 2019). It is not about eliminating the protagonism of consent, but rather surrounding it with protections and establishing limits, with a view to protecting the self-determination of the person itself (Mayer-Schönberger, 1998, p. 233; Doneda, 2011, p. 98; Bioni, 2019, p. 255)[8] .

[8] According to Bioni, during the normative generative process of data protection, "[...] consent emerges, is questioned, and reasserts itself as its central vector" (Bioni, 2019, p. 205). Just as in relation to informed consent in relations between doctor and patient, or for participation in scientific research, also in the relationship between individuals and entities that treat their data, the legal bibliography on the subject begins to highlight the concrete obstacles to the exercise of individual autonomy (Doneda,

The non-consented disclosure of intimate images, in addition to the personality rights framework, can also be legally qualified as a violation of the right to the protection of personal data, to the extent that these images constitute data that can identify a person[9] .

It is also critical to highlight the medium through which such disclosure generally occurs - the Internet. Therefore, the discussions about the right to personal data protection, which governs much of the discussions about the circulation of content *online*, is important for the analysis of legal solutions to NCII. It is possible to relate, then, the right to informational self-determination with a positive protection of the "virtual body", which is projected onto screens and networks.

If, on the one hand, treating the non-consented disclosure of images, especially on the Internet, as a violation of the right to the protection of personal data effectively expands the field of protection of the person, since it includes the right to control the modes and purposes of its circulation, on the other hand, once again, it refers the issue to the relationship of self-determination of an abstract subject with his immaterial assets of personality and with his personal data. And, in this abstraction, the body is, again, overshadowed.

In the judicial decisions on the subject, in the legislated law and in the legal theoretical production on the subject, concepts such as "image", "privacy", "autonomy", "personal data protection" are mobilized. We seek to highlight the centrality of personal autonomy in this legal regulation, which articulates the legal protection to individual self-determination over their personality assets and their personal data.

This brief review of the tortuous path of the body in Law, modern and contemporary, aims to think about how this presence/absence of the body in legal discourses is relevant to reflect on the role of legal discourse in the construction of these bodies and, consequently, in different forms of subjectivation.

4 EFFECTS OF THE LEGAL (UN)FRAMING OF THE BODY OF THE EXPOSED WOMAN

In legal discourses, various narratives of the body are revealed, forming a set of representations, not necessarily coherent with each other (Hyde, 1997). This is because there is no "real" or "material" body that is available for recognition by legal theory; there is no ready-made object upon which the norm will be applied.

Therefore, it is not only a matter of thinking about how Law resolves these issues, but how it equates them, how it brings them into the field of possible discussions. And to explore them in their multiplicity, to remove from them their naturalness and locate them in their political and social dimension.

Despite the plurality of representations, in Law, the notion of the body as an organic, unquestionable and fixed datum, over which the subject has autonomy, still prevails. This is reflected in the legal solutions

2011, p. 98). The legal solutions revolve, then, in both cases, in interdicting and limiting the individual waiver in relation to some sensitive points.

[9] The understanding of intimate images as personal data is a logical consequence of this. Countries such as Spain already use this approach for the legal protection of these cases (Neris et al., 2018). In Brazil, this framework is compatible with the General Law of Data Protection, as is clear from its art. 2, IV, combined with art. 5, I.

to NCII, especially those based on the violation of personality rights. The body continues to be naturalized and covered up by different legal constructions.

Rosalind Petchesky warns of a discursive change, noted especially in the negotiations of international agencies at the Cairo and Beijing Conferences, which enshrined the expression "sexual and reproductive rights" to refer to issues related to the regulation of women's bodies (Petchesky, 2015, p. 97). For the author, there is a rhetorical shift, in the mid-1990s, that replaces the term "rights over the body" for "security of the person" (*rights of the body* for *security of the person*, in the original). This discursive choice, "person" in place of "body," reinforces the dematerialization of the subject of law by alienating women from their physicality and sexuality.

Likewise, in the NCII, the erasure of the body in law contributes to obfuscate gender issues and reaffirm norms of conduct about female sexuality. The legal framing of *revenge porn* as a violation of personality rights, especially the rights to image, honor, and privacy, carries with it the risk of covering up the body and, as a result, of a certain neutralization of the gender violence present in these practices (Maddocks, 2018). Added to this are effects related to the specific construction of the feminine at the legal level, linked to individual accountability and stabilization of degrees of acceptability of certain conducts.

In this sense, we can ask: how do the legal discourses on *revenge porn* contribute to the construction of these exposed bodies? How is it possible to think about the body and the effects of power in the processes of subjectivation of women affected by revenge porn? How are body and subjectivation intertwined with the legal concepts of right to image, honor, privacy, protection of personal data, mobilized by Law in these cases brought to trial?

Feminist theories, for some decades now, have challenged the understanding of the body as a simple organic datum and called into question the very nature/culture dichotomy that is replicated in body-sex/gender oppositions, contributing to fixing a binary hierarchy between male and female genders (Lennon, 2019).

This reflection is fundamental to think about the legal responses to NCII. The thought of theorists such as Judith Butler and Donna Haraway can be mobilized, precisely, to politicize existing legal solutions, pointing out how these leave aside the issue of the generified body and the impacts that result from it.

Butler's thought contributes to understand that the body cannot be taken as a prior datum, over which social practices and discourses act. Bodies are constituted by discursive effects in multiple processes of subjectivation, while they materialize, through their performative actions, these discourses and practices[10] . And this is not only reduced to gender identity, but also embraces the materiality of the sexed body - which itself is also discursively constructed (Vasterling, 1999, p. 17).

[10] The differences between men and women, for the author, are performatively constructed, through reiterated practices (Butler, 2002, p. 18). Even if this construction is marked by intrinsic instability, it is a performative practice, reiterating norms and exclusion, which has the power to constitute subjectivities (Díaz, 2013, p. 446).

Haraway, in turn, conceives bodies as products of "imaginary" formations that produce realities-even if perceived as prior to and independent of all construction (1991, p. 225). Woman is also a subject-in-process, situated in a specific historical and cultural moment, for sex itself needs to be understood in a historicized way, not just gender (Haraway, 1991, p. 131-132).

In examining the legal responses to revenge pornography, the ethereal and asexual body in law, linked to a universal and abstract subject, is contrasted with the generified body of the exposed woman. This confrontation must be thought of from the power effects of legal discourses. What appears in the world of Law through its mediations ("privacy", "honor", "image", among others) has its social and political consequences.

The construction of female bodies is often also marked by violence, as is the case with the violence of NCII, which seeks to expose and embarrass the woman, putting her in her "rightful place.

Based on these reflections, it calls attention to the way the decisions enunciate the problem, without even mentioning the body, as in the judgment 1 of the Court of origin, which only refers to the "content considered offensive by the author". But the "content considered offensive" by the woman was the exposure of her body, which is equated to any other moral offense, in a process of double obfuscation: of the exposed body and the gender bias of *revenge porn* by the denial of language. The moral damage covers up the quality of the act that occurred, an undeniable manifestation of gender violence. By framing NCII in this way, judicial decisions can promote, therefore, an "erasure" of the sexualized body, depoliticizing and "sterilizing" issues related to female sexuality that are imbricated in these violent practices.

In addition, they open space to make the women who are victims of these practices at least partially responsible, to the extent that they attribute, even if not expressly, to them the duty to adapt their behavior in order to control the exposure of their bodies and sexuality. In fact, the right to intimacy, and even the protection of personal data, also depends on individual decisions about what is hidden and what is revealed. The legal treatment given to *revenge porn* cannot be reduced, therefore, to the violation of personality rights or the personal autonomy of the woman.

5 CONCLUSION: NCII, A GENDER PROBLEM

Qualifying *revenge porn* as gender violence, which affects the body, not as a mere occurrence on the internet that affects privacy, is a key shift (McGlynn *et al.* , 2017, p. 36). What appears in the world of law as a violation of privacy or the right to image, as a mere absence of consent, or as any other term, needs to be understood in its political and social imbrications, in the cut of gender violence and construction of female bodies and subjectivities.

The power effects of the repeated practices of *revenge porn* are produced in the victims, but also replicated in the behaviors of all women. This is effectively one of the ways in which the politics of gender and sexuality, which define which behaviors are acceptable and which are not, are materialized. And this form of violence is a *continuum of* other forms of violence against women (McGlynn *et al*., 2017, p. 36).

Studies of perpetrators of sexual violence against women show that motivations revolve around power and control (Robertiello; Terry, 2007, p. 511) and relate more to revenge, punishment, anger, recreation, and adventure than to sexual desire (Mann; Hollin, 2007, p. 3-9). Even though sexual gratification is a part of the offense, it intrinsically relates to ideas of power and control, the "right" to access that body, disregard for consent, and the notion of sexual abuse as a form of collective punishment of women (McGlynn *et al.* , 2017, p. 37). This is even clearer in cases of internet gender violence: perpetrators do not derive sexual pleasure, in the physical sense, from this practice, but still do it to humiliate women and demarcate their supposed position of power.

It is important, therefore, the emphasis given in Judgment 2 to the gender clipping and the qualification of NCII as violence (Brazil, 2018) - even though, in that same decision, the legal problem is equated in terms of violation of personality rights and absence of consent: "Scenes of nudity and sexual connotation of a totally private character of the defendant, whose disclosure occurred without any authorization on her part" (Brazil, 2018, p. 11).

The concealment of women's corporeality and sexuality, by legal categories thought for the abstract subject of law (without body, without gender), detaches the legal field from the reality of the exposed women, whose bodies are implicated in these practices, of which gender violence is inseparable.

The harmful effects of NCII, defined in legal circles as a violation of fundamental rights to sexual autonomy, integrity, and expression, have bodily impacts. Several women victims of *revenge porn* describe it as violence against their bodies or as sexual violence, not against their "privacy" or "image" (McGlynn *et al.* , 2017, p. 31).

The denomination of gender violence is justified, thus, for cases of *revenge porn* for two main reasons: first, the word violence is used by the victims themselves and activists in the area (Valente *et al.* , 2016, p. 12). Second, even if this denomination is contested, there is a performative effect in naming such practices as violent, which precisely is "to call into question the attention that culture gives to everything that is forbidden, transgressive, illegal" (Valente *et al.* , 2016, p. 13).

The legal responses to the unauthorized disclosure of intimate images are framed, however, within the scope of personality rights, especially the right to privacy, image, honor and protection of personal data. This category of rights, especially after World War II, corresponded to a return of moral and ethical values in the legal constructions[11] .

It is not a matter, here, of presenting a new legal solution internal to the law for the *revenge porn* issue or a legal answer that is more "correct". The legal treatment of the issue as a violation of personality rights or protection of personal data is not pointed out as inadequate, but as possible solutions that work within the internal logic of Law, but that, for this very reason, reproduce its limitations.

[11] On the one hand, it bet on its role to deepen a more democratic and pluralist vision. On the other, this ended up increasing and legitimizing the chances of the legal system - or of the judges themselves - to carry, in their judgments, their ethical-moral worldview (Rigaux, 1990, p. 610). The reaffirmation of individual self-determination comes with limits: those of the ethical-moral vision of law and judges.

For this very reason it is necessary to politicize the debate and link it to the gender debate. This is how progressive and feminist perspectives can be developed that aim to overcome the issue of erasure of the body and individual accountability.

The Law, by covering up the body and adopting a legal framework based on the relationship between the subject of law and her personality assets, contributes to sterilize the discussion of gender, by not recognizing the generified body that is a victim of *revenge porn*. To name it as gender violence is the previous step to think another reading of Law, which takes into consideration these subjectivities and the social context in which these gender normativities are placed. Moreover, understanding NCII as gender violence is a way to address the issue in which the body and gender would be more implicated.

REFERENCES

BEVILAQUA, Ciméa. Sobre a fabricação contextual de pessoas e coisas: as técnicas jurídicas e o estatuto do ser humano após a morte. *Mana*, 16(1), p. 7-29, 2010.

BIONI, Bruno Ricardo. *Proteção de dados pessoais*: a função e os limites do consentimento. Rio de Janeiro: Forense, 2019.

BODIN DE MORAES, Maria Celina. Ampliando os direitos da personalidade. In: BODIN DE MORAES, Maria Celina. *Na medida da pessoa humana*: estudos de direito civil-constitucional. Rio de Janeiro: Renovar, p. 121-148, 2010.

BRASIL. Decreto-Lei nº 2.848, de 7 de dezembro de 1940. Código Penal. Brasília, DF. Disponível em: <http://www.planalto.gov.br/ccivil_03/Decreto-Lei/Del2848.htm>. Acesso em: 12 maio 2020.

_____. Lei nº 8.069, de 13 de julho de 1990. Estatuto da Criança e do Adolescente. Brasília, DF. Disponível em: <http://www.planalto.gov.br/ccivil_03/LEIS/L8069.htm>. Acesso em: 12 maio 2020.

_____. Lei nº 10.406, de 10 de janeiro de 2002. Código Civil. Brasília, DF. Disponível em: <http://www.planalto.gov.br/ccivil_03/leis/2002/L10406compilada.htm>. Acesso em: 25 jun. 2020.

_____. Lei nº 12.737, de 30 de novembro de 2012. Brasília, DF. Disponível em: <http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Lei/L12737.htm>. Acesso em: 25 jun. 2020.

_____. Lei n. 12.965, de 23 de abril de 2014. Marco Civil da Internet. Brasília, DF. Disponível em: <http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l12965.htm>. Acesso em: 12 maio 2020.

_____. Lei nº 13.718, de 24 de setembro de 2018. Brasília, DF. Disponível em: <http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2018/Lei/L13718.htm>. Acesso em: 12 maio 2020.

_____. Superior Tribunal de Justiça. 3ª Turma. Recurso Especial nº 1.679.465/SP. Recorrente: Google Brasil Internet Ltda. Recorrido: Ministério Público do Estado de São Paulo. Relatora: Ministra Nancy Andrighi. 13 de maio de 2018. DJe 19 de março de 2018. Disponível em: <https://scon.stj.jus.br/SCON/GetInteiroTeorDoAcordao?num_registro=201602042165&dt_publicacao=19/03/2018>. Acesso em: 15 fev. 2021.

_____. Superior Tribunal de Justiça. 3ª Turma. Recurso Especial nº 1.735.712/SP. Recorrente: V. M. Z. Recorrido: Facebook Serviços Online do Brasil Ltda. Relatora: Ministra Nancy Andrighi. 19 de maio de 2020. DJe 27 de maio de 2020. Disponível em: <https://scon.stj.jus.br/SCON/GetInteiroTeorDoAcordao?num_registro=201800428994&dt_publicacao=27/05/2020>. Acesso em: 15 fev. 2021.

_____. Superior Tribunal de Justiça. 4ª Turma. Recurso Especial nº 1.445.240/SP. Recorrente: S. A. P. R. de S. Recorrido: A. do A. M. Relator: Ministro Luis Felipe Salomão. 10 de outubro de 2017. DJe 22 de novembro de 2017. Disponível em: <https://scon.stj.jus.br/SCON/GetInteiroTeorDoAcordao?num_registro=201302141542&dt_publicacao=22/11/2017>. Acesso em: 15 fev. 2021.

BUTLER, Judith. *Cuerpos que importan*: sobre los límites materiales y discursivos del "sexo". Buenos Aires: Paidós, 2002 [1993].

_____. *Problemas de gênero*: feminismo e subversão da identidade. Trad. Renato Aguiar. Rio de Janeiro: Civilização Brasileira, 2003.

CASTRO, Catarina Sarmento e. *Direito da informática, privacidade e dados pessoais*: a propósito da legalização de tratamentos de dados pessoais (incluindo videovigilância, telecomunicações e internet) por entidades públicas e por entidades privadas, e da sua comunicação e acesso. Coimbra: Almedina, 2005.

CASTRO, Ana Lara Camargo de; SYDOW, Spencer Toth. *Exposição pornográfica não consentida na internet*: da pornografia de vingança ao lucro. 1. ed. Belo Horizonte: D'Plácido, 2017. 190 p.

CHAVES, Antonio. *Direito à própria imagem*. Conferência proferida no Salão Nobre da Biblioteca Municipal de Araras, 1972.

CITRON, Danielle Keats. Sexual privacy. *Yale Law Journal*, New Haven, Estados Unidos da América, v. 128, n. 7, p. 1871-1960, 2019. Disponível em: <https://digitalcommons.law.yale.edu/ylj/vol128/iss7/2>. Acesso em: 12 mar. 2021.

_____; FRANKS, Mary Anne. Criminalizing revenge porn. *Wake Forest Law Review*, Winston-Salem, Estados Unidos da América, v. 49, n. 345, 19 maio 2014. Disponível em: <https://ssrn.com/abstract=2368946>. Acesso em: 20 mar. 2021.

DÍAZ, Elvira Burgos. Desconstrução e subversão: Judith Butler. *Sapere Aude*, Belo Horizonte, v. 4, n. 7, p. 441-464, 1º sem. 2013.

DINAMARCA. Act. n. 429, de 31 de maio de 2000. Act on processing of personal data (Persondatalovem). Disponível em: <https://rm.coe.int/16806af0e6>. Acesso em: 17 ago. 2020.

DONEDA, Danilo. A proteção de dados pessoais como um direito fundamental. *Espaço Jurídico Joaçaba* (12), p. 91-108, jul./dez. 2011.

_____. *Da privacidade à proteção de dados pessoais*. Rio de Janeiro: Renovar, 2006.

ESPANHA. Ley n. 15, de 13 de dezembro de 1999. Ley orgánica de proteção de dados de caráter pessoal. Disponível em: <https://fra.europa.eu/en/law-reference/ley-organica-151999-de-13-de-diciembre-de-proteccion-de-datos-de-caracter-personal>. Acesso em: 17 ago. 2020.

ESPOSITO, Roberto. *As pessoas e as coisas*. Trad. Andrea Santurbano e Patricia Peterle. São Paulo: Rafael Copetti, 2016.

FARIA, Fernanda Cupolillo Miana de; ARAÚJO, Júlia Silveira de; JORGE, Marianna Ferreira. Caiu na rede é *porn*: pornografia de vingança, violência de gênero e exposição da "intimidade". *Contemporanea, Comunicação e Cultura*, Salvador, v. 13, n. 3, p. 659-667, set./dez. 2015. Disponível em: <https://periodicos.ufba.br/index.php/contemporaneaposcom/article/view/13999/10888>. Acesso em: 13 fev. 2021.

FOUCAULT, Michel. *História da Sexualidade I*: a vontade de saber. Trad. Maria Theresa da Costa Albuquerque e J. A. Guilhon de Albuquerque. Rio de Janeiro: Graal, 1977.

GEDIEL, José Antônio Peres. *Os transplantes de órgãos e a invenção moderna do corpo*. Curitiba: Moinho do Verbo, 2000.

HARAWAY, Donna. *Simians, cyborgs, and women*: the reinvention of nature. London: Free Association Books, 1991.

HYDE, Alan. *Bodies of law*. Princeton: Princeton University Press, 1997.

MADDOCKS, Sophie. From non-consensual pornography to image based sexual abuse: charting the course of a problem with many names. *Australian Feminist Studies*, v. 33, n. 97, p. 345-361, 2018. Disponível em: <https://doi.org/10.1080/08164649.2018.1542592>. Acesso em: 6 abr. 2021.

MANN, Ruth E.; HOLLIN, Clive R. Sexual offenders' explanations for their offending. *Journal of Sexual Aggression* (13), p. 3-9, 2007.

MARTINS, Hermínio. Dilemas da república tecnológica. *Análise Social*, v. XLI (181), p. 959-979, 2006.

MAYER-SCHÖNBERGER, V. Generational development of data protection in Europe. In: AGRE, P. E.; ROTEMBERG, M. *Technology and privacy*: the new landscape. Cambridge: MIT Press, p. 219-241, 1998.

MCGLYNN, Clare; RACKLEY; Erica; HOUGHTON, Ruth. Beyond 'revenge porn': the continuum of image based sexual abuse. *Feminist Legal Studies*, p. 25-46, 2017.

MOTA PINTO, Paulo. O direito à reserva sobre a intimidade da vida privada. *Boletim da Faculdade de Direito* (64), Coimbra, p. 479-586, 1993.

NERIS, Natália; RUIZ, Juliana Pacetta; VALENTE, Mariana Giorgetti. Enfrentando disseminação não consentida de imagens íntimas: uma análise comparada. 2018. Disponível em: <https://www.internetlab.org.br/pt/desigualdades-e-identidades/mapa-pornografia-de-vinganca/>. Acesso em: 3 mar. 2021.

PETCHESKY, Rosalind P. Owning and disowning the body: a reflection. In: BAKSH, Rawwida; HARCOURT; Wendy. *The Oxford Handbook of Transnational Feminist Movements*. New York: Oxford University Press, p. 252-270, 2015.

PILKINGTON, Ed. Tyler Clementi, student outed as gay on internet, jumps to his death. *The Guardian*, New York, 30 set. 2010. Disponível em: <https://www.theguardian.com/world/2010/sep/30/tyler-clementi-gay-student-suicide>. Acesso em: 27 ago. 2020.

PONTES DE MIRANDA, Francisco Cavalcanti. *Tratado de direito privado*. Campinas: Bookseller, t. 7, 2000.

RIGAUX, François. *La protection de la vie privée et des autres biens de la personnalisté*. Bruxelles: Bruylant, 1990.

ROBERTIELLO, Gina; TERRY, Karen J. Can we profile sex offenders? A review of sex offender typologies. *Aggression and Violent Behaviour* (12), p. 508-518, 2007.

RODOTÀ, Stefano. *Tecnologie e diritti*. Bologna: II Mulino, 1995.

SHILS, Edward. Privacy: its constitution and vicissitudes. *Law and Contemporary Problems* (31), p. 281-306, 1966.

SOUZA, Carlos Affonso Pereira de. Contornos do direito à imagem. *Revista Trimestral de Direito Civil – RTDC*, v. 4, n. 13, p. 33-71, jan./mar. 2003.

TEFFÉ, Chiara Spadaccini de. Direito à imagem na internet: estudo sobre o tratamento do marco civil da internet para os casos de divulgação não autorizada de imagens íntimas. *Revista de Direito Civil Contemporâneo*, v. 15, p. 93-127, abr./jun. 2018.

VALENTE, Mariana Giorgetti; NERIS, Natália; RUIZ, Juliana Pacetta; BULGARELLI, Lucas. *O corpo é o código*: estratégias jurídicas de enfrentamento ao *revenge porn* no Brasil. InternetLab: São Paulo, 2016.

VASTERLING, Veronica. Butler's sophisticated constructivism: a critical assessment. *Hypatia* (14), p. 17-38, 1999.

CHAPTER 53

Vitamin D supplementation in patients after bariatric surgery

10.56238/rsfohsv1-053

Gabrielle Bueno Zákia Beltrame
Nutritionist
Universidade Paulista UNIP, Campinas, São Paulo– SP
Comendador Enzo Ferrari, 280 - Swift, Campinas - SP, 13045-770
E-mail: gabizakiaa@gmail.com

Sara de Oliveira Cardoso
Nutritionist
Universidade Paulista UNIP, Campinas, São Paulo– SP
Comendador Enzo Ferrari, 280 - Swift, Campinas - SP, 13045-770
E-mail: saraoliveira100@yahoo.com

Luciana Pietro
Biologist, PhD in Biomedical Sciences
Universidade Paulista UNIP, Campinas, São Paulo– SP
Comendador Enzo Ferrari, 280 - Swift, Campinas - SP, 13045-770
Phone: (19) 99684-3274
E-mail: lucianapietro1@gmail.com

ABSTRACT
Vitamin D acts in the regulation of bone metabolism and plays actions in other tissues, being considered of extreme importance. The causes of its deficiency are multifactorial, its deficiency after bariatric surgery can cause skeletal changes, calcium deficiency, increasing the risk of malignancies (colon, breast and prostate) and chronic inflammatory or autoimmune diseases, metabolic chances, peripheral vascular disease, muscle weakness and, osteoporosis or osteomalacia. Objective- Given the importance of this nutrient, this study was designed to analyze different types of adequate doses of vitamin D that can help in the treatment of obesity and possible pathologies after bariatric surgery. Methods- For this, it was performed a search in the Pubmed, Scielo and Science direct databases, with published articles in Portuguese and English. The search strategy used the keywords individually or in association "vitamin D", "supplementation", "bariatric surgery". There was no delimitation as to the year of publication of the articles. Results- 12 articles were selected The findings confirmed the existence of nutritional vitamin D deficiency in people who underwent bariatric surgery and explain the importance of long-term supplementation for prevention. Conclusion- Therefore, it is concluded that this deficiency in bariatric patients is evidenced in the literature, which elucidates its effects on health, demonstrating the importance of supplementation after bariatric surgery, but there is a need for more specific studies.

Keywords: Bariatric surgery. Vitamin D. Dosages. Supplementation.

1 INTRODUCTION

Obesity is a disease of multifactorial etiology that has become one of the biggest public health problems in the world, affecting the population over 35 years of age, and, according to data from the Brazilian Association for the Study of Obesity and Metabolic Syndrome (ABESO)1 , has a prevalence of about 17.9% in men and 18.2% in women.

According to data from the Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Inquiry (VIGITEL)2 , there has been a considerable increase in overweight and obesity in the Brazilian population over the last 13 years, from 11.8% to 20.3% between 2006 and 2019. When considering overweight, 55.4% of Brazilians are in this situation. Still, according to this study, according to the age group, overweight tends to increase, being present in 30.4% of young people aged 18 to 24 years

and in 59.8% among adults aged 65 years or more. The research also pointed out the presence of comorbidities, such as diabetes in 7.4% and hypertension in 24.5%.

Given the sharp increase in obesity in the country, data have shown a significant increase in the number of patients undergoing bariatric surgery. According to the Federal Council of Medicine (CFM)3 are candidates for surgical treatment (bariatric surgery) patients with Body Mass Index (BMI) greater than 40 kg/m² (grade III) or with BMI greater than 35 kg/m² (grade II) associated with comorbidities such as type 2 diabetes, sleep apnea, hypertension, dyslipidemia, cardiovascular diseases, stroke, depression, among others.

Currently, there are several types of surgeries for weight reduction, however, many seek as treatment the bariatric surgery known as gastroplasty or stomach reduction surgery, whose goal aims to reduce the size of the stomach, and consequently, weight reduction. According to data from the Brazilian Society of Bariatric and Metabolic Surgery (SBCBM)4 , 63,969 bariatric surgeries were performed in the entire year of 2018, of which 49,521 were performed by supplementary health (health plan), according to data from the National Supplementary Health Agency (ANS), 11,402 by the Unified Health System (SUS), and 3,046 private surgeries. The data also showed that the total number of procedures performed in 2018 was 4.38% higher than in 2017, when approximately 61,283 thousand surgeries were performed by the SUS and ANS.

Once the patient intends to undergo this procedure, exams to follow up on their condition are requested. At this stage, it is common to observe nutritional deficiencies, as well as the deficit of vitamins, such as Vitamin D, responsible for stimulating the absorption of calcium by the intestinal mucosa, at the level of the duodenum and jejunum, making the postoperative period even more challenging, due to the implications of bariatric surgery procedures on the patient's nutritional status, which must be specifically restricted to anatomical and physiological changes, which impair absorption pathways and/or food intake5,6 .

According to Azevedo7 , deficiency of some specific micronutrients in the body can impair basic functions and increase the risk of serious diseases, and micronutrient adequacy is important in maintaining long-term weight loss. Vitamins and minerals are essential factors and cofactors in many biological processes that regulate body weight directly or indirectly. Such deficiencies occur by restricted food intake and/or reduced nutrient absorption areas, decreased gastrointestinal transit time, and limited food contact with the brush border epithelium8 . Thus, it becomes a major challenge for patients to achieve the necessary intake of vitamins and minerals after surgery. Moreover, a key element for the incidence of nutritional deficiencies after surgery is the occurrence of frequent vomiting, which leads to malabsorption of nutrients, and also the patient's adherence to nutritional recommendations suggested by nutritionists9 .

In vivo studies have shown that some nutritional deficiencies such as vitamin D, vitamin A and zinc are concomitantly present in obesity, possibly because they play an important role in the regulation of adiposity or in appetite regulation mechanisms, besides the fact that they are absorbed in the duodenum and

proximal jejunum. Thus, it is essential that there is a careful schedule for clinical-nutritional monitoring, both preoperatively and postoperatively for the success of treatment5 .

Vitamin D is a fat-soluble vitamin, whose main compounds are ergocalciferol (Vitamin D2) and cholecalciferol (D3). Ergocalciferol is found in plants and is a product of ergosterol irradiation by ultraviolet B radiation (UVB), being usually consumed in the form of supplements or fortified foods; while cholecalciferol (Vitamin D3) is found in epithelial skin cells and depends on solar radiation (ultraviolet B rays - UVB) to be converted into vitamin D3. To exert its biological effects, a hydroxylation must occur in the liver to form the compound 25-hydroxyvitamin D (25OHD) and another hydroxylation in the kidneys to form the final active metabolite, 1,25-dihydroxyvitamin D1010 .

According to studies, the causes of vitamin D deficiency are multifactorial, and may be related to low exposure to solar radiation, reduced bioavailability of vitamin D in relation to sequestration (storage) of this fat-soluble vitamin in adipose tissue, which is present in excess in the case of obesity11 , and/or deficiency due to inadequate intake by food and supplements, despite the high overall caloric intake12 . In addition, a decrease in hepatic production of 25-hydroxyvitamin D due to hepatic steatosis and a decrease in vitamin D synthesis through the skin may also intervene .13

According to Bittar14 the lack of vitamin D after bariatric surgery may cause skeletal changes, calcium and vitamin D deficiency, increasing the risk of malignancies (colon, breast and prostate) and chronic inflammatory or autoimmune diseases, metabolic changes, peripheral vascular disease, muscle weakness and osteoporosis or osteomalacia. Also, according to Smith15 , calcitriol (1,25-(OH) $_2$D3, active form) is only produced upon low serum calcium levels (stimulated by parathormone or PTH), while high calcium levels form 24,25-(OH)2D3 (inactive form of vitamin D).

Given the above, it becomes important to analyze the appropriate dosages of vitamin D that can help in the treatment of obesity after bariatric surgery.

2 METHODS

This is a systematic literature review. For this, a search for articles published in the Scielo, Pubmed, and Science Direct and Lilacs databases was performed.

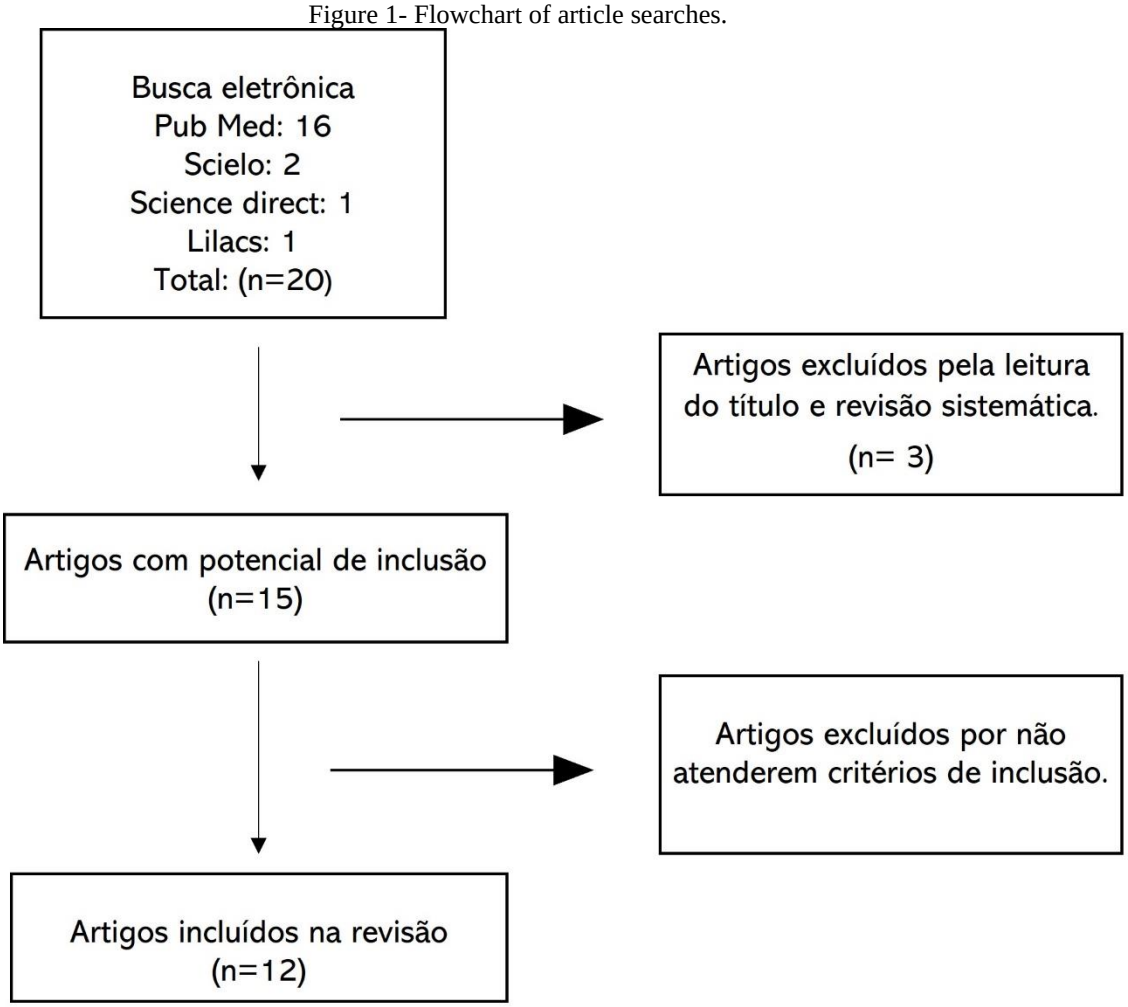
The data survey was carried out with the following keywords individually or in association and their combinations in Portuguese and English: "dosagens" (dosage), "suplementação" (supplementation), "vitamina D" (Vitamin D), "cirurgia bariátrica" (bariatric surgery). There was no delimitation as to the year of publication of the articles. Boolean operators of exclusion with the word "AND" or "NOT" were applied. There was no delimitation as to the year of publication of the articles.

Inclusion criteria were defined as articles containing information about the use of vitamin D, its different dosages, and nutritional deficiencies after bariatric surgery. The exclusion criteria were monographs, systematic reviews, animal studies, studies with unclear methodology, and research without scientific basis.

The study was divided into three phases, the first phase of the process followed the criteria of searching and reading articles related to the topic of bariatric surgery and vitamin D; the second phase encompassed the choice of articles and their full reading for analysis of their effectiveness and descriptive contribution to the present study; while in the third phase the production of the articles, results, and discussions were carried out according to the criteria used in the previous steps.

After searching the databases, 20 articles were identified. An analysis was made by title to exclude articles that were repeated or excluded by abstract. According to the eligibility criteria, 12 articles were selected for this review, where figure 1 was elaborated, which presents methodological aspects referring to the types of studies, gender, age, number of participants, types of surgery, duration of the research, and results.

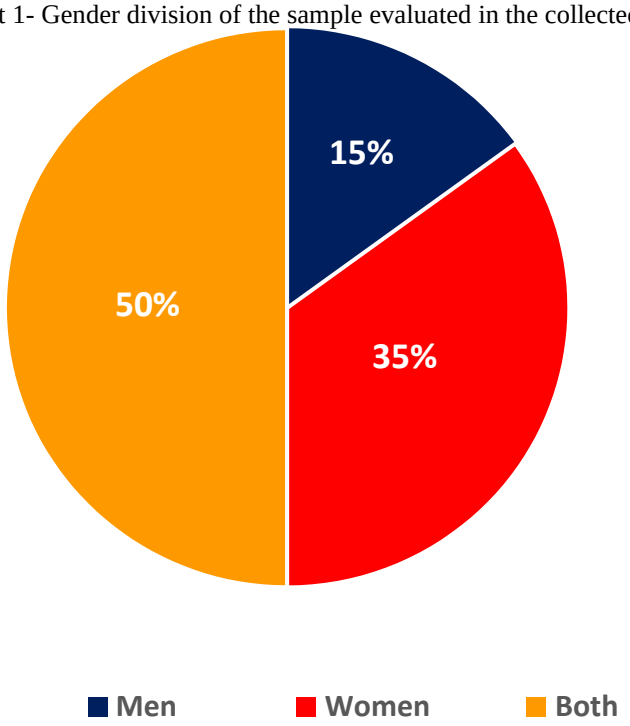
Figure 1- Flowchart of article searches.



3 RESULTS

The systematic literature search resulted in 12 articles analyzed, with the participation of 905 people, with a mean age of 45 years, ranging from men (15%), women (35%), and with both genders (50%), with the majority including only women (Graph 1).

Chart 1- Gender division of the sample evaluated in the collected articles.



These studies were published between 2007 and 2021. The sample size ranged from 1 to 222; and among the selected articles, 1 was a case study17 , 3 prospective studies21,22,23 , and 4 were double-blind randomized clinical trials16.18,20,25 (Table 2).

Table 2 - Characteristics of the studies evaluated.

Author	Type of study and N° participants	Sex and age	N° parrticipants	Type of surgery and time (days)	Types of Management	Vitamin D dosages	Goal
Luger et al, 2017[16]	Double-blind, randomized	M F 42	50	OLGB 6 months	-	3 doses of 100,000 IU; intervention group and 3420 IU; control group	To examine whether the administration of up to 3 oral loading doses at 1 month postoperatively (day 1 and weeks 2 and 4), followed by an oral maintenance dose in bariatric patients can significantly increase vitamin D levels, 24 weeks after surgery compared to the control group receiving placebo followed by the standard daily maintenance dose.
Papanastasiou et al., 2020[17]	Case Study	F 45	1	BGYR 3 months	Intramuscular	600,000 IU/ 20 days	To evaluate vitamin d deficiency, osteomalacia accompanied by insufficiency fractures presented 15 years after RYGB for morbid obesity.
Goldner et al; 2009[18]	prospective randomized clinical trial	F M -	45	BGYR 24 months	-	800, 2.000 e 5,000IU/day	Evaluate patients who plan to undergo by Roux-en-Y gastric bypass for one of three doses of vitamin D supplementation to see which is most effective.
Arts et al, 2011[19]	-	F 20-50	14	BGYR -	Oral solubilized	50,000 IU/ml	Quantify the changes in RYGB-induced

							intestinal cholecalciferol absorption to serve as a starting point for developing rational, individualized guidelines for dose adjustments to correct postoperative vitamin D deficits.
Dogan et al, 2014[20]	Randomized Clinical Trial	F M >18	74 74	BGYR 12 months	-	160 IU/day 500 IU/day	To evaluate the efficacy and safety of WLS Forte compared to standard MVS (MVS, commercially available tablets} after RYBG.
Lanzarini et al., 2015[21]	Prospective Study	F M 18-60	96 68	LSG RYGB 24 months	-	16,000 IU/day 16,000IU/day	evaluate the need for vitamin D supplementation to achieve normal vitamin D levels in morbidly obese patients after bariatric surgery.
Moore et al, 2014[22]	Prospective Study	F M 24-63	22	BGYR SG 3 months	tablets	2,000IU/day 1,500/day calcium citrate	To verify vitamin D3 and calcium supplementation after gastric bypass and vertical gastrectomy.
Flores et al, 2015[23]	Prospective Study	F M 18-65	176	LRYGB SG 12 months	Tablets	Study 1:800UI 1.200 IU/calcium carbonate Study 2: 2,000 IU	evaluate the efficacy and safety of achieving vitamin D levels with two supplementation regimens after bariatric surgery.
Nelson et al, 2007[24]	-	F M -	95	BGYR 12 months	Multivitamin supplement	710 IU 50,000IU/week	To evaluate the adequacy of supplementation to correct preoperative

							and postoperative vitamin D deficiency in patients undergoing RYGB.
Wolf et al, 2015[25]	Double blind, Randomized and placebo-controlled	F M >18	94	BGYR 12 months	-	84 ųg/day dissolved in oil or placebo (pure oil)	To analyze whether vitamin D supplementation in an oil suspension is an effective and safe measure to prevent and to achieve sufficiency by minimizing cardiometabolic risk markers.
Flores et al, 2010[26]	Intervention study	F M 44	222	BG 12 months	Combined chewed tablets	800 IU 1,200mg/day calcium carbonate	To evaluate the effect of receiving or not receiving Ca and vitamin D supplementation on the Ca, PTH and vitamin D axis in patients undergoing GB.

Legend: OLGB- Omega-Loop Gastric Bypass. RYGB- Roux-en-Y Gastric Bypass. BG- Gastric Bypass. SG- Laparoscopic Vertical Gastrectomy. OLGB- Omega Loop Gastroplasty. LRYGB- Laparoscopic Bypass.

When evaluating vitamin D and calcium supplementation after stomach reduction surgery, the studies by Flores et al.23,26 ; and Moore et al. 22which showed that both daily vitamin D3 supplementation schemes were effective, showing that 25 (OH) levels increased significantly after 12 months, and safely, since no adverse events were reported.

The studies by Lazanrini et al.21 investigated the effect of vitamin D intake after bariatric surgery. After 24 months, 68% of patients in the intervention group achieved normal vitamin D levels compared with 48% in the no-intervention group. Dogan et al20 , meanwhile, demonstrated that despite daily vitamin D intakes of 160 to 500 IUI, 29% of patients still remained insufficient for vitamin D after 12 months.

In the present article, four studies investigated the effect of vitamin D supplementation in bariatric patients. Two publications compared the effects of vitamin D supplementation in patients who underwent Y-de-Roux gastric bypass (BYGB) and laparoscopic vertical gastrectomy (LSG), and one compared this between patients undergoing BYGB and lifestyle.

In the evaluation, the status of serum 25 (OH) D levels before and after bariatric surgery were analyzed. The mean 25 (OH) D level before surgery was below 30 ng/ml in 6 studies and 5 of these studies

showed mean 25 (OH) D levels ≤ 20 ng/ml. Mean 25 (OH) D levels remained below 30 ng/ml after bariatric surgery despite various vitamin D replacement regimens, with only a few exceptions.

Papanastasiou et al. 17found a patient who presented in the admittance laboratory examination with anemia deficiency; vitamin B12 deficiency, vitamin D (25 OH D) deficiency and hyperparathyroidism, consistent with a diagnosis of osteomalacia due to severe vitamin D and calcium malabsorption deficiency. Treatment was started, with intravenous iron and calcium gluconate and intravenous infusion of alpha-calcidiol at the same time with calcium citrate, it was observed that one month later, calcium and phosphate levels returned to normal, PTH decreased and vitamin D became 8.1ng/ml, with skeletal muscle and weakness mobilized. After 2 months, hyperparathyroidism and vitamin D status improved, and BTM (Basal Metabolic Rate) was increased.

In another study, Goldner et al. 18evaluated a lower dosage of vitamin D3 in two groups, one intervention and the other placebo, in which it was divided into 3 doses each: 1 or 2 days, 2 weeks, and 4 weeks postoperatively until the 6-month visit. By the 4th week

Postoperatively, it was observed that the concentration remained below 75 nmol/L, with differences between groups analyzed after 2 months and 6 months, with the intervention group reaching a maximum concentration of 25 (OH) D of 75.7 nmol/L in 4.7 months. The control group showed a Cmx of 67.5 nmol/L at 4.2 months over the duration of the study.

4 DISCUSSION

Obesity is a chronic disease characterized by excessive accumulation of adipose tissue in the body, with an increase in its prevalence during the last decade26 . The main findings show that the obesity epidemic is one of the greatest public health, social, and economic challenges of the 21st century22 , so that bariatric surgery turns out to be an effective alternative in weight loss, improving the metabolic profile, quality of life, and consequently decreasing the mortality rate18,19 .

The main findings in this study highlight that bariatric surgery can cause changes in the anatomy of the gastrointestinal tract23,25 , causing malabsorption of essential vitamins (folate, vitamin B12 and vitamin D) and micronutrients (e.g., iron, calcium), as well as abnormalities in bone metabolism16,20,25 .

As stated above, the study by Dogan et al20 , observed the efficacy of multivitamin supplementation specifically designed for patients who underwent the gastric bypass Y-deRoux (RYGB) surgical procedure through a triple-blind randomized clinical trial. Following laboratory blood tests, 29% of the observed patients were identified with vitamin D deficiency after 12 months, which was corrected with solubilized oral cholecalciferol 50,000 IU/mL. During the observed period, patients received 1500 mg calcium carbonate and 1200 IU vitamin D daily as standard postoperative protocol.

Other studies find a high incidence of vitamin D deficiency (34% -73%) after RYGB, however, the exact mechanisms of postoperative vitamin D deficiency are not yet fully understood, as evidenced in the study by Wolf et al25 , so a daily intake of 2,000 IU of vitamin D is recommended, in addition to 1,500 to

2,000 mg per day of calcium30 . However, the study by Lanzarini et al21 , mentions that postoperative vitamin D supplements should range between 320IU and 2000IU per day, with a calcium intake of 1000 to 1500mg per day.31

Corroborating the authors mentioned above, according to the Papanastasiou study17 regular oral supplementation with high doses of vitamin D together with calcium is necessary. However, the study by Carlin et al32 shows that despite a daily intake of 800 IU of vitamin D, 44% of the population undergoing this type of surgical procedure remained with a vitamin D deficit in the body.

In his study, Papanastasiou17 reported on a severe vitamin D deficiency osteomalacia after bypass surgery for morbid obesity. The patient had anemia due to iron and vitamin D deficiency and secondary hyperparathyroidism. In addition, due to vitamin D deficiency and calcium malabsorption she was diagnosed with osteomalacia. Treatment was based on ergocalciferol intramuscularly, 600,000 IU every 20 days, 500g calcium citrate 4x a day. The study showed that these medications provided improvement at about three months after treatment, in the clinical and biochemical aspects.

In the context of the above, the study by Collazo-Clavell et al33 point out that since 2004 it is reported about the effectiveness of using aggressive calcium (1.8 g per day) and vitamin D supplementation (ergocalciferol 50,000 IU per day) to correct vitamin D deficiency and osteomalacia after gastric bypass surgery.

Moore22 in his study demonstrated that vitamin D deficiency in women undergoing bariatric surgery decreased from 60.6% preoperatively to 26.1% after 3 months of preoperative dietary intake of vitamin D and calcium using 2000 international units (IU) of vitamin D3 and 1500 mg of calcium citrate significantly increased concentrations of 25 (OH) D. However, some patients remained vitamin D deficient, suggesting more aggressive supplementation.

In analyzing the efficacy and safety of a forced-dose vitamin D regimen and its intervention effects in patients with liver fibrosis, Luger et al16 conclude that vitamin D has been proposed as a potential therapeutic option for liver fibrosis due to its metabolic, anti-inflammatory and antifibrotic effects on hepatocytes and liver cells. The results pointed out that the loading dose regimen with vitamin D3 was the only effective one in increasing 25 (OH) D concentrations in patients with significant liver fibrosis over the 6-month period in contrast to the conventional regimen using the same maintenance dose.

Evaluating 14 premenopausal morbidly obese women before and 4 weeks after laparoscopic RYGB, Aarts et al19 point out that to normalize vitamin D levels due to surgery-induced malabsorption was done with cholecalciferol (a type of Vitamin D), with a single oral dose of 50,000 IU of the solubilized vitamin, which maximum cholecalciferol levels were reduced by about 25% after RYGB.

In this same context, Avioli et al34 point out that the correction of vitamin D deficits after surgery is complex because the dose adjustments required to overcome malabsorption are not currently known. This lack of knowledge makes it difficult to develop rational guidelines for correcting calcium and vitamin

D deficits postoperatively. Therefore, it is recommended that further studies be developed to verify this specific analysis.

Nelson et al24 , presented evidence that vitamin D deficiency was effectively corrected after RYGB surgery with 710 IU of vitamin D per day or 50,000 IU weekly (doses applied to two different groups). The author further points out that current supplementation practices do not seem to optimize serum 25 (OH) D levels and need to be examined more closely with further studies.

With a similar objective to the aforementioned author, Goldner18 demonstrated that more aggressive vitamin D supplementation tends to elevate 25OHD levels. Vitamin D replacement up to 5,000 IU/day is safe and necessary in many patients to treat vitamin D deficiency after Y-de-Roux gastric bypass.

Flores et al26 , in their analysis study on the efficacy and safety of achieving 25-hydroxy VD (25 (OH) D) levels ≥75 nmol/L with two VD supplementation regimens after LYRGB in a period from 2009 to 2011, showed that the standard doses of 800 IU of VD was sufficient to satisfactorily achieve VD levels in 4 months, therefore, it was found that daily supplementation of VD3 in high and fixed doses was shown to be effective and safe in clinical practice, showing improvements in patients with vitamin D deficiency.

Despite showing relevant improvements, and its importance in bone metabolism and calcium homeostasis, the study by Arunabhs et al35 , comment on the relationship of vitamin D and obesity. An association between adiposity and serum 25-hydroxyvitamin D [25 (OH) D] levels, the relevant marker of low vitamin D status, was found in adults and children. In adults, an inverse relationship was reported between fat mass and circulating concentrations of 25 (OH) D.

5 CONCLUSION

The results of this review showed that vitamin D supplementation in most publications improved serum vitamin D levels. However, new intervention studies are needed to determine the optimal dose of vitamin D supplementation and replacement in individuals undergoing bariatric surgery, because patients presenting with other pathologies may interfere with the effects of supplementation.

BIBLIOGRAPHIC REFERENCES

1. Associação brasileira para o estudo da obesidade e da síndrome metabólica diretrizes brasileiras de obesidade/2018- ABESO. Disponível em: https://abeso.org.br/obesidade-e- sindrome-metabolica/mapa-da-obesidade/. Acesso em: 17 nov 2021.

2. BRASIL. Ministério da saúde. Vigitel Brasil 2019: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Disponível em: https://www.crn6.org.br/vigitel-2019-confira-dados-publicados-pelo-ministerio-da- saude. Acesso em: 20 abr 2021.

3. Conselho Federal de Medicina. Resolução CFM N. 2.131/2015, de 12 de novembro de 2015. Altera o anexo da Resolução CFM nº1.942/10, publicada no DOU de 12 de fevereiro de 2010, Seção 1, pág. 266.Diário Oficial da União, 13 de janeiro de 2016. Seção 1, p. 66.

4. Sociedade Brasileira de Cirurgia Bariátrica e Metabólica. Cirurgia bariátrica cresce 84,73% entre 2011 e 2018. Disponível em: https://www.sbcbm.org.br/cirurgia-bariatrica- cresce-8473-entre-2011-e-2018/. Acesso em: 25 abr 2021.

5. Parkes E. Nutritional management of patients after bariatric surgery. Am J Med Sci. 2006; 331(4):207-13.

6. Shikora SA, Kim JJ, Tarnoff ME. Nutrition and gastrointestinal complications of bariatric surgery. Nutr Clin Pract. 2007; 22(1):29-40.

7. Azevedo FR, Brito BC. Influência das variáveis nutricionais e da obesidade sobre a saúde e o metabolismo. Rev. Assoc. Med. Bras.2012; 58(6): 714-723.

8. Bordalo LA, Teixeira TFS, Bressan J, Mourão DM. Cirurgia bariátrica: como e por que suplementar. Rev. Assoc. Med. Bras. 2011; 57(1):113-120.

9. Isom KA, Andromalos L, Ariagno M, Hartman K, Mogensen KM, Stephanides K, Shikora S. Nutrition and metabolic support recommendations for the bariatric patient. Nutr Clin Pract. 2014;29(6):718-39.

10. Khosravi Z, Kafeshani M, Tavasoli P, Hassan A, Hassan M. Effect of Vitamin D supplementation on weight loss, glycemic indices, and lipid profile in obese and overweight women: A Clinical Trial study. Int J Prev Med. 2018; 9 (1): 63.

11. Wortsman J, Matsuoka LY, Chen TC, Lu Z, Holick MF. Decreased bioavailability of vitamin D in obesity. Am J Clin Nutr. 2000; 72(3) 690–93.

12. Hyppönen E, Power C. Hypovitaminosis D in British adults at age 45 y: nationwide cohort study of dietary and lifestyle predictors. Am J Clin Nutr. 2007; 85 (3)860–68.

13. Castro LCG. O sistema endocrinológico vitamina D. Arq Bras Endocrinol Metab. 2011; 55(8): 566-575.

14. Bittar, Thalita, Moraes, Aline, Benchimol, Alexander. Avaliação clínica pré e pós- operatórias na cirurgia bariátrica. 1ª ed. Itapevi: AC Farmacêutica; 2009.p.34

15. Smith C, Marks AD, Lieberman M. Bioquímica Médica básica de Marks. 2ª ed. Porto Alegre: Artmed. 2007. Capítulo 12, Proteínas; p.234-238.

16. Luger M, Kruschitz R, Kienbacher C, Traussnigg S, Langer FB, Prager G, Schindler K, Kallay E, Hoppichler F, Trauner M, Krebs M, Marculescu R, Ludvik B. Vitamin D3 Loading Is Superior to Conventional Supplementation After Weight Loss Surgery in Vitamin D-Deficient Morbidly Obese Patients: a Double-Blind Randomized Placebo-Controlled Trial. Obes Surg. 2017; 27 (5): 1196-1207.

17. Papanastasiou L, Gravvanis C, Tournis S, Markou A, Giagourta I, Lymperopoulos K, Kounadi T. Effectiveness of intrasmuscular ergocalciferol treatment in a patient with osteomalacia and insufficiency after bariatric surgery. J Musculoskelet Neuronal Interact. 2020; 20 (2): 291-296.

18. Goldner WS, Stoner JA, Lyden E, Thompson J, Taylor K, Larson L, Erickson J, McBride C. Finding the optimal dose of vitamin D following Roux-en-Y gastric bypass: a prospective, randomized pilot clinical trial. Obes Surg. 2009;19(2):173-179.

19. Aarts E, van Groningen L, Horst R, Telting D, van Sorge A, Janssen I, de Boer H. Vitamin D absorption: consequences of gastric bypass surgery. Eur J Endocrinol. 2011;164(5):827-32.

20. Dogan K, Aarts EO, Koehestanie P, Betzel B, Ploeger N, de Boer H, Aufenacker TJ, van Laarhoven KJHM, Janssen IMC, Berends FJ.Optimization of vitamin suppletion after Roux-en-Y gastric bypass surgery can lower postoperative deficiencies: a randomized controlled trial.. Medicine (Baltimore). 2014; 93 (25): 169.

21. Goldner WS, Stoner JA, Lyden E, Thompson J, Taylor K, Larson L, Erickson J, McBride C. Finding the optimal dose of vitamin D following Roux-en-Y gastric bypass: a prospective, randomized pilot clinical trial. Obes Surg. 2009;19(2):173-179.

22. Aarts E, van Groningen L, Horst R, Telting D, van Sorge A, Janssen I, de Boer H. Vitamin D absorption: consequences of gastric bypass surgery. Eur J Endocrinol. 2011;164(5):827-32.

23. Dogan K, Aarts EO, Koehestanie P, Betzel B, Ploeger N, de Boer H, Aufenacker TJ, van Laarhoven KJHM, Janssen IMC, Berends FJ.Optimization of vitamin suppletion after Roux-en-Y gastric bypass surgery can lower postoperative deficiencies: a randomized controlled trial.. Medicine (Baltimore). 2014; 93 (25): 169.

24. Lanzarini E, Nogués X, Goday A, Benaiges D, de Ramón M, Villatoro M, Pera M, Grande L, Ramón JM. High-Dose Vitamin D Supplementation is Necessary After Bariatric Surgery: A Prospective 2-Year Follow-up Study. Obes Surg. 2015;25(9):1633- 8.

25. Moore CE, Sherman V. Vitamin D supplementation efficacy: sleeve gastrectomy versus gastric bypass surgery. Obes Surg. 2014;24(12):2055-60.

26. Flores L, Moizé V, Ortega E, Rodríguez L, Andreu A, Filella X, Vidal J. Prospective study of individualized or high fixed doses of vitamin D supplementation after bariatric surgery. Obes Surg. 2015;25(3):470-6.

27. Nelson ML, Bolduc LM, Toder ME, Clough DM, Sullivan SS. Correction of preoperative vitamin D deficiency after Roux-en-Y gastric bypass surgery. Surg Obes Relat Dis. 2007;3(4):434-437.

28. Wolf, E., Utech, M., Stehle, P. et al. Oral High-Dose Vitamin D Dissolved in Oil Raised Serum 25-Hydroxy-Vitamin D to Physiological Levels in Obese Patients After Sleeve Gastrectomy-A Double-Blind, Randomized, and Placebo-Controlled Trial. Obes Surg.2016;26(8): 1821-1829.

29. Flores, L., Martínez Osaba, M.J., Andreu, A. et al. Calcium and Vitamin D Supplementation after Gastric Bypass Should Be Individualized to Improve or Avoid Hyperparathyroidism. Obes Surg. 2010;20(6): 738–743.

30. Aills L, Blankenship J, Buffington C, et al. Allied Health Sciences Section Ad Hoc Nutrition C. ASMBS allied health nutritional guidelines for the surgical weight loss patient. Surg Obes Relat Dis. 2008; 4 (5):73–108.

31. Decker GA, Swain JM, Crowell MD, et al. Gastrointestinal and nutritional complications after bariatric surgery. Am J Gastroenterol. 2007; 102 (11):2571–2580.

32. Carlin AM, Rao DS, Yager KM, et al. Effect of gastric bypass surgery on vitamin D nutritional status. Surg Obes Relat Dis. 2006;2(6):638–642

33. Collazo-Clavell ML, Jimenez A, Hodgson SF, Sarr MG. Osteomalacia after Roux-en-Y gastric bypass. Endocr Pract. 2004;10(3):195-198.

34. Avioli LV, Lee SW, McDonald JE, Lund J, DeLuca HF. Metabolism of vitamin D3-3H in human subjects: distribution in blood, bile, feces and urine. J of Clinl Invest. 1967; 46(6): 983–992.

35. Arunabhs S, Pollack S, Yeh J, et al. Body fat content and 25- hydroxyvitamin D levels in healthy women. J Clin Endocrinol Metab. 2003;88 (1):157-161.

CHAPTER 54

"CRISPR" Performances in genetic reconfiguration

10.56238/rsfohsv1-054

Eduardo Alves Nascimento

Gyzelle Pereira Vilhena do Nascimento

Alberto de Andrade Reis Mota

ABSTRACT

This article is based on a literary review of books and publications related to genetic diseases and the CRISPR-Cas9 technology, with the objective of analyzing the feasibility of the technique in treatments related to genetic diseases and creating a prospect of positive and negative results, thus classifying whether the known risks support the start of legalization of the technique in countries where it is still prohibited. The conclusion obtained is related to the prevention law where, even though it is a simple technology to be executed, it does not have a sustainable replicability standardization, and there are still no studies reporting its safety in long-case situations.

Keywords: CRISPR-Cas9. Genetic Diseases. Gene therapy. Safety.

1 INTRODUCTION

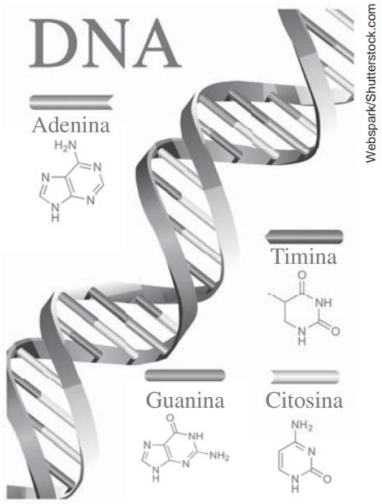
Throughout history, civilization has always faced lethal diseases such as the Black Plague of 1348 caused by bacteria found in black rats that resulted in 24 million deaths in the Middle Ages (REZENDE 2009) and smallpox, which for many years remained unknown to mankind about its origin and treatment, with reports of deaths such as that of Pharaoh Rames V in 1157 B.C. and historical epidemics in India in 1950 causing 14,092 deaths (BEHBEHANI 1983).

In these situations, human beings acted as quickly as possible, discovering the best treatment and cure for these diseases. In a historical parallel, the world went through several explanations of possible causes of why a person became ill, such as explanations of divine punishment, mythological beings and/or witchcraft (BARBOSA; LEMOS 2007). As science progressed there were advances and with Louis Pasteur's revisions on the spontaneous origin of life it was theorized that no organic organism would have the power to generate another form of life if it was not previously infected (ROSENDO 2016).

In current times, we know that some diseases were not linked to external pathogens but to the individual's own genetics (ORTIZ 2003). The chronic non-communicable diseases currently make up about 2/3 of deaths in developing countries, and among them are cardiovascular diseases, cancer, chronic respiratory diseases and diabetes (TEIXEIRA 2022). Thus, these classes of etiological diseases have several causes, the main ones being related to metabolic and genetic factors of each one.

For many years there was no effective way to treat these cases, because there were no specific drugs to modify this bioavailability, thus generating only a temporary remission to maintain a good experience of the patient (AREND et.al. 2016). The treatment of these, became possible only with the description of DNA, in 1953, by scientists James Watson and Francis Crick and the understanding of the nitrogenous bases in the influence of heredity (PIMENTA ; LIMA 2015).

Figure 1: Structure idealized by DNA scientists along with the structural bases that make it up.



Source: Genetics Applied to Biotechnology, (PIMENTA ; LIMA 2015).

The genetic modification of plants has been the basis of agriculture for over 10,000 years, leading to the improvement of its characteristics necessary for the prosperity of a particular civilization in a particular place (SILVA 2015). These modifications, which have always instigated humans, were initially performed in an empirical manner, being refined and studied over time, and thus becoming more refined, reaching in the 20th century to molecular levels. In 1973, scientists H. Boyer and S. Cohen were the first to "edit" a gene, by transferring a frog gene to a bacterium, opening the door to genetic change between animals and allowing in 1974 the creation of the first genetically modified animal. A mouse embryo in which a DNA virus was inserted in its genetic material (PEREIRA 2022).

However gene therapies emerge as a viable technique previously used by microorganisms and in agricultural fields, capable of modifying the target DNA by altering a defective genome or adding a resistance to other types of microorganisms (PEREIRA 2022).

With the advance of technology we found one of the most promising ways to perform a permanent gene therapy in a human cell, the CRISPR-Cas09 is a technique observed in bacteria where it uses the recognition of nucleotides of the invading DNA and adapts to generate the best reactive system against the foreign body, the nomenclature "Cas09" is directly related to the protein responsible for catalyzing the reactions cutting the viral DNA and preventing its action (GOMES; CRUZ 2021).

Such a discovery represents a great advance for health, but also a great risk for society, taking into account that from it, there is the possibility of creating as yet unknown genetic diseases and consequences for the entire line of descendants of the patient who incorporates this therapy (GOMES; CRUZ 2021).

Therefore, the objective of this work is to analyze the feasibility of this technique taking into consideration patient safety and socio-cultural care in the short, medium, and long term in view of its contraindications.

2 REVIEW OF LITERATURE

2.1 EVOLUTION OF TREATMENT TECHNIQUES IN HEALTHCARE:

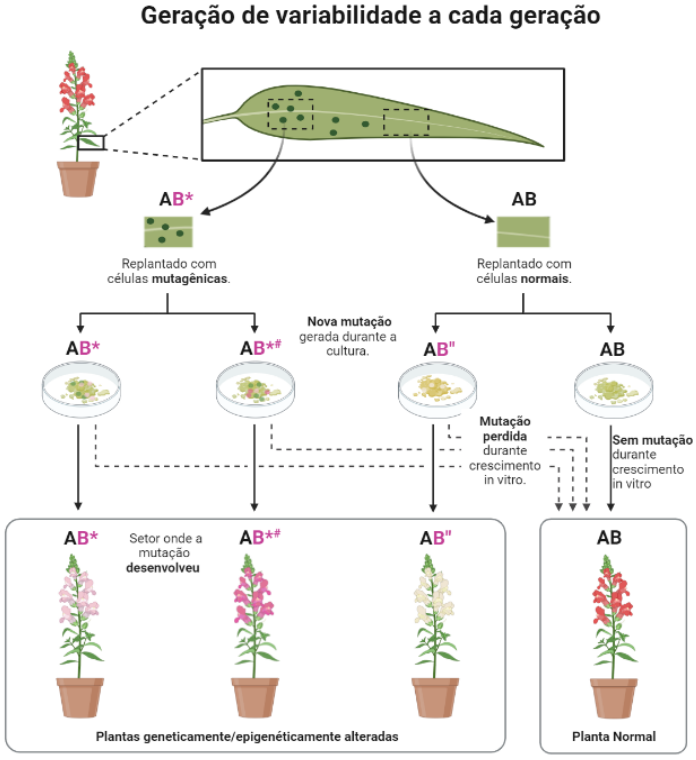
Medicine has always been present in society since the beginning of civilizations, which used rituals and medicinal plants to treat people with the most diverse diseases. Over the years and with research, several factors that caused diseases were discovered and, with these new discoveries, the way to treat a patient changed (ROSENDO 2016).

In 1860, building on previous research, scientist Louis Pasteur reviewed, with the aid of microscopes and other tests, the direct relationship of the onset of bacterial infections to the patient, proving that these infections would not arise randomly, as theorized, until then, by other scientists (ROSENDO 2016).

However, even with the discovery of microorganisms, some diseases still could not be explained, such as how a specific family shared non-infectious diseases hereditarily through generations. It is in the year 1865 that the researcher Gregor Johann Mendel comes up with an experiment that would prove his thesis of parental genes which would explain the genetic similarities between individuals of the same lineage (ASTRAUSKAS et.al. 2009).

The research consisted of using colored peas and mixing different species, tall and short, yellow and green, smooth and rough. Having a bank of results in hand, he analyzed and generated the first theory of inheritance by kinship, which in the future would be the basis of several current researches related to genetics (ASTRAUSKAS et.al.2009).

Figure 2.0: Technique used by Mendel to isolate the generations of the tested plants, thus observing their genetic variances.



Source: From the author, 2022.

However, due to lack of notoriety in academia, Mendel's articles would only be revisited in 1900 by a group of botanists who popularized him and established the laws of genetics that we follow today (ASTRAUSKAS et.al.2009). In 1953 two discoveries revolutionized the scientific environment, the chemical structure of human DNA by means of X-ray diffraction and the cell cycle theory of how a cell would multiply. Which generated the explanation of the main questions about how diseases could pass from parents to children (ORTIZ 2003).

From that year on, scientists from various biological areas sought to understand the cell cycle, thus understanding the metabolic actions that the body performs, the constant balance between the internal and external environments of the cell, and genetic transmissions that may vary due to environmental changes, which would result in the future development of diseases (PINHEIRO et.al.2022).

In 1972, Theodore Friedmann and Richard Roblin analyzed all possible ways to avoid the development of a genetic disease, analyzing three pillars that could be used: dietary therapy, pharmacotherapy, and gene therapy to replace defective genes. One example of this influence is connected with Diabetes Mellitus, where after the constant use of drugs for this disease, the risk of developing cardiovascular diseases would increase. Gene therapy, in theory, would be the best way to detect the problem still in the womb and, by using oncogenic viruses, would result in a permanent change in the cell. The main vision raised by scientists was based on the insertion of a DNA strand and viruses capable of joining this new DNA to the pre-existing cell, but there were two major problems: preventing the degradation of the DNA inside the cell and stabilizing the new DNA strand with the viral RNA, thus generating a new healthy cell (FRIEDMANN; ROBLIN 1972).

From 1980, with academia studying the structures of DNA, bacterial realized that the Escherichia coli strain had a pattern in its genome, formed by 4 million nitrogenous bases (PIMENTA ; LIMA 2015), and that much of these sequences were repeated so as to always create a variable structure interspersed with identical bases to help the bacterium to identify the beginning and end of a primordial gene. From this year until 2005 several files were postulated on the adaptive immune memory of bacteria against phages and plasmids, and their feasibility of implementing this editing technique in human cells (GONÇALVES ; PAIVA 2017).

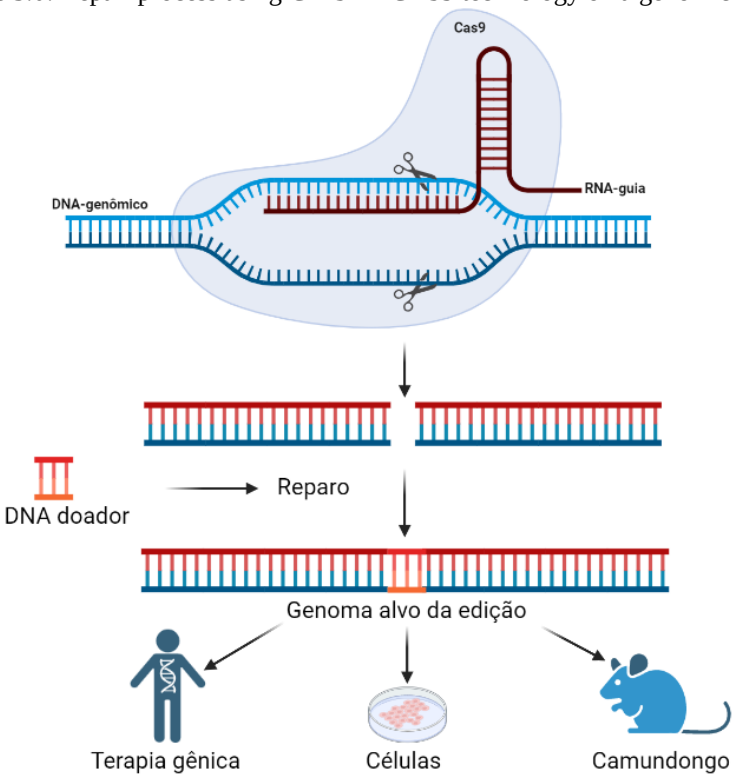
Other methods of using gene therapies have emerged over time, but it was only in 1989 that the first documented treatment was performed on a child with SCID (severe combined immunodeficiency syndrome) where there is no production of the enzyme Adenosine deaminase (ADA) by the body, which causes the degeneration of T cells, thus making the patient extremely susceptible to infections. After several cases of infections and allergies reported by the patient, the ethics committee allowed the start of a gene therapy treatment with a view to providing a better quality of life for the child. The therapy consisted of extracting T-cells from the patient's blood, introducing the ADA genes, inducing cell proliferation in the laboratory, and finally returning the modified cells to the patient's blood. This caused the girl to start expressing more T-cells, being a successful treatment (LINDEN 2010).

The description of the CRISPR locus (Clustered Regularly Interspaced Palindromic Repeats) first appeared in 1987 by Ishino when studying a gene that acted in the isoenzymes of alkaline phosphatase in Escherichia coli bacteria. However, the deficiency of DNA sequence data was the main barrier that prevented a biological prediction about the sequence generated in cells in vivo (SOGAYAR ; MACHAD 2022).

Through analysis of these E.Coli. bacteria a technique was analyzed where the microorganism recognizes the invading genetic material, separates it into small fragments and incorporates it into its own DNA, so that in a future reinfection the can be created RNA strands to incorporate into the invading system and destroy it (GONÇALVES ; PAIVA 2017).

Based on this mechanism, the CRISPR-Cas9 technique used in human DNA editing was developed, based on the administration of 3 processes to the system to alter the target DNA. These factors would be the Cas9 nuclease responsible for breaking the DNA, a guide RNA to identify the desired part to be changed and the target DNA that will be altered in the process (GONÇALVES; PAIVA 2017).

Figure 3.0: Repair process using CRISPR-CAS9 technology on a genomic DNA.



Source: From the author, 2022.

Crispr-9 technology is the most potential gene therapy in current times for having a high level of precision and for having a high versatility(GONÇALVES ; PAIVA 2017) , being the result of years of research with viability record analyzed since 1990 and that became extremely efficient when it was obtained in 2001 the sequencing of the human genome, thus enabling a greater understanding of how to be used (LINDEN 2010).

The main tests are being conducted in the United States, Europe, Australia and China (GONÇALVES ; PAIVA 2017). The use of this technology has already shown great promise, The treatment of ocular diseases are already in pre-clinical testing phase being tested on zebra fish retinas to generate changes in their eye tissue, besides familiarizing researchers to find dominant negative alleles in human DNA more easily (CABRAL et.al. 2017).

Another research is related to Crispr having the possibility to cure patients with cervical cancer diseases, the E6 and E7 proteins are compounds previously metabolized by the patient's body and that in high quantity is responsible for interfering in the cell cycle, by degrading and destabilizing the negative regulatory system responsible for stopping the exacerbated multiplication of cells. Crispr technology would be used as an extremely precise scissor to stop these two proteins from harming the environment (SIMONS 2022).

Recently American researchers have made progress with the correction of hemoglobins altered by sickle cell anemia. This experiment was performed using CD34+ cells from the patient carrying the anemia that after undergoing CRISPR-Cas9 edits demonstrated a reduction in the genes responsible for the disease (GONÇALVES ; PAIVA 2017).

However, with the emergence of this technology two main problems arose, the lack of long-term tests to know the interaction in the organism and because it is an easily accessible procedure in which people would be able to buy this protein together with the guide RNA and self-implant it without the supervision of a doctor, which could generate mutations and/or affect the social system of a population (GOMES ; CRUZ 2021).

2.2 ISSUES RELATED TO THE USE OF CRISPR-CAS9 TECHNOLOGY:

Sickle cell anemia is an example of a hereditary disease that, if left untreated, can lead to complications for the individual. Because it is a relatively well-known disease, it is known that it is formed from the beta globin gene, which, when mutated, results in the exchange of glutamic acid (GAG) for valine (GTG), thus originating a structural variation of hemoglobin so that it has a shape similar to that of a sickle (MATAVEIA 2021).

Crispr technology emerged as a way to modify the B(beta) chain of the patient's altered hemoglobin, thus generating circular hemoglobins instead of sickle-shaped ones, which facilitates the passage of oxygen through the body and prevents obstructions in blood vessels (MATAVEIA 2021).

However the indiscriminate alteration of red blood cells in a region can affect a community in which the patient is in because of sickle cell anemia generates a defense to the malaria virus (SANTOS et.al 2017), so even though it is a hereditary disease that hinders the patient it is recommended to be kept in places like in Sub-Saharan Africa where the number of malaria cases is prevalent as one of the country's most lethal causes (ROWE et.al.2009).

Therefore, the best alternative would be to alter the environment where people live first so that the alteration in the genetic system is not affected by socio-environmental and viral issues in the environment (SANTOS et.al 2017).

In some countries the moral and ethical factors are still the main ones to prevent in vivo tests because of the precautionary law. However, in 2015 a Chinese researcher performed an alteration in the genes of embryos seeking a mutation that promised to confer resistance to HIV to their patients, and of 26 embryos only 4 were successful. This shows an inefficiency of over 70% (GONÇALVES; PAIVA 2017).

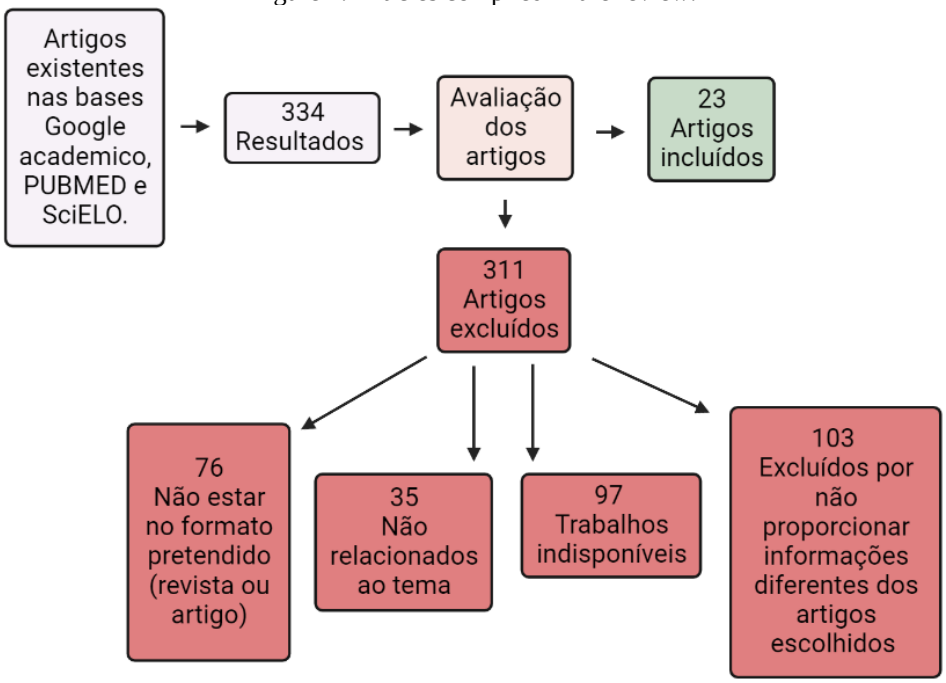
3 METHODOLOGICAL PROCEDURE

The article is structured from integrative bibliographic research, by searching different databases such as PUBMED and Google Scholar, using as keywords the following topics: **CRISPR-Cas9, Genetic Diseases, Gene Therapy, Safety and** their equivalents in English. The search considered complete articles, in Portuguese and English, published from 2000 to 2022, with primary punctual references of the time to exemplify the evolution of treatment without considering the time frame of relevant documents.

The search resulted in a total of 334 articles, as probable sources to provide technical-scientific basis, which were qualified according to their abstracts, through observational studies or studies that compiled relevant information on the subject in the form of reviews. Articles that were not available in full and/or did not clearly present the methodology used to obtain the results were excluded from the analysis (Figure 4). The synopses of the articles obtained were compiled, analyzed, and classified separately as "out of scope" or "in scope". Following the complete reading of each article, 21 were selected and used as the theoretical base for the elaboration of the present work

.

Figure 4. Articles compiled in the review.



Source: From the author, 2022.

4 DATA PRESENTATION AND ANALYSIS

- Tests performed with this technology

References	Summary of the main results
Arend M. C. *et*.al. 2016	Evidence suggests that CRISPR-Cas9 could suppress the genetic factors causing cardiovascular disease by preventing ischemia and occlusion in the future.
Friedmann T.; Roblin R. 1972	The development of an efficient and affordable gene therapy for the population would generate a drastic drop in the number of cases and consequent deaths from any genetic disease.
Linden R. 2010	CRISPR-Cas9 technology already has success points in medical practices related to hemophilia,some types of cancer, severe immunodeficiencies, and retinopathies.
Gomes M. F.; Cruz C. A. C. V. 2021	Social analysis of CRISPR-Cas9, on the principle of prevention in the uncertainty of genetic engineering. Based on legal theory and by deductive process maintaining the veto of its use.
Cabral T., *et*.al. 2017.	To prove and extol the ophthalmologic potential of the CRISPR-Cas technique and its derivatives in mammalian treatments for chronic retinal diseases.
Simões G. A. S. 2022	In vitro tests on the use of CRISPR-Cas9 have lower cost, greater efficiency and viability in cervical lesions compared to other treatments.
PAULINI E. 2022	Legal factors and risks generated from an unrestricted release of genetic alteration techniques in Brazil.
Gonçalves G. A. R.; Paiva R. M. A. 2017	Historical presentation of the importance of studying the effects related to CRISPR-Cas9 to avoid possible toxicity, creating a parallel with antibiotic therapy and chemotherapies.
SOGAYAR, Mari C.; MACHAD, Raquel Arminda C. 2022.	History of the discovery of the CRISPR-Cas9 technique used by bacteria and its adaptation to possible use in humans.

5 CONCLUDING REMARKS

Even though Crispr is a simple technology to use, one should not underestimate the changes that changing a small part of human DNA can cause if performed in an unattended or inappropriate manner (GONÇALVES ; PAIVA 2017).

Crispr in Brazilian territory is not yet regulated because the innovation does not yet have sufficient and reliable tests that the technology does not generate problems in the short, medium, and long term (PAULINI 2022)**.**

Aiming at the best treatment of the patient some factors should be considered being they a full knowledge of every cycle that will be replaced and/or added in the target DNA, a treatment accompanied

by other postoperative tests to check results and the initial treatment of only one genetic alteration at a time to avoid unwanted interactions (GONÇALVES ; PAIVA 2017).

Recent biotechnological advances employed for the improvement of gene therapy, such as induced pluripotent stem cells in patients with liver diseases, immunotherapy with chimera antigen receptor T cells, and genomic editing by the CRISPR-Cas9 system, are addressed in this review (GONÇALVES ; PAIVA 2017).

REFERENCES

AREND M. C. *et*.al. O Sistema CRISPR/Cas9 e a Possibilidade de Edição Genômica para a Cardiologia. **Programa de Pós-Graduação em Ciências da Saúde (Cardiologia) - Instituto de Cardiologia**, Fundação Universitária de Cardiologia - IC/FUC, Porto Alegre - RS, 2016.

ASTRAUSKAS J. P., *et*.al. AS LEIS DA HERANÇA POR GREGOR JOHANN MENDEL, UMA REVOLUÇÃO GENÉTICA. **Revista Científica Eletrônica de Medicina Veterinária**,Veterinária e Zootecnia de Garça - FAMED/FAEF, Garça/SP, Ano VII, N. 13, Julho 2009.

BARBOSA D. F.;Lemos P. C. P. **A medicina na Grécia antiga. Revista de Medicina - Seção Medicina & Cultura.** Rev Med (São Paulo). 2007 abr.-jun.;86(2):117-9.

BEHBEHANI A. M. The Smallpox Story: Life and Death of an Old Disease. **MICROBIOLOGICAL REVIEWS**, Vol. 47. No. 4. P.465-509, 1983

CABRAL T., *et*.al. CRISPR Applications in Ophthalmologic Genome Surgery. **Author Manuscript, Curr Opin Ophthalmol**, p.252–259, May 2017.

FRIEDMANN T.; ROBLIN R. Gene Therapy for Human Genetic Disease? Proposals for genetic manipulation in humans raise difficult scientific and ethical problems. **Magazine SCIENCE,** Volume 175, Number 4025, 3 March 1972.

GOMES M. F.; CRUZ C. A. C. V.; MANIPULAÇÃO GENÉTICA POR MEIO DA TÉCNICA DO CRISPR-CAS9, O ESTADO DA CIÊNCIA E O PRINCÍPIO DA PRECAUÇÃO. **Revista Direitos Sociais E Políticas Públicas (UNIFAFIBE)**, ISSN 2318-5732 – VOL. 9 , N. 3 , P.75-103, 2021.

GONÇALVES G. A. R.; PAIVA R. M. A. Terapia gênica: avanços, desafios e perspectivas. **Journal Einstein – SP**, Einstein. 2017;15(3):369-75.

LINDEN R. Terapia gênica: o que é, o que não é e o que será. **Artigo - Estudos Avançados 24**, Instituto de Biofísica Carlos Chagas Filho, UFRJ, 2010.

MATAVEIA E. R. F. Aplicabilidade clínica da técnica CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats) no tratamento da anemia falciforme: uma revisão integrativa. **Trabalho de Conclusão de Curso**, Universidade Federal de São Carlos – SP, 2021.
ORTIZ L. C. A fantástica descoberta da estrutura do DNA faz 50 anos. **Revista MUNDO**, Cienc. Cult., vol.55, no.2, São Paulo, Abril/Junho 2003.

PAULINI E. FATORES JURÍDICOS LIMITANTES AO USO IRRESTRITO DO CRISPR: UMA ANÁLISE DO DIREITO PÚBLICO À RESPONSABILIDADE CIVIL NO BRASIL. **Trabalho de Conclusão de Curso**, UNIVERSIDADE FEDERAL DO PARANÁ, 2022.

PEREIRA L. F. Transgênicos: a relação entre o conhecido e o desconhecido. **Revista Eletrônica Nutritime,** Vol. 19, Nº 04, jul/ago de 2022.

PIMENTA, C. A. M.; LIMA, J. M. D. Genética Aplicada à Biotecnologia.**Editora Saraiva,** 2015.

PINHEIRO R. M. S. .*et*.al. O conceito de célula no processo de ensino e aprendizagem: Relações entre os modos de fazer ciência, ensinar e aprender. **Revista Contexto & Educação**, [S. l.], v. 37, n. 118, p. e11468, 2022.

REZENDE, J. M. As Grandes Epidemias da História. In: À sombra do plátano: crônicas de história da medicina [online]. **São Paulo: Editora Unifesp**, 2009, pp. 73-82. História da Medicina series, vol. 2. ISBN 978-85-61673-63-5.

ROSENDO T. G. LOUIS PASTEUR – UM HUMANISTA DO SÉCULO XIX. **Dissertação de Mestrado**, Universidade Fernando Pessoa – Porto/Portugal, 2016.

ROWE A. K. *et*.al. Quality of malaria case management at outpatient health facilities in Angola. **Malaria Journal**, BioMed Central, p.1-20, 2009.

SANTOS G. R., *et.* al. DEFICIÊNCIA DE G6PD, ANEMIA FALCIFORME E SUAS IMPLICAÇÕES SOBRE A MALÁRIA. **Revista Bionorte**, v. 6, n. 2,p. 13-21, jul. 2017.

SILVA F. A. TRANSGENIA DA ÁREA DE ALIMENTOS: UMA ABORDAGEM DE DESENVOLVIMENTO CIENTÍFICO E DE SEGURANÇA ALIMENTAR. **Trabalho de Conclusão de Curso,** UNIVERSIDADE ESTADUAL PAULISTA - SP, 2015.

SIMÕES G. A. S. UTILIZAÇÃO DE CRISPR PARA TRATAMENTO DO CÂNCER DO COLO DO ÚTERO. **Trabalho de conclusão de curso**, Centro Universitário Una – MG, 2022.

SOGAYAR M. C.; MACHAD R. A. C. Edição Gênica por CRISPR/Cas9: da Teoria à Prática.**Editora Blucher**, 2022.

TEIXEIRA T. P. TABAGISMO**. BOLETIM TELESSAÚDEBA.** FESF-SUS , Bahia , Ano 9 , Nº 5 , Maio 2022.

CHAPTER 55

Syphilis: diagnosis, treatment and control

10.56238/rsfohsv1-055

Fabiana Bogéa Lima
Undergraduate student in Pharmacy at the Centro Universitário Aparício Carvalho - FIMCA
Institution: Centro Aparício Carvalho - FIMCA
Address: Rua: Cuaça, 2661, Cohab, Porto Velho-RO, Zip Code: 76808074
E-mail: fabiannys133@gmail.com

José Chaves de Medeiros Júnior
Undergraduate student in Pharmacy at the Centro Universitário Aparício Carvalho - FIMCA
Institution: Centro Universitário Aparício Carvalho - FIMCA
Address: Rio Brilhante, 3860, Cidade Nova, Porto Velho-RO, Zip Code: 76810536
E-mail: jrmedeiros@gmail.com

Marco Antônio Galego Júnior
Undergraduate student in Pharmacy at the Centro Universitário Aparício Carvalho - FIMCA
Institution: Centro Universitário Aparício Carvalho - FIMCA
Address: Rua Bem Te vi, 255, Eldorado, Porto Velho-RO, Zip Code: 76811686
E-mail: marcofimca@gmail.com

Neuza Biguinati de Barros
Professor at the Centro Universitário Aparício Carvalho - FIMCA
Institution: Centro Universitário Aparício Carvalho - FIMCA
Address: Rua das Araras, 241, Eldorado, Porto Velho-RO, CEP 76811678
E-mail: prof.barros.neuza@fimca.com.br

Celina A. Bertoni Lugtenburg
Specialist. Professor at the Aparício Carvalho University Center - FIMCA
Institution: Centro Universitário Aparício Carvalho - FIMCA
Address: Rua das Araras, 241, Eldorado, Porto Velho-RO, CEP 76811678
E-mail: celina.lugtenburg@hotmail.com

ABSTRACT
The sexually transmitted disease (STD) caused by the bacterium Treponema pallidum, which at certain times of its stages can be highly contagious, being a public health problem due to the increase in the number of cases and its consequences for a pregnant woman For the newborn . In this way the present study aims to characterize the factors. For this purpose a bibliographic survey of the main available databases was carried out. Syphilis presents at the onset of the infection, mild symptoms, but can lead to severe complications if there is no treatment. There are three types of symptomatic diseases, in addition to latent forms. The infectious form of the disease is mostly non-sexually unprotected, but can still be transmitted through blood transfusions, from mother to child during the gestational period or at the time of delivery. Its diagnosis is made through laboratory tests to improve the treatment of the disease in its different stages. If not treated properly, it can lead to serious visceral, cutaneous, dermal, and neural infections, causing miscarriages in pregnant women, prematurity and various pathological changes in the baby. Its treatment is effective and low cost when notified at the stage, leading to patient healing.

Key Word: T. pallidumin, Syphilis, diagnosis, treatment and Control.

1 INTRODUCTION

Syphilis is a systemic, infectious disease, caused by the anaerobic bacterium Treponema Pallidum, which can affect different organs and tissues of the human body leading to multiple manifestations and complications, it can be contracted via direct contact with spirochete-rich lesions, occurring mainly through sexual intercourse, which occupies a significant importance among the most frequent public health problems worldwide (SCHWARTZ, 2021).

The Clinical Protocol and Therapeutic Guidelines for Comprehensive Care of People with Sexually Transmitted Infections, published by the Ministry of Health. The document presents the use of rapid tests, follow-up of cases, clinical and laboratory management, it is necessary to train managers and health

professionals continuously, with a view to the integration between assistance and surveillance, and the strengthening of effective actions to control syphilis, the comprehensiveness of the search for sexual partnerships and the broad access of the most vulnerable populations to health services (SAMPAIO, 2021).

It is characterized by periods of activity and latency; by disseminated systemic involvement and the evolution of severe complications in part of the patients who were not treated or were inadequately treated (PELLOSO, 2018). It is known since the 15th century, and its study has occupied all medical specialties, its etiological agent, Treponema pallidum, has never been cultured and, despite being described more than 100 years ago and being treated since 1943 by penicillin, the most effective drug, it continues as a major health problem in developed or underdeveloped countries (PELLOSO, 2018).

The (WHO) has established four pillars for the eradication elimination of syphilis, ensuring government policy with a well-established program; increasing access and quality of maternal and child health services; identifying and treating all pregnant women with syphilis and their partners; establishing surveillance, monitoring, and evaluating the health system (ARRUDA, 2020).

Syphilis manifests itself in less than 2 years after contact. It is subdivided into three stages: primary, secondary and recent latent, the incubation time of the primary stage is on average 21 days after contact and has as a clinical sign a single painless nodule at the site of contact, an ulcer, forming the hard canker (VARGAS, 2020).

In this phase, systemic signs and symptoms, skin rashes and palmoplantar erythemato-squamous lesions are common. Finally, the latent stage initially occurs in the first 2 years of infection, without any clinical symptoms being observed, only reactivity in immunological tests, and can be easily confused with another disease.Given the characteristics of the form of transmission, the disease has accompanied the behavioral changes in society and in recent years, and has become even more important due to the possibility of increasing the risk of transmission of acquired immunodeficiency syndrome (RADIS, 2019).

New laboratory tests and control measures mainly focused on the adequate treatment of patients and partners, such as the use of condoms and information to the population, are part of the measures adopted to control syphilis by those responsible for health programs of chronic infectious diseases, which have challenged mankind for centuries, affects virtually all organs and systems, and despite having effective and low-cost treatment, have remained as a public health problem to this day, although the (WHO) has launched the initiative to eliminate the transmission of syphilis, in recent years there is an increase in infection (AMBRÓSIO, 2019).

In this context, laboratory diagnosis plays the key role in the fight against syphilis, by allowing the confirmation of the diagnosis and monitoring the response to treatment, because every laboratory test must have quality, and this through the standardization of processes and quality control, from the acquisition of inputs and reagents to the issuance of results, training and commitment of the professionals involved (AMBRÓSIO, 2019).

Sexually Transmitted Infections (STI) are a serious public health problem in Brazil; this group of diseases affects all social classes, races, creeds and nationalities, even if in different proportions. Among the STIs, syphilis deserves attention due to its high incidence, especially in underdeveloped countries (APARECIDA, 2011).

When untreated, it alternates symptomatic and asymptomatic periods, with distinct clinical, immunological, and histopathological characteristics, divided into three phases: primary syphilis, secondary syphilis, and tertiary syphilis (ARRUDA, 2020).

If there is no treatment after secondary syphilis, there are two latency periods: a recent one, with less than a year of disease, and another of late latency, with more than a year of disease, infection by Treponema pallidum does not confer permanent immunity, so it is necessary to differentiate between the persistence of reagent tests (serological scar) and reinfection by T. pallidum, presents signs and symptoms of the disease very variable and complex when untreated, evolves to more severe forms, which can compromise the nervous system, the cardiovascular system, the respiratory system and the gastrointestinal tract (RORIZ, 2016).

This paper aimed to conduct a literature review emphasizing the importance of health professionals being familiar with the different manifestations of syphilis in its different stages, ensuring the correct diagnosis, referral, treatment support, and follow-up.

2 METHODOLOGY

This paper is a systematic review, which highlights the methodology proposed for the identification of studies on the topic of syphilis, in which searches were conducted in scientific articles. In this context, the databases used for this systematic review were: Google Scholar, Scientific Electronic Library Online (SCIELO), online magazines and newspapers, Ministry of Health's Virtual Health Library, Ministry of Health's website, Federal Pharmacy Council. The keywords used were: Treponema pallidum, Syphilis, Diagnosis, Treatment and Control.

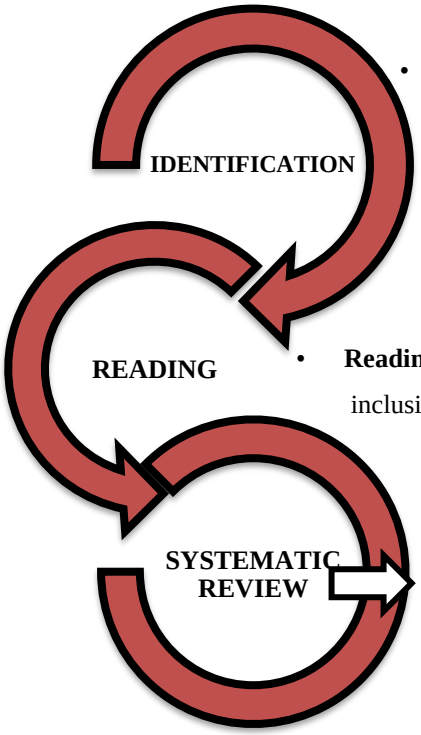
The literature review included research in books, dissertations, review and original articles that had a first reading to evaluate their content, and those that presented greater relevance about the objective of this work were selected. As inclusion criteria, we used study materials in Portuguese, Spanish and English, and exclusion of studies that did not meet the inclusion criteria, publications between the years 2010 and 2021.

The articles selected from the databases were analyzed by title and abstract within the established criteria: The following were extracted from the selected articles: year of publication, article title, methodological characteristics, clinical trial, and outcome. Through qualitative analysis and no other form of analysis was used. Through this method, papers related to molecular techniques for detection of Treponema pallidum were included.

3 RESULTS AND DISCUSSION

- **Identified studies based on scientific data:**
- SCIELO: 16
- BVS: 12
- GOOGLE ACADEMIC: 2
- TOTAL: 30

- **Excluded studies:**
- Per title: 4
- Duplicates: 2
- Review Article: 18



- Articles dealing with: *Treponema pallidum*, Syphilis, Diagnosis, Treatment and Control.
- **Reading articles:** application of inclusion and exclusion criteria

Syphilis is caused by a spirochete bacterium called Treponema pallidum, which has humans as its only host and can affect various organs and tissues, leading to serious implications if not properly treated: sexual intercourse without protective barrier with infected people, blood transfusions, sharing needles, contact with the mucous membrane, blood, saliva of contaminated people, as well as by transmission from mother to fetus or newborn which is called congenital syphilis (PASSARELLI, 2016).

The results of clinical trials assume a crucial role in generating scientific information about efficacy, safety, and therapeutic interventions in syphilis medication, knowing the potentials of treatments studied in clinical trials, making them of great importance to the community (RIBEIRO, 2020).

It is essential to make patients aware of the risks of sharing needles, to instruct on safe sex practices, and to warn about the importance of proper diagnosis and treatment of the patient and partner if any Sexually Transmitted Disease (STD) is detected, such as syphilis, for example, since individuals with syphilis are also at increased risk of acquiring other STDs, especially HIV, because the lesions resulting from the disease favor the entry of the virus in the human body (PAVANNI, 2020).

The laboratory diagnosis of syphilis will depend on the clinical history, clinical symptoms, and detection of antigens or antibodies in laboratory tests, and can be divided into two stages: screening and confirmatory where there will be treponemal and non-treponemal tests. It is possible to use treponemal tests because they will detect the presence of specific antibodies against antigens of Treponema pallidum (ROMERO, 2021).

The non-treponemal tests will detect antibodies that are not specific for Treponema pallidum, but are present in syphilis, and can be qualitative used in the determination of a sample and can also be quantitative, which will indicate the amount of antibodies present in the reagent samples, helping to monitor the disease in response to treatment (LIBONATI, et al., 2020).

The disease is identified by laboratory methods, such as the direct dark-field examination for Treponema pallidum, best indicated in the primary phase of the disease (GUINSBURG, 2010). Non-specific serological tests can cite VDRL (Venereal Disease Research Laboratory),

RPR (Rapid Plasma Reagin) and TRUST (Toluidine red unheated serum test), which are quantitative, low-cost tests, where the positive results appear between the second and fourth week after the appearance of the inoculation canker (MOURA, 2020).

Treponemal tests, such as FTA-Abs (Fluorescent Treponemal Antibody Absorption), TPHA (Treponema Pallidum Hemagglutinatio Test) and enzyme-linked immunosorbent assay (ELISA) are specific and qualitative having positive results from the second week after the onset of syphilitic canker (SUZZUKI, 2018).

The direct techniques are: dark field microscopy, direct immunofluorescence (IFD) and genomic amplification (Polymerase Chain Reaction - PCR) according to them are used exclusively in the early phase (primary and secondary syphilis) in which cancers are present, which are rich in bacteria numbers, which brings efficiency to the techniques. Since the techniques seek the bacteria and/or their structures. The use of these techniques in the late phase is accompanied by low efficiency (NASCIMENTO, 2018).

The non-treponemal immunological test becomes reagent after a few weeks and detects non-specific antibodies to the T. pallidum antigen, and can be qualitative (indicates presence or absence of antibodies in the sample) or quantitative (helps in the titration of antibodies), and is used for diagnosis and mainly to monitor the success of treatment, they are: VDRL (Venereal Disease Research Laboratory); RPR (Rapid Test Reagin), and TRUST (Toluidine Red Unheated Serum Test) according to the (MINISTRY OF HEALTH, 2015).

There are four types of non-treponemal tests with flocculation methodology, however, among these the VDRL (Venereal Disease Research Laboratory) stands out. It is recommended by the (WHO) as an efficient serological test for diagnosis (MULLER, 2020).

VDRL is positive between 5 and 6 weeks after infection and between 2 and 3 weeks after the onset of cancer. Therefore, it may be negative in primary syphilis. In secondary syphilis it has high sensitivity and in late forms the sensitivity decreases, the reaction is not specific and may be positive in other treponematoses and in several other situations (MULLER, 2020).

Of great importance in aiding diagnosis due to the immediate reading, were developed from the agglutination tests, the immunochromatographic assay is the most effective, the immunochromatographic test promotes the visual and qualitative detection of antibodies (IgG, IgM and IgA) against a recombinant 47-kDa antigen of *T. pallidum* in whole blood, serum and human plasma, the blood can be collected by

puncture of the chirodactyl. The test is read between five and 20 minutes after it is performed (LENIN, 2017).

The sensitivity and specificity of the test are 93.7% and 95.2%, respectively, and were shown to be higher than those of the RPR in preliminary studies. However, the test should not be used as the sole criterion in the diagnosis of T. pallidum infection (MULLER, 2020).

These tests may replace non-treponemal rapid tests, mainly as screening tests, laboratory tests should be done regularly for people are not carriers of syphilis, because with an early diagnosis it is possible to obtain a cure effectively, and those in treatment should continue to perform all the necessary tests for a monitoring of the disease (CAIRES, 2018).

Penicillin was discovered by Fleming in 1928, but only in 1943 it was used for the first time to treat T. pallidum (Vargas, 2020). The efficient therapeutic action of penicillin was even published in an American journal, the American Journal of Public Health and the Nation's Health. For over 50 years, penicillin has been used in the treatment of syphilis with proven efficacy, penicillin when used in doses and at the right time has bactericidal action, not allowing precursors that are formed by catalytic enzymes of the bacteria cell wall to act (ARAÚJO, 2018).

Scientific research states that the factors that may be associated in the incidence of this disease and the scarce lack of information, even limited access to health care, teenage pregnancy, the non-treatment of the infected partner, existence of people infected by the bacteria but asymptomatic, and lack of condom use, drug use, sexual freedom (SHEILA, 2019).

The World Health Organization (WHO) emphasizes that service users should receive information about the disease and be convinced that prevention and treatment can result in important benefits for women's health (PEZZOTI, 2013). The treatment of the partner is also a determining factor for the effective cure of the woman, as well as for the end of the grievance, aiming at the control of the disease, and early detection, it is valid that women of childbearing age who present risks of a problematic reinfection addressed as a possible aggravating factor for the prevalence of Syphilis (HERNANDES, 2013).

4 CONCLUSION

In this sense, the present literature review has contributed to the generation of a new source of information for health professionals and the general population, based on the compilation of highly relevant scientific articles regarding new treatments, therapeutic resources, and syphilis prophylaxis. Each evidence should be carefully analyzed when determining new medical conducts for the management of seropositive patients, always respecting the clinical picture and individual characteristics.

REFERENCES

ARAÚJO, *Treponema pallidum, Sífilis**, Atenção Farmacêutica, Syphilis,***
Pharmacetical Attention Minas Gerais, Outubro de 2018. <Acesso em: 10 de Junho de 2021.

AMBRÓSIO, *Fatores Associados à ocorrência de **Sífilis Congênita,** 2019. <Acesso em: 10 de Junho de 2021.*

APARECIDA, *Aspectos Clínicos, **Epidemiológico, preventivos, diagnóstico e de tratamento relativo à sífilis, e a sífilis congênita no brasil,** Minas Gerais 2011. <Acesso em: 12 de Junho de 2021.*

AMARAL, *Ministério da Saúde Secretaria de Vigilância em Saúde Departamento de DST, AIDS e Hepatites Virais, **SÍFILIS, Estratégias para Diagnóstico no Brasil** TELELAB 2010. . <Acesso em: 12 de Junho de 2021.*

ARRUDA, *Importância do **diagnóstico laboratorial para a sífilis congênita no prénatal,** ue, 14 Jul 2020 in Journal of Management & Primary Health Care. <Acesso Junho de 2021.*

BRASIL, *Ministério da Saúde. Secretaria de Vigilância em Saúde: **Departamento de Doenças de Condições Crônicas e Infecções Sexualmente Transmissíveis.** Protocolo Clínico e Diretrizes Terapêuticas para Prevenção da Transmissão Vertical do HIV, Sífilis e Hepatites Virais. 1.ed. Brasília, DF: Ministério da Saúde, 2019. Disponível em: . <Acesso em: 10 de Junho de 2021.*

GUINSBURG R, SANTOS AMN. *Critérios diagnósticos e t**ratamento da sífilis congênita**. Documento Científico - Departamento de Neonatologia Sociedade Brasileira de Pediatria. São Paulo, dezembro de 2010. <Acesso Junho de 2021.*

HERNANDES, SÍFILIS: *Diagnóstico, Tratamento e **Controle do Treponema Pallidum**, Microbiologia Clínica da Academia de Ciência e Tecnologia 2013. <Acesso Junho de 2021.*

LENIN, *A importância da **informação sobre a sífilis,** Granes Lagos, Outubro de 2017. <https://docplayer.com.br/105268537-A-importancia-da-informacao-sobre-a-sifilis. <Acesso Junho de 2021.*

MULLER, SÍFILIS*: Da Clínica ao **Diagnóstico,** Revista NewsLab, 2020. <Acesso Junho de 2021.*

MOURA, *Comportamento da Sífilis, no Estado do M aranhão, Dezembro de 2020.*

https://renasf.fiocruz.br/sites/renasf.fiocruz.br/files/disseracoes/2020_UFMA_Disserta%C3%A7%C3%A3o_Maria%20Madalena%20Reis%20Pinheiro%20Moura. <Acesso Junho de 2021.

NASCIMENTO, *Sífilis Treponema pallidum Universidade Federal de Juiz de Fora, Juiz de Fora 2018. <Acesso Junho de 2021.*

PEZZOTI, *Diagnóstico, Tratamento e Controle do Treponema Pallidum, Ciência e Tecnologia 2013. <Acesso Junho de 2021.*

PELLOSO, *Rev. Latino-Am. Enfermagem Sífilis na gestação: associação das características maternas e perinatais,2018. <Acesso Junho de 2021.*

PASSARELLI, D. H. C. Sífilis: *Aspectos clínicos, transmissão, manifestações orais, diagnóstico e tratamento. Revista Odontologia São Bernardo do Campo, v. 23, n. 45-46, p. 65-76, 2015. <Acesso Junho de 2021.*

PAVANI, SÍFILIS: *Aspectos Clínicos, Manifestações bucais, Diagnóstico e Tratamento, Universidade de Rio Verde, GO 2020. <Acesso Junho de 2021. <https://www.unirv.edu.br/conteudos/fckfiles/files/LET%C3%8DCIA%20RIBEIRO%20PAVANI. <Acesso em: 10 de Junho de 2021.*

RIBEIRO, *Sífilis Aspectos Clínicos, Revista Científica Odontológica, v. 11, n. 1, p. Goiânia 2020. <Acesso Junho de 2021.*

RORIZ , *Artigo de Revisão: Sífilis congênita Congenital syphilis: a review article, Revista de Medicina e Saúde de Brasília 20 de Março 2016. <Acesso Junho de 2021.*

REVISTA RADIS, *Aborda a epidemia de sífilis- INI/Fiocruz, edição 196 da revista Radis - 25 de janeiro 2019. <Acesso Junho de 2021.*

ROSA, *Principais Fatores Relacionados à Sífilis, Brasil – Revisão Integrativamain Factors Related Syphilis in Brazil - Integration Review, Goiânia 2019. <Acesso Junho de 202. <http://repositorio.aee.edu.br/jspui/bitstream/aee/1725/1/PRINCIPAIS%20FATORES%20RELACIONADOS .<Acesso 12 de junho de 2021.*

ROMERO, *A sífilis é uma IST causada pela bactéria Treponema pallidum, Consenso Epidemiol. Serv. Saúde 30 (spe1) 15 Mar 2021 15 de Março 2021. <https://scielosp.org/article/ress/2021.v30nspe1/. <Acesso 24 de Junho 2021.*

SAMPAIO, *Protocolo Brasileiro para Infecções Sexualmente Transmissíveis 2020: sífilis adquirida, Consenso • Epidemiol. Serv. Saúde 30 (spe1) 15 Mar 2021.*

SCHWARTZ, *Protocolo Brasileiro para Infecções Sexualmente Transmissíveis 2020: sífilis adquirida, Epidemiol. Serv. Saúde, Brasília, 30(Esp.1):e2020616, 2021.*

SUZUKI, *A importância da informação sobre a sífilis, União das Faculdades dos Grandes Lagos – UNILAGO, 1 Outubro de 2018. <Acesso Junho de 2021.*

SHEILA, *Tratamento da Sífilis , São Paulo Novembro 2019.*

VARGAS, *Produção Científica na área da saúde sobre sífilis, SANARE (Sobral, Online), 12 de maio 2020. <Acesso Junho de 2021.*

LIBONATI, ,Gabrielle Santos, Mota. *Casos notificados de* ***sífilis congênita e seus impactos*** *Braz. J. Hea. Rev., Curitiba, v. 3, n. 5, p. 11659-11669, set./out. 2020. <https://www.brazilianjournals.com/index. <Acesso Setembro de 2021.*

CHAPTER 56

Bionomics of *Peckia* (*Euboettcheria*) *anguilla* and *Peckia* (*Euboettcheria*) *collusor* (Diptera: Sarcophagidae) in the laboratory

10.56238/rsfohsv1-000

Raquel Fernandes Silva Chagas do Nascimento
Laboratório de Entomologia Médica e Forense, Pavilhão Herman Lent, Instituto Oswaldo Cruz, Fundação Oswaldo Cruz. Rio de Janeiro, Brazil

Alexandre da Silva Xavier
Programa de Pós-Graduação em Biodiversidade e Saúde, Instituto Oswaldo Cruz-Fundação Oswaldo Cruz, Pavilhão Arthur Neiva, Rio de Janeiro, Brazil

Lorrane de Andrade Pereira
Laboratório de Transmissores de Hematozoários, Pavillhão Carlos Chagas, Instituto Oswaldo Cruz, Fundação Oswaldo Cruz. Rio de Janeiro, Brazil

Carlos Manuel Dutok Sánchez
Universidade Federal do Amapá, Campus Binacional do Oiapoque. - Oiapoque, Amapá, Brazil

Margareth Maria de Carvalho Queiroz
Mestrado Profissional em Ciências Ambientais, Universidade de Vassouras - FUSVE, Rio de Janeiro, Brazil

ABSTRACT
Flesh-flies are important mechanical vectors that cause myiasis in man and animals and they also play an important role in forensic entomology. Postmortem interval can be estimated using data available in the literature on the biology of the species. This study aims to elucidate the bionomics of *these two species* in order to provide preliminary data for medical, veterinary and forensic entomology analyses. We analyzed the larval stage durations (L1–L3), weight of the mature larvae (L3), L1-pupae stage duration, L3-pupae stage duration, pupal stage duration, L1–adult duration, adult emergence, atrophies and the viability of larvae and adults. The mean duration of the L1–adult of *Peckia anguilla* was 22.6 days and 21.8 days, in the first and second experiments. Mean lifespan for females and males was 75 and 69.6 days, respectively. The mean duration of the L1–adult of *Peckia collusor* was 25.9 days and 23.8 days, in the first and second experiments. Mean lifespan for females and males was 77.5 and 73.5 days, respectively. *Although the two species presented similar results in relation to their post-embryonic development, P. collusor showed an adult lifespan longer, laying 1983 larvae throughout the experiment, while P. anguilla depositing 2298 larvae.*

Keywords: Flesh-Flies, Biology, Muscoid Dipterans, Forensic Entomology

1 INTRODUCTION

Forensic entomology is the branch of science responsible for studying insects and other arthropods associated with criminal and civil events. Knowledge about the life cycle and feeding habits of these organisms provides useful information to estimate the postmortem interval (PMI), which can help to solve crimes (Oliveira-Costa et al 2001; Cherix et al 2012).

Named popularly as "flesh flies", the muscoid dipterans that belong to the Sarcophagidae family have a large diverse bionomics which gives them the ability to procreate in almost all regions of the world. The Neotropical Region comprises approximately 750 species, of which 270 are distributed throughout Brazil (Carvalho et al 2012). In Brazil, the genus *Peckia* appears in large numbers on carcasses of vertebrates, including human corpses (Oliveira & Vasconcelos 2010; Vasconcelos et al., 2013). The larvae of the species *Peckia (Euboettcheria) anguilla* (Curran & Walley, 1934) and *Peckia (Euboettcheria) collusor* (Curran & Walley, 1934) have a high affinity for excrement and decomposing organic matter. Therefore, the adults and immature samples of these species can be found colonizing carcasses (Byrd & Castner 2001; Carvalho & Linhares 2001; Barros et al 2008; Barbosa et al 2009). Despite being insects of

great ecological importance, they can also act as causes of secondary myiasis and vectors of enteropathogens making them of medical-veterinary and sanitary importance (Greenberg 1973; Dias et al 1984; Leão et al 1996; Oliveira et al 2002).

Knowledge of the biology of these species is extremely important because of their close relationship with humans and this knowledge can be used to control the spread of these pathogen carriers. In addition, this knowledge provides support for forensic entomology and can be used in criminal investigations, such as at a crime scene or in cases of neglect of the elderly, children and the disabled (Benecke et al 2004). The comparison between bionomic data of species of the same genus and subgenus is essential for a good interpretation of the results, since these insects, even coexisting in the habitat, may have specific ecological, morphological and biological characteristics.

This work aims to analyze the bionomics of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* through post-embryonic development, biotic potential, sex ratio and mean lifespan of adults in the laboratory, in order to provide primordial data for ecological, sanitary and medical-legal studies.

2 MATERIAL AND METHODS

Colonies of *Peckia* (*Euboettcheria*) *anguilla* and *Peckia* (*Euboettcheria*) *collusor* were established from the adult samples collected on the campus of the Instituto Oswaldo Cruz (IOC / FIOCRUZ) (S 22° 51' 06" 43° 14' 27" W), a metropolitan area of Rio de Janeiro, Brazil, from August to December 2016. The flies were actively collected with the aid of Falcon tubes inside Shannon-type traps (da-Silva-Xavier et al 2015), containing carcasses of albino rats (*Mus musculus* L.) at the initial stage of putrefaction.

After collection, the insects were transported to the Laboratório de Entomologia Médica e Forense (LEMEF/IOC), where they were identified by a group-specific key (Carvalho & Mello-Patiu 2008) and kept in wooden cages (30 x 30 x 30 cm) coated with nylon mesh and conditioned in a climatic chamber regulated at a temperature of 27 ± 1 °C, relative humidity of 60 ± 10% and a 12h photoperiod. These muscoid dipterans received a saccharose solution of 80% and a putrefactive ground beef diet that also served to stimulate posture.

After larviposition, 400 neolarvas (L1), belonging to the first generation of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* were removed from the meat with the help of fine brushes (number zero) and transferred to plastic containers (5 x 7 cm) containing 2g / larvae of putrefaction ground meat. Two experiments were done with four replicates, containing 50 larvae each. The experiments were performed at intervals of two weeks between them in order to confirm the results obtained.

These containers were placed in larger containers (10 x 10 cm) containing vermiculite (substrate for pupariation) and were kept in a climatic chamber with the same temperature, relative humidity and photoperiod as the colonies. In order to collect information on the bionomics of these species, the mature larvae (L3) were then weighed on a precision scale in order to obtain a biomass mean. After this, the larvae were individualized and packed in test tubes containing 1/3 of vermiculite and capped with cloth and elastic.

Thus, the duration and viability of its larval, pre-pupal, pupal and neolarva periods to adult could be recorded.

To study the biotic potential and lifespan of the species, three wooden cages (30 x 30 x 30 cm) containing 15 couples from the first four replicates of the tests were assembled. Ground beef in decomposition stage was offered daily to cages in order to record the number of L1 larvae laid by the females. These were recounted when they reached the L3 stage in order to record the viability of the postures. Mortality of males and females was also checked daily to generate their survival curves.

The survival curves for males and females were represented by the Weibull distribution model. This model shows if arthropods reared in laboratory are comparable with the expected survival curve to the wild ones. One of the advantages of using Weibull distribution for survival analysis is that, by estimating only two parameters, informations on both lifespan and type of survival curve are obtained (Sgrillo1982). Chi-square test was carried out to analyze the survival distribution of the insects in order to confirm if they followed the Weibull distribution model (Sgrillo 1982).

3 RESULTS

The values of chi-square (0,3869 for males and 0,2093 for females of *P.* (*E.*) *anguilla*; 0,1722 for males and 0,1559 for females of *P.* (*E.*) *collusor*) showed a concordance between observed values and expected values, therefore, the survival distribution followed the Weibull model.

The larval viability found for larvae of *P.* (*E.*) *anguilla* at 27 °C in the first experiment was 86%, whereas in the second experiment it was 90% (Table 1). The mean duration of the larval period of this species in the first experiment was 11.8 ± 7.4 days (Table 2), ranging from 4 to 29 days. In the second experiment the duration of this period was 10.0 ± 6.4 days (Table 2), ranging from 3 to 24 days.

Table 1 Viability of immature stages of *Peckia* (*Eubottcheria*) *anguilla* (Diptera: Sarcophagidae) from the first experiment (F) and the second experiment (S) maintained under laboratory conditions (27 ± 1° C, 60 ± 10% RH and 12 hours photoperiod).

BIOLOGICAL CHARACTERISTICS	VIABILITY (%)
LARVAL STAGE (F)	86
LARVAL STAGE (S)	90
L1-L3	90.7
PUPAL STAGE (F)	43.6
PUPAL STAGE (S)	53.3
L1 TO ADULT (F)	37.5
L1 TO ADULT (S)	48

Table 2 Duration of immature stages of *Peckia* (*Euboettcheria*) *anguilla* (Diptera: Sarcophagidae) from the first experiment (F) and the second experiment (S) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours of photoperiod).

BIOLOGICAL CHARACTERISTICS	DURATION (DAYS)	
	MEAN ± SD	RANGE
LARVAL STAGE (F)	11.8 ±7.4 [a]	4 – 29
LARVAL STAGE (S)	10 ± 6.4 [b]	3 – 24
L1-PUPAE (F)	13.3 ± 0 [a]	5 - 30
L1-PUPAE (S)	11,1 ± 0 [a]	4 – 25
L3-PUPAE (F)	1.4 ± 0.48 [a]	1 – 5
L3-PUPAE (S)	1.1 ± 0.87 [b]	1 – 11
PUPAL STAGE (F)	13.3 ± 2.9 [a]	3 – 17
PUPAL STAGE (S)	14 ± 2.2 [a]	12 – 19
NEOLARVAE TO ADULT (F)	22.6 ± 5.4 [a]	11 – 39
NEOLARVAE TO ADULT (S)	21.8 ± 4.4 [a]	19 – 34

SD: Standard deviation; Different letters in the columns represent statistical differences when applied to Tukey's Multiple Comparison Test of Means between the different temperatures in the same experiment.

The mean larval mass obtained in the first experiment was 94.4 ± 24.2 mg (Table 3), with a minimum of 17.8 and a maximum of 167.7 mg. In the second experiment the mean larval mass obtained was 88.1 ± 24.9 mg (Table 3), ranging from 21.4 mg to 163.0 mg. The L1 to pupal stage lasted on average 13.31 days in the first experiment and 11.19 days in the second experiment (Table 2).

Table 3 Mass (mg) of larvae L3 mature *Peckia* (*Euboettcheria*) *anguilla* (Diptera: Sarcophagidae) from the first experiment (F) and the second experiment (S) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours photoperiod).

BIOLOGICAL FEATURES	MASS (mg)	
	MEAN ± SD	RANGE
L3 (FEMALE) (F)	97.5 ± 22.7 [a]	66 – 156,6
L3 (FEMALE) (S)	92.2 ± 17.5 [a]	44,9 – 133.5
L3 (MALES) (F)	102.9 ± 26.6 [a]	17.8 – 147
L3 (MALES) (S)	96.3 ± 23.5 [a]	35.6 – 148
MATURE LARVAE L3 (TOTAL) (F)	94.4 ± 24.2 [a]	17.8 – 167.7
MATURE LARVAE L3 (TOTAL) (S)	88.1 ±24.9 [a]	21.4 – 163
LARVAE DSD (F)	89.1 ± 22.5 [a]	26.5 – 167.7
LARVAE DSD (S)	81.3 ± 27.7 [a]	21.4 – 163
LARVAE DNFD (F)	113.1 ± 24.5	85.1 – 139.2
LARVAE DNFD (S)	-	-

DSD: They did not develop; **DNFD:** They did not finish the development; **SD:** Standard deviation; Different letters in the columns represent statistical differences when applied to Tukey's Multiple Comparison Test between the experiments.

After mature larvae L3 left the diet they took an average of 1.49 ± 0.48 days to begin the pupation process in the first experiment and 1.13 ± 0.87 days in the second experiment (Table 2). In the first experiment, the shortest time a mature larva took to start the pupation process was one day, while the longest was five days. In the second experiment, while some of the larvae also started the pupation process after only one day, others took up to 11 days.

Mature larvae that were unable to continue their development had a mean larval mass of 89.1 ± 22.5 mg (Table 3), with a minimum mass of 26.5 mg and a maximum mass of 167.7 mg in the first experiment, whereas in the second experiment they obtained 81.3 ± 27.7 mg (Table 3), with a minimum of 21.4 mg and a maximum of 163.0 mg. The larvae that initiated the emergency process, but did not finish it, were only present in Experiment 1. They obtained an average larval mass of 113.1 ± 24.5 mg (Table 3) in the first

experiment, ranging from 85.1 to 139.2 mg.

The pupal viability was 43.6% in the first experiment and 53.3% in experiment 2 (Table 1). The mean duration of the pupal periods was 13.3 ± 2.9 days and 14.0 ± 2.2 days in the first and second experiments, respectively (Table 2). While in the first experiment, the minimum duration of this stage was 3 days and the maximum period was 23 days, in the second experiment, these values ranged from 6 days to 22 days.

In the neolarva period, the mean number of days obtained for the first experiment was 22.6 ± 5.4 days (Table 2), ranging from 15 to 41 days and with a total viability of 37.5% (Table 1). In the second experiment, this period averaged 21.8 ± 4.4 days (Table 2), with a minimum of 18 and a maximum of 35 days, with a total viability of 48.0% (Table 1). The gender ratio was 0.5 in both tests.

Atrophied specimens were observed only in the first experiment. A total of 18.9% of atrophy was recorded, male adults presented 14.7% of total atrophy and females 14.6% of that same atrophy (Table 4). In the case of males, two specimens presented atrophies on the wings and three specimens were totally atrophied (Table 5). The females only presented six fully atrophied specimens (Table 5).

Table 4 Percentage of atrophied males and females of *Peckia* (*Euboettcheria*) *anguilla* and *Peckia* (*Euboettcheria*) *collusor* from the first experiment (F) and the second experiment (S) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours of photoperiod).

SPECIES	EXPERIMENT	ATROPHY (%)			
		ATROPHIEDMALES	ATROPHIED FEMALES	SUS	TOTAL
Peckia (*Euboettcheria*) *anguilla*	(F)	14.7	14.6	5.0	18.9
Peckia (*Euboettcheria*) *collusor*	(F)	5.3	10	0.6	8.2
	(S)	13.7	22.6	0.7	19.4

SUS: Specimens with undetermined sex, not being able to identify it.

Table 5 Types of male and female atrophies of *Peckia* (*Euboettcheria*) *anguilla* and *Peckia* (*Euboettcheria*) *collusor* from the first experiment (F) and from the second experiment (S) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours of photoperiod).

SPECIES	EXPERIMENT	TYPES OF ATROPHY		
		ONLY ATROPHIED WINGS	TOTALLY ATROPHIED	TOTAL
Peckia (*Euboettcheria*)*anguilla*	(F)	0 ♀ / 2 ♂	6 ♀ / 3 ♂	6 ♀ / 5 ♂
Peckia (*Euboettcheria*) *collusor*	(F)	0 ♀ / 0 ♂	7 ♀ / 4 ♂	7 ♀ / 4 ♂
	(S)	2 ♀ / 2 ♂	15 ♀ / 6 ♂	17 ♀ / 8♂

The maximum lifespan for male adults was 75.0 ± 17.7 days, and the minimum was 14.3 ± 10.7 days. The first death occurred on the 2nd day and the last occurred on the 95th day (Fig. 1). The maximum lifespan for females was 69.6 ± 8.6 days, and the minimum was 5.6 ± 3.5 days. The first recorded death occurred on the 2nd day and the last occurred on the 79th day (Fig 2).

Fig 1 Survival curve following the Weilbull distribution model with the observed results (points) and the expected results (line) for male adults of *Peckia* (*Euboettcheria*) *anguilla* (Diptera: Sarcophagidae) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours photoperiod).

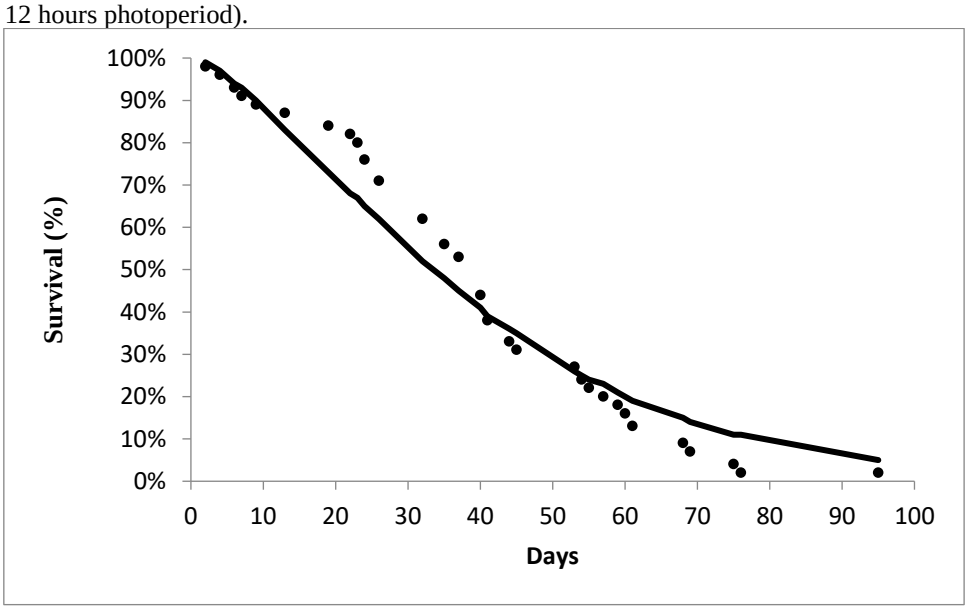
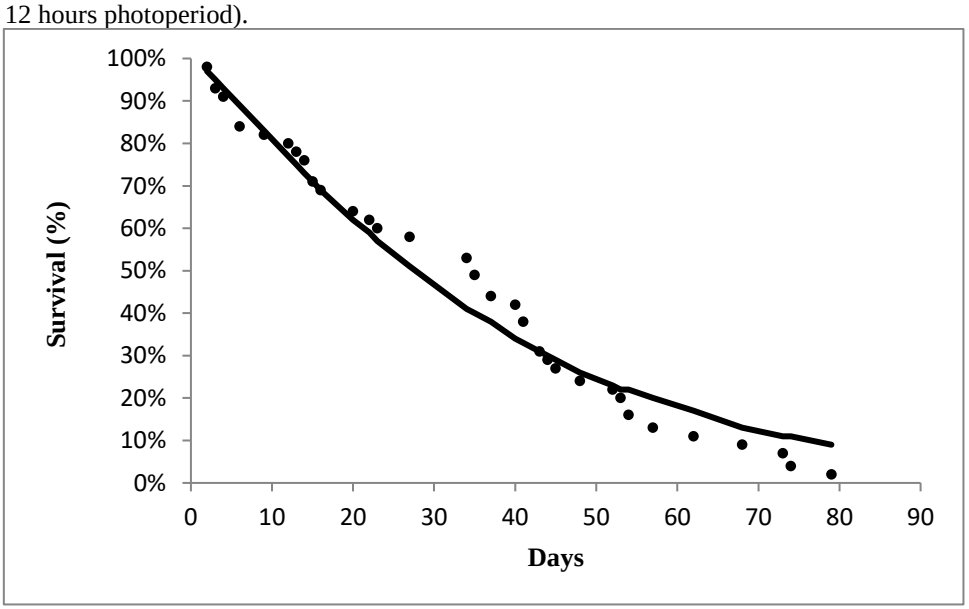
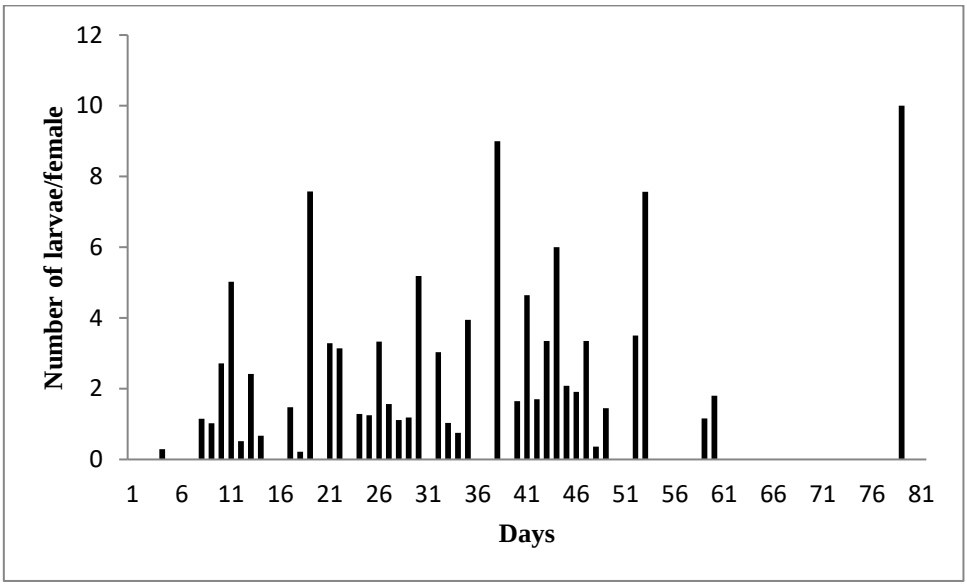


Fig 2 Survival curve following the Weilbull distribution model with the observed results (points) and the expected results (line) for female adults of *Peckia* (*Euboettcheria*) *anguilla* (Diptera: Sarcophagidae) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours photoperiod).



During the experiment, 2298 larvae L1 were deposited, from day 8 to day 79. The number of larvae deposited per female ranged from 0.22 on the 18th day to 10.0 on the 79th day (posture peak) with a mean of 2.92 larvae per female (Fig 3). Of these larvae, only 2085 developed until the L3 stage, so that the viability of L1-L3 was 90.7% (Table 1).

Fig 3 Number of larvae deposited in ground beef at initial stage of decomposition divided by the number of females of *Peckia* (*Euboettcheria*) *anguilla* (Diptera: Sarcophagidae) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours photoperiod).



The larval viability found for larvae of *P.* (*E.*) *collusor* at 27 °C in the first experiment was 75%, whereas in the second experiment it was 89% (Table 6). The mean duration of the larval period of this species in the first experiment was 11.3 ± 0.9 days (Table 7), with a variation of 6 to 13 days. In the second experiment the duration of this period was 6.3 ± 2.2 days (Table 7), ranging from three to 11 days.

Table 6 Viability of immature stages of *Peckia* (*Eubottcheria*) *collusor* (Diptera: Sarcophagidae) from the first experiment (1) and the second experiment (2) maintained under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours photoperiod).

BIOLOGICAL FEATURES	VIABILITY (%)
LARVAL STAGE (1)	75
LARVAL STAGE (2)	89
L1-L3 (1)	85.1
PUPAL STAGE (1)	96.7
PUPAL STAGE (2)	74.7
L1 TO ADULT (1)	72.5
L1 TO ADULT (2)	66.5

Table 7 Duration of immature stages of *Peckia* (*Euboettcheria*) *collusor* (Diptera: Sarcophagidae) from the first experiment (1) and the second experiment (2) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours of photoperiod).

BIOLOGICAL FEATURES	DURATION (DAYS)	
	MEAN ± SD	RANGE
LARVAL STAGE (1)	11.3 ± 0.9	6 – 13
LARVAL STAGE (2)	6.3 ± 2.2	3 – 11
L1-PUPAE (1)	13.7 ± 0	1 – 15
L1-PUPAE (2)	8.5 ± 0	4 – 19
L3-PUPAE (1)	2.3 ± 2	1 – 12
L3-PUPAE (2)	3.1 ± 2.5	1 – 15
PUPAL STAGE (1)	12.5 ± 1.3	3 – 17
PUPAL STAGE (2)	14.8 ± 1.3	12 – 19
NEOLARVAE TO ADULT (1)	25.9 ± 3.6	11 – 39
NEOLARVAE TO ADULT (2)	23.8 ± 2.7	19 – 34

SD: Standard deviation; Different letters in the columns represent statistical differences when applied to Tukey's Multiple Comparison Test of Means between the different temperatures in the same experiment.

The mean larval mass obtained in the first experiment was 82.90 ± 6.70 mg (Table 8), with a minimum of 57.7 and a maximum of 94.9 mg. In the second experiment the average larval mass obtained was 84.90 ± 10.40 mg (Table 8), ranging from 25.3 to 150.1 mg. In the first experiment, L1 to pupa lasted on average 13.71 days, while in the second experiment it lasted 8.54 days (Table 7). The L3-pupae stage lasted 2.3 ± 2.0 days in the first experiment and 3.1 ± 2.5 days in the second experiment (Table 7).

Table 8 Mass (mg) of larvae L3 mature *Peckia* (*Euboettcheria*) *collusor* (Diptera: Sarcophagidae) from the first experiment (1) and the second experiment (2) kept under laboratory conditions (27 ± 1 ° C, 60 ± 10% RH and 12 hours photoperiod).

BIOLOGICAL FEATURES	MASS (mg)	
	MEAN ± SD	RANGE
L3 (FEMALE) (1)	81.6 ± 6.8 [a]	57.7 – 94.9
L3 (FEMALE) (2)	84.7 ± 11 [b]	37.6 – 107.6
L3 (MALES) (1)	84 ± 21 [a]	63.3 – 94.1
L3 (MALES) (2)	86.6 ± 9.7 [a]	60.4 – 119
MATURE LARVAE L3 (TOTAL) (1)	82.9 ± 6.7 [a]	57.7 – 94.9
MATURE LARVAE L3 (TOTAL) (2)	84.9 ± 10.4 [a]	25.3 – 150.1
LARVAE DSD (1)	83 ± 4 [a]	78.4 – 88.2
LARVAE DSD (2)	89.6 ± 27.7 [b]	25.3 – 150.1
LARVAE DNFD (1)	87.9 ± 0 [a]	-
LARVAE DNFD (2)	88.3 ± 10.3 [a]	81 – 95.7

DSD: They did not develop; **DNFD:** They did not finish the development; **SD:** Standard deviation; Different letters in the columns represent statistical differences when applied to Tukey's Multiple Comparison Test between the experiments.

After mature larvae L3 left the diet they took an average of 2.34 ± 2.06 days to begin the pupation process in the first experiment (Table 7) and 3.19 ± 2.51 days in the second experiment (Table 7). In the first experiment, the shortest time that a mature larva took to start the pupation process was one day, while the longest was 12 days. In the second experiment while some larvae started the pupation process after only one day, others took up to 15 days.

Mature larvae that originated male adults had a larger mass than the L3 that originated females in both experiments. The mean L3 larval mass that originated male adults in the first experiment was 84.0 ± 21.0 mg (Table 8), with a variation of 63.3 to 94.1 mg and the L3 that gave rise to females was 81.6 ± 6.8 mg (Table 8), ranging from 57.7 to 94.9 mg. In the second experiment the mean L3 larval mass that originated male adults was 86.6 ± 9.7 mg (Table 8), with a variation of 60.4 to 119.0 mg and of the L3 that gave rise to females the mean mass was 84.7 ± 11.0 mg (Table 8), ranging from 37.6 to 107.6 mg.

The mature larvae that were unable to continue their development had a mean larval mass of 83.0 ± 4.0 mg (Table 8), with a minimum of 78.4 mg and a maximum of 88.2 mg, in the first experiment, whereas in the second experiment the mean mass obtained was 89.6 ± 27.7 mg (Table 8), with a minimum of 25.3 mg and a maximum of 150.1 mg. The larvae that started the emergency process, but did not finish it, had a mean mass of 87.9 ± 0 mg in the first experiment (Table 8), without minimum and maximum, since there was only one specimen. In the second experiment, the mean larval mass for this category was 88.3 ± 10.3 mg (Table 8), with a minimum of 81 and a maximum of 95.7 mg.

The pupal viability was 96.7% in the first experiment and 74.7% in the second experiment (Table 6). The mean duration of the pupal period was 12.5 ± 1.3 days and 14.8 ± 1.3 days in the first and second

experiments, respectively (Table 7). While in the first experiment, the minimum duration of this stage was three days and the maximum period was 17 days, in the second experiment, these values ranged from 12 days to 19 days.

In the neolarva period, the mean number of days obtained for the first experiment was 25.9 ± 3.6 days (Table 7), with a variation of 11 to 39 days and a total viability of 72.5% (Table 6). In the second experiment, this period averaged 23.8 ± 2.7 days (Table 7), with a minimum of 19 and a maximum of 34 days, presenting a total of 66.5% of viability (Table 6). The gender ratio was 0.5 and 0.6, in the first and second experiments, respectively.

The percentages of male and female adult atrophies that emerged were recorded, with 8.2% total atrophy in the first experiment and 19.4% in the second experiment (Table 4). In the first experiment, the male adults presented 5.3% of atrophy (Table 4), and four specimens were in a totally atrophied state (Table 5). The females of this experiment presented 10% of total atrophy (Table 4), and seven were totally atrophied (Table 5). In the first experiment, there was one atrophic specimen with undetermined sex, representing 0.6% atrophy in this category (Table 4).

The total percentage of male adults atrophied in the second experiment was 13.7% (Table 4), of which two had atrophied wings and six were totally atrophied (Table 5). The total percentage of female adults atrophied in the second experiment was 22.6% (Table 4), of which two also had atrophied wings and 15 were also totally atrophied (Table 5). There was an atrophied specimen whose sex could not be identified, so that the percentage of atrophy here was 0.7% (Table 4).

The maximum longevity of male adults was 77.5 ± 0.8 days (Fig 4), while for females it was 73.5 ± 7.5 days (Fig 5). The minimum longevity of male adults was 11.5 ± 9.3 days (Fig 4), while for females it was 6.2 ± 4.5 days (Fig 5). The first death of the adult males occurred on the 2nd day and the last occurred on the 79th day (Fig 4). The first death of the female adults was recorded on the 1st day, while the last was on the 79th day (Fig 5).

Fig 4 Survival curve following the Weibull distribution model with the observed results (points) and the expected results (line) for male adults of *Peckia* (*Euboettcheria*) *collusor* (Diptera: Sarcophagidae) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours photoperiod).

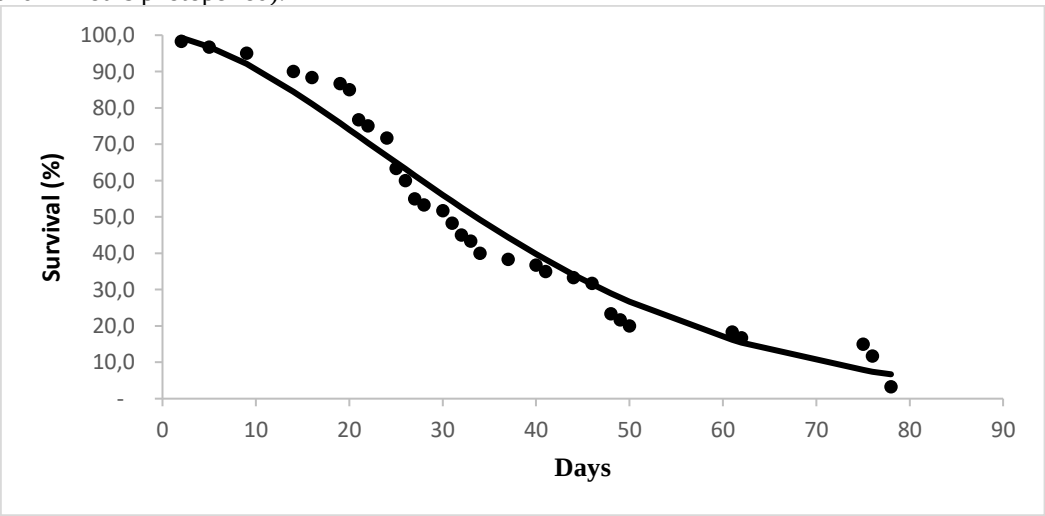
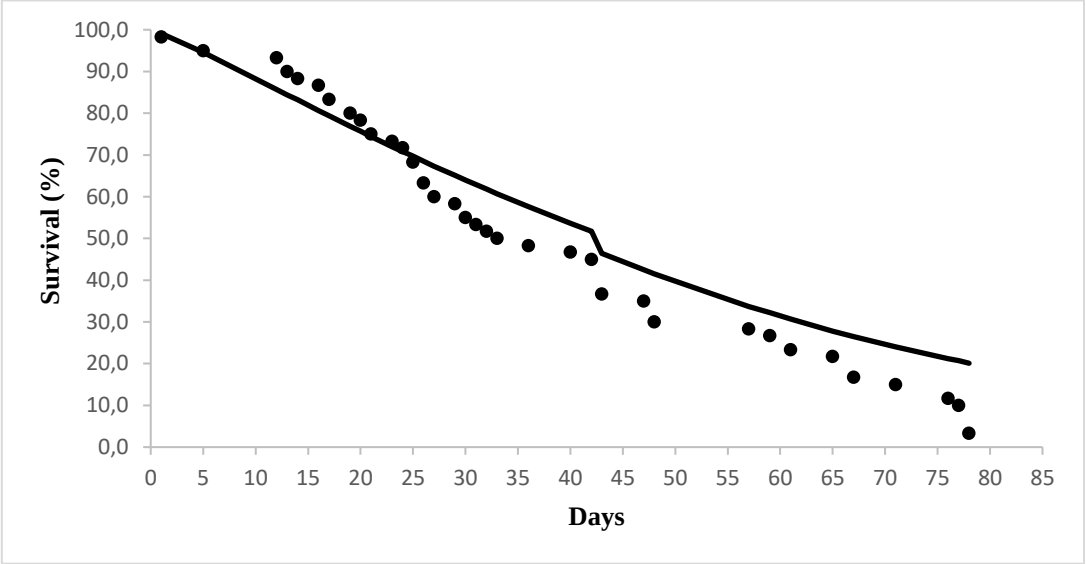


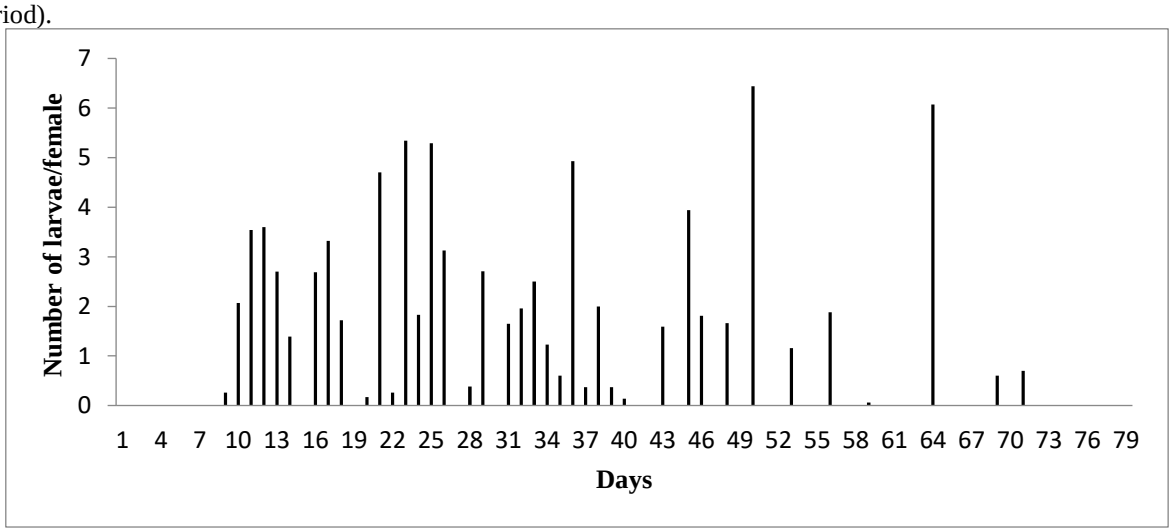
Fig 5 Survival curve following the Weilbull distribution model with the observed results (points) and the expected results (line) for female adults of *Peckia* (*Euboettcheria*) *collusor* (Diptera: Sarcophagidae) kept under laboratory conditions (27 ± 1 ° C, 60 ± 10% RH and 12 hours photoperiod).



The results of the survival curves of *P.* (*E.*) *collusor* were concordant with the χ^2 test, as well as the expected results, allowing the survival curves to follow the Weilbull distribution model. In the experiments done with *P.* (*E.*) *collusor* at 27 °C the value of χ^2 for males was 0.1722 and for females it was 0.159. This difference was not considered significant.

Throughout the experiment 1961 L1 larvae were deposited from the 9th to the 71st day. The number of larvae deposited per female ranged from 0.2 on the 40th day to 7 on the 25th day (posture peak), with a mean of 2.36 larvae per female (Fig 6). Of these larvae, only 1668 were able to develop until the L3 stage, so that the viability of L1-L3 was 85.1% (Table 6).

Fig 6 Number of larvae deposited on ground meat at initial stage of decomposition divided by the number of females of *Peckia* (*Euboettcheria*) *collusor* (Diptera: Sarcophagidae) kept under laboratory conditions (27 ± 1 °C, 60 ± 10% RH and 12 hours photoperiod).



4 DISCUSSION

Bionomic studies have shown that knowledge about the post-embryonic development of muscoid dipterans is essential to determine the immature ages, especially larvae, as well as the biotic potential and longevity of adults. This is a very important step for forensic entomology, since the PMI can be estimated from this data (Catts & Goff 1992; Oliveira-Costa and Mello-Patiu 2004; Amendt et al 2000). The experiments were carried out in an ideal temperature range for insect development, which makes the data obtained in this work act as the comparative basis of the PMI calculation. Kamal (1958) cataloged the developmental time of the larval stages of 13 necrophagous species of Calliphoridae and Sarcophagidae under laboratory conditions at 27 °C with the same diet. This pioneering work was the basis for all other studies related to the forensic diptera bionomy.

Madubunyl (1986) developed bionomic studies with *Sarcophaga* (*Bercaea*) *africa* at 23-28 °C and obtained a larval viability of 80.69%. The bionomics of *Peckia* (*Squamatodes*) *trivittata* was analyzed by Salviano et al (1996) and these authors obtained a larval viability of 89.82%, at 27 ºC. The results obtained by these authors are similar to those found in the present study for *P.* (*E.*) *anguilla* in the first and second experiments (86 and 90%, respectively) and those found for *P.* (*E.*) *collusor* in the second experiment (89 %). Loureiro et al. (2005) found 99% larval viability in studies with *Peckia* (*Pattonella*) *intermutans* at this same temperature, but differing from all viabilities found for *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor*. In a study on the biology of Sarcophagidae, da-Silva-Xavier et al (2015) obtained a larval viability of 82% for *Peckia* (*Sarcodexia*) *lambens* and 76% for *Oxysarcodexia amorosa*, both maintained at 27 °C. The value found for *P.* (*E.*) *collusor* in the first experiment (75%) resembles the value found for *P.* (*S.*) *lambens* by da-Silva-Xavier et al (2015).

The results obtained for the duration of the larval period of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* in the two experiments differ from those found in most of the literature on the subject. Oliveira-da-Silva et al (2006) when developing bionomic studies at the Adolpho Ducke forest reserve in Manaus found that the duration of the larval period of *Peckia* (*Pattonella*) *smarti* at 26 °C was 2.4 days in the rainy season and 2.04 days in the dry season at 26.6 °C. At this same location, the authors found 2.25 days of the larval period of *Peckia* (*Pattonella*) *pallidipilosa* at 26 ºC in the rainy season and 2.1 days in the dry season at 26.6 ºC. Salviano et al (1996) reported that there are significant biological differences, including the time of their development, among the Sarcophagidae species bred in the laboratory to those that develop in their natural environment. Until this date, no experiments have been performed in the field with the species studied in the present study, as well as laboratory experiments with the species studied by Oliveira-da-Silva et al (2006). Because of this, it became impossible to compare these data. However, the results found in both experiments differ from most bionomic studies performed under laboratory conditions.

The values found for the larval period of the species studied in this study can be considered high when compared with other species of the same family analyzed at 27 ºC. Da-Silva-Xavier et al (2015) obtained 3.51 days of larval period of *P.* (*S.*) *lambens* and *O. amorosa,* similar to the 3.7 and 3.9 days found

by Ferraz (1995) in her studies of the bionomics of *Peckia* (*Peckia*) *chrysostoma* at 25.9 and 27 °C, respectively. The duration of this period found by Salviano et al (1996) for *P.* (*S.*) *trivittata* was 4.2 days, while Loureiro et al (2005) reported 5.7 days in their studies with *P.* (*P.*) *intermutans.* Nassu et al (2014), analyzing the post-embryonic development of *Microcerella halli*, obtained a mean duration of the larval period of 6.5 days at 25 °C and 6 days at 30 °C, values very similar to the 6.31 days obtained in the second experiment of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* at 27 °C, respectively. It is interesting to note that Nassu et al (2014) also analyzed the development of *Sarcophaga* (*Liopygia*) *ruficornis*, at 25 ºC and 30 °C, and obtained 4.6 and 4.5 days, respectively. The results of Nassu et al. (2014) are close to the other development studies of the genus *Peckia* but differ from the results obtained for *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor*, showing that the post-embryonic development of Sarcophagidae differs even within a genus.

Although the values obtained for the mean larval mass of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* differed from each other, these results were the ones that came closest. da-Silva-Xavier et al (2015) found 33.67 mg for *P.* (*S.*) *lambens* and 28.28 mg for *O. amorosa* but they did not observe any significant values to distinguish males from females by larval mass. Loureiro et al (2005) obtained for *P.* (*P.*) *intermutans* 195.63 mg of general mass, while Salviano et al (2006) obtained for *P.* (*S.*) *trivittata* 257 mg for males and 238 mg for females. The larvae that originated male adults of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* had a mean weight higher than the larvae that originated female adults, similar to that observed by Salviano et al (1996). According to Slansky & Scriben (1985), adult insect size and body mass are the two main factors that influence its performance. Size also intervenes directly on mating behavior and dispersion. Body mass reveals the amount of energy and nutrients stored. The two factors together can influence the final fecundity of adult flies, which makes it necessary to include this type of information in bionomic studies. In the work of da-Silva-Xavier et al (2015) the larvae with body mass below 22 mg of *P.* (*S.*) *lambens* completed the pupation but the adult insects did not emerge, which can be considered as a limiting factor for adult development of this species. In the present study, similar results were obtained only in the second experiment of *P.* (*E.*) *collusor*, where the lowest larval body mass found was 25.3 mg, whose larva completed its pupation, but did not emerge. In the second experiments with *P.* (*E.*) *anguilla* at 27 ºC a larva presented 17.8 mg of larval body mass, differing from the mean of larval body mass, but was able to continue its development, giving rise to a male adult insect. In relation to the species *O. amorosa*, da-Silva-Xavier et al. (2015) did not observe a limiting weight, since adults emerged from pupae with a minimum weight of 14 mg. This finding was also observed in the experiments performed with *P.* (*E.*) *collusor*, the lowest value found for the body mass of an L3 was 60.4 mg, but this was able to carry out the pupation process, develop and generate an adult without anomalies.

Although Fraenkel & Bhaskaran (1973), Cepeda-Palacios & Scholl (2002), Barros-Cordeiro et al (2010), Barros-Cordeiro et al (2014), Nascimento et al (2014) and Flissak & Moura (2018) conducted studies on terms and definitions related to the intra-puparial development of muscoid dipterans, there are many gaps to be filled in this area. To date, the literature of the post-embryonic development of

sarcophagids does not take into account the pre-pupal period, making an in-depth interpretation of the data found in the present study impossible. The values found for the pre-pupae period of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* exemplify the need to include this data in bionomics studies because they directly influence the duration time of the complete life cycle of the insect. Oliveira-da-Silva et al (2006) developed bionomic studies in the Adolpho Ducke forest reserve in Manaus found a mean duration of the posture period up to the pre-pupa of 4.58 days for *Peckia* (*Pattonella*) *smarti* during the rainy season at 26.6 °C, and 3.82 days during the dry season at 26 °C. For *Peckia* (*Pattonella*) *pallidipilosa* the average duration of the posture period until the pre-pupae was 3.77 days in the rainy season and 5.27 days in the dry season. Although they recognized this period, it was not considered, thus pointing out the lack of importance attributed to it. In addition to contributing to a better data collection on the pupae of these dipterans, as well as their general biological aspects, the inclusion of the duration of this period in biological studies may be of prime importance for a better estimation of PMI.

The pupal viability of *P.* (*E.*) *collusor* in the first experiment (96.7%) was similar to the pupal viabilities obtained by Salviano et al (1996) for *P.* (*S.*) *trivittata* (92.75%), by Madubunyl (1986) for *S.* (*B.*) *africa* (89.83%) and by Loureiro et al (2005) for *P.* (*P.*) *intermutans* (86.7%). The pupal viability of *P.* (*E.*) *anguilla* in both experiments (43.6% and 53.3% in the first and second experiments, respectively) approached the results obtained by Ferraz (1995) in her studies with *P.* (*P.*) *chrysostoma* (69.9%) and those obtained by da-Silva-Xavier et al (2015) for *P.* (*S.*) *lambens* (65.24%).

The mean pupal period of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* corroborates with the observations of several other authors, who affirm that the duration of the pupal period of dipterans of the family Sarcophagidae, in temperatures close to 27 ° C, ranges from 10 to 20 days (Nishida 1984; Ferraz 1995; da-Silva-Xavier et al 2015). The mean duration was 13.3 ± 2.9 days and 14 ± 2.2 days for *P.* (*E.*) *anguilla* and 12.5 ± 1.3 days and 14.8 ± 1.3 days for *P.* (*E.*) *collusor*, in the first and second experiments, respectively; these results are close to the values observed by Salviano et al (1996) for *P.* (*S.*) *trivittata* (15.7 days), by Loureiro et al (2005) for *P.* (*P.*) *intermutans* (13.87 days), by Oliveira-da-Silva et al. (2006) for *P.* (*P.*) *smarti* (17.93 days) at 26.6 °C and for *P.* (*P.*) *pallidipilosa* (15.87 days) at 25.9 °C, and by Nassu et al (2014) for *S.* (*L.*) *ruficornis* (12 days) and *M. halli* (14 days). The duration of the pupal stage found for *P.* (*E.*) *anguilla* and *P.* (*E*) *collusor* differ from that obtained by da-Silva-Xavier et al. (2015) for *P.* (*S.*) *lambens* (8.26 days). Although the values found differ from those seen by Ferraz (1995) for *P.* (*P.*) *chrysostoma* at 18 °C (23.5 days), the values are still predicted for the variation of days of the average pupal period of the Sarcophagidae family (da- Silva-Xavier et al 2015).

The results of da-Silva-Xavier et al. (2015) for *P.* (*S.*) *lambens* viability from the neolarva period to adult was 54.5%, similar to the results obtained for *P.* (*E.*) *anguilla* in both our experiments (37.5 and 48%, in the first and second experiments, respectively). The mean duration of the adult neolarva period found for *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* in the present study was higher than that observed by Loureiro et al (2005) for the neolarva time to adult for *P.* (*P.*) *intermutans*, which ranged from 17-20 days, under the same

conditions of temperature and humidity. Still within the genus *Peckia*, Gomes et al. (2003) for *P.* (*P.*) *chrysostoma*, also under the same conditions of temperature and humidity, reported a mean period of neolarva to adult of 19.33 ± 1.59 days. The mean age of adult neolarva obtained by da-Silva-Xavier et al (2015) for *P.* (*S.*) *lambens* was 11.53 days, with a minimum of nine and a maximum of 15 days. This suggests that the post-embryonic developmental period of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* is larger than that of other species of the genus *Peckia.* This is also observed when the results obtained for these species are compared with other species of Sarcophagidae, such as *S.* (*L.*) *ruficornis* and *O. amorosa.* Nassu et al (2014) found 17.5 days of total post-embryonic development time for *S.* (*L.*) *ruficornis*, while da-Silva-Xavier et al (2015) obtained 13.6 days for *O. amorosa*. The species that presented a period of neolarva to the adult similar to that of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* was *M. halli.* Nassu et al. (2014) obtained a total post-embryonic development time of 21.8 days for this species.

The results found for the gender ratio of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* (0.5-0.6, respectively) resemble those found by Salviano et al (1996) for imagos from larvae of 100-199 mg for *P.* (*S.*) *trivittata.* The average lifespan of female adults of *P.* (*E.*) *anguilla* presented greater longevity than males. This result differs from that observed by Salviano et al (1996) for *P.* (*S.*) *trivittata*, where male longevity at 27 °C was higher than that of females (14.7 days). The longevity between species of Sarcophagidae differ greatly between them. For *P.* (*E.*) *collusor*, for example, there was no statistically significant difference between the mean longevity of male and female adults. Under the same conditions of temperature and humidity as the present experiment, Salviano et al (1996) obtained a mean longevity for *P.* (*S.*) *trivittata* of 11.9 ± 1.1 days for females and 14.7 ± 1.3 days for males. While, da-Silva-Xavier et al. (2015) observed a duration of 39.33 days for females and 57.33 days for males of *P.* (*S.*) *lambens* and 83.66 days for females and 84 days for males of *O. amorosa.* The longevity results of male and female adults of *P.* (*E.*) *collusor* suggest that this species adapts to laboratory conditions better than *P.* (*E.*) *collusor*. Unlike *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* all the cited species obtained a longer longevity in males than in females. Ferraz (1995) obtained a longer longevity of females of *P.* (*P.*) *chrysostoma*, similar to that obtained in the present study. The greater longevity of females observed in this study and in the study of Ferraz (1995) do not corroborate the affirmation of Salviano et al (1996), who justified a lower longevity of females in relation to males, due to the ovarian development. On the other hand we believe that males expend a lot of energy at the time of copulation and consequently have a lesser longevity.

Throughout the experiment, females of *P.* (*E.*) *anguilla* and *P.* (*E.*) *collusor* deposited a total of 1326 and 1983 larvae in ground meat, respectively. Values similar to those found by da-Silva-Xavier et al (2015) for *P.* (*S.*) *lambens* (1433). These same authors also reported 4781 larvae were deposited for *O. amorosa.* The females of *O. amorosa* had a much higher longevity than *P.* (*E.*) *anguilla*, which would explain the greater number of deposited larvae. The longevity of *O. amorosa* females was similar to that found for females of *P.* (*E.*) *collusor*, but the latter deposited a smaller number of larvae. These results corroborate the high biotic potential of *O. amorosa* under these laboratory conditions. The posture peak of

P. (*E*.) *anguilla* and *P*. (*E*.) *collusor*, was 3.7 and 6.4 days, respectively, suggesting a greater preference of *P*. (*E*.) *collusor* in depositing its larvae in ground beef. On the other hand da-Silva-Xavier et al (2015) found a posture peak of 10.17 larvae per female of *P*. (*S*.) *lambens*, showing that this species has a higher biotic potential, since more larvae were deposited in less time (39.33 days). It is interesting to note that *P*. (*E*.) *anguilla* and *P*. (*E*.) *collusor* in our study and *P*. (*S*.) *lambens* and *O*. *amorosa* (da-Silva-Xavier et al 2015) had a range of 7 to 11 days before the first larviposition occurred, and ground beef in putrefaction was offered to the four species from the first day of the experiment. This interval may be a period in which females utilize the protein present in the meat for ovarian maturation or sexual maturation.

5 CONCLUSION

The results of this study have added to the knowledge of the species *P*. (*E*.) *anguilla* and *P*. (*E*.) *collusor*. These species have potential sanitary, medical and forensic importance, since they have already been found on vertebrate carcasses. Moreover, these species reproduce easily on decomposing animal substrates (Barros et al 2008; Yepes-Gaurisas et al 2013). Besides *P*. (*E*.) *collusor* has already been found colonizing corpses, there are no reports in the literature that prove the larviposition of larvae of *P*. (*E*.) *anguilla* directly on human cadavers. On the other hand, this does not mean that the species does not colonize corpses or animal carcasses; moreover, their breeding and feeding habits have not yet been fully studied (Vanin et al 2011). As this species has a preference for rural regions and closed forests, *P*. (*E*.) *anguilla* could be an important indicator of the location of the crime and any movements of a corpse, if its forensic importance is proven (Dias et al 1984).

AUTHORS' CONTRIBUTION

Raquel Fernandes Silva Chagas do Nascimento - execution of all work.

Alexandre da Silva Xavier - revision and writing of the work.

Lorrane de Andrade Pereira - Bionomy bioassay.

Carlos Manuel Dutok Sánchez – statistic and revision of the work.

Margareth Maria de Carvalho Queiroz - planning, supervision and writing of the work.

ACKNOWLEDGEMENTS

This study was supported by grants from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq [311831/2017-6], POM and PAEF (IOC/FIOCRUZ) and FAPERJ.

REFERENCES

Amendt J, Krettek R, Niess C, Zehner R, Bratzke H (2000) Forensic entomology in Germany. For Sci Int. 113: 309-314

Barbosa RR, Mello-Patiu CA, Mello RP, Queiroz MMC (2009) New records of calyptrate dipterans (Fanniidae, Muscidae and Sarcophagidae) associated with the decomposition of domestic pigs in Brazil. Mem Inst Oswaldo Cruz. 104: 923-926

Barros RM, Mello-Patiu CA, Pujol-Luz JR (2008) Sarcophagidae (Insecta, Diptera) associados à decomposição de carcaças de *Sus scrofa* Linnaeus (Suidae) em área de Cerrado do Distrito Federal, Brasil. Rev Bras Entomol. 52: 606-609

Barros-Cordeiro KB, Pujol-Luz JR (2010) Morfologia e duração do desenvolvimento pós embrionário de *Chrysomya megacephala* (Diptera: Calliphoridae) em condições de laboratório. Pap Avulsos Zool. 50(47): 709-717

Barros-Cordeiro KB, Báo SN, Pujol-Luz JR (2014) Intra-puparial development of the Black soldier-fly *Hermetia illucens*. J. Insect Sci. 14(83): 1-10

Benecke M, Josephi E, Zweihoff R (2004) Neglect of Elderly: Forensic Entomology Cases and Considerations. For Sci Int. 165: 195-199

Byrd JH, Castner JL (2010) Forensic Entomology: The Utility of Arthropods in Legal Investigations. 2nd ed. CRC Press

Carvalho JBC, Mello-Patiu CA (2008) Key to the adults of the most common forensic species of Diptera in South America. Rev Bras Entomol. 52: 390-406

Carvalho JBC, Rafael JA, Couri MS, Silva VC. Diptera. In: Rafael JA, Melo GAR, Carvalho CJB, Casari AS, Constantino R (2012) eds. Insetos do Brasil: Diversidade e Taxonomia. Holos Editora

Carvalho LML, Linhares AX (2001) Seasonality of insect successions and pig carcass decomposition on a natural forest area in Southeastern Brazil. J Forensic Sci. 46: 604-608

Catts EP, Goff ML (1992) Forensic Entomology in criminal investigation. Ann Rev Entomol. 37: 253-272

Cepeda-Palacios R, Scholl PJ (2002) Intra-puparial development in *Oestrus ovis* (Diptera: Oestridae). J Med Entomol. 37: 239-245

Cherix D, Wyss C, Pape T (2012) Occurrences of flesh flies (Diptera: Sarcophagidae) on human cadavers in Switzerland, and their importance as forensic indicators. Forensic Sci Int. 220: 158–163

da-Silva-Xavier A, Barbosa RR, Barbosa CG, Queiroz MMC (2015) Bionomy of two flies of sanitary and forensic importance: *Peckia* (*Sarcodexia*) *lambens* (Wiedemann) and *Oxysarcodexia amorosa* (Schiner) (Diptera, Sarcophagidae). Rev Bras Entomol. 59: 229-233

Dias ES, Neves DP, Lopes HS (1984) Estudos sobre a fauna de Sarcophagidae (Diptera) de Belo Horizonte, Minas Gerais. III - Atratividade das iscas. Mem Inst Oswaldo Cruz. 79: 413-417

Ferraz MV (1995) Larval and pupal periods of *Peckia chrysostoma* and *Adiscochaeta ingens* (Diptera: Sarcophagidae) reared under laboratory conditions. Mem Inst Oswaldo Cruz. 90: 611-614

Flissak JC, Moura MO (2018) Intrapuparial Development of *Sarconesia chlorogaster* (Diptera: Calliphoridae) for Postmortem Interval Estimation (PMI). J Med Entomol. 55: 277-284

Fraenkel G, Bhaskaran G (1973) Pupariation and pupation in Cyclorrhaphous flies (Diptera): Terminology and Interpretation. Ann Entomol Soc Am. 66: 418-422

Gomes CM, D'Almeida JM, Santos JAA (2003) Avaliação do efeito do látex de *Euphorbia splendens* var. *hislopii* (Euphorbiacea), no desenvolvimento pós embrionário de *Peckia chrysostoma* (Wiedemann, 1830) (Diptera: Sarcophagidae), em condições de laboratório. Entomol Vect. 10: 109-120

Greenberg B (1973) Flies and Diseases. Vol. I: Ecology, Classification and Biotic Associations. Princeton Uni Press, Princeton

Kamal AS (1958) Comparative study of thirteen species of sarcosaprophagous Calliphoridae and Sarcophagidae (Diptera). Ann Entomol Soc Am. 51: 261-70

Leão RNQ, Fraiha Neto H, Cruz JPN, Tibana R (1996) Miíase uretal por *Sarcodex lambens* (Wiedemann, 1830) (Diptera: Sarcophagidae). Relato de um caso amazônico. Rev Para Med. 10: 27-29

Loureiro MS, Oliveira VC, D'Almeida JM (2005) Desenvolvimento pós- embrionário de *Pattonella intermutans* (Thomson) (Diptera: Sarcophagidae) em diferentes dietas. Rev Bras Entomol. 49: 127-129

Madubunyl LC (1986) Laboratory life history parameters of the red-tailed fleshfly, *Sarcophaga haemorrhoidalis* (Fallen) (Diptera: Sarcophagidae). Insect Sci Appl. 7: 617-621

Nascimento BP, Ribeiro AC, Luz RT, Aguiar VM, Maia VC, Couri MS (2014) Intra-puparial development of *Chrysomya putoria* (Diptera: Calliphoridae). J Med Entomol. 51: 908-915

Nassu MP, Thyssen PJ, Linhares AX (2014) Developmental rate of immature of two fly species of forensic importance: *Sarcophaga* (*Liopygia*) *ruficornis* and *Microcerella halli* (Diptera: Sarcophagidae). Parasitol Res. 113: 217-222

Nishida K (1984) Experimental studies on estimation of postmortem interval by means of fly larvae infesting human cadavers. Nippon-Hoigaku-Zasshi. 38: 24–41

Oliveira TC, Vasconcelos SD (2010) Insects (Diptera) associated with cadavers at the Institute of Legal Medicine in Pernambuco, Brazil and its implications for forensic entomology. For Sci Int. 198: 97-102

Oliveira VC, Mello RP, D'Almeida JM (2002) Dípteros muscoides como vetores mecânicos de ovos de helmintos em jardim zoológico, Brasil. Rev Saúde Pública. 36: 614- 620

Oliveira-Costa J, Mello-Patiu CA (2004) Application of forensic entomology to estimate of the postmortem interval (PMI) in homicide investigations by the Rio de Janeiro Police Department in Brazil. Forensic Med Toxicol. 5: 40-44

Oliveira-Costa J, Mello-Patiu CA, Lopes SM (2001) Dípteros muscóides associados com cadáveres humanos na cena da morte no estado do Rio de Janeiro, Brasil. Bol Mus Nac Zoo. 464: 1- 6

Oliveira-da-Silva A, Ale-Rocha R, Rafael JA (2006) Bionomia dos estágios imaturos de duas espécies de *Peckia* (Diptera, Sarcophagidae) em suíno em decomposição em área de floresta no norte do Brasil. Rev Bras Entomol. 50(4): 524-527

Salviano RJB, Mello RP, Beck LCNH, D'Almeida JM (1996) Aspectos Bionômicos de *Squamatoides trivittatus* (Diptera, Sarcophagidae) sob condições de laboratório. Mem Inst Oswaldo Cruz. 91: 249-254

Sgrillo RB (1982) A distribuição de Weibull como modelo de sobrevivência de insetos. Ecossistema. 7: 9-13

Slansky F, Scriber JM (1985) Food consumption and utilization. In: Comprehensive Insect Physiology, Biochemistry and Pharmacology. Vol. III, Pergamon Press, Oxford.

Vanin S, Gherardi M, Bugelli V, Di Paolo M (2011) Insects found on human cadaver in central Italy including the blowfly Calliphora loewi (Diptera: Calliphoridae), a new species of forensic interest. For Sci Int. 207: 30-33

Vasconcelos S, Soares T, Costa D (2013) Multiple colonization of a cadaver by insects in an indoor environment: First record of *Fannia trimaculata* (Diptera: Fanniidae) and *Peckia* (*Peckia*) *chrysostoma* (Sarcophagidae) as colonizers of a human corpse. Internat J Leg Med. 128

Yepes-Gaurisas D, Sanchez-Rodriguez JD, Mello-Patiu CA, Wolff ME (2013) Synanthropy of Sarcophagidae (Diptera) in La Pintada, Antioquia, Colombia. Rev Biol Trop. 61: 275-1287

CHAPTER 57

Riverside women from Amazonas: traditional knowledge and care practices in climacteric

10.56238/rsfohsv1-057

Semírames Cartonilho de Souza Ramos
Federal University of Paraíba, Brazil
E-mail: semiramesramosmoga@gmail.com

Carla Sousa Guedelha
Federal University of Amazonas
E-mail: csguedelha@gmail.com

Adriana Olímpia Barbosa Felipe
Federal University of Alfenas
E-mail: adriana.barbosa@unifal-mg.edu.br

Ana Lúcia Basílio Carneiro
Federal University of Paraíba, Brazil
E-mail: analucarneiro@gmail.com

ABSTRACT
Women's health in the climacteric period and its immediate and late impacts is a growing concern in contemporary society. Adequate social support in this transitional phase strengthens women's health and well-being. The study aimed to know the knowledge and practices of riverside women regarding self-care in the climacteric period. An observational, cross-sectional, descriptive and exploratory study was carried out with riverine women living in communities located along the left bank of the Amazon River. Recruitment and data collection took place at the Basic Health Unit of the Catuiara River of the Municipal Health Secretariat of Manaus. A total of 24 women aged between 40 and 65 years participated in the research. Leininger's thematic analysis method was used. The data revealed women with low schooling who, in general, lived with a partner (n=20; 83.3%). The speeches of the participants allowed the construction of three thematic categories: a) perception of the climacteric/menopause: signs, symptoms and personal experience; b) self-care practices in climateric and c) health care systems in climateric: family-popular care system and professional care system. It was observed a lack of knowledge of the word climacteric, but familiarity with the word menopause and its signs and symptoms. In this transition process, considering the individual and community knowledge and local availability, they use teas, food, exercises, self-medication, and medical assistance as care practices. In this community, intergenerational knowledge and medicinal plants are the basis of self-care. Therefore, the study reveals a connection of knowledge and practices in the construction of self-care among riverbank women.

Keywords: Cross-Cultural Nursing, Women's Health, Climacteric, Self-Care, Rural Population, Medicinal Plants.

1 INTRODUCTION

Women make up the majority of the Brazilian population and are the main users of Unified Health System (SUS) in Brazil. In 2019, there were more women than men in Brazil, with the population composed of 51.8% women[1]. Within this universe, millions of women are in the climacteric period, a period beginning around the age of 40 and extending until the age of 65, thus, around 34% of Brazilian women are in the process of transition between the reproductive and non-reproductive phases of life[2].

During the climacteric period, the changes in the ovaries decrease the production of estrogen becoming insufficient to ensure reproduction and maintenance of functional characteristics of the female sexual organs. During this period of change several alterations can occur with characteristic signs and symptoms of the climacteric syndrome, bringing transient and permanent changes with discomforts, physical and emotional changes that influence the health of women[3]. The thousands of women in this phase, especially the riverine ones, need access to health care, a major challenge that implies the preparation and attention of public policies and programs to ensure the precepts of universality, equity, and completeness, pillars of the Unified Health System.

In Brazil, epidemiological information on Amazonian riverine populations, those who live on the banks of rivers and lakes in the Brazilian Amazon, is scarce. The isolation due to the relief and colossal geographical dimensions of the Amazon imposes numerous restrictions, where, almost always, the riverside dwellers are people deprived of basic sanitation, where sewage is thrown in the open, without access to treated water, electricity, and health services; situations that are among the most important social determinants of health [4,5].

The invisibility, physical dispersion, and isolation of this population, socioeconomic problems combined with the absence or insufficiency of public health and sanitation policies, and the scarcity of resources directed to these communities, have contributed to underpin this serious scenario of deprivation[6]. The multidimensional deprivation of the Amazonian river dwellers is a determinant for facing the imposed difficulties, and strengthens what the community has in common. In this reality of affinities and searches, women find in their culture millennial knowledge useful in the processes of self-care and healing.

Thus, the objective of this work was to get to know the practices and knowledge of riverside women related to the climacteric period and self-care performed, being able to contribute with information for the reduction of inequalities and the construction of public policies.

2 METHOD

This was an observational study of exploratory descriptive type, with a qualitative approach, carried out in riverside communities located on the left bank of the Amazon River, assisted by the Basic Health Unit (UBS) Fluvial Catuiara of the Municipal Health Secretariat of Manaus, AM. This fluvial unit assisted Amazonian riverside communities every two weeks. Tracing a route of ten days duration and each day attending two communities, one in the morning and the other in the afternoon, being them: Lago do Arumã, Nossa Senhora do Carmo, Nossa Senhora do Perpétuo Socorro, Tabocal BonSucesso, Tabocal Guajará, and Jatuarana.

Women between 40 and 65 years of age, living in the riverside communities on the left bank of the Amazon River participated in the research. This study excluded indigenous women with mental disorders or any impediment, illness/situation, from the interview or who were absent at the time of the interview.

2.1 RECRUITMENT AND DATA COLLECTION

The research participants were identified at the time of reception at the UBS, while waiting for care at the Catuiara river unit, and selected from the inclusion and exclusion criteria. All female volunteers who met the inclusion criteria were interviewed.

Data collection occurred in June 2006. The team conducted individual semi-structured interviews, whose speeches were recorded to maintain the reliability of the information. The data

collection instrument contained sociodemographic data and guiding questions:

a) Do you know what climacteric or menopause is? Can you tell us a little bit about your experience in this phase?
b) What do you feel at this stage? Have you noticed any changes in your body, your feelings, or family relationships?
c) What did you use or do to take care of yourself when you felt these changes?
d) Is there a person in the community who helps women in this phase? What kind of help does he/she offer?

2.2 INFORMATION ANALYSIS AND DATA INTERPRETATION

The information analysis and data interpretation was based on Leininger's thematic analysis technique[7]technique, consisting of the following steps:

a) Pre-analysis: organization of the information to be analyzed through a floating reading, exhaustive contact with the data and definition of the registration units, textual clippings, and the coding modality;
b) Material exploration: Based on the clippings and selected registration units, the significance of the speeches that contributed to the specification of the themes is carried out and categories are chosen by grouping by similarities;
c) Treatment of results and data interpretation: induction and inferences mediated by the theoretical information available on the theme were used. Each participant received an identification in letters and numbers to ensure data confidentiality (E1, E2 ...E24).

In the construction of this study, the legal norms recommended in Resolution 466/2012 were observed. Authorized by the Management of Health Education Management (GESAU) of the Municipal Health Secretariat of Manaus (Authorization number 12/2016). Approved by the Research Ethics Committee (CEP) of the Federal University of Amazonas (CAAE: 53773416.8.0000.5020). The research participants signed an Informed Consent Form (ICF).

The authors have granted the right of first publication to *Research, Society and Development* with the title "Knowledge and practices of riverine women in climateric conditions: self-care, use of medicinal plants and health care systems" under a *Creative Commons Attribution* License.[8].

3 RESULTS

We will follow a history built by many generations of women and shared now by 24 of its riverine representatives participating in the study. It will be a look that contemplates the popular knowledge experienced in the daily life of this community. In this sample, we noticed a prevalence of women who lived with a partner or husband (n=20; 83.3%) and with low education levels (Table 1).

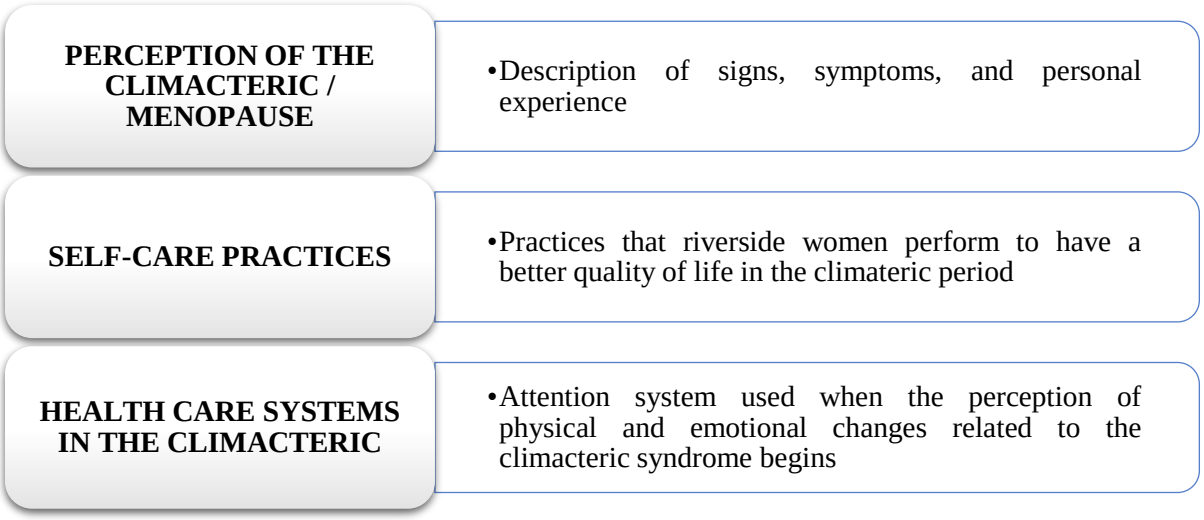
Table 1. Profile of women participating in the research, Amazonas, Brazil, (n=24).

VARIABLES	CATEGORIES	n	%
Relationship Status	Companion/husband	20	83,3
	Widow	2	8,5
	Separated/Divorced	1	4,2
	Single	1	4,2
Education	Literate	5	20,8
	Incomplete elementary school	6	25,0
	Elementary School	6	25,0
	High School	5	20,8
	Higher Education	2	8,5
Occupation	From Home	9	37,5
	Retired	4	16,7
	Seller	4	16,7
	Farmer	3	12,5
	Teacher	2	8,3
	General Services	1	4,2
	Unemployed	1	4,2

Source: Research data.

The participants' speeches allowed the construction of three thematic categories described in Figure 1.

Figure 1. Thematic categories elaborated based on the speeches of the riverine women participating in the research.



3.1 CATEGORY I: PERCEPTION OF THE CLIMACTERIC/MENOPAUSE: SIGNS, SYMPTOMS AND PERSONAL EXPERIENCE

The research participants were asked about: a) their understanding of the terms climacteric/menopause; b) their experiences during these phases, whether they felt any changes occurring in their bodies, feelings, or family relationships as the years went by. The answers to these questions will be broken down in the following paragraphs.

The word climacteric was unknown to all the interviewees. The answer was always negative when asked if they knew how to describe the concept of this technical term or if they had only heard about it. However, when asked about menopause, they showed more familiarity with the term. Most of the participants correctly conceptualized menopause as the cessation of menstruation. As can be seen in

the following statements:

> *[...] it was end of blood, like a weakness* (E4).
>
> *I don't know how to explain it, I only know that the woman stops menstruating* (I15)

On the other hand, some women associated the body changes as the very concept of menopause. In this sense, one of them reported:

> You start to feel dizzy, have pain in your ... then it's already the beginning of menopause. I feel dizzy when I menstruate, I spend many hours with colic pain. Before I menstruate I spend almost fifteen days with nausea to be able to menstruate, and after I menstruate it goes away. (E10)

Still others reported the concept of menopause as being the sum of the climacteric symptoms and the **last menstrual period**.

> [...] it is a woman's cycle when she stops menstruating and starts to feel that heat, dry vagina... she is entering menopause, you know?

As for the signs and symptoms, it is important to highlight that the participants' speeches highlighted physical, neurological and psycho-emotional **changes** (Figure 2). There were also two reports (S12 and S17) with experiences of an asymptomatic climacteric process.

Figure 2: Report of alterations during climacteric conditions, Amazonas, Brazil.

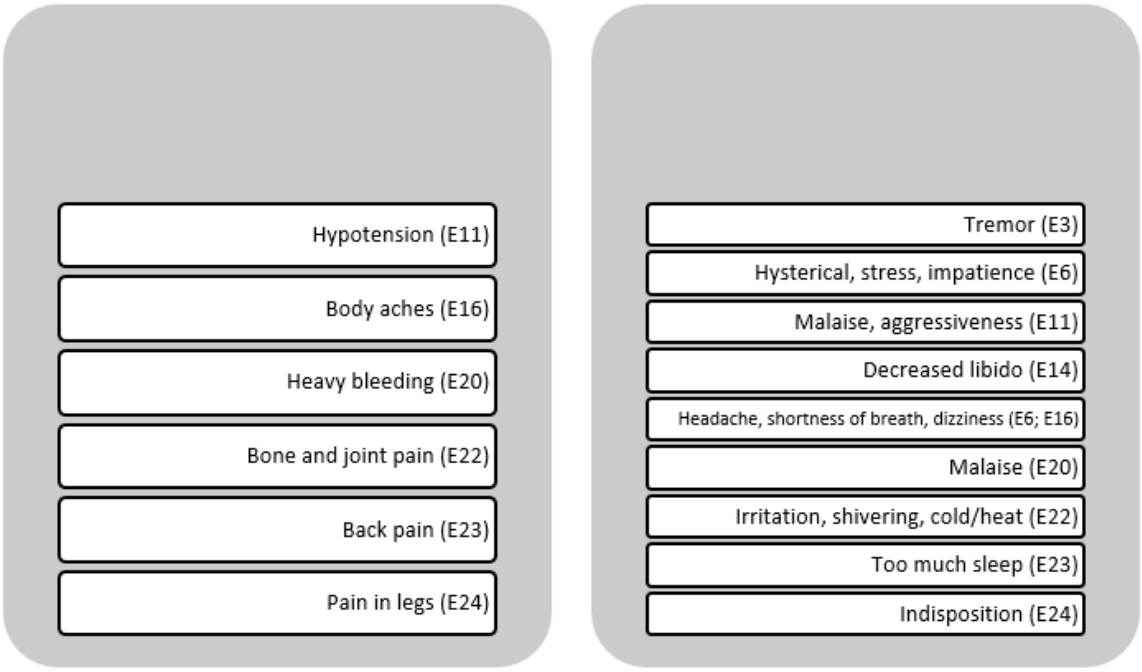


Figure 2 shows several reports of symptoms of anxiety and depression. Age, previous history of psychiatric disorders, and economic and social factors may be risk factors for mental distress in these women in this transition phase[9].

In this category, the interviewees revealed the significance and experience of the climacteric/menopause in their lives. The reports showed diverse perceptions of the climacteric period, but always associated with **symptoms and negative feelings.** The emphasis on discomfort and negative perception is a collective historical construction with participation of the media, the pharmaceutical industry and even health professionals for identifying the climacteric as a pathological event, not natural, and base their practices on the process of curing and not caring and maintaining health.

The experience of the climacteric syndrome experienced by these women is strongly related to a vision of disease and, therefore, emphasis on the perception of signs and symptoms. For them, this phase of life is difficult, because its meanings and physical and psycho-emotional manifestations compromise their relationships and occupations. This negative self-perception of health may be related to the lack of a formal job and the low self-esteem of the[10] and with women's low self-esteem after the age of 40.

In this context, women have their social role compromised, when they think they are a burden to family and society, often suppressing feelings in order not to bother other people. The climacteric period is not a specific period in a woman's life; it accompanies the female aging process and the changes in body image. Therefore, this phase often has a negative meaning because it announces yet another transition. Middle-aged women have a more negative perception about the aging experience, associating it with negative impacts on autonomy, health, appearance and sexuality[11]. In a positive perspective Jung (2014)[12], wrote:

> It is a great mistake to assume that the meaning of life is exhausted after the juvenile phase of expansion, that a woman is "liquidated" when she enters menopause. The evening of human life is as full of meaning as the morning. They only differ in meaning and intention.

The knowledge of riverine women about climacteric/menopause is multidimensional, heterogeneous, culturally constructed and influenced by access to information and educational level of each one. In this study all were literate, and of the 24 women interviewed, 13 had educational levels ranging from elementary school to college. This fact conditions the possibility of access to information, observation, understanding, and more accurate interpretation, providing these women with the capacity for self-understanding, self-care, and seeking support when necessary.

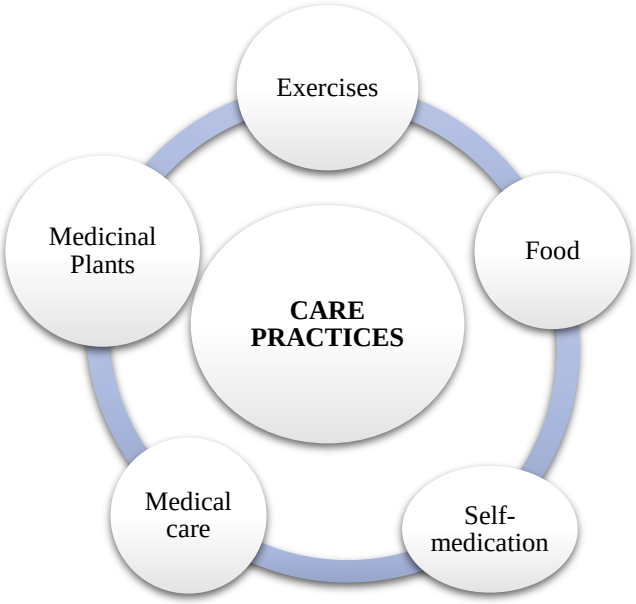
The perception of climacteric/menopause for these women reveals their history, translates their interpretation of the daily events experienced, the beliefs and myths built and their direct and indirect impacts on physical and mental health. Therefore, the facing of signs, sensations, and symptoms are influenced by the social, cultural, and economic environment where each woman is inserted.

In the next section, we will report on how women perform self-care at this stage.

3.2 CATEGORY II: SELF-CARE PRACTICES IN THE CLIMATERIC PERIOD

We identified, as shown below, four types of practices that the interviewees perform when facing the signs and symptoms of climacteric conditions (Figure 3).

Figure 3: Report of the care practices of Amazonian riverside women in the climacteric process.



It can be seen in Figure 3, that the self-care strategies include the Western or conventional biomedical model, medical care, and the unconventional, also known as traditional or popular, represented here by the use of medicinal plants.

3.2.1 The use of medicinal plants

Among the practices performed by the group of women participating in the study, there is the use of medicinal plants in the form of tea to alleviate the symptoms of the period. Chart 1 presents the list of medicinal plants mentioned by the riverine women. Some participants described the preparations and their indications:

> Mix them together, the jucá bark and the arruda leaf; make tea and drink it every time you feel the symptoms that reduce the bad feeling. (E1)
>
> Watercress tea controls pressure and normalizes when my menstruation was coming too much (E11).
>
> Lemon balm and chamomile tea helps to calm down (E22)

Table 1. List of medicinal plants mentioned by the riverside women.

MEDICINAL PLANTS			
	Scientific Name	**Popular Name**	**Part used**
1.	*Arrabidaea chica*	Crajirú	-
2.	*Aspidospermum sp.*	Paracanaúba	-
3.	*Bertholletia excelsa*	Castanheira	-
4.	*Costus*	Pobre-velho	-
5.	*Endopleura uchi*	Uxi-amarelo	Bark
6.	*Gossypium*	Algodão-roxo	-
7.	*Justicia calycina*	Sara-tudo	-
8.	*Justicia pectoralis*	Mutuquinha	-
9.	*Libidibia ferrea*	Jucá	-
10.	*Lippia alba*	Cidreira	-
11.	*Matricaria chamomilla*	Camomila	-
12.	*Morus*	Amora	Sheet
13.	*Nasturtium officinale*	Agrião	-
14.	*Piper nigrum*	Pimenta-do-reino	-
15.	*Ruta graveolens*	Arruda	Sheet
16.	*Uncaria tomentosa*	Unha-de-gato	-
17.	*Zingiber officinale*	Mangarataia	-

Source: Authors

Seeking, then, the relief of climacteric syndrome symptoms, riparian women made use of 17 species of medicinal plants. The use of Integrative and Complementary Health Practices (IPCPs) is a relevant alternative, especially in places where access to health care is difficult or precarious, as in most riverside communities. Phytotherapy in the lives of riverine women has a fundamental role in strengthening the practice of female care. The accessibility and variety of plants available in the community can help in the discomforts of menstruation to hormonal changes and other general discomforts[13]. The use also values the role of women in the community, since they cultivate and pass on the acquired knowledge, strengthening the culture and the trans-generational knowledge.

The species *Arrabidaea chica, Justicia pectoralis, Ruta graveolens, Uncaria tomentosa and Zingiber officinale,* for example, are on the list of Plantas Medicinais de Interesse ao Sistema Único de Saúde (RENISUS) of Brazil[14].

3.2.2 Diet and exercise

Healthy eating and exercise were among the participants' self-care practices. In the interviews, we recorded:

> [...] eat a lot of soy meat, eat a lot of chickpeas...you need to nourish yourself because it will do you good in menopause...eat strawberry, a lot of strawberry because it helps with bone decalcification, there help with the necessary vitamins, that it has vitamin D. Eat beans.... (E20)
>
> To help calm down, other things like that? the passion fruit juice is also very good. (E22)
>
> I've been walking for a long time now, I exercise... and I feel better (E23)

Physical activity and healthy eating are valuable resources recommended by health agencies and professionals and should be encouraged throughout a woman's life, including during menopause. The promotion of healthy eating and physical and mental balance are essential in maintaining the quality of life and well-being of women.

The integral and integrated care of women in the climateric period must be intensified through teams that meet individual and collective needs while respecting the local culture. In this way, it is possible to meet the daily needs.

3.2.3 Self-medication

Women also self-medicate when they feel any of the symptoms of the climacteric syndrome:

> [...] I take that women's health drug that is proper for menopause, it is written on the bottle: menstrual regulator (I10)
>
> When I feel a headache, I take a dipyrone... a paracetamol, that's it. (E22)

The data revealed that the practice of self-medication among riverine women is common, especially when considering self-medication as the use of medication without prescription, guidance or monitoring of a doctor or dentist[15] or even the ingestion of herbs or home remedies on their own initiative or on the advice of other unqualified people[16].

Self-medication is a multifactorial practice and, in the reality of riverine women - life dynamics, socioeconomic, cultural, and geographical conditions - self-medication emerges as a strategy of self-care and even survival. In a reality of difficulties and limitations, self-medication can be the result of difficult access to health services and qualified professionals, as well as of advertisements and marketing campaigns.[17,18] and advertisements[19-21]. Self-medication seems to be practiced by about one third of the adult population[17] with prevalence in females.[17,19,20].

3.2.4 The search for medical assistance

The participants' responses also revealed that seeking medical assistance is one of their care practices:

> Simply, what I advise is medical follow-up, measuring the hormone. They always advise this way. (E21)

As observed, riparian women when experiencing climate change perform the following self-care practices: the use of medicinal plants in the form of tea, eating foods that are a source of nutrients such as vitamin D related to bone problems, physical activity, self-medication and seeking medical help. These practices reflect the knowledge they acquire from the support network they have.

3.3 CATEGORY III: HEALTH CARE SYSTEMS IN CLIMATERIA

The interviewees were asked if there was anyone in the community who offered support to them during the period they were going through the changes of climacteric/menopause and what kind of help this person offered. Their answers revealed the sources from which their knowledge and practices were derived, to whom they turned to for answers about the moment they were going through. From the answers, two systems of care became evident, family-population and professional. The answers are shown below.

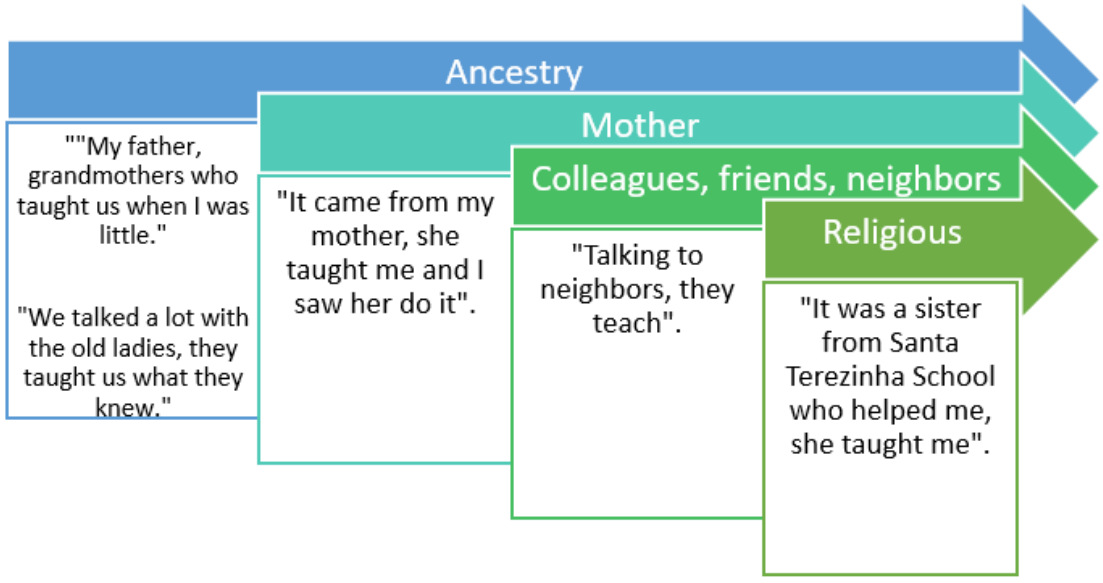
3.3.1 Family-popular care system, principle of experience belief

> We all belong to a very long line of people who have become lanterns swinging in the darkness, lighting their own way and the steps of others[22].

The interviews showed results that reveal that knowledge is spread from generation to generation, in a process of transgenerationality, revealing an active community in the process of apprehension, transmission, and construction of knowledge. They present the family with an important role in the accumulation and transmission of knowledge between generations. It also highlights the value of mutual and reciprocal interrelation in the exchange of information and learning, brings the fundamentals of the educational process, with elements of popular education, permeated by personal experiences, described by educator Paulo Freire.

This group of women reported that their sources of support were those around them: family, neighborhood, friends, religious, and people in the community. Figure 4 presents the family-population care system of the riverine women.

Figure 4. Family-population system of care for riverine women.

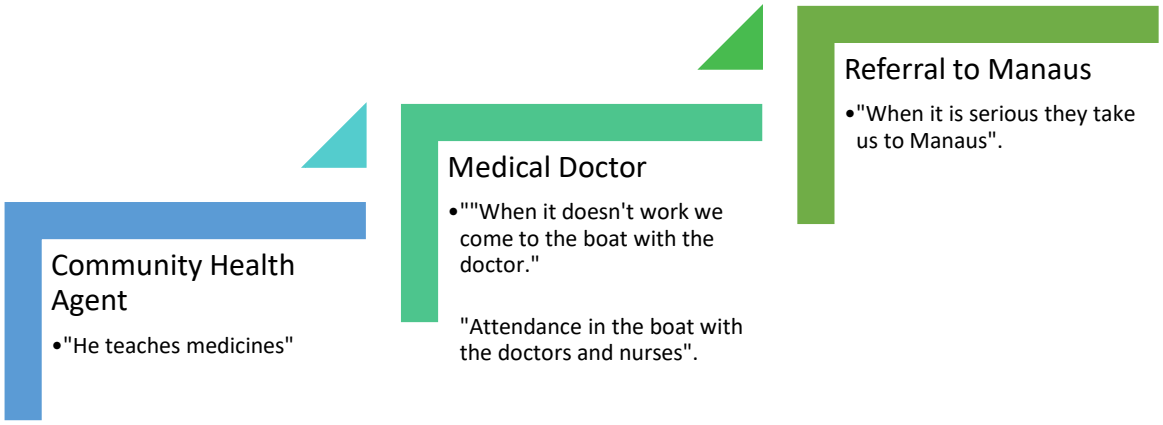


Source: Authors.

3.3.2 Professional care system

It was identified that these women follow two paths to contact the health professional. The first is the search for local biomedical knowledge, the Community Health Agent, usually the professional who deals directly with the communities, and then the other professionals who provide care every two weeks. The second is the search for professional knowledge outside the community, only when their resources are exhausted and the problem is not solved, they are referred to other centers, larger cities nearby or to Manaus, the capital of the state of Amazonas (Figure 5).

Figure 5. Professional care system for riverine women in Amazonas.



Source: authors

The reality experienced by the women living on the river banks, in this study, presents a care model represented by conventional and non-conventional care in harmony: family-popular care system (popular, traditional knowledge) and the Western scientific medical model, the Biomedical model[23].

The Family Popular Care System called by Cruz and Macedo[24] of "Popular Medicine Model" is based on the principle of belief, experience, and notorious knowledge and care, and is characterized by historical evolutionism that has added practices to the knowledge throughout natural history. In some regions of Brazil, such as the riverside regions, home remedies, teas, prayers, and beliefs are often the only treatments available, corroborating the importance of the system in the process of care, health, and disease.

In this study it was found that even though there is the fortnightly presence of the Basic Floating Health Unit, self-care based on knowledge acquired over the years and from experiences lived in the community is strongly disseminated and used in the communities. It is possible to infer that the fact that none of the study participants knew the scientific term climacteric, unusual in the community, is justified by their primary source of information being the Popular Family Care System.

One should consider the influence that the factors exert in the life of each woman, because a culturally coherent care approaches the popular knowledge of the professional. The results point out that

even though riverside women value biomedical knowledge, when experiencing the changes of the climacteric syndrome, the vast majority of them initially opt for the transgenerational and popular knowledge acquired both within the family and in the community where they live.

It is important for women to build affective and effective bonds with the professionals who accompany this process. Thus, the welcoming, communication, and offer of specific programs with guidance on normal physiological changes, self-care, and sexuality/sexual health are factors to minimize the impacts in this phase.

4 CONCLUSION

The riverine women in this study have significant knowledge about the climacteric syndrome and identify it according to their perceptions, lives and experiences built through cultural symbolisms, and especially through the perception of signs and symptoms. They perform self-care practices (such as the use of medicinal plants, self-medication, nutrition and physical activities), acquired through their Family-Popular health care system (Popular Medicine Model) that preserves customs and beliefs and use the Professional Care System (Biomedical Model), demonstrating that complementarity between models is possible, in the construction of a strong health system, to assist and contribute to better quality health. It allows reflections on the challenge of promoting and assisting the health of remote peoples. It urges professionals to contemplate transculturality in work processes for a comprehensive quality care, thus allowing new perspectives of care in order to promote better quality of life for riverside women.

REFERENCES

1. IBGE. Conheça o Brasil - População: quantidade de homens e mulheres. 2019.

2. Brasil. Manual de Atenção à Mulher no Climatério/Menopausa. Saúde Md, editor. Brasília: Ministério da Saúde; 2008. 192 p.

3. Selbac MT, Fernandes CGC, Marrone LCP, Vieira AG, da Silveira EF, Morgan-Martins MI. Mudanças comportamentais e fisiológicas determinadas pelo ciclo biológico feminino–climatério à menopausa. Aletheia 2018;51(1 e 2).

4. Reis MHDS, Portugal JKA, Mariño JM, Barros WDS, Dantas JDS, Souza TTGD, Reis YDSD, Germano SNF, Barão ÉJDS, Freitas DLAD. O impacto do advento de uma Unidade Básica de Saúde Fluvial na assistência aos povos ribeirinhos do Amazonas. Revista Eletrônica Acervo Saúde 2020(53):e3631.

5. Gama ASM, Fernandes TG, Parente RCP, Secoli SR. Inquérito de saúde em comunidades ribeirinhas do Amazonas, Brasil. Cadernos de Saúde Pública 2018;34(2).

6. Brasil. Política Nacional de Saúde Integral das Populações do Campo e da Floresta. In: Participativa DdAàG, editor. Brasília: Editora do Ministério da Saúde; 2013. p 48.

7. Leininger M, R McFarland M. Transcultural nursing: concepts, theories, research, and practice. McGraw-Hill; 2002.

8. Guedelha CS, Ramos SCDS, Carneiro ALB, Ribeiro Junior OC, Felipe AOB, Costa CBA, Albarado KVP, Martins TM, Carneiro PRC, Santos MLDAD. Saberes e práticas de mulheres ribeirinhas no climatério: autocuidado, uso de plantas medicinais e sistemas de cuidado em saúde. Research, Society and Development 2022;11(3):e17511326391.

9. Negreiros BAD, Feitosa YP, Ribeiro YCF, Pereira Junior JL. Transtornos psicóticos associados ao período do climatério. Research, Society and Development 2021;10(10):e371101018061.

10. Silva VH, Rocha JSB, Caldeira AP. Fatores associados à autopercepção negativa de saúde em mulheres climatéricas. Ciência & Saúde Coletiva 2018;23(5):1611-1620.

11. Souza CLD, Gomes VS, Silva RLD, Silva ESD, Alves JP, Santos NR, Reis VN, Ferreira SA. Aging, sexuality and nursing care: the elderly woman's look. Revista Brasileira de Enfermagem 2019;72(suppl 2):71-78.

12. Jung CG. Psicologia do Inconsciente. Appy ML, translator. Vozes2014.

13. Oliveira AKDD, Oliveira KKDD, Souza LBD, Lins RHP. Uso de plantas medicinais e fitoterápicos no climatério e menopausa. Research, Society and Development 2021;10(10):e206101018752.

14. Ferreira EE, Carvalho EDS, Sant´Anna CDC. A importância do uso de fitoterápicos como prática alternativa ou complementar na atenção básica: revisão da literatura. Research, Society and Development 2022;11(1):e44611124643.

15. Consulta Pública n º 95, de 19 de novembro de 2001. 2001.

16. Bennadi D. Self-medication: A current challenge. Journal of basic and clinical pharmacy 2014;5(1):19-23.

17. Domingues PHF, Galvão TF, de Andrade KRC, de Sá PTT, Silva MT, Pereira MG. Prevalência da

automedicação na população adulta do Brasil: revisão sistemática. Revista de Saúde Pública 2015;49:1-8.

18. Gama ASM, Secoli SR. Self-medication practices in riverside communities in the Brazilian Amazon Rainforest. Revista Brasileira de Enfermagem 2020;73(5).

19. Musial DC, Dutra JS, Becker TCA. A automedicação entre os brasileiros. SaBios-Revista de Saúde e Biologia 2007;2(2).

20. Arrais PSD, Fernandes MEP, Dal Pizzol TdS, Ramos LR, Mengue SS, Luiza VL, Tavares NUL, Farias MR, Oliveira MA, Bertoldi AD. Prevalência da automedicação no Brasil e fatores associados. Revista de Saúde Pública 2016;50(supl2):13.

21. Dhamer T, Dal-Molin AP, Helfer A, Possuelo LG, Carneiro M, Kauffmann C, Vallim ARM. A automedicação em acadêmicos de cursos de graduação da área da saúde em uma universidade privada do estado do Rio Grande do Sul. Revista de Epidemiologia e Controle de Infecção 2013;2(4):138-140.

22. Estés CP, Barcellos W. A ciranda das mulheres sábias: ser jovem enquanto velha, velha enquanto jovem. Editora Rocco LTDA; 2007.

23. Andrade JTD, Costa LFAD. Medicina complementar no SUS: práticas integrativas sob a luz da Antropologia médica. Saúde e Sociedade 2010;19(3):497-508.

24. da Silva Cruz R. Saberes e estratégias de cuidado na medicina popular–uma revisão epidemiológica em medicina popular ou fitoterapia. Revista Cathedral 2020;2(3):157-169.

FINANCIAL SUPPORT

This work was financially supported by the Call 03/2020,
Productivity in Research PROPESQ/PRPG/UFPB.
Research
project code
in SIGAA PVG13497-2020.

CHAPTER 58

Humanized nursing assistance in emergency and emergency: an integrative literature review

10.56238/rsfohsv1-058

Felipe Santana e Silva

Rosana Moreno de Sousa

Fernando Antonio da Silva Santos

Charlles Nonato da Cunha Santos

Wekadja Alves Lobão

Diego Maciel de Oliveira

Antônio Carlos Pereira de Sousa

Vanessa de Araújo Lima

Thamyris Cardoso Vieira

Iramir Ribeido da Silva

Israel Amâncio Mendes

Felisangela dos Santos de Castro

ABSTRACT

Objective: to know how humanized nursing care is provided in urgent and emergency services and what is the importance of this service in health promotion. Methodology: bibliographic research, of the integrative literature review type, and the searches took place in the electronic databases: Online Scientific Electronic Library (SCIELO), Virtual Health Library (VHL) and Latin American and Caribbean Literature on Health Sciences (LILACS); using the descriptors: urgency and emergency, nursing care and humanization. Results: based on the authors of this research, the nurse is essential for there to be a humanization in urgent and emergency care, acting with professionalism, but welcoming the patient in his most delicate moment, because one action does not exclude the other, but there must be a health education for such a change to actually take place. Conclusion: humanization in urgent and emergency services, performed by nurses, is very important, as this assistance shows that the professional values the human being, making the professional's dignity essential in this process. However, in order to carry out the humanization process, it is important that the professional has the technique and is humanely trained to care for his patient.

Keywords: Urgency and emergency, Nursing assistance, Humanization.

1 INTRODUCTION

Humanization has great relevance for health promotion, and has been seen over the years, as something that brings important issues for the return of ethical and moral values that should exist in all assistance provided by nurses, because they are the ones who deal directly with the patient.(RIOS, 2018).

The importance of humanized care motivated the implementation of the National Program for Humanization of Hospital Care (PNHAH), which in 2003 became the National Humanization Policy (PNH), and should be present in all health actions, especially in the sectors of urgency and emergency care, which despite being widely used in the daily lives of the Brazilian population, end up being confused, becoming synonyms. Therefore, before addressing this issue, it is necessary to understand both meanings (SILVA, 2017).

In this sense, the Federal Council of Medicine (CFM) Resolution No. 1451/95 defines urgency as the unforeseen occurrence of health problems with or without potential risk to life, whose bearer needs immediate medical assistance without great risk of death. Emergency is the medical verification of health conditions that imply immediate risk of life or intense suffering, therefore requiring immediate medical treatment (CFM, 2014).

The importance of these two categories for health care is indisputable. Therefore, it should occur in all care units, from the simplest to the most complex, forming an articulated and integrated network with the Mobile Emergency Care Service (SAMU), in the Emergency Care Units - UPA, specialized services such as hospitals and even in polyclinics (GIGLIO, 2010).

It is known that the emergency room is a sector where the patient rarely stays for a long time, but it is there where the patient is at his most vulnerable state, often in pain, suffering, and in need of a humanized look from the professional who attends him. The empathy, the look in the eye, the affection, the effort to relieve the pain are essential for the patient to have quality care (SILVA, 2013).

Nurses themselves already have this humanization, by the fact of caring and meeting the needs of someone. Many times, the professional is a father, son and friend, but with poor working conditions and a team without the correct quantity, it is difficult to meet the patient's needs. Despite this, these professionals need to act according to their essence, which is the art of caring (MACIAK, 2012).

It is important to emphasize that humanizing is not only the act of the nurse treating the patient well, paying attention to his or her care. It is a gradual process that gets better as this relationship gets closer and closer. Thus, the nursing professional starts to consider the circumstances that the patient experiences at the moment of hospitalization, such as fears, anxiety and concern about his future, giving him maximum comfort and ensuring the quality and promotion of the health of this individual.(GALLO, 2019). Therefore, the research problem that directed this article arose: how does humanization occur in nursing care in urgency and emergency services?

The previous question is what motivated and justifies the development of this work, making one wonder what the nursing team can do to improve their care in the urgency and emergency sectors? Because humanized care in health units is fundamental for professionals and users of these services to interact in a way that generates a harmonious and favorable coexistence to reestablish the health of those who need it. Therefore, it is a theme that needs to be deepened, since humanized care brings great benefits to the well-being of patients.

Given this, this article had the general objective of knowing how humanized nursing care is given in urgency and emergency services and the importance of this care in promoting health. And as specific objectives: to emphasize the importance of nurses for humanized care in providing assistance in urgency and emergency units; to point out the main points that prevent nursing from providing humanized care in urgency and emergency services.

The methodology chosen was a bibliographic research, of the integrative literature review type, related to humanized nursing care in urgency and emergency, which according to Mendes, Silveira and Galvão (2013), the integrative literature review is one of the research methods used in Evidence-Based Practice (EBP), and consists of a broad analysis of the literature.

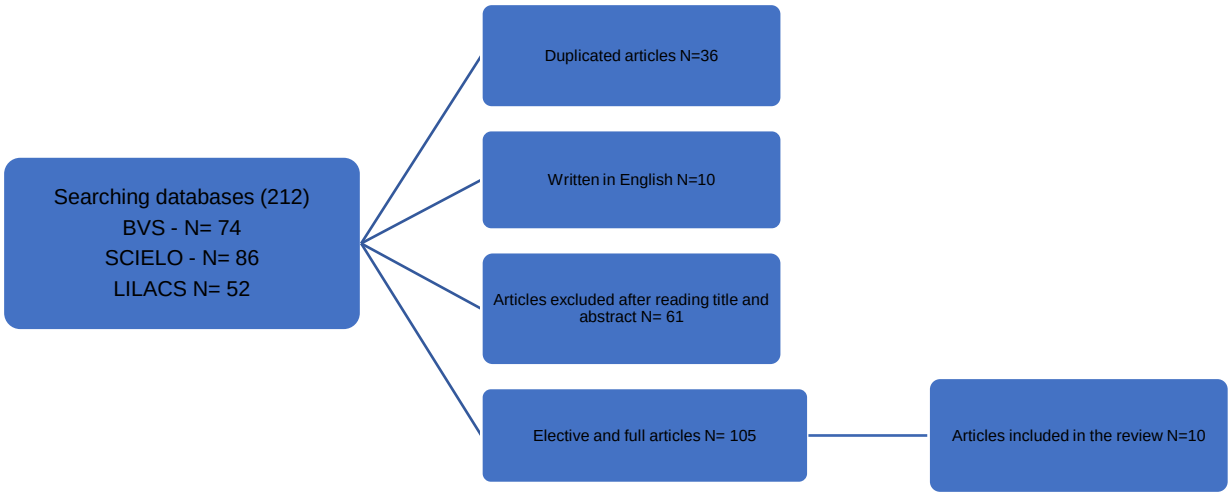
The search was carried out in the electronic databases SCIELO, Biblioteca Virtual em Saúde (BVS) and Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), using the descriptors:

urgency and emergency, nursing care and humanization. The exclusion criteria were: duplicate articles, in the English language, and that did not encompass the study's objective.

2 THE DEVELOPMENT OF THE SCIENTIFIC PAPER

To reach the results of this research, a total of 212 studies were found in the chosen databases. After removing 36 duplicate articles, 176 were found, but 10 were written in English, leaving only 166. Of these, titles and abstracts were analyzed, and 61 were excluded, leaving only 105 articles consistent with the research question. Among these 105 articles, the exclusion process was carried out for the following reasons: 53 did not tend to the time frame; 24 were incomplete articles and 18 were case studies, not consistent with the methodology of this study. After all these exclusion analyses, there were 10 articles that addressed humanized nursing care in urgency and emergency that were included in the integrative review.

Figure 1 - Flowchart of search strategies and article selection according to PRISMA instrument guidelines, 2010 to 2019.



As a procedure for selection of articles, first the titles and abstracts were read, and when these were not satisfactory, it was necessary to read the entire article to obtain more complete information. The instrument used to collect data and register the information from the periodicals was based on the following information: authors, year, objectives, study approach and location, and database. Data collection was carried out through an exploratory reading of the selected articles; selective reading, (in-depth reading of the parts that really matter); and recording the information extracted from the sources in a specific instrument. After gathering the final material, 10 articles were included in the integrative review.

The specifications of the 10 articles analyzed in this integrative review are shown in table 1.

Table 1 - Summary of the studies included in the integrative review, in the bases BVS, SCIELO, LILACS, in the period from 2006 to 2019. Barra do Corda-MA, 2022.

N	TITLE	AUTHORS	YEAR	OBJECTIVES	STUDY APPROACH/TYPE AND LOCATION	DATABASE
I	Humanization of Nursing Care in an Emergency Unit: perception of the nursing team and the user.	MACIAK, Ines. I, Sandri. JVA, Spier	2010	Analyze the care received in the emergency units.	Qualitative (BRAZIL)	SCIELO
II	Humanized care in urgency and emergency units.	GALLO, Adriana Martins. MELLO, Hellen Caroline de.	2011	Verify the existence of a humanized nursing care process in urgency and emergency units	Exploratory and descriptive (BRAZIL)	SCIELO
III	Emergency Room: a view about the interaction between nursing professionals and patients. R	Souza, R. B.; Silva, M. J. P. & Nori, A	2019	Analyze the care and communication between nurse and patient.	Description (BRAZIL)	BVS
IV	Nurse: care humanized in urgency and emergency	Siqueira, A. D. J., & Carvalho, M. F. A. D.e	2019	To discuss about the professional nurse in the humanized care of urgency and emergency.	Description (BRAZIL)	LILACS
V	Limits and possibilities of permanence of family members in the intensive care unit.	Nascimento, Amélia Zavadowski et al.	2014	Verify humanization in SUS.	Exploratory and descriptive (BRAZIL)	LILACS
VI	Humanized care in hospital nursing services as perceived by the caregiver	Andrade et al,	2012	Understand the national humanization plan (PNH).	Description (BRAZIL)	SCIELLO
VII	Humanized patient care at the emergency department of a private general hospital	Silva, A. L.	2013	Verify the humanized care in urgency and emergency	Description	LILACS
VIII	Humanized support in the Emergency Room: a challenge for nursing.	Dal Pai D, Lautert L	2010	Analyze humanized nursing care for vulnerable patients.	Qualitative	SCIELLO
IX	Reception as a Humanization Device: Perception of Users and Health Workers.	FALK, M. L. R et al.	2010	To understand how humanization happens in emergency units and the role of nurses.	Qualitative	BVS
X	Humanization in health care.	Oliveira, B. R. G.	2014	To know how nurses have been dealing with humanization over the years.	Exploratory and descriptive	SCIELLO

Source: Sousa, 2022.

From the integrative review and analysis of the studies, which sought to discuss about humanized nursing care in urgency and emergency, it was possible to observe that the humanization of health care, performed by the nursing professional, is an important action, given that it flourishes the appreciation of the human being, making the dignity of the professional essential in this process. However, to carry out the humanization process, it is important that the professional has the technique and is humanely trained to serve his patient (GALLO; MELLO, 2010).

Some authors investigated by this study point out that the issue of humanization has become prominent in discussions about quality in health care and that the nursing professional should be the main responsible for this practice. The issue of humanization of health care services refers to the need for observance of a care that is more focused on the ideals of humanity and that is sufficiently and potentially able to ensure human dignity in situations of need for medical attention. (SILVA, 2013).

Through the authors Maciak, Sandri and Spier (2010), it was possible to understand that humanized care in urgent and emergency care is the care that is rescued from the small and large events of everyday life, which make human beings unique and special in different spaces and situations, in order to provide personalized care, focused not on the disease, but on the human being who is ill. They also point out that the proposal to humanize public health services is, therefore, a basic value to achieve better quality in health care for users and in the working conditions of professionals throughout the health system.

However, they reinforce that, no matter how hard we try to serve everyone properly, with respect and dignity, the conditions presented in the daily work prevent this from happening in a personalized, orderly manner, with the quality that the PNHAH recommends. The aggravating factor is the inadequate accommodation on stretchers, standing, in chairs, even on the floor, until there is a vacant bed in the unit itself, in clinics or hospitals. For these are people who are in a fragile situation, between life and death, and are subject to accept what they are offered (MACIAK; SANDRI e SPIER, 2010).

In the studies by Gallo and Mello (2010), the theme of humanization of health care is very significant, especially when talking about the integrality of care, equity, and social participation of the patient, because the appreciation of the dignity of the worker is essential in this process. For, according to them, there is a need for nurses to reassess their assistance, in order to realize that bioethical principles should always govern their practice, in order to help respect the patient and the humanized nursing care. Making their assistance not only the application of nursing techniques, but a complex practice that considers that the one to whom this care is provided is a human being with dignity, with needs that are not only biological, but also psychological, social and spiritual (GALLO; MELLO, 2010).

Souza et al., (2019), report that providing humanized care does not necessarily require dedicating more time to the patient or having ideal working conditions. It is enough to know how to speak words of comfort and safety, give real attention to the person, talk to them, let them express themselves, and even let them complain, since a more humanized care does not necessarily require dedicating more time to the patient, but the effective use of the time we already have with them.

During the time of a puncture, of checking vital signs, there is time to look them in the eye, to convey safety and care in a minimum of attention. However, they state that the nursing team that works in emergency units must be prepared to, at every moment, without prior knowledge, attend to the most varied situations of urgency and emergency, unlike the other nursing teams in a hospital, thus being subjected to constant stress. The diversity of activities, frequent interruptions, unforeseen events, direct contact with suffering and death, are aggravating factors in nursing work that can even lead to mental exhaustion.(SOUZA et al., 2019).

In a hospital, the emergency room is one of the areas with greater complexity in the assistance and greater flow of activities and users. The reception in urgency and emergency is an action that requires skill and preparation by the entire multiprofessional team, because it requires professional skill, immediate assistance, extensive technical knowledge and employment of resources (SIQUEIRA, 2019).

Humanization in healthcare is a task of responsibility of everyone in the hospital environment. Moreover, this humanism should be appropriate in any circumstance of professional practice, because integrality and humanization should go together (NASCIMENTO et al., 2014).

Andrade (2012), highlights in his research that the National Humanization Policy (NHP) has existed since 2003 to implement the principles of SUS in the daily practice of care and management, qualifying public health in Brazil and encouraging solidarity exchanges between managers, workers, and users. The NHP must be present and inserted in all SUS policies and programs.

According to Silva (2013), nursing has a fundamental role in caring for the human being in all its dimensions, establishing the first contact with the patient in the institution accompanying him/her twenty-four hours a day. Therefore, this professional is expected to be prepared for the reception and humanized care. This means that the professional needs to have not only the technical knowledge of the pathology, but to develop skills to assist the patient as a whole, seeking to minimize the physical and emotional upheavals that may exist.

In the studies of Dal pai and Lautert (2010), it became clear that, in the search for the stabilization of the patient's vital conditions, care is provided through life support, requiring agility and objectivity. In

this sense, the work process is shaped in the fight against time to achieve the vital balance considered as the objective of the work. It becomes, therefore, a challenge for nursing to build its work, considering the ethical, subjective, technical and institutional dimensions of care and values, feelings and limits of being cared for and being cared for, especially when the work scenario is an emergency unit and its specificities.

According to Falk et al. (2010), the proposal for humanization of health care emerges in the public policy arena as an opportunity to propose, discuss, and undertake a process of change in the culture of care prevailing throughout the SUS network, breaking the boundaries historically imposed.

The possibility of changing the culture in the long term lies in the ability to build legitimized new representations that health actors may have as a result of their participation in communicative processes of humanizing learning. They also add that humanization directed to urgency and emergency services

promotes many benefits for greater satisfaction of patients and professionals who work in these services (FALK et al., 2010).

Humanizing means a proposal for qualified listening, dialogue, establishment of an affective bond, aiming at a process of reciprocity, of commitment, forming a set of benefits that when added to the technological practices of treatment for cure can further improve the knowledge and quality of care of nursing teams in urgency and emergency (FALK et al., 2010).

Talking about nursing in an urgency and emergency unit should be equivalent to talking about a technical and humanitarian activity that focuses on caring for the population in the health-disease process. From this perspective, the great challenge for nursing is to reconstruct its know-how, based on new ways of interpreting what it is to care, to care, and to be cared for. It should be recognized that the work in urgency and emergency units needs to be fast and intense, and nurses should be prepared for any type of intercurrence, and still act in a humanized way with their patients (OLIVEIRA et al., 2014).

3 FINAL CONSIDERATIONS

In this integrative review, it was identified that a humanized care in urgency and emergency sectors, provided by nursing professionals is an action of utmost importance, since this professional has a leading role as it is a profession that seeks to promote the well-being of human beings, considering their freedom and dignity, acting in health promotion, disease prevention, in the course of diseases and illnesses, in disabilities and in the dying process.

The professionals who work in the field of urgency and emergency need humanitarian skills and theoretical and practical knowledge to ensure safe care and reduce the risks that threaten the patient's life. However, with the accumulation of functions, this becomes a great challenge for nurses.

Given the information presented, this study showed that nurses have a significant role in the actions directed to the care provided to patients in the urgency and emergency service, whether in performing a simple dressing to more complex procedures. Therefore, through the difficulties presented for the adoption of humanized care in this sector, it is valid the correct training of these professionals since the beginning of their graduation, as well as for the professionals already graduated, the recapacitation through continuing education, being primordial for the improvement of the care service in the emergency sector.

Once the studies were finished and the discussions were made, it was possible to conclude that humanization in urgency and emergency services performed by nurses is very important, because this assistance shows that the professional values the human being, making the dignity of the professional indispensable in this process. However, to carry out the humanization process, it is important that the professional has the technique and is humanely trained to assist the patient.

Given the data presented, it was found that nurses work with delicate situations, often with patients who are in very serious condition. Thus, the humanized care is of great importance, in addition to providing

safe assistance to the patient. Thus, this professional is indispensable in the urgency and emergency service, both in emergency units and hospital emergency rooms.

REFERENCES

ANDRADE, L. M. et al. Atendimento humanizado nos serviços de emergência hospitalar na percepção do acompanhante. **Rev Eletrônica Enferm.**, v. 11, n. 1, p. 51-72, 2012.

CFM. CONSELHO FEDERAL DE MEDICINA - **Resolução CFM nº 1451/95.** (2014). Disponível em: http://www.portalmedico.org.br/resolucoes/cfm/1995/1451_1995.htm. Acesso em: 12 de abril de 2022.

DAL Pai, Daiane; LAUTERT, Liana. Suporte humanizado no Pronto Socorro: um desafio para a enfermagem. **Revista Brasileira de Enfermagem,** v. 58, n. 2, p. 23-4, 2010.

FALK, M. L. R et al. Acolhimento como Dispositivo de Humanização: Percepção do Usuário e do Trabalhador em Saúde. **Rev. APS,** Juiz de Fora, v.13, n.4, p. 4-9, jan./mar. 2010.

GALLO, Adriana Martins; MELLO, Hellen Caroline de. Atendimento humanizado em unidades de urgência e emergência. **Revista F@pciência,** Apucarana, v. 5, n. 1, p.1-11, 2009.

GIGLIO-JACQUEMONT, A. **Urgências e emergências em saúde:** perspectivas de profissionais e usuários. Rio de Janeiro: Editora FIOCRUZ, 2010.

MACIAK, I.; Sandri, J. V. A. & Spier, F. D. Humanização da assistência de enfermagem em uma unidade de emergência: percepção do usuário**. Rev Cogitare,** v. 14, n. 1, p. 127-35, 2010.

MENDES, K. D. S; SILVEIRA, R. C. C. P; GALVÃO, C. M. Revisão integrativa: método de pesquisa para a incorporação de evidencias na saúde e na enfermagem. **Texto Contexto Enfermagem,** Florianópolis, v. 17, n. 4, p. 758-764, 2018.

NASCIMENTO, Amélia Zavadowski; RIBEIRO, Grasieli; BERNARDINO, Elizabeth; OLIVEIRA, Edinaldo S. de. Limites e possibilidades da permanência de familiares em unidade de terapia intensiva. **Cogitare Enfermagem,** v. 12, n. 4, p. 446-451. 2014.

OLIVEIRA, B. R. G.; COLLET, N.; VIERA, C. S. A humanização na assistência à saúde. **Rev Latino-am Enfermagem,** São Paulo, v. 14, n. 2, p.277-284, 2014.

RIOS, Isabel Cristina. Humanização: a essência da ação técnica e ética nas práticas de saúde. **Revista Brasileira de Atenção Médica – USP**, São Paulo, v. 33, n. 2, p. 253-261, 2018.

SILVA, Averanice Gomes da; SOUZA, Tania Toledo R. de. **Assistência de Enfermagem Humanizada:** dificuldades encontradas por enfermeiros em hospital privado de São Paulo. **ConScientiae Saúde**, v. 7, n. 2 p. 251-259, 2013.

SIQUEIRA, A. D. J., & Carvalho, M. F. A. D. (2019). Enfermeiro: atendimento humanizado em urgência e emergência. **Revista Eletrônica Acervo Saúde,** v. 1, n. 2, p. 54-64.

SOUZA, R. B.; Silva, M. J. P. & Nori, A. Pronto-Socorro: uma visão sobre a interação entre profissionais de enfermagem e pacientes. **Rev Gaúcha Enferm.**, v. 28, n. 2, p. 242-9, 2019.

CHAPTER 59

Anti-inflammatory activities in Amazonian leaginous plants

10.56238/rsfohsv1-059

Danielle Monteiro
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Lorena Caroline
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Nicole Oliveira
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Tânia Collares
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Sabrina Begot
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Marcela de Souza Figueiras
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Barbara Elizabeth Teixeira-Costa
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Orquidea Vasconcelos dos Santos
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil
E-mail: orquideavs@ufpa.br

ABSTRACT
The Amazon is the largest tropical forest in the world, being rich in biodiversity and with great pharmacological potential due to its huge flora that gives this biome a great source of chemical compounds (Aguiar et al., 2022). In this context, Amazonian fruits and oilseeds deserve to be highlighted, which contain high nutritional and functional value, including bioactive compounds (BAC), which have antioxidant, anti-inflammatory, anticancer, antitumor, and cardioprotective effects, among others, in the body (Santos et al., 2022). The CBA are micronutrients or pigments found in the matrix of foods, which can help in the individual's health, because according to several epidemiological studies, the consumption of foods that have these compounds are associated with lower incidence of oxidative stress in cells and, consequently, of non-transmissible chronic diseases (NCDs) (Neves et al., 2021).

1 INTRODUCTION

The Amazon is the largest tropical forest in the world, being rich in biodiversity and with great pharmacological potential due to its huge flora that gives this biome a great source of chemical compounds (Aguiar et al., 2022). In this context, Amazonian fruits and oilseeds deserve to be highlighted, which contain high nutritional and functional value, including bioactive compounds (BAC), which have antioxidant, anti-inflammatory, anticancer, antitumor, and cardioprotective effects, among others, in the body (Santos et al., 2022). The CBA are micronutrients or pigments found in the matrix of foods, which can help in the individual's health, because according to several epidemiological studies, the consumption of foods that have these compounds are associated with lower incidence of oxidative stress in cells and, consequently, of non-transmissible chronic diseases (NCDs) (Neves et al., 2021).

Amazonian oilseeds have significant amounts of monounsaturated essential fatty acids such as omega-9 and polyunsaturated fatty acids (PUFAs), such as omega-6 and omega-3, which are substances of extreme importance in the synthesis of signaling molecules, such as eicosanoids and docosanoids, essential in immune response. Dietary PUFAs besides maintaining the integrity of the structure and fluidity of the

cell membrane, have anti inflammatory and immunomodulatory actions, such as chemotaxis of leukocytes and endothelial adhesive interactions, as well as adhesion molecules expression, production of prostaglandins and leukotrienes (from arachidonic acid) and inflammatory cytokines like TNF-a and IL-1b. It is worth mentioning that Amazon oilseeds such as sapucaia, tucuma, Brazil nut, pupunha are recognized sources of omega-3 and -6 fatty acids, besides containing bioactive substances relevant compounds and other micro and macronutrients (Santos et al., 2022).

Omega-3s also have anticarcinogenic action, since they have the ability to inhibit the transcription of pro-inflammatory genes, thus inhibiting carcinogenesis and slowing the growth of tumors. They also act on cell differentiation, cell apoptosis, improve the efficacy of chemotherapy, and decrease the toxicity caused by chemotherapy. Studies indicate that, as bioactive compounds, omega-3 fatty acids used in cancer treatment are advantageous compared to conventional drugs precisely because of this ability to reduce toxicity. Added to this, PUFAs (omega-3 and omega-6) besides having numerous biological activities, such as modulating the inflammatory response, also play a relevant role in platelet aggregation, as well as in cell growth and differentiation (Leite et al., 2021). This author further states that the increase of n-3 PUFAs in the blood circulation preventing negative expressions of inflammatory responses; interrupting oxidative stress through the signaling pathway of the inflammatory marker heme oxygenase-1 with Nuclear Factor E2 (Nrf2), induces the expression of numerous cytoprotective and detoxifying genes, and decreases the production of low-density lipoprotein (LDL) in the liver, implying a reduction in the rate of plasma triglycerides.

It is important to highlight that NCDs are responsible for approximately 41 million deaths per year, being related not only to genetic issues, but also to eating behavioral patterns with strong physiological, psychological, and economic implications for the individual (Ribeiro et al., 2022).

Research shows that OE favors the development of NCDs, since there is cellular or tissue damage, which can be caused by increased reactive oxygen species (ROS), as well as by the production of adipokines, cytokines that are very frequent in obese individuals. It is of utmost importance to include foods rich in bioactive compounds in the diet, such as polyphenols, phenolic acids, and flavonoids, in order to prevent such metabolic changes and reduce the risk of these chronic diseases, such as obesity (Oliveira et al., 2020).

Another group of bioactive compounds are carotenoids (CTs), which are lipophilic natural pigments with substantial health benefits, assisting in the maintenance of the body and prevention of some chronic diseases due to their remarkable physicochemical, structural and biological properties, involving their antioxidant, anti-inflammatory and even obesity-fighting role, among others (Silva et al., 2020; Hajizadeh-Sharafabad et al., 2021). Carotenoids, particularly β-carotene, lycopene, lutein, and astaxanthin, have photoprotective effects, not only through direct light absorption properties, but also through their antioxidant effects due to the elimination of reactive oxygen species, as well as by regulating ultraviolet light-induced gene expression, modulating stress-dependent signaling, and/or suppressing cellular and

tissue responses, such as inflammation (Silva et al., 2020).

In the inflammatory process, pathogens are detected by receptors that stimulate the production of cytokines (pro-inflammatory), such as tumor necrosis factor (TNF)-α, interleukin (IL)-1β and interferon (IFN)-γ, promoting an inflammatory response (Hajizadeh- Sharafabad et al., 2021). However, studies have been revealing the action of carotenoids as inflammatory modulators. In a study by Manabe et al. (2021) for example, it was found that TNF-α-induced activation of NF-κB and IRFs was significantly inhibited by βcarotene (- 28% and -45%, respectively). This author further states that circulating leukocytes, especially monocytes, are considered an important source of pro-inflammatory cytokines, as monocytes receive inflammatory stimuli, numerous pro-inflammatory genes are induced mainly by activation of nuclear factor kappa B (NF-κB) and interferon regulatory factors (IRFs). It was also observed in a meta-analysis research of randomized clinical trials a significant reduction in the levels of C-reactive protein, which is a marker of inflammation caused by the presence of β-carotene (Hajizadeh-Sharafabad et al., 2021). Added to this, CTs also play an important role in preventing neurodegenerative disorders (NDs), which have in common the occurrence of OE, which occurs due to the high production of EROs during the progression of these diseases. It is worth noting that numerous neurons can resist the deleterious effect of the increased level of OE (oxidative stress), while others are already susceptible to this increase that may result in cell damage or death, contributing to neurodegeneration by (Kabir et al., 2022).

It is important to highlight that the methods of extraction of oils from fruits and vegetable seeds can be performed in a conventional way (mechanical and solvent use) and unconventional (extraction with supercritical fluid, ultrasound, microwave and enzyme assisted) (Narvaez et al., 2022). However, as an alternative to conventional extraction methods, supercritical fluid extraction stands out because it is a continuous, emerging, and environmentally safe process. It is emphasized that factors such as temperature, pressure, particle size and density, extraction time, auxiliary solvents and matrix complexity can influence the chemical characteristics, yield and antioxidant potential of the oils extracted by this method (Souza, 2021).

The objective of this paper is to demonstrate, through the review of several studies, the main functional characteristics of eight Amazonian oilseeds: Sapucaia, Pracaxi, Munguba, Pupunha, Brazil nut, Buriti and Tucumã, highlighting their excellent bioactive content and relating them to the relevant beneficial action on the body. For such this narrative research revisits on-line databases, using for the searches the following descriptors: buriti oil (*Mauritia flexuosa*), tucuma (*Astrocaryum* spp.), Brazil nut (*Bertholletia excelsa)*; pracaxi (*Pentaclethra macroloba*); Monguba *(Pachira aquatica);* sapucaia (*lecythis pisonis camb*); pupunha (*Bactris gasipaes Kunth*); anti-inflammatory action, action of carotenoids, action of fatty acids, omega, omega 6, functional foods, Amazonian oilseeds, antioxidant, inflammatory process, oilseeds in Portuguese and English. The electronic databases accessed were: Google Scholar, Pubmed, ScienceDirect, Scientific Electronic Library Online (SciELO), through the Periodical Portal of the Coordination for the Improvement of Higher Education Personnel (Capes).

The criteria for the selection of articles were: studies published in national and international journals, in various methodologies (experimental, literature reviews, book chapters) with emphasis on publications between the years 2005 and 2022.

2 INFLAMMATORY MECHANISMS IN HUMAN HEALTH

Inflammation is a physiological process that occurs in response to adverse conditions encountered in the human body, such as microbial infections and tissue injury. It is an essential reaction of the immune system that enables damaged tissues to recover and defend against pathogens such as viruses and bacteria (Kazemi, Shirzad, & Rafieian-Kopaei, 2018).

Anti-inflammatory drugs are used to treat symptoms caused by inflammation, such as fever, pain, and redness, and can be classified into two categories: steroid-derived anti-inflammatory drugs (SIAs) and non-steroid-derived anti-inflammatory drugs (NSAIDs), and they differ only in their mechanisms of action (Kazemi, Shirzad, & Rafieian-Kopaei, 2018). NSAIDs act by inhibiting the production of prostaglandins and proteins involved in the inflammatory process by preventing the release of arachidonic acid (AA) by phospholipids present in the plasma membrane, while NSAIDs act by inhibiting cyclooxygenase (COX), a rate-limiting enzyme in prostanoid synthesis, interfering with the production of prostaglandins (PGs) and thromboxanes (TxAs), responsible for the immune response in the face of inflammation (Nunes, et al., 2020).

Nonsteroidal anti-inflammatory drugs are important therapeutic agents used to treat inflammation because of their ability to reduce pain and fever in patients. NSAIDs can be separated into groups according to their chemical structure, most of them being organic acids with relatively low pKa, which influences their pharmacological properties. Despite their structural differences, they have a common mechanism of action, which is the inhibition of the enzyme cyclooxygenase, responsible for the production of prostanoids (Atkinson & Fudin, 2020).

Inflammatory activity is a response to a body homeostatic imbalance, caused by infection and injury. This activity is regulated by pro-inflammatory mediators, such as TNF-α, COX-2 IL-1β, and IL-6, triggering a local immune response (Sell, 2001). However this overproduction can be more harmful than the injury that caused it, as it can be associated with chronic and autoimmune diseases. (Pyee et al., 2014; Felice et al., 2014; Heneka et al., 2014; Tall et al., 2015). The inhibition of excess production of inflammatory mediators happens a through pharmacological mediators, however, these drugs can trigger adverse effects (Lee et al., 2010; Clarck et al., 2013).

With this in mind, further studies on plants with potential anti inflammatory effects have been gaining prominence in order to present new therapeutic alternatives, and the oleaginous plants from the Amazon region stand out due to the diversity of compounds present in their species.

2.1 OMEGA-3 ANTI-INFLAMMATORY ACTION

The exacerbated inflammatory process contributes to the evolution of a chronic inflammatory process, which can cause cardiovascular diseases, autoimmune diseases, fibrosis, and cancer (Nathan, 2010; Tobas, 2013). In response to an injury (tissue or microbial infection), leukocytes are recruited to the site of injury to perform the process of phagocytosis of bacteria and/or cellular debris in order to clean the site of injury; subsequently, monocyte-derived macrophages are recruited to perform efferocytosis (removal of dead cells caused by phagocytosis), causing the acute inflammatory process(Serhan,2014). Inflammation is governed by specialized cells and soluble mediators (Serhan,2014; Serhan, 2018).

The omega-3 polyunsaturated fatty acids, including eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and docosapentaenoic acid (DPA), have a large

variety of beneficial health effects, among them is the reduction of inflammatory symptoms (Calder,2013). The biological actions of omega-3 fatty acids are mediated by bioactive lipid mediators produced by fatty acid oxygenenases, such as cyclooxygenases (COXs), lipoxygenases (LOXs), and cytochrome P450 monooxygenases (Serhan,2014; Isobe, 2014).

The anti-inflammatory effect of omega-3s is related to their presence in enzymatic sites of inflammation, acting in enzymatic conversion into bioactive mediators, competing with the formation of AA eicosanoids and in the formation of alternative metabolites with a less potent action than that of AA-derived mediators, contributing to the reduction of the inflammatory process of atherosclerosis and in the reduction of pro-inflammatory stimuli (Back and Hansson, 2018).

2.2 ANTI-INFLAMMATORY ACTION OF OMEGA 6

2.2.1 Metabolization of Omega 6

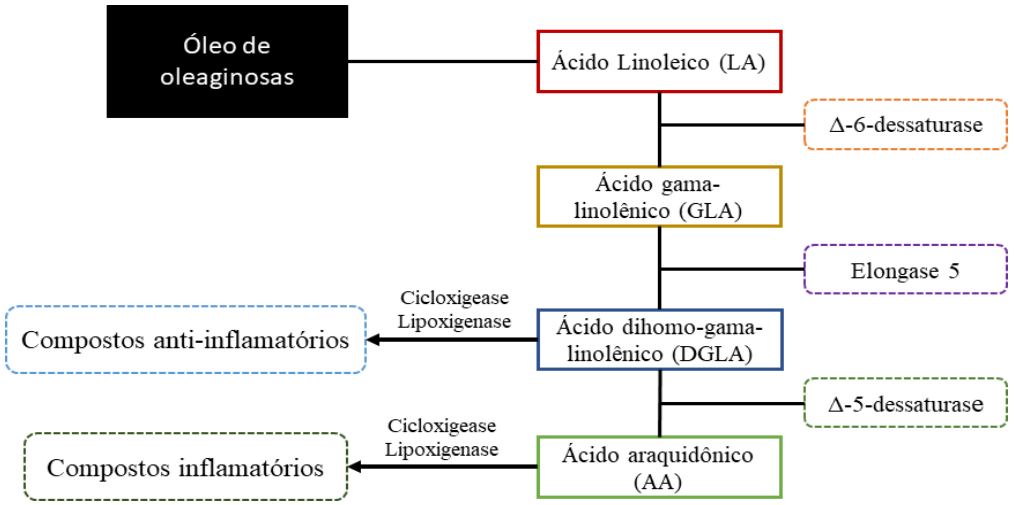
Long-chain polyunsaturated fatty acids (PUFAs, or LC-PUFAs as they are known in English) are essential lipids for body function and have two main categories of PUFAs: ω-3 and ω-6 groups (Grandini et al., 2020). These fatty acids (FAs) and their metabolites influence cell membrane composition and regulate cell signaling (Lee et al., 2016). The ω-6 family comprises linoleic acids (LA), γ-linolenic acid (GLA) and their metabolites: dihomo-γ-linolenic acid (DGLA) and arachidonic acid (AA) (Sergeant; Rahbar; Chilton, 2016). LA is the main PUFA in the Western diet and can be found mainly in nuts, seeds, and vegetable oils, such as soybean, the staple oil of the Western diet. Foods derived from vegetable oils, such as margarine, have significant levels of LA. After ingestion, LA is metabolized into GLA by the mammalian body through the action of the enzyme Δ-6-dessaturase (D6D) (Innes; Calder, 2018). Decreased action of this enzyme is a marker of cellular aging. Diabetes, alcohol consumption, and radiation exposure are factors that accelerate cellular aging. Deficiency of the conversion of LA to GLA results in stimulation of inflammatory processes (Timoszuk; Bielawska; Skrzydlewska, 2018).

After GLA is absorbed from the diet or formed through D6D enzyme-mediated metabolism, there is insertion of carbons into its main chain, a step catabolized by the enzyme elongase-5, generating dihomo-

γ-linolenic acid (DGLA) (Innes; Calder, 2018). The conversion of GLA to DGLA occurs rapidly and results in low levels of circulating GLA in the human body (Sergeant; Rahbar; Chilton, 2016). DGLA is metabolized in the cyclooxygenase (COX) and lipoxygenase (LOX) pathways, resulting in anti-inflammatory, antiproliferative, and anti-aggregative eicosanoids such as class E1 prostaglandins, leukotrienes, and thromboxanes (Timoszuk; Bielawska; Skrzydlewska, 2018).

Of opposite and competitive effect, DGLA can synthesize arachidonic acid (AA) as a consequence of the action of the enzyme Δ-5-dessaturase, adding unsaturations to the carbon chain. AA is a substrate of the COX and LOX pathways, like DGLA, but produces pro-inflammatory and platelet aggregating eicosanoids. The conversion of GLA to AA appears to occur to a lesser extent compared to the conversion to DGLA and studies show that the anti-inflammatory effect prevails with the ingestion of GLA source oils, and the AA/DGLA ratio is a critical factor for inflammatory processes occurring in plasma, tissues, and cells (Innes; Calder, 2018; Sergeant; Rahbar; Chilton, 2016). Figure 1 demonstrates the metabolization cascade of ω-6.

Figure 1: Metabolization of Omegas 6.



2.2.2 Mechanism of action of LA

According to Bardaa et al (2016), the healing effects of linoleic acid present in pumpkin oil come from its composition containing mainly this compound (50%), in addition to oleic acid (25%) and palmitic acid (15%). This high content of LA was correlated with improved wound closure because it reduced bleeding time, suggesting a stabilization of fibrin and consequent migration of fibroblasts. Also, hydroxyproline content increased, possibly due to fibroblast activation, and the number of infiltrating macrophages in the wound tissue reduced after 11 days of injury induction. Taken together, the authors infer that these results indicate that topical treatment with pumpkin oil accelerates tissue repair, mainly due to LA effects.

Also, to analyze the effects of LA on neutrophil migration, since these are the first cell type recruited to the inflammatory site, being determinant for the healing process, another experiment conducted by Pereira et al. (2008), introduced an air pouch in the dorsal region of Wistar rats treated with LA (100 μM), and 4 hours later, the exudate was collected and the cells counted. LA increased the influx of neutrophils into the pouches, corroborating the results described in the wound tissue. This effect on migration can be explained by the induction of adhesion molecules such as L-selectin on the neutrophil surfaces. Neutrophil recruitment is a highly regulated process that involves at least four steps: rolling, activation, adhesion, and transmigration. Using intravital microscopy assay, it was observed that LA also elevated leukocyte-endothelium interactions (rolling and adhesion) (Pereira et al, 2008).

Once at the injured site, neutrophils produce cytokines, chemokines, reactive oxygen species (ROS), and other molecules to expand the inflammatory response. In the context of wound healing, ROS production is the first event that occurs after tissue disruption due to hypoxia. Low concentrations of H2O2 are important to support wound healing, as ROS not only disinfect the injured area, but also act as signaling messengers that regulate gene expression and cell function, such as migration and cytokine production (Morgan & Liu, 2011). Thus, controlling inflammation is crucial for tissue repair, since chronic inflammation can worsen the wound. In this regard, LA has also shown a beneficial effect, as it increases the release of pro-inflammatory mediators in the early phase of inflammation (1-4 hours) and reduces them in the resolution phase (18-48 hours) (Rodrigues et al., 2010).

2.2.3 Mechanism of action of GLA

Considering the relevance of macrophages in inflammatory processes such as arthritis and wound healing, Chang et al. (2010), demonstrated that in the macrophage cell line RAW 264.7, concentrations of GLA (100 to 200 μM) reduced the expression of inducible nitric oxide synthase (iNOS) and, consequently, the concentration of NO. GLA also inhibited the expression of COX-2 and prointerleukin-1, suggesting a reduction in inflammatory responses. To explain these results, the authors evaluated the expression of proteins involved in the NF-κB pathway. GLA decreased phosphorylation and degradation of IκB, blocking NF-κB transmigration to the nucleus, which was confirmed by reduced nuclear p65 protein expression. Taken together, these results explain the reduced activation of NF-κB in GLA-treated macrophages.

2.2.4 Mechanism of AA action

In agreement with in vivo studies by Rossen et al. (2011), AA induced endothelial cell adhesion in vitro. Again, this modulating effect showed a biphasic pattern as also observed with other fatty acids such as LA. In the first phase, the positive effect on cell dissemination was independent of AA concentration. However, in the later phase, there was an inverse correlation between AA concentration and spreading. Low concentrations of AA (20 μM) increased cell spreading and high concentrations of AA (80 μM) reduced it.

This effect may be associated with the metabolites generated from the oxidation of AA, since, according to the same authors, at low concentration, AA is fully metabolized and the products can induce cell adhesion. On the other hand, at high concentrations, the reaction is saturated in AA, and the enzymes involved are not sufficient to metabolize all the available AA. So there is a reduction in AA metabolites and consequently a reduction in cell spreading. AA also randomizes the migration of endothelial cells. This action is related to the loss of direction during migration due to the presence of AA and seems to be inversely correlated with AA concentration (Rossen et al., 2011).

Some of these effects of AA, observed by Oh et al. (2015) in endothelial cells, were also described in human umbilical cord blood-derived mesenchymal stem cells (hUCB-MSCs), and again, AA concentration was inversely related to the migratory response. The mechanism behind this effect appears to involve GPR40, a membrane receptor for fatty acids (Tomita et al., 2014).

Also in this same study, Oh et al. (2015), demonstrated that AA binds to GPR40 and then induces phosphorylation of rapamycin complex 1 (mTORC2) in mammalian (mTORser2481) which activates Aktser407, which phosphorylates protein kinase Cζ (PKCζ). pPKCζ activates p38, through Sp1 phosphorylation, and increases the expression of matrix metalloproteinases (MMPs). MMP degrades fibronectin, a component of the extracellular matrix, promoting the migration of hUCB-MSCs. Taken together, the studies demonstrate that AA and its metabolites promote wound healing due to the induction of cell migration and angiogenesis. However, these positive effects are closely related to the concentrations used.

2.3 ANTI-INFLAMMATORY ACTION OF OMEGA 9

Omega 9 is called oleic acid, an essential fatty acid, which participates in metabolism, playing a key role in the synthesis of hormones. It is considered an unsaturated fatty acid because of the double bond between the carbons. The omega 9 is a monounsaturated fatty acid, in which stands out for its relationship with the levels of total blood cholesterol, LDL and by increasing HDL, whose such effect is due to the content of phytosterols, substances that assist in the elimination of cholesterol and also in reducing abdominal circumference. (Food ingredients Brazil, 2018).

The monounsaturated fatty acids (MUFAs), characterized by containing only one instauration in the hydrocarbon chain, have as the main representative of the MUFAs, the oleic acid classified as a ω-9 series of fatty acids, being the most frequently found in nature, where its main sources are found in olive and canola oils; however, it can be synthesized by all mammals. Studies emphasize the influence of AGMIs on the cardiovascular system, when comparing the intake of a diet rich in AGMIs with a hyperlipidic diet it was possible to report that the former results in lower triglyceride and total cholesterol values and slight increases in HDL values (Silva & Souza, 2018).

Mammals are able to synthesize the unsaturated fatty acids of the ω-9 series, enzymes are able to transform oleic acid (omega-9) into linoleic acid (omega-6) or α-linolenic acid (omega-3). Because the

body does not have desaturases enzymes specifically responsible for adding a double bond before the ninth carbon from the methyl (distal) end, enzymes responsible for the synthesis of ω-6 and ω-3. The enzymes needed for this purpose are the delta-9 and delta-15 desaturases (Melo, 2018).

A study on "Early overnutrition in male mice cancels out the metabolic benefits of a diet rich in monounsaturated and omega-3 fats," highlights the Western diet as typically high in saturated fats causing the development of diabetes, and research has suggested that the saturated fat palmitic acid is particularly harmful to beta cell function and promotes insulin resistance. As an artifice to a healthy diet, the Mediterranean diet is highlighted with olive oil, which is rich in the monounsaturated fat oleic acid, and fish with abundant omega-3 polyunsaturated fats, which have been shown to improve insulin sensitivity (Clavas *et al*, 2021).

The pharmacological action in photochemicals of plant origin as in fatty acids, for presenting the ability to regulate lipid metabolism, a disorder that occurs in diabetes and leads to the development of cardiovascular diseases and microcirculatory complications - diabetic nephropathy, neuropathy and retinopathy, diabetic foot formation. Carboxylic acids with a long aliphatic chain provide the prevention of oxidations of cell membrane lipids, contributing to the reduction of blood cholesterol, normalize lipid and protein metabolism, increase the detoxification function of the liver, stimulate the immune-protective function, increase elasticity and reduce the permeability of blood vessel walls, to and improve microcirculation (Savych et ala., 2021).

2.4 ANTI-INFLAMMATORY ACTION OF CAROTENOIDS

Carotenoids are pigments found in nature and have more than 1100 different structures. They are hydrophobic, lipophilic, insoluble in water, but soluble in some organic solvents. Generally, they are tetraterpenoids, composed of 40 carbon atoms, but carotenoids with 30 and 50 carbon atoms can also be found in nature. They provide the yellow, orange, and red coloration to fruits and vegetables (Bonh, 2019; Mesquita, et al, 2017).

These are transported in the blood and reach the body through the action of lipoproteins, especially LDL, and their plasma concentrations are considered indicators in the evaluation of the daily consumption of fruits and vegetables. Among the benefits, it can be highlighted the carotenoids source of pro-vitamin A, such as β-carotene and lycopene, besides conferring a protective effect to the skin against ultraviolet (UV) radiation inducing photo oxidative stress (Bergmann et al 2021).

Carotenoids participate in many biological functions. In animals, carotenoids have been suggested to promote health through their antioxidant activity, anti-inflammatory activity and ability to enhance immune response, directly linked to the ability to prevent chronic diseases such as cancer and cardiovascular disease (CVD), preserving vision and protecting against age-related macular degeneration (Bergmann et al., 2021; Oliveira et al., 2020). After consumption, carotenoids will be incorporated into micelles and actively absorbed into the mucosal cells of the small intestine, where they are partially

converted into vitamin A, mainly in the form of deretinyl esters. Both carotenoids and retinyl esters are packaged into chylomicrons for release into the lymphatic system and transported into the bloodstream (Woodside et al., 2015).

The inclusion of fruits, vegetables and carotenoids in the diet is associated with positive lifestyle changes. It can be stated that the intake of foods considered to be sources of carotenoids is associated with a decrease in CVD. Increased intake of lycopene reduces prostate cancer progression (Bergmann et al., 2021).

3 OILSEEDS FROM THE AMAZON

3.1 BURITI (MAURITIA FLEXUOSA)

Mauritia flexuosa Lf, regionally known as buriti, is a species of palm (*Arecaceae*) distributed in tropical South America, mainly in humid areas. Its fruit is an oval drupe protected by a scaly pericarp that can be red or dark red and is found mainly in swampy areas of the Amazon rainforest and Cerrado (Cruz, 2020).

Figure 2 - Buriti fruit.



Source: Authors, 2022.

The buriti oil extracted from the fruit pulp arouses great interest in the cosmetic, pharmaceutical and food industry, due to its chemical and physical properties (Figure 2). The oil is rich in unsaturated fatty acids with a predominance of oleic acids. It has a high content of antioxidants, with beta-carotene being in the greatest amount, responsible for the reddish coloration of the oil (Berni et al., 2020). The endocarp is spongy and the mesocarp is edible with yellow coloration, rich in vitamins A, C and E, antioxidants (carotenoids, phenolic compounds and tocopherol) and dietary fiber (Neri- Numay et al., 2018).

The buriti fruit is considered a functional food due to its carotenoid content. The fat-soluble vitamins present in buriti and other oilseeds act as regulatory compounds of high functional relevance. A. Its pulp is considered one of the main sources of vitamin A, which has anti-inflammatory effects that improve the functioning of the immune system and maintain the integrity of the mucosa that protects the body against infections. These effects occur through different mechanisms, including TNF-γ production, NK cell regulation, and IL-2 production (Santos, 2020).

3.1.1 Anti-inflammatory activity

Despite technological advances and all the sanitary measures in place, the control of infectious agents is still a challenge. An example of this is the frequent increase in bacterial resistance to antibiotics and the genetic mutations of some viruses such as Sars- CoV-2. Given this problem, researchers from various parts of the world are seeking pharmacological alternatives that can contribute to the control of these pathogenic microorganisms (TRIGO-GUTIERREZ et al., 2021; DOURADO et al., 2021).

The antioxidant effects of the oil are promoted by chemical mechanisms, including the elimination of free radicals by electron transfer or hydrogen donation and chelation of transition metals, exerted by its components: tocopherols, carotenoids (mainly the presence β-carotenes) and phenolics (Leão et al., 2019). Antioxidant activity is related to the presence of phenolic compounds and may be more specifically associated with the flavonoid/polyphenol ratio (Carmona-Hernandez et al., 2021; Barboza et al., 2022).

Carotenoids (including β-carotene) and flavonoids (including anthocyanins) have antioxidant action, which is related to improved immune response and reduced risk of cardiovascular and degenerative diseases. In addition, β-carotene plays a significant role in vision and cancer prevention, with 0.6 µg of β-carotene being equivalent to one international unit of vitamin A. The contents of total flavonoids and anthocyanins found in the oil were 59.86 and 6.40 µg/g, respectively. Thus, the buriti oil presents itself as a good source of bioactive compounds, which can give the fruit good oxidative stability and functional properties as food (Oliveira et al., 2020). The buriti pulp has a significant concentration of oil rich in fatty acids, mainly monounsaturated compounds (Pereira et al, 2020).

The fatty acid profile obtained by Cruz et al, 2020, was composed of monounsaturates (73.05%), especially oleic acid (72.23%). As well as found by Marcelino et al, 2022, where oleic acid presented the main fraction with 76.38%. In Serra et al, 2019, it was found between 65.6 - 78.55% of this acid. Oleic acid is essential for the formation of hormones and in the prevention of oxidative stress, stimulating the production of anti-inflammatory mediators, helping to protect against cardiovascular diseases (Marcelino et al., 2022).

In the study by Amorim et al. (2021) aqueous extracts of epicarp, mesocarp, and endocarp were applied orally at high doses (500 mg/kg or 1000 mg/kg) in mice with paw edema and peritonitis induced by phlogistic agents. The results showed a reduction in the number of peritoneal leukocytes, TNF-ÿ levels, and abdominal pain, indicating the potential of the fruit combined with pharmacological agents in inflammatory diseases.

The superoxide radical anion, O2 -ÿ, is a reactive species of oxygen formed in the biological system from the reduction of one electron of molecular oxygen and is considered harmful for having a long half-life and high mobility in the cellular environment for being highly reactive in the oxidation of cellular structure constituents such as lipids, proteins and nucleic acids, contributing to the development of cardiovascular and neurodegenerative diseases, cancer and inflammation. The graph of the logarithm of the concentration of buriti oil (mg/mL) versus the percentage of O2 -ÿ inhibition showed IC50 value

(concentration of oil that inhibits by 50% the formation of O2 -ÿ) at 1.11 mg/mL. This activity may be associated with the presence of bioactive compounds such as carotenoids and flavonoids, which are considered natural antioxidants capable of slowing the oxidation processes of normal physiological functions, reducing the risk of various diseases (Oliveira, 2022).

Considering that Amazonian oilseed species represent important food sources of immunologically active compounds, such as arachidonic [ARA], eicosa pentaenoic [EPA] and docosahexaenoic [DHA] acids, which can modulate and potentiate anti-inflammatory mechanisms, and amino acids that play a role in the production of cytokines and antibodies (Santos,2020). Omega-3 (ω3) and omega-6 (ω6) fatty acids have functional properties that act synergistically in the regulation of several biological processes, and the ratio of the contents of these fatty acids (ω6/ω3) is one of the parameters used to verify the nutritional profile of oils and fats.356 According to the recommendation of the UK Department of Health and Social Security, values lower than 4.0 are acceptable (Pereira, 2020). In the study by Oliveira et al. (2020) the value found was 1.35, suggesting compliance with the recommended value.

The oil from the buriti pulp has proven to have potential for use in the food and pharmaceutical industries. It has a high content of carotenoids, which can be considered a rich source of these compounds, which, combined with the high concentration of monounsaturated fatty acids and the predominance of oleic acid, contribute to its high nutritional quality and stability during heating (Cruz et al., 2020).

The consumption of buriti in natura is important as a nutritional source. However, perishability is a factor that hinders its commercialization. For this reason, its processing for products is a viable strategy both to support the intake of nutrients and from an economic point of view. In addition, applications of peels and seeds for product development should be encouraged considering their nutritional potential.

3.1.2 Tucumã (Astrocaryum spp.)

The tucumã belongs to the Arecaceae family (palms), *Astrocaryum* genus, is popularly known as "tucumanzeiro" and has wide distribution in South America, being out of the species *Astrocaryum aculeatum* Meyer and *Astrocaryum vulgare* Mart. The species *A. vulgare*, also known as tucumã comum, tucumã-do-Pará, tucumã Pitanga, tucumum bravo, is found in firm lands and has a wide geographic distribution in northern South America, concentrating mainly in the eastern part of the Amazon (Azevedo et al, 2017). The species *A. aculeatum* Meyer, meanwhile, also known as tucumã-do-amazonas or tucumã-açu, is a palm tree that originated in the State of Amazonas, having dispersed throughout South America, and may extend to the northern coast of South America above the State of Pará (Kieling et al., 2019).

The fruit has an elliptical shape with a length of 3 to 5 cm, thickness of 2 to 4 mm, yellow-orange coloration when ripe, fibrous and gelatinous pulp, and characteristic odor (Figure 3) (Ferreira et al., 2021b). It is widely used by Amazonian peoples, who consume almost all parts of the palm. The mesocarp (pulp) is highly appreciated by the local population and is used to produce ice cream, popsicles, tapioca, and sandwich fillings. The pulp is also used as feed for cattle, pigs, fish, and chickens, and for soap production (Hiura et al, 2018).

Figure 3: Tucuma fruit.



Source: https: //www.pregonagropecuario.com/cat.php?txt=6643

3.1.3 Anti-inflammatory activities

The co-products generated from fruit processing, such as seeds, grains and pomace have great potential for reuse, because they have a significant concentration of phenolic compounds (phenolic acids, flavonoids and tannins) and carotenoids (Ferreira et al., 2021a). These phenolic compounds are of interest due to their antimicrobial, anticancer, antitumogenic, and antioxidant properties, thus, such antioxidant activity found in the tucuma coproduct is related to the presence of phenolic acids (gallic acid and caffeic acid) (Rezende et al., 2018). The antioxidant activity of phenolic acids, on the other hand, is mainly related to the reducing properties of its structure, which acts both in the capture of reactive species and in the chelation of transition metals, participating in the stages of initiation and propagation of the oxidative process (Abrahão et al., 2019).

Amazonian fruit species such as the tucuma are of interest in studies due to its economic potential and its vast popular use. Ferreira, et al (2021a) obtained the oil extract of the tucumã coproduct by green extraction, using palm oil by ultrasound method, and then performed microencapsulation by spray dryer and verified its antioxidant activity. The microparticle showed spherical and heterogeneous structures and good encapsulation efficiency from the spray dryer process, using maltodextrin as wall material. The microparticle also presented low humidity and water activity, indicating good stability and conservation.

This same study evaluated the physical-chemical characteristics of the nuts, quantified the content of phenolic compounds by spectrophotometry and identified most of them by Ultra - High Performance Liquid Chromatography (UHPLC) and their antioxidant capacity. The crude extract and the microparticle showed significant contents of phenolic compounds and good antioxidant activity by the tested methods.

Thus, the authors suggest that the extraction and drying processes were efficient and kept the antioxidant activity preserved, generating a product rich in phenolic compounds with possible application in the functional food area.

Furthermore, a research by Souza, Ansolin, Batista, Meirelles, & Tubino (2019), detected that the fatty acid composition indicates that tucuma pulp oil is very rich in monounsaturated fatty acids, mainly oleic acid (61.99%). In addition, oleic acid has greater oxidative stability compared to polyunsaturated fatty acids and that these benefits are associated with a reduced risk of developing coronary heart disease and inflammatory responses. Stearic acid (16.6%) is the main saturated fatty acid in its composition, while linoleic acid (11.8%) is the main polyunsaturated fatty acid.

In another study, Mattos et al. (2020), evaluated the ingestion of tucuma pulp using 14 rats as experimental group and observed lower levels of total cholesterol levels in these animals, stating that this may be directly related to phytochemicals present in the tucuma fruit (for example, flavonoids and carotenoids), also evidencing the anti-inflammatory biological potential of this oilseed against diseases related to high cholesterol levels.

Brazil Nut (*Bertholletia excelsa*)

The Brazil nut belongs to the species *Bertholletia excelsa, of* the Lecythidaceae family and is a seed native to the Amazon, also widely known as Brazil nut or Amazon nut. Brazil is one of the largest producers of this nut, and is also the source of much of the income of Brazil nut gatherers. It is an oleaginous plant with great protein content, Ca, K, Fe, Mg, Mn, Zn and very rich in Selenium, unsaturated fatty acids (such as oleic and linoleic), and polyphenols, which are bioactive compounds (CBA) with great antioxidant power (Maldonado, S. A. S, 2020). It is also a source of B-complex vitamins (thiamine, niacin, B6), vitamin E, and Copper (MB et al., 2017). It is worth mentioning that the minerals, magnesium, manganese, zinc, and selenium stand out for their regulatory and enzymatic functions, the latter being very important in the mediation of approximately twenty selenoproteins that have selenocysteine in their active centers, such as glutathione peroxidase and thioredoxin reductase, the former acting as an antioxidant enzyme in plasma, which in addition to strengthening the immune system also helps prevent heart disease (CHD) and some types of cancer (MB et al., 2017) As for vitamins, the tocopherols (vitamin E), whose action is to convert free radicals (FRs) into more stable species by donating a hydrogen atom to these reactive oxygen species (ROS), should be highlighted. It is important to note that the antioxidant effects are enhanced when this vitamin is associated with Selenium in the diet (MB et al., 2017).

Oxidative stress conditions appear to be involved in the etiology of several chronic noncommunicable diseases (NCDs), such as cardiovascular (CVD), diabetes, cancer, genetic, metabolic, and neurodegenerative diseases (MB et al., 2017). In this context, lipid peroxidation and the inflammatory process, however, lead to the formation of atheroma plaques (Ferrari, 2020). According to Maldonado (2020) studies point out that the consumption of nuts has an important impact in reducing cardiovascular

diseases, helping to reduce lipid oxidation and reducing the risk of developing pathologies such as atherosclerosis, brain dysfunction and some types of cancer.

Studies also reveal that CBA have great antioxidant potential and also act in inhibiting or inducing enzymes and gene expression. They act as radical carriers or metal chelators, reducing the production of ROS (MB et al., 2017). In a research conducted by Rojas et al. (2021), in which the composition of phenolic compounds was evaluated through the HPLC-ESI-QTOF method in Brazil nuts, important antioxidant compounds were found, such as catechin, epicatechin, quercitin, besides β-Sitosterol, γ-Tocopherol, α-Tocopherol and squalene.

A Brazilian study evaluated the effects of Brazil nut supplementation (one Brazil nut per day) on total blood cholesterol (TC) and blood glucose in 130 volunteers and found that this supplementation significantly decreased serum levels of both parameters . In addition to these atheroprotective mechanisms, eating Brazil nuts has also been associated with decreased inflammatory biomarkers (IL-1, IL-6, INF γ, TNF-α) in humans (Ferrari, 2020).

A study reported by Ferrari (2020) showed that Brazil nut ingestion increased the expression of nuclear factor E2 (Nrf2), thus increasing the antioxidant response and decreasing lipid peroxidation, besides decreasing the inflammatory response by reducing the levels of C-reactive protein and interleukin-6 (IL-6) in hemodialysis patients. In another study revealed by the same author, the administration of ß-sitosterol in hamsters resulted in a 20% decrease in plasma cholesterol compared to the control group, in addition to a notable reduction in liver cholesterol.

According to Schott et al. (2018) there are some genes associated with NCD risk that have potential nutrigenetic response, such as the manganese-dependent superoxide dismutase (SOD2) gene. The SOD2 enzyme acts as a superoxide scavenger SOD2, and is therefore a key player in controlling oxidative molecules in mitochondria and cells. Interestingly, high levels of peroxide (H2O2) in a homozygous AA genotype has been associated with the risk of some types of cancer, and the VV genotype has been associated with cancer aggressiveness. But some dietary patterns can minimize the risk of AA cancer by helping cells to maintain homeostasis, such as the consumption of Se, whose action, among others, is to promote the sequestration of H2O2 produced at high levels in AA cells.

Monguba (Pachira aquatica)

Monguba is a resilient tree that adapts to diverse conditions and produces large quantities of fruit. Found on the banks of rivers and lakes, which is familiar in humid environments and with abundant light exposure, its habitat is located from southern Mexico to northern South America. *Pachira aquatica* Aublet (family *Malvaceae*, subfamily *Bombacaceae*), due to the favorable climate, is easily spotted in the wetlands and floodplains of the Amazon rainforest (Costa & Altemio, 2021). The medium-sized species with large branches, has fruits wrapped in a woody capsule weighing about 1 to 1.5 kg with brown color, containing many seeds (nuts), which can be eaten fresh, roasted or as flour in the preparation of breads, cakes, when

ground can replace coffee among other food products, chocolate powder and wheat flour (Figure 4) (Freires, 2022).

Figure 4: Munguba seed



Source: https://curiosidadesvegetais.blogspot.com/2018/12/a-munguba.html

Recent studies emphasize that these seeds have high contents of lipids (38.39-53.90%) and proteins (11.86-15.10%), being rich sources of these nutrients (Freires, 2022). Therefore, they are classified as oilseeds, and the extracted crude oil has a low intensity yellowish color, peculiar aroma to its origin, and solid state at room temperature. Finally, its potential exploitation use for food, pharmaceutical, medicinal, cosmetic, and biofuel industries (Correia 2022).

3.1.4 Anti-inflammatory activities

Studies highlight the analysis of its chemical composition in seeds of PAA through the characterization of fatty acids being possible to recognize their nutritional benefits for human health, where in research, the analysis revealed a predominance of palmitic acid, linoleic acid, oleic acid and stearic acid, which meets the studies already conducted around the oil, being palmitic acid and C-tocopherol the main compounds, the study also reveals that the seeds have high content of sugars as the main sucrose, and minerals such as potassium calcium and magnesium, these results lead us to the potential source of minerals that the seeds of PAA can provide as a source (Marcelino, 2020).

In all, 11 fatty acids were identified (Table 1), including saturated, monounsaturated, and polyunsaturated fatty acids. Being organized in saturated acids contents, lauric, myristic, pentadecanoic, palmitic, margaric, stearic and arachidic acids, and represented 67.43%, being palmitic acid the highest (49.03%). Of the monounsaturated acids, palmitoleic, oleic, and elaidic acids accounted for 21.4 %, with oleic acid being the highest among these (18.17%). The only polyunsaturated fatty acid identified, the

Table 1: Fatty acid composition of *Pachira aquantica* seed oil.

Dodecanoic Acid	Lauric Acid	0.02
Tetradecanoic Acid	Myristic Acid	0.79
Pentadecanoic Acid	Acid Pentadecyl	0.17
Hexadecanoic Acid	Palmitic acid	49,30
Cis-9 hexadecenoic acid	Palmitoleic acid	1.04
Heptadecanoic Acid	Marguric Acid	0.39
Octadecanoic Acid	Stearic Acid	8.68
Cis-9-octadecanoic acid	Oleic Acid	18.17
Tr- 9 octadecanoic acid	Elaldic acid	2.17
Eicosanoic acid	Linoleic Acid	19/11
Eicosanoic Acid	Arachidic acid	8.08
Monounsaturated fatty acids		21,38
Polyunsaturated fatty acids		19/11
Saturated fatty acids		67,43

Source: Sanday, 2019.

Parts of monguba possess pharmacological properties, its bark and seed are used as traditional healers in eastern Nicaragua for treatments of diarrhea, diabetes, infections, rashes, wounds, and anemia, and its twig and leaf structure have been provided in hives treatments, while monguba root infusions can be used for diabetes mellitus control. Recently, monguba stems have been reported to be active in pro-inflammatory neutrophil responses, based on which the authors addressed how potential candidate for the treatment or prevention of various inflammatory diseases monguba may be (Rodrigues et al., 2019).

Pracaxi Nut (*Pentaclethra macroloba)*

The tree *Pentaclethra macroloba* (Willd.) Kuntze, of the *Fabaceae*, popularly known as "pracaxi", is an Amazonian tree that has been gaining prominence due to the high potential for sustainable exploitation (Teixeira et al., 2020). This tree is native in countries such as Brazil, Peru, Colombia, Venezuela, Trinidad and Tobago, Guyana, and Suriname in South America, and Nicaragua, Honduras, Jamaica, Cuba, Costa Rica, and Panama in Central America. In Brazil, it is found natively in the Amazon biome, both in dry and humid regions, but mainly in floodplain areas. It has good propagation capacity with a tendency to cluster (Silva & Durigan, 2018).

Pentaclethra macroloba is medium-sized, between 8 and 14 m tall, with a dense crown, straight and cylindrical trunk, rough bark, and compound, bipinnate leaves that are dark green and shiny (Figure 6). The flowers are small, white, spike-shaped inflorescences. The fruits are of the pod type, dry, green in color, which become dark brown as they ripen. These pods have 4 to 6 large, dark brown seeds that turn opaque when ripe (Soares et al., 2019). The seeds are edible and provide 45 to 48% oil, and they should be collected directly from the trees before the opening of the fruits, between December and March to produce the oil (Dantas, 2021).

Figure 6: Pracaxi fruit.



Source: https: //www. oleosessenciais.org/oleo-de- pracaxi/

The pracaxi fruit oil has potential for multiple uses in the food, cosmetic and pharmaceutical industries, mainly due to its composition in fatty acids, which have emollient properties (Pizzi, 2021). Also, it is produced in small industries in Brazil and can be used as an ingredient by the cosmetic industry in oil blends with coconut, olive, andiroba oils, among others. This mixture is commonly used in soaps, moisturizers, exfoliants, skin cleansers, conditioners and shampoos (Teixeira et al., 2020). The commercialization of pracaxi oil is still done on a small scale and no data on the production of this raw material was found.

3.1.5 Anti-inflammatory activity

The pracaxi nut oil is rich in fatty acids such as oleic, behenic, linoleic and lignoceric acids, and in smaller quantities arachidic, stearic, lauric, myristic and palmitic acids are also found (Azzi, 2019). Fatty acids perform important functions in the body, such as energy storage and production, lipid transport, are essential for the formation and maintenance of cell membranes, act as lubricants, emollients and anti-inflammatory, and are classified as monounsaturated fatty acids (MUFAS) and polyunsaturated fatty acids (PUFAS) (Cruz et al., 2020). Teixeira et al (2020), point out that pracaxi nuts have about 54.3% oleic acid (C18:1, ω9), the main MUFA present in nuts, and have approximately 16.2% behenic acid, being one of the few sources reported in the literature for this fatty acid. Other fatty acids are also present in lower percentages, in addition to a high concentration of MUFA (72.16%), which represents higher oxidative stability compared to PUFA (20.36%), reiterating its antioxidant capacity. Serra et al (2019), demostrates that pracaxi nuts have the highest tocopherol content (639.21 μg/g), with γ-tocopherol and α-tocopherol being the main ones identified in these nuts. Other carotenes were also found in high concentrations, such as α- tocotrienol (93.53 ppm) and β- tocotrienol (79.92 ppm), which are natural antioxidants. Whereas α-tocopherol is the form responsible for the highest activity of vitamin E, and is associated with beneficial effects on the biological system, such as prevention of various diseases, including atherosclerosis and fatty liver disease, as these molecules have the ability to quench free radicals in membranes and lipoproteins, contribute to the stabilization of cell membranes, and influence cellular responses to oxidative stress (Azzi, 2019).

Pupunha (*Bactris gasipaes* Kunth)

The pupunha belongs to the species *Bactris gasipaes,* of the *Arecaceae* family, found in green, yellow and white colors after cooking (Figure 7). Among the palm species, the pupunha tree has great commercial potential, from which the palm heart, consumed worldwide, is extracted, and the fruits, typical of the northern region of the country, widely consumed at breakfast, after cooking in water and salt, in the manufacture of flour and other culinary preparations (Figure 8) (Santos et al., 2022; Spack, et al., 2021).

Figure 7: Red pupunha and yellow pupunha.



Source: Monteiro et al., 2021.

3.1.6 Anti-inflammatory action

Pupunha has high nutritional value, containing some vitamins, identified in the mesocarp, such as niacin (0.81 mg/100 g), vitamins C (18.7 mg/100 g), Bl (thiamine) (0.045 mg/100 g), B2 (0.135 mg/100 g) and A (1.1 mg/100 g), besides tocopherols (vitamin E) (Spack et al., 2021)**.** This oilseed is also a good source of bioactive compounds, with a high content of β-carotene and unsaturated fatty acids that give it functionality, besides being a good source of fiber and protein. It is possible to identify, in this species, that the content of unsaturated fatty acids (53.69%) is higher than that of saturated fatty acids (45.57%), with a higher prevalence of monounsaturated fatty acids, with approximately 29.94% of oleic acid present in yellow pupunha. It is worth mentioning that the oil of this fruit is closely related to the cardioprotective action due to the presence of bioactive compounds, such as carotenoids (beta carotene) and unsaturated fatty acids (w-6 and w-9), which act to prevent the formation of atheromatous plaques, platelet aggregation, reduction and control of serum cholesterol, among others (Santos et al., 2022).

A recent study by (Chisté et al., 2021) reported that di-C-glycosyl flavones (eschaftoside and vicenin-2) are the main phenolic compounds of pupunha and that β-carotene is the main carotenoid of yellow pupunha. Regarding the extraction of oil from pupunha by means of solvents, studies have been conducted seeking new safer and sustainable alternatives, in face of the toxicity caused by this type of extraction. In this context, recent data from a research reported by Santamarina et al. (2022) established a new sustainable method for carotenoid extraction from *Bactris gasipaes* applying an ethanolic solution of butyl-3-methylimidazolium 1- tetrafluoroborate - [C4C1im][BF4] totally free of any residual level of VOS and ILs until the end of the process. Thus, an extract rich in carotenoids was obtained and gave rise to promising results regarding the intake of bioactive compounds with high antioxidant activity and anti-inflammatory action.

It is important to stress that the atherogenicity index (AI) and the thrombogenicity index (TI) and the ratio of hypocholesterolemic and hypercholesterolemic fatty acids H/H determine the functionality of the oil related to platelet aggregation and thus the development of atherosclerosis and thrombosis. Thus, in a research conducted by Santos et al. (2022) with yellow pupunha oil obtained values within the standard for AI (0.85) and TI (1.65) and H/H (1.16), indicating that this oil is potentially cardioprotective. Regarding the P/S index, it is recommended that the index be lower than 1.0, and therefore the yellow pupunha oil is in accordance with the proposed (0.46).

In a study conducted by Giombelli et al. (2020) the use of the pupuneira by-product (portion of the palm stalk) was evaluated to obtain extracts rich in total phenolic compounds (CFT) and soluble sugars using the subcritical extraction method with water. The characterization of the extracts obtained with different methods (continuous magnetic stirring and continuous orbital stirring). The results showed higher contents of CFT (921.50 mg/100 g), phenolic acids (gallic, hydroxybenzoic, vanillic, caffeic, serinic, ferulic, chlorogenic) and antioxidant activity (ABTS: 4.23 ± 0.02 µmol TE/g; DPPH: 1235.00 ± 10.97 µmol TE/g; FRAP: 1165.64 ± 6.70 µmol TE/g), leading the authors to the conclusion that the subcritical technology presents high efficiency in the extraction of the studied compounds under maximized conditions.

Sapucaia (*Lecythis pisonis* camb)

The sapucaia tree (*lecythis pisonis camb*) is a tree native to Brazil, distributed in the Amazon and the Atlantic forest, it is also found in Venezuela and the Guianas, are producers of nuts, similar to the Brazil nuts (Teixeira et al., 2018; Demoliner, 2018). It is popularly known as the sapucaia nut. Its nuts are sources of macro and micronutrients, essential amino acids, and fiber (Teixeira et al., 2018). They have a sweet and savory flavor, being considered with a more pleasant taste than the Brazil nut. They are consumed in natura form, cooked, roasted, replacing the consumption of other almonds, nuts or common chestnuts (Demoliner,2018). In folk medicine, the oil extracted from the nut is used to treat pruritus(itching) and muscle pain (Barreto et al., 2020). In studies conducted on the chemical composition of *lecythis pisonis camb* detected the presence of triterpenes, steroids, triterpenic saponins, diterpenes, phenolic acids, flavonoids, alcohols, aldehydes and monoterpenes.(Barreto et al., 2020). Demoliner (2018) demonstrates in his study that the sapucaia nuts and cake are excellent sources of protein, dietary fiber and selenium, while its oil is a source of unsaturated fatty acids (oleic and linoleic acids), y-tocopherol and β-sitosterol.

3.1.7 Anti-inflammatory action

The high amount of phenolic compounds presented in the sapucaia nut samples, when orally administered, showed anti-inflammatory, neuroprotective and anticancer activity due to the presence of ellagic acid, studies indicate that the presence of phenolic compounds is associated with antinociceptive, antitumor and anti-inflammatory activities due to their antioxidant activity, due to the presence of the

phenol group, an ideal structure for sequestration and neutralization of free radicals (Moraes et al., 2020). Polyphenolic compounds, mainly ellagic acid derivatives show antioxidant, neuroprotective, antiviral, antimicrobial, antidiabetic, anti-apoptotic, anti-inflammatory, antinociceptive, and antitumor activity (Moraes et al., 2020). Azevedo (2016) attributes the anti-inflammatory activity of terpenes to the interaction with enzymes in the inflammation cascade such as phospholipase A2 (PLA2), cyclooxygenase (COX) and lipoxygenase (LOX).

Flavonoids are compounds found in several plants, it has several therapeutic activities, among them is the anti-inflammatory activity. Oliveira (2019) associates in his study the presence of flavonoids with the action on lipoxygenase and cyclooxygenase pathways, thus inhibiting the production of inflammatory mediators, including LTB4.

4 CONCLUSION

This review shows that Amazonian oilseeds have high levels of bioactive compounds, especially carotenoids and essential fatty acids, such as w-3 and w-6, which have been shown in studies to decrease oxidative stress, improve inflammatory processes, and prevent the development of NCDs such as atherosclerosis, obesity, and cancer.

It can be inferred that this study is significantly important, since it provides a critical and comprehensive evaluation of scientific research carried out by several authors, highlighting the relevance of the functional aspect of these oilseeds, as well as disseminating knowledge about Amazonian biodiversity.

It is expected that this study will lead to further research, mainly directed to *in vivo* tests, including toxicity assays that can evaluate possible health damage caused by ingestion of the fruit and its by-products, as well as relate the bioactivity and bioavailability of these bioactive compounds in these functional foods.

REFERENCES

Abrahão, F.R.; Rocha, L.C.R.; Santos, T.A.; do Carmo, E.L.; Pereira, L.A.S.; Borges, S.V.; Pereira, R.G.F.A.; Botrel, D.A. (2019). Microencapsulation of bioactivecompounds from espresso spent coffee by spray drying. LWT, 103.

Aguiar, P. A. et al. Avaliação preliminar do potencial antioxidante e anti- inflamatório da Amêndoa do Tucumã (Astrocaryum aculeatum). Brazilian Journal of Health Review, 2022.

Amaral, G. O. Rocha, S. A. S. Pereira, A. L. F. Carvalho, E. A. (2021). Elaboração de Mix de Açaí (Euterpe oleracea) Adicionado de Líquor de Cacau (Theobroma cacao). Brazilian Journal of Development, Curitiba, v.7, n.8, p. 82160- 82180.

Amorim, VR, Rodrigues, DC do N., Silva, J. do N., Ramos, CLS, Almeida, LMN, Almeida, AAC, PinheiroNeto, FR, Almeida, FRC, Rizzo, MS, Pereira-Freire, JA , &

Ferreira, PMP (2021). Mecanismos antiinflamatórios de frutas e subprodutos de Mauritia flexuosa, uma planta exótica com benefícios funcionais#. Journal of Toxicology and Environmental Health - Parte A: Current Issues, 84(11), 441– 457.

Azevedo, L. F., Silva, S. M., Navarro, L. B. et al. (2016). Evidence of anti- inflammatory and antinociceptive activities of Plinia edulis leaf infusion, Journal of Ethnopharmacology, 192, 178-182.

Azevedo, S. C. M.; Vieira, L. M.; Matsuura, T.; Silva, G. F.; Duvoisin Junior, S.; Albuquerque, P. M. (2017). Estudo da conservação das propriedades nutricionais da polpa de tucumã (Astrocaryum aculeatum) in natura em embalagens a vácuo. Braz.
J. Food Technol. v. 20.

Atkinson, T. J., & Fudin, J. (2020). Nonsteroidal Antiinflammatory Drugs for Acute and Chronic Pain. Physical Medicine and Rehabilitation Clinics of North America, 219- 231

Azzi, A., (2019). Tocopherols, tocotrienols and tocomonoenols: Many similar molecules but only one vitamin E. Redox Biology, 26.

Barboza, N. L.; Cruz, J. M. dos A.; Corrêa, R. F., et al. (2022). Buriti (Mauritia flexuosa L. f.): Na Amazonian fruit with potential health benefit. Food Research International, 159.

Bardaa, S.; Halima B. N.; Aloui F. et al., (2016). Oil from pumpkin (Cucurbita pepo L.) seeds: evaluation of its functional properties on wound healing in rats. Lipids in Health and Disease, vol. 15, no. 1, p. 73.

Banov, D., Banov, F., Bassani, A.S. (2014). Case series: the effectiveness of Fatty acids from pracaxi oil in a topical silicone base for scar and wound therapy. Dermatol Ther (Heidelb). v.4, n.2, p.259-269.

Barreto, K. G.;* Moreira, L. L. P. F.; Gomes, J. S. X.; Matos, C. R. R.; Mathias, L. Rev. Virtual Quim., 2020, 12 (6), 0000-0000.

Bergmann, Amanda; Eymael, Diana de Araujo; Gomes, Natália Rosa; Frasson, Sabrina Feksa; Silva, Catia Silveira da; (2021). Benefícios do Consumo de Carotenoides a partir de frutas nativas do Brasil: Uma revisão de literatura. Revista Brasileira de Obesidade, Nutrição e Emagrecimento; Vol. 15.

Berni P; Pinheiro AC; Bourbon AI; Guimarães M; Canniatti-Brazaca Solange G, Vicente AA. Characterization of the behavior of carotenoids from pitanga (Eugenia uniflora) and buruti (Mauritia flexuosa) during microemulsion production and in a dynamic gastrointestinal system. J Food Sci Technol

57 (2): 650:662.

Bezerra, C.V., Rodrigues, A.M. C., Oliveira, P.D., Silva, D.A., Silva, L.H.M. (2017). Technological properties of amazonian oils and fats and their applications in the food industry. Food Chemistry. v. 221, p. 1466–1473.

Bohn T. (2019). Carotenoids and Markers of Oxidative Stress in Human Observational Studies and Intervention Trials: Implications for Chronic Diseases. Antioxidants (Basel). Jun 17;8(6): 179.

Bony, E. et al. (2012). Awara (Astrocaryum vulgare M.) pulp oil: Chemical characterization, and anti-inflammatory properties in a mice model of endotoxic shock and a rat model of pulmonary inflammation. Fitoterapia, v. 83, p. 33–43.

Calder, P. C. 2013. Omega-3 polyunsaturated fatty acids and inflammatory processes: nutrition or pharmacology? Br. J. Clin.Pharmacol. 75:645.

Carmona-Hernandez, J. C., Gonzalez-Correa, ´ C. H., Le, M., Id´ arraga- Mejía, A. M., & Gonzalez-Correa, ´ C. H. (2021). Flavonoid/polyphenol ratio in mauritia flexuosa and theobroma grandiflorum as an indicator of effective antioxidant action. Molecules, 26 (21), 6431.

Chang, C. S; Sun, H. L.; Lii, C. K.; Chen, H. W.; Chen, P. Y. & Liu, K. L. (2010). Gamma-linolenic acid inhibits inflammatory responses by regulating NF-κB and AP-1 activation in lipopolysaccharide-induced RAW 264.7 macrophages. Inflammation, vol. 33, no. 1, pp. 46–57.

Costa, A. K. B. & Altemio, Â. D. C. (2021). Desenvolvimento e caracterização sensorial de paçoca de Munguba (Pachira aquática Aubl.). Research, Society and Development V. 10, n. 8, e 9810816945,2021.

Costa, R. D. S.; Rodrigues, A. M. C.; Silva, L. H. M. (2021). The fruit of peach palm (Bactris gasipaes) and its technological potential: an overview. Food Science and Technology.

Cruz, Mariana Bento; Oliveira, Wellington da Silva; Araujo, Renata Lazará; França Adelina Cristina; Pertuzattia, Paula Becker. (2020). Buriti (Mauritia Flexuosa L.) pulp oil as an immunomodulator against enteropathogenic Escherichia coli; Industrial Crops & Products 149.

Dantas, A. R. (2021). Ecologia, manejo e conservação de Pentaclethra macroloba (Willd.) Kuntze (Fabaceae) em floresta de várzea estuarina do rio amazonas. 147 f. Tese (Doutorado) - Curso de Biologia, Instituto Nacional de Pesquisas da Amazônia, Manaus.

Demoliner, F., Policarpi, P., de, B., Vasconcelos, L.F.L., Vitali, L., Micke, G.A., Block, J.M. (2018). Sapucaia nut (Lecythis pisonis Cambess) and its by- products: A promising and un- derutilized source of bioactive compounds. Part II: Phenolic compounds profile. Food Research International 112 , 434–442.

De Rosso, V.V.; Mercadante, A.Z. (2008). Identification and quantification of carotenoids, by HPLC-PDA-MS/MS, from Amazonian fruits. J Agric Food Chem. 62- 72

Dos Santos, O. V., Langley, A. C. D. C. P., de Lima, A. J. M., Moraes, V. S. V., Soares, S. D., & Teixeira-Costa, B. E. (2022). Nutraceutical potential of Amazonian oilseeds in modulating the immune system against COVID-19–A narrative review. Journal of Functional Foods, 105123.

Ferrari, C. K. B. (2020). Anti-atherosclerotic and cardiovascular protective benefits of Brazilian nuts. Frontiers in Bioscience, Scholar, 12, 38-56.

Ferreira, L.M.M.C.; Pereira, R.R.; De Carvalho, F.B.; Santos, A.S.; Ribeiro- Costa, R.M.; Silva, J.

(2021a). Green Extraction by Ultrasound, Microencapsulation by Spray Drying and Antioxidant Activity of the Tucuma Coproduct (Astrocaryum vulgare Mart.) Almonds. Biomolecules, 11, 545.

Ferreira, M.J.A.; Mota, M.F.S.; Mariano, R.G.B.; Freitas, S.P. (2021b). Evaluation of liquid-liquid extraction to reducing the acidity index of the tucuma (Astrocaryum vulgare Mart.) pulp oil. Sep. Purif. Technol., 257, 117894.

Fiedor, J., Burda, K. (2014). Potential role of carotenoids as antioxidants in human health and disease. Nutrients 6 (2), 466–488.

Freires, J. D., (2022) Efeito da utilização da farinha da castanha de munguba (pachira aquatica) na qualidade física, físico-química, microbiológica e atividade antioxidante de pão sem glúten. Dissertação (Mestrado em Ciências Naturais e Biotecnologia) - Universidade Federal de Campina Grande, Centro de Educação e Saúde.

Giombelli, C.; Iwassa, I. J.; Da Silva, C.; Barros, B. C. B. Valorization of peach palm by-product through subcritical water extraction of soluble sugars and phenolic compounds. The Journal of Supercritical Fluids, v. 165, p. 2-9, 2020.

Glavas, M. M. et al,. (2021) Early overnutrition in male mice negates metabolic benefts of a diet Pharmacia 68(2): 433–439 high in monounsaturated and omega-3 fats. Scientifc Reports. 2021.

Grandini, N. A. et al. (2020). A ação de suplementos de óleo de peixe no reparo tecidual de camundongos lesionados. Brazilian Journal of Development, v. 6, n. 5, p. 26130–26143.

Gross, M.D., Bishop, T.D., Belcher, J.D., Jacobs Jr, D.R. (1997). Induction of HL-60 cell diferentiation by carotenoids. Nutr Cancer 27(2):169-73.

Hajizadeh-Sharafabad, F. et al. Carotenoids supplementation and inflammation: A systematic review and meta-analysis of randomized clinical trials. Crit. Rev. Food Sci. Nutr. 2021.

Hiura, A.L., Rocha, A.E.Sd., (2018). Flora of the canga of Serra dos Carajás, Pará, Brazil: Arecaceae. Rodriguésia 69 (1), 41–48.

Innes, J. K.; Calder, P. C. (2018). Omega-6 fatty acids and inflammation.Prostaglandins Leukotrienes and Essential Fatty Acids, v. 132, n. 21, p. 41–48.

Isobe, Y. and Arita, M. 2014. Identification of novel omega-3 fatty acid- derived bioactive metabolites based on a targeted lipidomics approach. J. Clin. Biochem. Nutr. 55:79.

Kazemi, S., Shirzad, H., & Rafieian-Kopaei, M. (2018). Recent Findings in Molecular Basis of Inflammation and Anti-inflammatory Plants. Current Pharmaceutical Design, 24 (14), 1551-1562.

Kabir, Md. T. et al. Therapeutic promise of carotenoids as antioxidants and anti-inflammatory agents in neurodegenerative disorders. Biomedicine & Pharmacotherapy, 2022.

Kieling, A.C.; Santana, G.P.; dos Santos, M.C.; Jaqtinon, H.D.C.C.; Monteiro,C.C.P. (2019). Cadeia do Tucumã comercializado em Manaus-AM. Sci. Amaz., 8, b1–b9.

Krinsky, N.I., Johnson, E.J. (2005). Carotenoid actions and their relation to health and disease. Mol. Asp. Med. 26 (6), 459–516.

Kubo, I., Masuoka, N., Ha, T. J., & Tsujimoto, K. (2006). Antioxidant activity of anacardic acids. Food

Chemistry, 99(3), 555-562.

Leão KMM, Reis LVC, Speranza P, et al. (2019). Physicochemical characterization and antimicrobial activity in novel systems containing buriti oil and structured lipids nanoemulsions. Biotechnol Reports; vol. 24.

Lee, H. J., Ahn, B. J., Shin, M. W., Choi, J. H., & Kim, K. W. (2010).Ninjurin1: a potential adhesion molecule and its role in inflammation and tissue remodeling. Molecules and Cells, 29(3), 223-227.

Lee, J. M. et al. (2016). Fatty acid desaturases, polyunsaturated fatty acid regulation, and biotechnological advances. Nutrients, v. 8, n. 1, p. 1–13.

Leite, J. T. A. Lobo, L. C. Andrade, L. G. Ômega-3 no tratamento paliativo do câncer. Revista Ibero-Americana de Humanidades, Ciências e Educação. São Paulo, v.7.n.10. out. 2021.

Maldonado, S. A. S. (2020). Determination of total phenolic compounds, antioxidant activity and nutrients in Brazil nuts (Bertholletia excelsa H. B. K.). Journal of Medicinal Plants Research. Vol. 14(8), pp. 373-376.

Manabe, Y. et al. Multivariate Analysis Reveals That Unsubstituted β-Ring and C8-Keto Structures Are Important Factors for Anti-Inflammatory Activity of Carotenoids. Nutrients 2021, 13, 3699.

MB, E. et al. (2017). Bioactive Compounds in Nuts and Edible Seeds: Focusing on Brazil Nuts and Baru Almond of the Amazon and Cerrado Brazilian Biomes. SM Journal of Nutrition and Metabolism.

Marcelino, J. M., (2020) de sementes de Pachira aquatica Aublet (Malvaceae): Determinação da segurança pré-clínica do óleo obtido histopatológico, bioquímico, hematológico e estudos de toxicidade genética em ratos. Drug and Chemical Toxicology.

Marcelino, G; Hilane, PA.; Pott, A.; De Oliveira Filiú, W.F.; et al. (2022). Characterization of Buriti (Muritia flexuosa) Pulp oil and the Effect of lts Supplementation in an In Vivo Experimental Model. Nutrients. 2022. 14, 2547.

Mattos, A.C., Oliveira, R.S., Rezende, A.A., Barbosa, R.R., Ribeiro, E.F., Correia, G.G.S., et al (2020). Ingestão do fruto do tucumã do amazonas (astrocaryum aculeatum Meyer) promove modulação dos níveis de colesterol plasmático em ratos. Biodiversidade, 19: 2-16.

Mazzetto, S. E., Lomonaco, D., & Mele, G. (2009). Cashew nut oil: opportunities and challenges in the context of sustainable industrial development. Química Nova, 32(3), 732-741.

Mesquita, S.S.; Teixeira, C.M.L.L.; Servulo, E.F.C. (2017) Carotenoides: Propriedades, Aplicações e Mercado. Revista Virtual de Química; Vol.9; Num.2.

Monteiro, S. F. et al. Simultaneous extraction of carotenoids and phenolic compounds from pulps of orange and yellow peach palm fruits (Bactris gasipaes) by ultrasound-assisted extraction. Food Science and Technology, 2021.

Moraes, S. Z. C., Shan, A. Y. K. V., Melo, M. A. O. et al. (2020).Antinociceptive and anti-inflammatory effect of Poincianella pyramidalis (Tul.) L.P. Queiroz. Journal of Ethnopharmacology, 254, 112563-0.

Morgan, M. J. & Liu, Z.-g. (2011). Crosstalk of reactive oxygen species and NF-κB signaling. Cell Research, vol. 21, no. 1, pp. 103–115.

Narvaez, L. E. M. et al. A Review of Potential Use of Amazonian Oils in the Synthesis of Organogels for Cosmetic Application. Molecules, 2022.

Neves, B. V. et al. (2021). Improvement of Bioactive Compound Levels, Antioxidant Activity, and Bioaccessibility of Carotenoids from Pereskia aculeata after Different Cooking Techniques. ACS Food Science & Technology.

Nunes, C. d., Arantes, M. B., Pereira, S. M., da Cruz, L. L., Passos, M. d., & de Moraes, L. P. (2020). Plants as Sources of Anti-Inflammatory Agents. Molecules, 3726.

Oh, S. Y.; Lee, S. J.; Jung, Y. H.; Lee, H. J. & Han, H. J. (2015). Arachidonic acid promotes skin wound healing through induction of human MSC migration by MT3-MMP-mediated fibronectin degradation. Cell Death & Disease, vol. 6, no. 5.

Oliveira, C.B.C. et al. (2020). Obesity: Inflammation and Bioactive Compounds. J. Health Biol Sci.; 8(1): 1-5).

Oliveira, C. C. O., Matos, N. A., Veloso, C. C. et al. (2019). Anti- inflammatory and antinociceptive properties of the hydroalcoholic fractions from the leaves of Annona crassiflora Mart. in mice. Inflammopharmacology, 27, 397–408.

Oliveira, R. M. M.;* Pereira, F. T.; Pereira, E. C.; Mendonça, C. J. S. (2020). Óleo de Buriti: Índice de Qualidade Nutricional e Efeito Antioxidante e Antidiabético; Revista Virtual Química, 12 (1), 2-12. Data de publicação na Web: 28 de janeiro de 2020.

Pereira, L. M.; Hatanaka, E.; Martins E. F. et al. (2008). Effect of oleic and linoleic acids on the inflammatory phase of wound healing in rats. Cell Biochemistry and Function, vol. 26, no. 2, pp. 197–204.

Pizzi, A. (2021). Tannins medical / pharmacological and related applications: A critical review, Sustainable Chemistry and Pharmacy, v.22.

Polmann, G. et al. (2021). Non-conventional nuts: An overview of reported composition and bioactivity and new approaches for its consumption and valorization of co-products. Future Foods.

Rezende, Y.R.R.S.; Nogueira, J.P.; Narain, N. (2018). Microencapsulation of extracts of bioactive compounds obtained from acerola (Malpighia emarginata DC) pulp and residue by spray and freeze drying: Chemical, morphological and chemometric characterization. Food Chem. 254, 281–291.

Ribeiro, E. A.; Ferreira, R.; Silva, M. C. (2022). Os efeitos da ingestão precoce do ômega 3 na prevenção da obesidade e de doenças cardiovasculares. Research, Society and Development, v. 11, n. 9.

Rodrigues, A. P. et al., (2019) Chemical Composition and Antioxidant Activity of Monguba (Pachira aquatica) Seeds. Food Research International 121. p. 880–887.

Rodrigues, A. P.; Pastore, G. M. (2021). A review of the nutritional composition and current applications of monguba (Pachira aquatica Aubl.) plant. Journal of Food Composition and Analysis.

Rodrigues, H. G.; Vinolo, M. A. R.; Magdalon, J. et al. (2010). Dietary free oleic and linoleic acid enhances neutrophil function and modulates the inflammatory response in rats. Lipids, vol. 45, no. 9, pp. 809–819.

Rossen, N. S.; Hansen, A. J.; Selhuber-Unkel, C. & Oddershede, L. B. (2011). Arachidonic acid

randomizes endothelial cell motion and regulates adhesion and migration. PLoS One, vol. 6, no. 9.

Santos, M.F.G., Alves, R.E., Brito, E.S., Silva, S.M., Silveira, M.R.S. (2017). Quality characteristis of fruits and oils of palms native to the brazilian amazon. Revista Brasileira de Fruticultura, 39: e305.

Santos, O. V. et al. (2022). Nutritional and functional potential of yellow variety peach palm oil (Bactris gasipaes Kunth). Scientia Plena 18, 061501.

Schott, K. L. et al. (2018). Brazil nut improves the oxidative metabolism of superoxide-hydrogen peroxide chemically imbalanced human fibroblasts in a nutrigenomic manner. Food and Chemical Toxicology.

Sergeant, S.; Rahbar, E.; Chilton, F. H. (2016). Gamma-linolenic acid, Dihommo-gamma linolenic, Eicosanoids and Inflammatory Processes. European Journal of Pharmacology, v. 785, n. 15, p. 77–86.

Serhan, C. N. 2014. Pro-resolving lipid mediators are leads for resolution physiology. Nature 510:92.

Serhan, C. N. and Levy, B. D. 2018. Resolvins in inflammation: emergence of the pro-resolving superfamily of mediators. J. Clin. Invest. 128:2657.

Serra, J.L., Rodrigues, A.M.C., de Freitas, R.A., Meirelles, A.J., de, A., Darnet, S.H., Silva, L.H.M.da. (2019). Alternative sources of oils and fats from Amazonian plants: Fatty acids, methyl tocols, total carotenoids and chemical composition. Food Research International 116, 12–19.

Silva, J.L e Durigan, M.F.B. (2018). Valorização e uso popular do óleo de pracaxi [Pentaclethra macroloba (wild.) Kuntze]. Embrapa. Boa Vista.

Silva, N. F. B. et al. (2020). Carotenoides e suas bioatividades: uma mini- revisão focada nas fontes aquáticas. Ciagro.

Soares, R.N., Santos, R.O.dos, Silva, B.M.da S.E. (2019). Morphological aspects and anatomy of the fruit, seeds and seedlings of Pentaclethra macroloba (willd.) Kuntze (Fabaceae). Journal of Seed Science 41 (4), 452–460.

Souza, P. T., Ansolin, M., Batista, E. C., Meirelles, A. J. A., & Tubino, M. (2019). Identification of extra virgin olive oils modified by the addition of soybean oil, using ion chromatography. Journal of the Brazilian Chemical Society, 30, 1055– 1062.

Spack, K. C. et al. (2021). Pupunha (Bactris gasipaes kunth): uma revisão.Agricultura e Agroindústria no contexto do desenvolvimento rural sustentável.

Teixeira, G.L., Ávila, S., Hornung, P.S., Barbi, R.C.T., Ribani, R.H. (2018). Sapucaia nut (Lecythis pisonis Cambess.) flour as a new industrial ingredient: Physicochemical, thermal, and functional properties. Food Research International 109.

Teixeira, G.L., Maciel, L.G., Mazzuti, S., Gonçalves, C.B., Ferreira, S.R.S., Block, J.M. (2020). Composition, thermal behavior and antioxidant activity of pracaxi (Pentaclethra macroloba) seed oil obtained by supercritical CO2, Biocatalysis and Agricultural Biotechnology, v. 24.

Timoszuk, M.; Bielawska, K.; Skrzydlewska, E. (2018). Evening primrose (Oenothera biennis) biological activity dependent on chemical composition. Antioxidants, v. 7, n. 8, p. 1–11.

Tomita, T.; Hosoda, K.; Fujikura, J.; Inagaki, N. & Nakao, K. (2014). The G- protein-coupled long-chain

fatty acid receptor GPR40 and glucose metabolism. Frontiers in Endocrinology, vol. 5, p. 152.

Vieira, T. S. (2007). Estudos visando à síntese de novos derivados do LCC com potencial atividade no tratamento da doença de Alzheimer [Dissertação de mestrado, Universidade de Brasília].

CHAPTER 60

Functional foods in prebiotic sources, inulin in unconventional sources and their applications: a review

10.56238/rsfohsv1-060

Amanda de Sousa Loiola
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Jonilson de Melo e Silva
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Simone da Silva Santos
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Marcela de Souza Figueiras
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Barbara Elisabeth Teixeira-Costa
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil

Orquidea Vasconcelos dos Santos
Graduate Program in Food Science and Technology, Federal University of Pará, Brazil
E-mail: orquideavs@ufpa.br

ABSTRACT
Prebiotics are compounds that favor the activity and development of beneficial microorganisms present in the intestinal microbiome, thus helping to prevent diseases and improve quality of life. These compounds are found naturally in a wide variety of foods, so the diet becomes a factor of fundamental importance in obtaining the benefits conferred by the ingestion of prebiotics, however, there are several factors to be observed, such as the amount ingested, bioaccessibility and bioavailability of these constituents, as well as inter-individual factors, which may make some individuals benefit more than others. Inulin is a prebiotic component of the fructan type, with recognized functional properties, due to its ability to balance the intestinal flora, it acts as an energy reserve in various plant matrices, with chicory (Cichorium intybus) being the main source of extraction of this compound on a large scale. commercial. Thus, the present review, carried out through bibliographic research in books and scientific articles, aims to provide a broader view of the prebiotic action of inulin on the human microbiota and its technological properties. The analysis of the revised data showed that the ingestion of inulin in food is in fact considered a precursor as a prebiotic agent in the human body and has several technological properties applicable in the food industry, being able to act as a regulator of texture, aroma and flavor. However, more studies must be carried out in vitro and in vivo so that consumption doses can be established in terms of prebiotic characteristics and avoid possible adverse reactions to the organism.

Keywords: prebiotics, inulin, functional foods

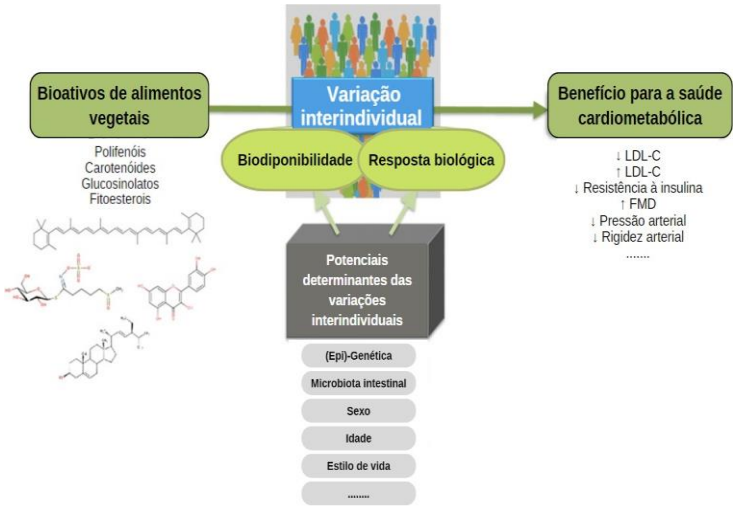
1 INTRODUCTION

Interest in the relationship between nutrition, health and disease has led to great advances in knowledge about the bioactive compounds present in foods and the recognition of the essential role that diet plays in maintaining health. However, there are still many questions to be studied and clarified in the field of functional foods, since there are several complex processes, such as the mechanism of action of bioactive compounds, which can be influenced by a number of factors, such as their bioavailability(Duarte & Reis, 2019; Reis & Duarte, 2018).

According to Manach et al. (2017) the bioavailability of bioactive compounds is influenced by elements such as genetics, intestinal microbiota, gender, age and lifestyle, so that all these factors interfere in obtaining the benefits caused by the ingestion of a particular food or nutrient with bioactive constituents, thus, Some individuals may benefit more than others, due to their inter-individual characteristics, as

exemplified in (Figure 1) below, which shows the interference of these elements in obtaining the benefits conferred to cardiometabolic health, due to the consumption of bioactive compounds from plant sources.

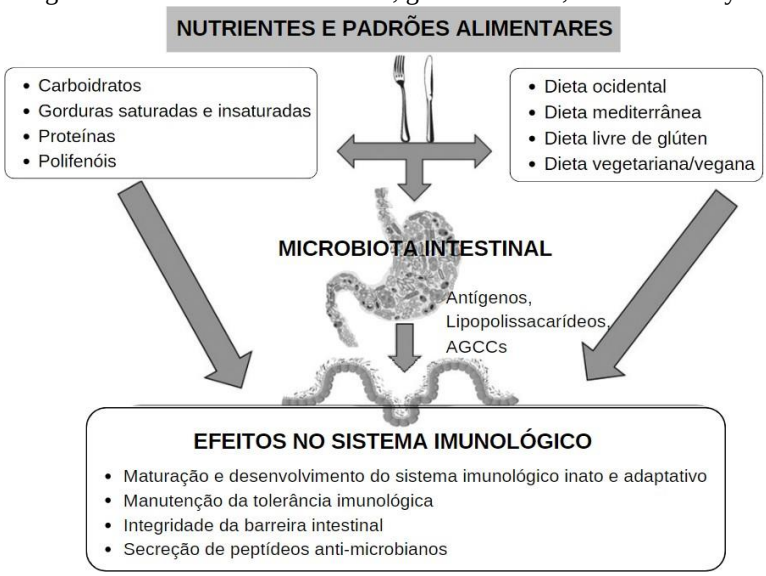
Figure 1 - Determinants responsible for interindividual variability and biological response to the consumption of bioactive compounds in cardiometabolic health.



Notes. Source: Adapted by the authors themselves from Manach et al. (2017).

Regarding the intestinal microbiota, it is also one of the variables responsible for mediating the immune system, acting in the modulation of maturation, development, and functions, both of innate and acquired immunity, and may suffer interference from genetic and environmental factors, with emphasis on the role played by the diet, as presented in (Figure 2), since the various nutrients act in different ways on this microflora, such as fiber and carbohydrates, which are a source of energy for colonic bacteria and produce beneficial metabolites, such as short-chain fatty acids (SFA), after being fermented by these microorganisms (Quigley, 2017; Barrea et al., 2020). In this context, the consumption of products with prebiotic characteristics, act in the modulation of the intestinal microbiota.

Figure 2 - Interaction between diet, gut microbiota, and immune system.



Note. Source: Adapted by the authors themselves from Barrea et al. (2020).

According to Carlson et al. (2018) the first concept for "prebiotic" was estimated in 1995 to be "non-digestible food constituents that beneficially influence the host by inducing selective growth of certain microorganisms in the colon, thereby improving health". In 2008, the International Scientific Association for Probiotics and

Prebiotics (ISAPP), defined "prebiotics" as "a selectively fermented component that succeeds particular modifications in the composition and/or activity of the gastrointestinal microbiota, attributing health benefits to the host," a concept that remains today (Abed et al., 2016; Gibson et al., 2010).

Prebiotics can be obtained naturally, from various food raw materials, their consumption can aid in the prevention of various diseases, helping to improve quality of life, and are also able to increase the absorption of ions, such as calcium and magnesium, as well as aid in the control of blood glucose and plasma lipids, in addition, they have various roles in immunomodulation and suppression of carcinogens (Khangwal & Shukla, 2019).

Numerous groups have been studied to point out the functions related to prebiotics and the most usual ones being fructo-oligosaccharides (FOS), galacto-oligosaccharides (GOS) and trans-galacto-oligosaccharides (TOS) (Davani-Davari et., 2019). Inulin has been pointed out as another prebiotic to add to the usual existing ones, because it is a fructooligosaccharide that presents particularities of contribution in human nutrition by bringing beneficial transformations in the intestinal microbiota, therefore, characterizing it as a functional food (Mauro et al., 2010).

The presence of inulin has been verified in particular in vegetable matrices of fruits and vegetables, commonly found in wheat, onions, bananas, asparagus, garlic, leeks, and chicory, the last mentioned matrix being researched for industrial purposes, in the extraction of fructan found in chicory, a vegetable of the Compositae family, whose root provides non-fractionated inulin, i.e. that does not have divisions, consisting of glucose, fructose, sucrose, and moderate olysaccharides (Abed et al., 2016).

The present literature review aims to provide a broader view on the prebiotic action of inulin on the human microbiota and its technological properties due to its wide use in the food industry.

2 METHODOLOGY

This is an exploratory analysis of qualitative nature, through bibliographic research in books and scientific articles, in the Pubmed, Science Direct, Web of science, and Periódicos Capes databases, with the inclusion of various search terms, such as prebiotic Inulin, chicory, and Inulin, prebiotics and probiotics, modulation of intestinal flora and technological application of Inulin, the search was conducted in the month of August 2022, the selection of articles was made excluding articles that ran away from the theme and duplicates, with no date restriction for the articles chosen.

What are the differences between probiotics, prebiotics, and symbiotics?

Probiotics are microorganisms capable of acting on the modulation of intestinal microbiota, thus, when ingested in adequate amounts bring numerous benefits to consumer health, and the most commonly used are the lactic acid bacteria, for example, Lactobacillus acidophilus, L. casei, L. delbrueckii spp bulgaricus, L. fermentum, Lactococcus lactis spp lactis, Bifidobacterium bifidum, B. infantis, Enterococcus faecalis, among others (González-Herrera et al, 2021; Redondo-Useros et al., 2019).

The action of lactic bacteria is related to their ability to inhibit various pathogenic microorganisms, which are harmful because they form a wide variety of fermentation end products, thus these probiotic bacteria are able to increase the proportion of beneficial bacteria in the gastrointestinal tract (González-Herrera et al., 2021).

Prebiotics, in turn, are the dietary components that exert the effect of promoting the activity and growth of these beneficial microorganisms, in this context, Florowska et al. (2022) state that carbohydrates, phytochemicals, and others such as peptides or nondigestible conjugates of carbohydrate hydrolysates and proteins are food ingredients that have been reported to promote prebiotic effects, and they also highlight the potential ability of prebiotics to decrease the risk of obesity and cardiovascular disease, in addition to stimulating the immune system and promoting increased bone mineral density.

According to Cunningham et Al. (2021) the field of study with prebiotics is quite broad, including emerging prebiotics such as isomalto-oligosaccharides, xyllo-oligosaccharides, and resistant starch, as well as others that have been studied longer, such as fructo-oligosaccharides, galacto-oligosaccharides, inulin, and more recently human milk oligosaccharides.

Symbiotics, according to Mohanty et al. (2018), are the combination between probiotics and prebiotics, which exert a synergistic effect, assisting in improving the survival and implementation of the products content of living microorganisms, usually found in the form of foods, medicines and supplements.

Rugji et al. (2022) developed a functional drink based on whey, being added Bifidobacterium animalis as probiotic and D-alulose and β-glucan as prebiotics, in this work the authors evaluated the microbiological and physicochemical aspect of the drink, as well as its interference in several health indicators of Wistar rats, concluding that the beverage developed has the potential to play an important role in health promotion and protection against diseases, especially regarding the reduction of total cholesterol, improvement of blood lipid profile and reduction or maintenance of body weight.

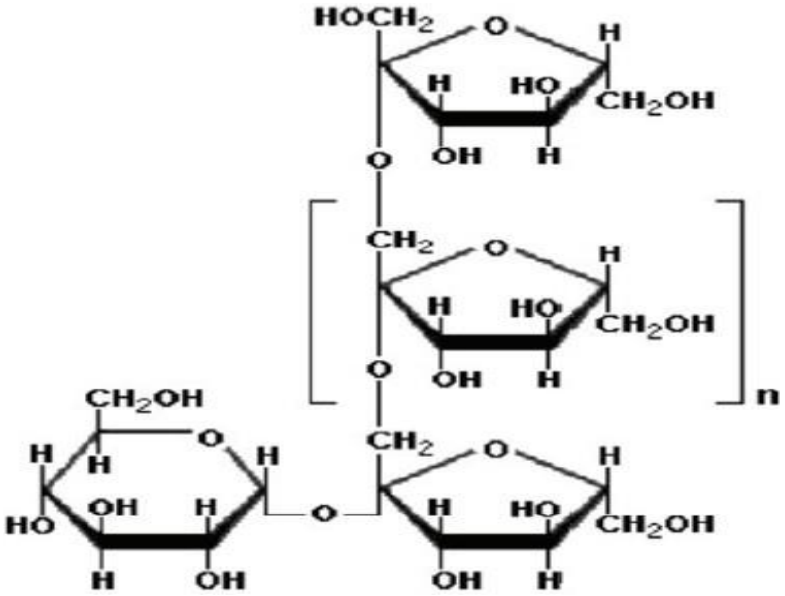
Bambace et al. (2019) added Lactobacillus rhamnosus in an alginate-based coating, enriched with Inulin and oligofructose, applied on fresh blueberries, concluding that the coating exerted a bioprotective activity on blueberries and that the added prebiotics improve probiotic viability.

Chemical Properties

Inulin is a normal chain compound, i.e., it does not present branches in its structure and is constituted by fructose-fructose bonds, and these bonds occur in the anomeric carbon of a monosaccharide through its

hydroxyls and with exit to a water molecule (Roberfroid, 2005; Mauro; Ishii; Oliveira, 2010). Figure 3 shows the molecular structure of inulin.

Figure 3 - Molecular structure of inulin



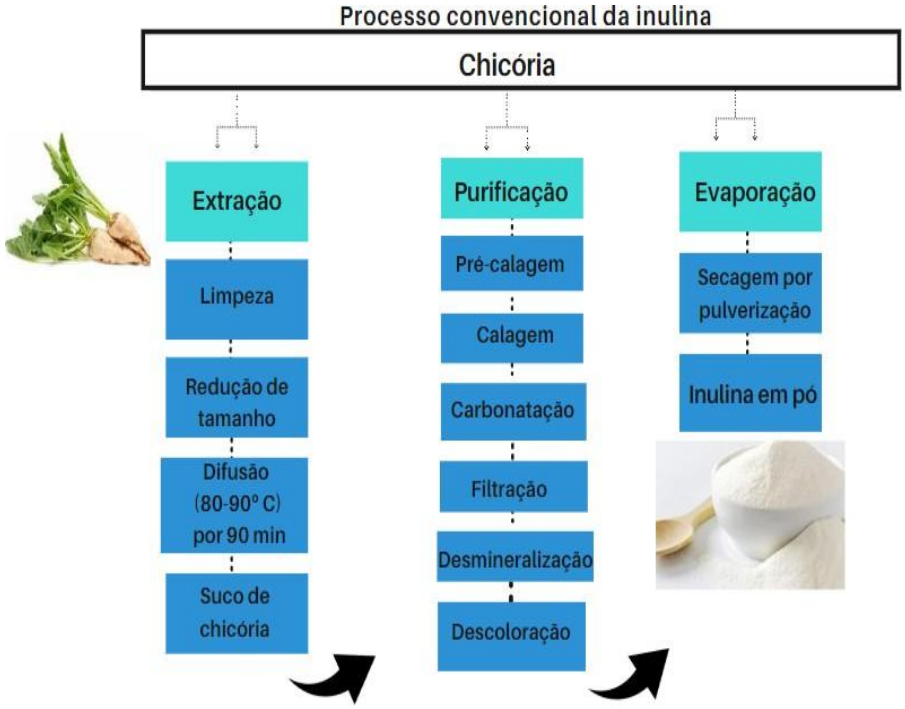
Source: Adapted from Hauly & Moscatto (2002).

Inulin can be represented by GFn, where G characterizes the glycosyl part, F the frutosyl part, and n the amount of frutosyl constituents associated by b(2,1) linkages, this linkage being a factor for inulin not being converted as a characteristic carbohydrate, whose caloric value as a dietary fiber is reduced because of this linkage. Thus, a glucose molecule commonly sits at the end of each fructose chain and is maintained by a(2,1)-bond as in sucrose. Furthermore, the intensity of polymerization, i.e. the reaction of larger molecules forming from smaller molecules varies almost from 2 to 60 (Abed et al.,2016).

Extraction

The conventional extraction process of inulin consists of three steps: extraction, purification and evaporation (Figure 4). They are commonly obtained from chicory roots because they are easy to obtain and the desired DP of the extract. This process starts first with the cleaning of the raw material, followed by size reduction, i.e, cutting, slicing or pulping. Following the diffusion of the granules in heating of 80-90ºC for 90 minutes, until obtaining the chicory juice (extract). The purification step involves pre liming, liming, carbonation, demineralization, and decolorization. After the purification of the paste, it follows light evaporation process to then be dried by pulverization obtaining the inulin powder which is the final product of the process (Mazzoccoli, 2016; Teferra, 2019).

Figure 4 - Conventional process of inulin from chicory roots



Source: adapted by the authors themselves from Zhu; He et al.(2016).

Inulin in unconventional sources

Due to the several benefits from the use of Inulin, several scientific studies have been conducted with the objective of optimizing the extraction process, as well as searching for other sources with potential to obtain this fructan, since the industrial production of Inulin is concentrated in the extraction of chicory roots (Cichorium intybus). Redondo-Cuenca et al. (2021) performed an Inulin extraction from artichoke tuber and artichoke by-product and obtained 81.1 g/100g dry weight and 4.2 g/100g, respectively.

Umeonuorah et al. (2022) evaluated the prebiotic capacity of Inulin from okra pods (Abealmoschus esculentus L), in this study Inulin was added to an extruded snack, the results showed that wistar rats fed with this snack had significant growth, proving that this is a safe and acceptable food, besides exerting prebiotic properties, since it provided a 30% increase in the growth of Bifidobacterium bifidum compared to the control group.

Lima et al. (2021) carried out the optimization process of Inulin extraction from the residue of açaí industrial production. In this work the optimum condition found for this raw material was 80°C, 12% concentration of açaí seed and 20 minutes extraction time.

Esmaeili et al. (2021) used ultrasound technique to obtain inulin from burdock root extract (Arctium lappa L.), the amount extracted by the treatments ranged from 4.65 to 13.48%, and the optimal conditions for extraction were sonication time = 36.65 min, sonication temperature = 55.48°C and water/solid = 1:35 g/ml.

Loyo Ruíz et al. (2020) used small bulb garlic species, for the extraction of fructans from various vegetables and their systematic characterization to determine the relevant parameters in the extraction and

quality of fructans, being subjected to alcoholic and aqueous extraction. About 10 bulbs were used, their anomaly being known as onion (undifferentiated bulbs), in addition to four other types of onion that were: yellow, white, purple and cambric onions. The results obtained from the performance of the analyzed samples showed that the yellow onion had the lowest fructan content with 25%, while the highest content was presented by the differentiated garlic 76.3%. The dry fiber yield of the two types of garlic and four types of onion, respectively were 15.4; 14.2; 5.2; 5.6;5.1; 6.2 (g).

In this sense, about the use of vegetable species used by Loyo Ruíz et al. (2020) in their study, confers us that the best performance was presented by differentiated garlic, however, this is a usual product of the basic food basket, so its use in other applications is not recommended. Above all, the following vegetable garlic with onion or not

Therefore, it can be seen as a good alternative for its use, avoiding losses, since the characterization made in this study showed similarities regarding the use of undifferentiated garlic to obtain several products, in this case, the most evident, fructan.

Inulin Applications

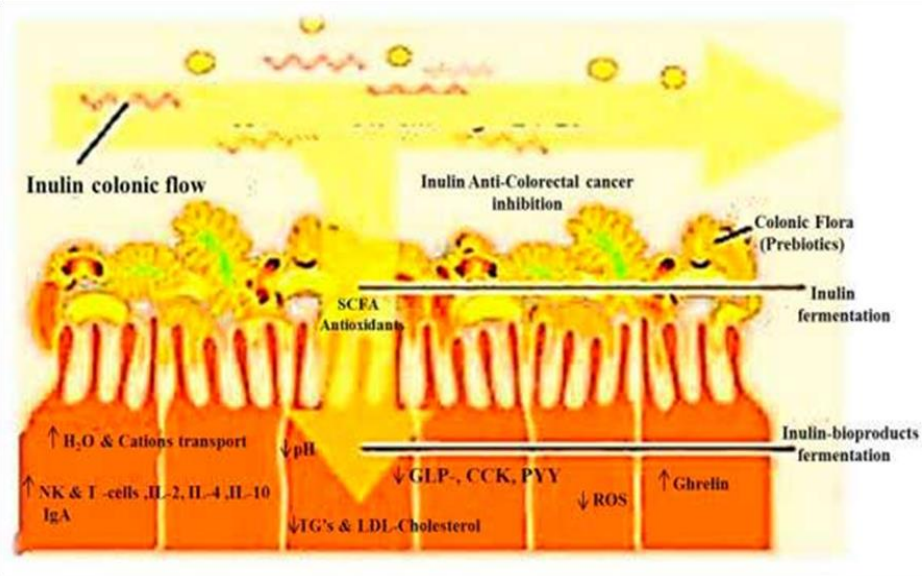
According to Mauro (2010), inulin has scientific proof that it improves the digestion of its consumers by having characteristics of dietary fiber. It is undeniable the close relationship between dietary fiber and inulin, for this reason, several authors place this fructan in the category of dietary fiber. Inulin and oligofructose are examples of prebiotics.

Other physiological actions that elevate inulin to the position of a prebiotic food are improved intestinal flow and increased peristalsis of the large intestine. According to Mauro (2010), these factors decrease constipation in adult humans.

Another physiological event is the reduction of pH in the contents of the ileum, cecum, and colon, allowing an increase in the concentration of ionized minerals. This condition facilitates passive diffusion, hypertrophy of the cecal walls, and increased concentration of volatile fatty acids, bile salts, calcium, phosphorus, phosphate, and to a lesser extent magnesium in the cecum. Inulin from chicory increases calcium influx into bone tissue improving bone mineral density and shown to have the potential to even prevent osteoporosis (Kaur & Grupta, 2002).

According to Abreu (2019), inulin improves colonization resistance, prevents bacterial translocation and, finally, contributes to improve the chemical and enzymatic functions that protect the gastrointestinal tract, according to (Figure 5) that shows the action of inulin in the human organism. Inulin has a stimulatory action on a certain group of bacteria, the bifidobacteria. These bacteria have modulating capacity of apoptosis expression, an anti-tumorigenic event (Mauro, 2010). However, some studies, according to Le Bastard et al. (2020) show that inulin is also able to act in modulating other groups of the intestinal microbiota, including Anaerostipes spp, Lactobacillus spp and Faecalibacterium spp.

Figure 5 - Action of inulin in the human organism



Source: inulin pharmacokinetics and effects on markers (2017).

Another hypothesis to explain another beneficial effect of inulin would be the increase in serum glutamine levels. This would be possible due to the fermentation of inulin and consequent production of short chain fatty acids, which serve as substrate for the colonic mucosa, thus saving glutamine, which is the preferential substrate for the lymphatic system. This, in turn, relates directly to the intestinal defense functions and can thus improve the immune system under various circumstances (Mauro, 2010).

The short-chain fatty acids, but specifically butyrate (butyric acid), formed during the fermentation of inulin, provide an energy source for enterocytes, stimulate cell proliferation of the epithelium, and increase visceral blood flow.

Li et al. (2021) reported that increased intake of inulin is also able to significantly reduce the mean values of blood glucose (-0.42 mmol/L), total cholesterol (-0.46 mmol/L), and triglycerides (TAG) (-0.21 mmol/L) in individuals with pre-diabetes and diabetes compared with the control group, thus, the implementation of inulin in the diet of this group may bring numerous benefits. It was also observed that inulin tends to decrease the levels of total and LDL cholesterol.

However, Teferra (2019) attributes side effects related to high inulin consumption such as gastrointestinal symptoms including flatulence, bloating, nausea, abdominal cramps and other complications to varying degrees in humans, due to such complications, inulin prebiotics application is limited to only 10 - 15g/day, and further research is needed to increase the inulin dose and reduce intolerance symptoms while meeting the Recommended Dietary Allowance (RDA) for dietary fiber.

Factors related to interindividual characteristics should also be considered, because the changes in the intestinal flora caused by the consumption of prebiotics may be different depending on each individual. According to Martines et al. (2010) these observed differences may be related to the presence or absence of certain bacterial groups of the individual endogenous microflora, in addition to factors such as variations

in transit time or in the secretion of digestive enzymes influenced by the host genotype, which affect the amount of prebiotics that survive digestion.

Rodriguez et al. (2020), in an experiment with mice colonized with the fecal microbiota of obese individuals, reported improvement in metabolic disorders caused by inulin ingestion and that it is linked to the presence of certain specific microbiome microorganisms, since weight loss was observed in obese individuals who contained the initial presence of certain genera, such as Anaerostipes , Akkermansia, and Butyricicoccus. However, although the results suggest that individual differences play an important role in the response elicited by prebiotic intake, there are still no validated biomarkers to guide recommendations to consumers.

Prebiotics have also been used with the aim of bringing improvements to technological processes of food production, due to act both in sensory characteristics and in physicochemical and nutritional characteristics. According to Costa et al. (2019) when conducting a study on the influence of the use of prebiotics on yogurt characteristics, they concluded that the addition of inulin, together with polydextrose and galactooligosaccharides caused improvement in the parameters of consistency, elasticity, viscosity, and firmness, in addition to contributing to the aroma and flavor by virtue of the diversification of volatile compounds.

In another study Rodrigues et al. (2012) found that the addition of Inulin along with fructooligosaccharides, in the formulation of cheeses, proved to be efficient in increasing the content of free fatty acids, more specifically in relation to linoleic acid, reflecting in a lower rate of atherogenicity in the final product, with improvement in its nutritional profile.

The application of inulin in the food industry is mainly due to the properties that make it able to replace sugar or fat, with the advantage of not resulting in an increase in calories. It can thus be used as an ingredient in a number of foods, such as chocolates, ice cream, and yogurt, among others. Its use in products with low calorie and reduced fat content is already widespread in European countries, the United States and Canada. The fat replacement property of inulin is based on the formation of gel particles with water when subjected to a shearing force. The resulting gel has a texture similar to fat and imparts the desired taste. Unlike insoluble fibers, whose high water absorption capacity affects viscosity, inulin can replace fat by immobilizing water during gel particle formation (Inulin and its benefits, n.d).

3 FINAL CONSIDERATIONS

In summary, the data from the articles reviewed brought us scientific-literary subsidies that the ingestion of prebiotics is capable of promoting countless benefits for the health of its consumers, acting in the maintenance of the development of the intestinal flora and consequently helping in various functions, such as modulating the immune system. Several studies have proven the action of Inulin as a prebiotic agent in the human body, as well as highlighting its various technological properties applicable in the food industry, and can act as a regulator of texture, aroma, and flavor. It was also observed that there is an

increasing demand for new Inulin supplier sources, since commercial production currently comes from a single main matrix (Cichorium intybus roots). However, more studies should be conducted in vitro and in vivo to know the consumption doses regarding prebiotic characteristics and avoid possible adverse reactions to the organism.

REFERENCES

A inulina e seus benefícios, (s.d). EditoraInsumos. https://plantbasedfoods.com.br/upload_arquivos/201605/20160509176290014637640 54.pdf.

Abed, S. M., Ali, A. H., Noman, A., Niazi, S., Ammar, A. F., & Bakry, A. M. (2016). Inulin as prebiotics and its applications in food industry and human health; a review. International Journal of Agriculture Innovations and Research, 5(1), 88-97.

Barrea, L., Muscogiuri, G., Frias-Toral, E., Laudisio, D., Pugliese, G., Castellucci, B., Garcia-Velasquez, E., Savastano, S., & Colao, A. (2020): Nutrition and immune system: from the Mediterranean diet to dietary supplementary through the microbiota, Critical Reviews in Food Science and Nutrition. 61(18), 3066-3090. https://doi.org/10.1080/10408398.2020.1792826.

Bambace, M. F., Alvarez, M. V., & del Rosario Moreira, M. (2019). Novel functional blueberries: Fructo-oligosaccharides and probiotic lactobacilli incorporated into alginate edible coatings. Food Research International, 122, 653-660. https://doi.org/10.1016/j.foodres.2019.01.040.

Carlson, J., Erickson, J., Lloyd, B., & Slavin, J. (2018). Health Effects and Sources of Prebiotic Dietary Fiber. Current Developments in Nutrition, 2(3), Nzy005. https://doi.org/10.1093/cdn/nzy005.

Costa, M. F., Pimentel, T. C., Guimaraes, J. T., Balthazar, C. F., Rocha, R. S., Cavalcanti, R. N., ... & Cruz, A. G. (2019). Impact of prebiotics on the rheological characteristics and volatile compounds of Greek yogurt. Lwt, 105, 371-376. https://doi.org/10.1016/j.lwt.2019.02.007.

Cunningham, M., Vinderola, G., Charalampopoulos, D., Lebeer, S., Sanders, M. E., & Grimaldi, R. (2021). Applying probiotics and prebiotics in new delivery formats–is the clinical evidence transferable?. Trends in Food Science & Technology, 112, 495-506. https://doi.org/10.1016/j.tifs.2021.04.009.

Davani-Davari, D., Negahdaripour, M., Karimzadeh, I., Seifan, M., Mohkam, M., Masoumi, S. J., ... & Ghasemi, Y. (2019). Prebiotics: definition, types, sources, mechanisms, and clinical applications. Foods, 8(3), 92. https://doi.org/10.3390/foods8030092.

BONDT, D. (2003). V. Novas tendências para bebidas funcionais. Brasil Alimentos, 18.

Duarte, G.B.S & Reis, B.Z. (Eds.). (2019). Alimentos funcionais e compostos bioativos: ciência, avaliação e consumo. ILSI Brasil - International Life Sciences Institute do Brasil. https://www.researchgate.net/publication/340364223_Alimentos_Funcionais_e_Compostos_Bioativos_ciencia_avaliacao_e_consumo.

Esmaeili, F., Hashemiravan, M., Eshaghi, M. R., & Gandomi, H. (2021). Optimization of aqueous extraction conditions of inulin from the Arctium lappa L. roots Using ultrasonic irradiation frequency. Journal of Food Quality, 2021. https://doi.org/10.1155/2021/5520996.

Florowska, A., Hilal, A., & Florowski, T. (2022). Prebiotics and synbiotics. In Probiotics (pp. 19-37). Academic Press. https://doi.org/10.1016/B978-0-323-85170-1.00018-X.

Gibson, G. R., Scott, K. P., Rastall, R. A., Tuohy, K. M., Hotchkiss, A., Dubert-Ferrandon, A., Gareau, M., Murphy, E. F., Saulnier, D., Loh, G., Macfarland, S., Delzenne, N., Ringel, Y., Kozianowski, G., Dickmann, R., Lenoir-Winjkoop, I., W., Walker, C., Buddington, R. (2010). Dietary prebiotics: Current status and new definition. Food Sci.Technol. Bull. Funct. Foods. 7(1), 1-19. https://doi.org/10.1616/1476-2137.15880.

González-Herrera, S. M., Bermúdez-Quiñones, G., Ochoa-Martínez, L. A., Rutiaga-Quiñones, O. M., & Gallegos-Infante, J. A. (2021). Synbiotics: a technological approach in food applications. Journal of Food Science and Technology, 58(3), 811-824. https://doi.org/10.1007/s13197-020-04532-0.

Hauly, M. C. O., & Moscatto, J. A. (2002). Inulin and oligofructosis: a review about functional properties, prebiotic effects and importance for food industry. Semina: Ciências Exatas e Tecnológicas, 23(1), 105-118.

Kaur, N., & Gupta, A. K. (2002). Applications of inulin and oligofructose in health and nutrition.

Journal of biosciences, 27(7), 703-714. https://doi.org/10.1007/BF02708379.

Khangwal, I., & Shukla, P. (2019). Prospecting prebiotics, innovative evaluation methods, and their health applications: A review. 3 Biotech, 9(5), 187. https://doi.org/10.1007/s13205-019-1716-6.

Le Bastard, Q., Chapelet, G., Javaudin, F., Lepelletier, D., Batard, E., & Montassier, E. (2020). The effects of inulin on gut microbial composition: a systematic review of evidence from human studies. European Journal of Clinical Microbiology & Infectious Diseases, 39(3), 403-413. https://doi.org/10.1007/s10096-019-03721-w.

Li, L., Li, P., & Xu, L. (2021). Assessing the effects of inulin-type fructan intake on body weight, blood glucose, and lipid profile: A systematic review and meta-analysis of randomized controlled trials. Food Science & Nutrition, 9(8), 4598-4616. https://doi.org/10.1002/fsn3.2403.

LIMA, E. C. D. S., MANHÃES, L. R. T., SANTOS, E. R. D., FEIJÓ, M. B. D. S., & SABAA-SRUR, A.

U. D. O. (2021). Optimization of the inulin aqueous extraction process from the açaí (Euterpe oleracea, Mart.) seed. Food Science and Technology, 41, 884-889. https://doi.org/10.1590/fst.24920.

Loyo Ruíz, J. A., Cruz Ramírez, M., & Arciga Pedraza, R. (2020). Extracción y comparación de fructanos en ajos y cebollas. Revista Nthe, (Octubre), 74–81. http://nthe.mx/NTHE_v2/pdfArticulos/PDF_Articulo20201119173436.pdf.

Manach, C., Milenkovic, D., Wiele, T., Rodriguez-Mateos, A., Roos, B., Garcia-Conesa, M., . . . Morand, C. (2017). Addressing the inter-individual variation in response to consumption of plant food bioactives: Towards a better understanding of their role in healthy aging and cardiometabolic risk reduction. Molecular Nutrition & Food Research, 61(6), 1600557-N/a. https://doi.org/10.1002/mnfr.201600557.

Mauro, M., Ishii, P., & Oliveira, R. (2018). O alimento funcional inulina e suas atividades biológicas. Revista Terra & Cultura: Cadernos De Ensino E Pesquisa, 26(51),53-62.Recuperado de http://periodicos.unifil.br/index.php/Revistateste/article/view/258.

Martínez, I., Kim, J., Duffy, P., Schlegel, V., & Walter, J. (2010). Resistant starches types 2 and 4 have differential effects on the composition of the fecal microbiota in human subjects. PloS One, 5(11), e15046. https://doi.org/10.1371/journal.pone.0015046.

Mazzoccoli, G. (2016). Body composition: Where and when. European journal of radiology, 85(8), 1456-1460. https://doi.org/10.1016/j.ejrad.2015.10.020.

Mohanty, D., Misra, S., Mohapatra, S., & Sahu, P. S. (2018). Prebiotics and synbiotics: Recent concepts in nutrition. Food bioscience, 26, 152-160. https://doi.org/10.1016/j.fbio.2018.10.008.

Quigley, E. M. M. (2017). Gut microbiome as a clinical tool in gastrointestinal disease management: Are we there yet?. Nature Reviews Gastroenterology & Hepatology 14 (5), 315–20. https://doi.org/10.1038/nrgastro.2017.29.

Redondo-Cuenca, A., Herrera-Vázquez, S., Condezo-Hoyos, L., Gómez-Ordóñez, E., & Rupérez,

P. (2021). Inulin extraction from common inulin-containing plant sources. Industrial Crops and Products, 170, 113726. https://doi.org/10.1016/j.indcrop.2021.113726.

Reis, B.Z., & Duarte, (Eds.). (2018). Alimentos funcionais e compostos bioativos: Avanços científicos, perspectiva. ILSI Brasil - International Life Sciences Institute do Brasil.
https://www.researchgate.net/publication/328808668_Alimentos_Funcionais_e_Compostos_Bioativos_Avancos_Cientificos_Perspectivas_e_Desafios.

Rodrigues, D., Rocha-Santos, T., Gomes, A., Goodfellow, B., & Freitas, A. (2012). Lipolysis in probiotic and synbiotic cheese: The influence of probiotic bacteria, prebiotic compounds and ripening time on free fatty acid profiles. Food Chemistry, 131(4), 1414-1421. https://doi.org/10.1016/j.foodchem.2011.10.010.

Rodriguez, J., Hiel, S., Neyrinck, A., Le Roy, T., Pötgens, S., Leyrolle, Q., .Delzenne, N. (2020). Discovery of the gut microbial signature driving the efficacy of prebiotic intervention in obese patients. Gut, 69(11), 1975-1987. http://dx.doi.org/10.1136/gutjnl-2019-319726.

Roberfroid, M. B. (2005). Introducing inulin-type fructans. British journal of nutrition, 93(S1), S13-S25. https://doi.org/10.1079/BJN20041350.

Rugji, J., Çalışkan, Z., Dinçoğlu , A., Özgür , M., Erol, Z., & Özgür, E. (2022). Prebiotic effect of D-allulose and β-glucan on whey beverage with Bifidobacterium animalis and investigation of some health effects of this functional beverage on rats. Food Science and Technology, 42. https://doi.org/10.1590/fst.07022.

Teferra, T. F. (2019). Direct and Indirect Actions of Inulin as Prebiotic Polysaccharide: A Review.

Cient Periodique Nutrifion, 3, 1-15. https://www.researchgate.net/publication/337415512.

Umeonuorah, U., Arueya, G., Ogunbanwo, T., & Ogunremi, Y. (2022). Development of Okra (Abelmoschus esculentus L.) Inulin extruded Snacks and Evaluation of their Prebiotic and Safety Potentials. Journal of Food Science and Nutrition Research, 5(1), 358-370. https://doi.org/10.26502/jfsnr.2642-11000087.

Zhu, Z., He, J., Liu, G., Barba, F. J., Koubaa, M., Ding, L., et al. (2016). Recent insights for the green recovery of inulin from plant food materials using non-conventional extraction technologies: A review. Innovative Food Science & Emerging Technologies, 33, 1-9. https://doi.org/10.1016/j.ifset.2015.12.023.

CHAPTER 61

Geographical distribution and monitoring of dengue in 141 municipalities in the center-west of Brazil

10.56238/rsfohsv1-061

Alexander Gonçalves Ferreira Guimarães
Doutorando em Saúde Coletiva pelo Programa de Pós-Graduação em Saúde Coletiva, do Instituto de Saúde Coletiva da Universidade Federal de Mato Grosso - Campus Universitário de Cuiabá
Institution: Universidade Federal de Mato Grosso - Campus Universitário de Cuiabá Address: Av. Fernando Correa da Costa, 2367, CCBS-III, Boa Esperança,
CEP: 78060-900, Cuiabá - MT, Brasil
E-mail: alexanderguimaraes27@gmail.com

Lucinéia Claudia de Toni Aquino da Cruz
Doutora em Saúde Coletiva pelo Programa de Pós-Graduação em Saúde Coletiva, do Instituto de Saúde Coletiva da Universidade Federal de Mato Grosso - Campus Universitário de Cuiabá
Institution: Universidade Federal de Mato Grosso - Campus Universitário de Cuiabá Address: Av. Fernando Correa da Costa, 2367, CCBS-III, Boa Esperança,
CEP: 78060-900, Cuiabá - MT, Brasil
E-mail: lucineiadetoni@gmail.com

Gustavo Benedito Medeiros Alves
Mestre em Geografia pela Universidade Federal de Mato Grosso do Programa de Pós-Graduação em Stricto Senso em Geografia, Laboratório de Geoprocessamento da Universidade Federal de Rondonópolis - Campus Universitário de Rondonópolis (UFR – MT) Institution: Universidade Federal de Rondonópolis - Campus Universitário de Rondonópolis (UFR – MT)
Address: Av. dos Estudantes, 5055, Cidade Universitária, CEP: 78735-901, Rondonópolis - MT, Brasil.
E-mail: gustavo.benedito90@gmail.com

Mário Ribeiro Alves
Pós-Doutor em Saúde Coletiva pela Universidade Federal de Mato Grosso do Instituto de Saúde Coletiva - Campus Universitário de Cuiabá
Institution: Universidade Federal de Mato Grosso - Campus Universitário de Cuiabá Address: Av. Fernando Correa da Costa, 2367, CCBS-III, Boa Esperança, CEP: 78060-900, Cuiabá - MT, Brasil
E-mail: malvesgeo@gmail.com

Marina Atanaka
Doutora em Saúde Pública pela Fundação Oswaldo Cruz do Programa de Pós-Graduação em Saúde Coletiva do Instituto de Saúde Coletiva - Campus Universitário de Cuiabá
Institution: Universidade Federal de Mato Grosso - Campus Universitário de Cuiabá Address: Av. Fernando Correa da Costa, 2367, CCBS-III, Boa Esperança,
CEP: 78060-900, Cuiabá - MT, Brasil
E-mail: marina.atanaka@gmail.com

ABSTRACT
In fact, it appears that dengue is characterized as a disease that has relevance to public health in the country. For the year 2019, 1,544,987 cases of dengue could be reported, with the presence of 782 confirmed deaths. Regarding the interruption of dengue epidemic cycles, it was noted that measures associated with vector control have not been successful. This study aims to analyze the spatial distribution associated with dengue cases present in the municipalities of the state of Mato Grosso, from 2015 to 2018, in order to identify the municipalities that have the highest risk rates related to the presence of arbovirus. Gross and Smoothed Rates were used through the Local Empirical Bayesian method. In order to calculate these Bayesian rates, a neighborhood matrix was developed with the presence of the continuity criterion that removed the zero risk of dengue from this calculation, thus minimizing the effects associated with the random fluctuations present in the areas that were monitored. Of course, the SaTScan software was used to calculate the Relative Risk (RR), and it was found that in this spatial scan clusters of low, medium and high risks were identified, demonstrating statistically significant data. The use of statistical techniques and spatial analysis employed in the study expanded the more detailed examination of the risk of transmission in the monitored areas, contributing significantly to the formulation and planning of integrated prevention and control strategies aimed at monitoring the arbovirus present in the state of Mato Grosso.

Keywords: spatial analysis, bayesian rates, relative risk, collective health.

1 INTRODUCTION

The epidemiological setting concerning the dengue in Brazil has been distinguished by the concurrent circulation regarding the four serotypes of the dengue virus (DENV), which has been accompanied by an important number of serious cases and deaths. These are often preventable. The introduction of the Zika (ZIKV) and Chikungunya (CHIKV) viruses in Brazil, in 2014 and 2015,

respectively, with wide dispersion throughout the country, has made the suspicion and differential clinical diagnosis of these three types of arboviruses very complex, turning this situation into more challenge. Thus, greater rigor on the part of health services and professionals is imperative, so that complications and occurrence are avoided (BRASIL, 2019).

Dengue has been considered the most important resurgent transmitted disease among the other viral diseases transmitted by biological vectors, and also shows in epidemic bouts, occurring mainly in urban areas (PIGNATTI et al, 2012).

In fact, it could be noted that the incidence concerning dengue has significantly grown throughout the world over the last few decades. The real number of cases of this disease is undernotified and many cases are wrongly classified. Recent estimates have put the incidence of dengue at around 390 million infections per year (consisting of a Confidence Interval (CI) of 95%, from 284 to 528 million), of which the total of 96 million (67 to 136 million) cases have clinical manifestations, whatever the severity of the disease. According to another study regarding the prevalence of dengue, it could be estimated that the total of 3.9 billion people, living in 128 countries, may be at some risk of infection by the Dengue Virus (DENV) (WHO, 2019; GUODOND et al, 2015; GUZMAN et al, 2016).

The DENV belongs to the genus Flavivirus and to the family Flaviviridae. The DENV is transmitted by arthropod vectors (mosquitoes) from the genus Aedes, the main transmitting mosquito being Ae. aegypti. At present, four different serotypes of the dengue virus are known: DENV-1, DENV-2, DENV-3 and DENV-4. However, cases of a fifth serotype, DENV-5, have been reported in Malaysia (MAROUN et al. 2008; CASTANHA et al, 2016).

In Brazil, in 2019 up to Epidemiological Week (SE) n.º 52 (30 December 2019), 1,544,987 possible cases with respect to the dengue could be reported (consisting of the Incidence Rate (IR) of 735.2 probable cases per 100 000 inhabitants). This means an increase of 545.4% in the number of cases, when compared to the same period of 2018, when 239,389 notified cases of dengue were reported. The number of dengue deaths in 2019 is 5.36% higher than that recorded in 2018. By SE 52, 782 deaths from dengue had been confirmed. The states with the greatest number of deaths under investigation are: São Paulo (265), Minas Gerais (172), Goiás (81), Distrito Federal (58), Espírito Santo (34) Bahia (32), Paraná (31) and Mato Grosso do Sul (29) (BRASIL, 2020).

The Midwest Region presented 1,349.1 probable cases per 100 000 inhabitants, followed by the Southeast (1,159.4 probable cases per 100 000 inhabitants), Northeast (376.7 probable cases per 100 000 inhabitants), North (195.8 cases per 100 000 inhabitants) and South (165.2 probable cases per 100 000 inhabitants). The states of Sao Paulo, Minas Gerais and Goiás stand out, which concentrated 66.2% of the probable cases in the country (BRASIL, 2020).

In MT between the years 2015 to 2018, 78,800 probable cases of dengue were reported, with confirmation of 24 deaths. The accumulated incidence in the study period in the state ranged from the

minimum in 2018 of 197.2/100 thousand inhab., to the maximum incidence in 611.4/100 thousand inhab., in 2015, the same year with the record of 6 deaths, the largest of the period (BRASIL, 2020).

Indeed, it could be observed that the spatial distribution of diseases may be analyzed and mapped using the Geographical Information System (SIG), which is able to store geographical information, and establish correlations with table data, and which can be used for collection, storage, querying and presentation of spatial data, helping with the spatial location of the diseases and the graphic analysis of epidemiological indicators. According to the World Health Organization (WHO), this is an efficient tool for the administration of the Programa Nacional de Controle da Dengue (PNCD) (in English National Programme for Dengue Control) (ESRI, 2020; MS, 2002).

In fact, it is essential to use maps in the health area, in relation to the planning process and for the control of the disease (Lima et al., 2006). Spatial epidemiology allows one to acknowledge the distribution, importance and frequency concerning the distinct factors that may have a bearing on the increase of certain risks for health, as well as providing the identification of groups that share similar risks (BARCELOS et al, 2005).

Indeed, the characterization and identification of these areas may be performed by the spatial and temporal scanning window, which can be performed in the SaTScan software (KULLDORFF, 1997), in which this software may calculate the Relative Risk (RR) regarding the incident of an event present in a study area. This software is used worldwide by the epidemiologists in order to describe spatial clusters of chronic and infectious diseases, risk factors and disease vectors (SHERMAN et al, 2014).

As aforementioned, this research aimed to analyze the spatial distribution of probable dengue cases in the 141 municipalities in the state of MT between 2015 and 2018, in order to make a comparison between the spatial distribution regarding the Incidence Rates (IR) with Smoothed Rates by the local empirical Bayes method, thus possibly identifying the risk areas of transmission in the 16 health regions in the state of MT.

2 METHODS

2.1 STUDY DESIGN

This study was of the ecological type, where the unit of observation is associated with the community or population within a defined geographical area. In the study, we used data of notification of cases of dengue by municipality of abode, obtained through the Sistema Nacional de Agravos de Notificação (SINAN) (in English National System of Notifications of Disease) of the Ministry of Health (Brazil), between January 2015 and December 2018, comprising the 141 municipalities of the Mato Grosso state, in Midwestern Brazil.

2.2 TERRITORY OF THE STUDY

The Brazilian state of MT has a total area of 903,357.908 km2. It is the third largest state in Brazil, after Amazonas and Pará. The urban area of MT comes to 519.7 km2, which means that it is only 11th place in the league table of Brazilian states with largest urban sprawl. The state accounts for 1.59% of the total population of Brazil. In addition, 81.9% of the population live in the urban part of the state, compared to 18.1% in the rural part. The number of men is slightly more than the number of women: men account for 51.05% of the population and women for 48.95%. The rate related to the population growth for Mato Grosso state is 1.9% per annum (IBGE). The area covered in this study includes all 141 municipalities of MT, a state that lies in the Midwest Region of Brazil and has an estimated population of 3,035,122 inhabitants, according to the Insitituto Brasileiro de Geografia e Estatística (IBGE) (in English Brazilian Institute of Geography and Statistics) (IBGE, 2020) These municipalities are divided among five mesoregions of the State: Centre-South of MT; Northeast of MT; North of MT; Southeast of MT; and Southwest of MT. The 141 municipalities of the state are also divided into 16 regional health offices, which are the main object of risk analysis, namely: Alta Floresta; Água Boa; Cáceres; Barra do Garças; Cuiabá; Colíder; Juara; Pontes e Lacerda; Juína; Diamantino; Peixoto de Azevedo; Rondonópolis; Porto Alegre do Norte; Sinop; São Felix do Araguaia; and Tangará da Serra, representing the units analyzed in this work (Figure 1).

2.2.1 Population and study period

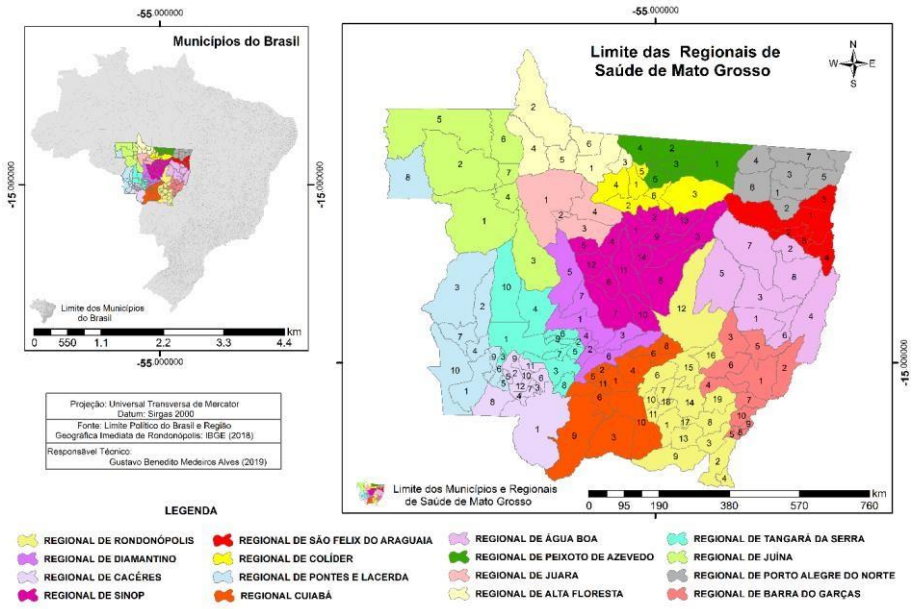
The population for this study comprised all cases of dengue, duly notified by municipality of abode at the SINAN in the 141 municipalities of the State of MT between 2015 and 2018. Throughout the study period, the annual population could be estimated by the IBGE was used to construct incidence rates and smoothed rates.

2.3 CHARACTERIZATION OF RISK AREAS FOR DENGUE

The regional health centers, with the municipalities they cover, have been categorized following the criteria set by the National Programme of Dengue Control (Programa Nacional de Controle de Dengue – PNCD), as follows: low incidence (up to 100 cases per 100 000 people); medium incidence (between 100 and 300 cases per 100 thousand inhabitants), high incidence (between 300 and 1,000 cases per 100 thousand people) and also the epidemic areas (consisting of more than 1,000 cases per 100 thousand people) (BRASIL, 2002; BOHM et al, 2016).

The classification of 141 municipalities in MT according to their size is related to their total inhabitants and obeys the following characterization: a) Small I, with up to 20,000 inhabitants - 104 (73.76%) municipalities; b) Small II, from 20,001 to 50,000 inhabitants – 26 (18.44%) municipalities; c) Medium, from 50,001 to 100,000 inhabitants - 6 (4.25%) municipalities; d) Large, 100,001 to 900,000 inhabitants - 5 (3.55%) (IBGE, 2019; SEPLAN, 2018).

Figure 1 - Location of the area studied in this paper



Legend: Numerical identification of the 141 municipalities in the Brazilian State of Mato Grosso (MT) as distributed among the 16 Regional Health Offices:

- Rondonópolis Regional Health Office: 1. Rondonópolis, 2. Alto Araguaia, 3. Alto Garças, 4. Alto Taquari, 5. Araguainha, 6. Campo Verde, 7. Dom Aquino, 8. Guiratinga, 9. Itiquira, 10. Jaciara, 11. Juscimeira, 12. Paranatinga, 13. Pedra Preta, 14. Poxoréo, 15. Primavera do Leste, 16. Santo Antônio do Leste, 17. São José do Povo, 18. São Pedro da Cipa, 19. Tesouro.
- Diamantino Regional Health Office: 1. Diamantino, 2. Alto Paraguai, 3. Nobres,

4. Nortelândia, 5. Nova Maringá, 6. Rosário Oeste, 7. São José do Rio Claro.

- Cáceres Regional Health Office: 1. Cáceres, 2. Araputanga, 3. Curvelândia, 4. Glória D'Oeste, 5. Indiavaí, 6. Lambari D'Oeste, 7. Mirassol d'Oeste, 8. Porto Esperidião, 9. Reserva do Cabaçal, 10. Rio Branco, 11. Salto do Céu, 12. São José dos Quatro Marcos.
- Sinop Regional Health Office: 1. Sinop, 2. Cláudia, 3. Feliz Natal, 4. Ipiranga do Norte, 5. Itanhangá, 6. Lucas do Rio Verde, 7. Nova Mutum, 8. Nova Ubiratã, 9. Santa Carmem, 10. Santa Rita do Trivelato, 11. Sorriso, 12. Tapurah, 13. União do Sul,

14. Vera.

- São Felix do Araguaia Regional Health Office: 1. São Félix do Araguaia, 2. Alto Boa Vista, 3. Luciara, 4. Novo Santo Antônio, 5. Serra Nova Dourada.
- Colíder Regional Health Office: 1. Colíder, 2. Itaúba, 3. Marcelândia, 4. Nova Canaã do Norte, 5. Nova Guarita, 6. Nova Santa Helena.
- Pontes e Lacerda Regional Health Office: 1. Pontes e Lacerda, 2. Campos de Júlio, 3. Comodoro, 4. Conquista D'Oeste, 5. Figueirópolis D'Oeste, 6. Jauru, 7. Nova Lacerda, 8. Rondolândia, 9. Vale de São Domingos, 10. Vila Bela da Santíssima Trindade.
- Água Boa Regional Health Office: 1. Água Boa, 2. Bom Jesus do Araguaia, 3. Canarana, 4. Cocalinho, 5. Gaúcha do Norte, 6. Nova Nazaré, 7. Querência, 8. Ribeirão Cascalheira.

- Peixoto de Azevedo Regional Health Office: 1. Peixoto de Azevedo, 2. Guarantã do Norte, 3. Matupá, 4. Novo Mundo, 5. Terra Nova do Norte.
- Juara Regional Health Office: 1. Juara, 2. Novo Horizonte do Norte, 3. Porto dos Gaúchos, 4. Tabaporã.
- Alta Floresta Regional Health Office: 1. Alta Floresta, 2. Apiacás, 3. Carlinda,

4. Nova Bandeirantes, 5. Nova Monte Verde, 6. Paranaíta.

- Tangará da Serra Regional Health Office: 1. Tangará da Serra, 2. Arenápolis, 3. Barra do Bugres, 4. Campo Novo do Parecis, 5. Denise, 6. Nova Marilândia, 7. Nova Olímpia, 8. Porto Estrela, 9. Santo Afonso, 10. Sapezal.
- Juína Regional Health Office: 1 Juína, 2. Aripuanã, 3. Brasnorte, 4. Castanheira,

5. Colniza, 6. Cotriguaçu, 7. Juruena.

- Porto Alegre do Norte Regional Health Office: 1. Porto Alegre do Norte, 2. Canabrava do Norte, 3. Confresa, 4. Santa Cruz do Xingu, 5. Santa Terezinha, 6. São José do Xingu, 7. Vila Rica.
- Barra do Garças Regional Health Office: 1. Barra do Garças, 2. Araguaiana, 3. Campinápolis, 4. General Carneiro, 5. Nova Xavantina, 6. Novo São Joaquim, 7. Pontal do Araguaia, 8. Ponte Branca, 9. Ribeirãozinho, 10. Torixoréu.
- Cuiabá Regional Health Office: 1. Cuiabá, 2. Acorizal, 3. Barão de Melgaço, 4. Chapada dos Guimarães, 5. Jangada, 6. Nossa Senhora do Livramento, 7. Nova Brasilândia, 8. Planalto da Serra, 9. Poconé, 10. Santo Antônio do Leverger, 11. Várzea Grande.

2.4 ANALYSIS OF DATA

For the demarcation of risk areas and visualization of the geographical distribution of cases of dengue, we used incidence rates. Indeed, the IR is associated with the easiest risk estimators as well as those most used for mapping occurrences of diseases and disorders; however, these rates normally generate significant instability on showing the risk of an event when it is rare and when the population related to the region of the occurrence is not relevant (CARVALHO et al, 2007).

The most usual form of rate mapping uses the so-called Incidence Rate, given by the expression:

$$Tbi = Yi / Pi \text{ x } 100{,}000,\ i = 1, ..., n$$

being, Yi the number of cases that could be observed, Pi is associated with the total population-at-risk and n is related to the number of geographical units (for instance, municipalities)

contained in the map. Through this calculation, the observed number of events in each municipality i (i = 1, ..., n) is obtained in a base population of 100 thousand people (CARVALHO et al, 2011).

Considering that the state of MT has many small municipalities, it is necessary to flatten the incidence rates, because, as the denominators of these areas are low in value, the results obtained can be easily masked. Out of the available alternatives for flattening, we used the Local Bayesian Approach.

The Empirical Bayesian Estimators bring the incidence rates of small areas closer to the average rate of their neighbours (SOUZA et al, 2007). These corrected rates can be more stable, since according to their calculation, they may consider information about the neighbourhood associated with the area. In this way, maps based on these estimates are more informative. The Global Empirical Bayesian Estimator aims at approximating the average rate of the group of municipalities, while the Local Empirical Bayesian Estimator works with the mean incidence value found near the municipality (DRUCK et al, 2004).

To reduce the random variability of incidence rates, the Local Empirical Bayesian Estimator was used, which smoothes rates, which allows comparisons between different populations and also takes into consideration the regional variances (BARBOSA e SILVA, 2015; SILVA et al, 2015). Calculating the rate locally, using only the geographic neighbors of the area in which it is desired to estimate the rate, converging towards a local average (MARSHALL, 1991). The corrected rates are more stable, considering in their calculation not only the information of the area, but also the information of its neighbourhood. Thus, the estimates become closer to the reality of the events (CARVALHO et al, 2011; CÂMARA et al, 2004). The local Bayesian estimate consists of a small change in the global Bayesian method proposed by Marshall (1991): instead of $\hat{m}$ and $\bar{n}, \hat{mi}, \bar{ni},$ are used, representing, respectively, the local rate in the vicinity of the area i and the average number of events in this area neighbourhood.

$$_i = C_i\, r_i + (1 - C_i)\hat{m}$$

An essential procedure for the evaluation of spatial dependence is the preparation of a neighbourhood matrix, which shows the spatial relationship between each area and the others. It is possible to draw up a matrix based on the list of neighbours of each area, using the distance between the areas, or even based on the presence or absence of a border between two specific areas, weighted using the length associated with the common border. A value of one (1) is assigned to adjacent areas and a value of zero (0) to non-adjacent areas. Areas where there is a direct neighbourhood are known as first-order neighbours. Next, the self-correlation function compares the value of the indicator to the values of the same indicator in neighbouring areas (SOUZA et al, 2007).

For production of theme maps, we used the list of municipalities based on the IBGE. The free geoprocessing software, TerraView 4.2.2, could also be used to calculate the local empirical Bayesian

estimates and for the preparation of thematic maps. The automatic process of the geocoding tool of the ArcGis10.5 programme was also performed.

2.5 ANALYSIS OF RISK RELATIVE (RR)

For RR calculation with a significance level of 99% and data analysis, it could be used the SaTScan software, which is available on the website www.satscan.org.

In this software, it may be observed that the area is related to a single point which is presented in a polygon, i.e., characterized by the centroid. Thus, it is noted that the RR may be calculated from the observed number of cases that will be divided by the respective expected number of cases. Then, RR > 1 shows that the observed number of cases may be more relevant than the expected value. In fact, the RRT is related to a relative measure of association which is founded on the force of combination that has been usually applied to epidemiological studies (KALE et al, 2009). The statistical significance can be expressed in terms of 999 replications and p value (0.05) (JONES e KULLDORF, 2012).

To calculate the RR, data on the population annual, number associated with the confirmed cases of a certain disease and plan coordinates were used (Lambert's Conical Projection: Central Meridian: W56.0; Latitude of Origin: S13.0, metric units) centroid of each municipality. In fact, it could be used the Poisson probability model, that includes the analysis concerning the count data, that is, it considers the number of individuals that can be affected by a certain disease (MCCULLAGH e NELDER, 1989).

2.6 ETHICAL CONSIDERATIONS

The Research Ethics Committee of the Universidade Federal do Mato Grosso (UFMT) approved the present study, comprising the research project that introduces the general title of: “Prevention and control: viral analysis in Aedes aegypti (Linnaeus, 1762) for the identification of risk areas and factors that determine arboviruses” (CAAE No. 58645516.2.0000.5541), being in compliance with the requirements set out by Resolution No. 466 associated with the National Health Council, December 12, 2012.

3 RESULTS

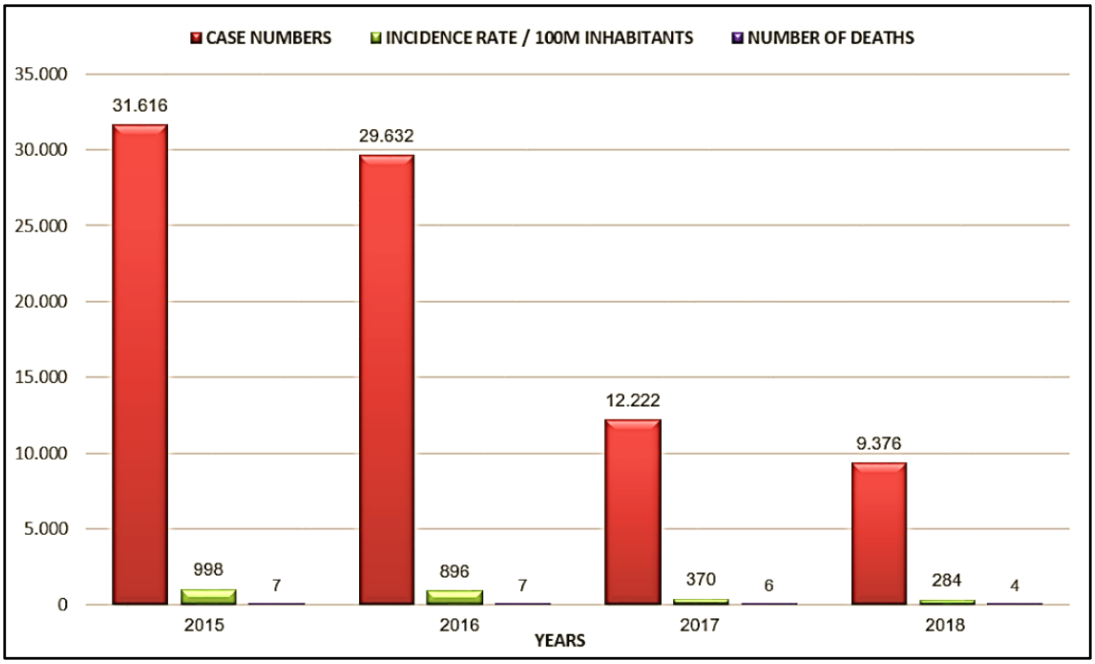
The grouped data of 2015 and 2016, for analysis (Figure 2), within the monitoring of cases of dengue in the state of (MT) up to epidemiological week (SE) N.º 50/2016 (up to 17 December 2016), considering cumulative incidence (consisting of the total number of cases that was informed in the period) considered the state of MT as being of high risk for the transmission of the disease, due to its high incidence of dengue (comprising 896 cases per 100 000 people). The number of probable cases of dengue in 2016 (29,632 cases) suggests a reduction of 6.3% in relation to the same period of 2015 (MINISTÉRIO DA SAÚDE, 2017a).

The grouped data from 2016 to 2017, with respect to analysis, includes the monitoring of cases of dengue in the state of (MT) up to epidemiological week (SE) n.º 52/2017 (up to 30 December 2017), considering accumulative incidence (representing the total number of cases that could be notified in the

period) considered the state of MT as being of high risk for the transmission of the disease, due to its high incidence of dengue (370 cases per 100 thousand people). However, the number related to the probable dengue cases that was recorded in 2017 (12,222 cases) suggests a reduction of 59% in relation to the same period of 2016 (MINISTÉRIO DA SAÚDE, 2017b).

The grouped data for the analysis of the years 2017 and 2018 within the monitoring of cases of dengue in the state of Mato Grosso (MT) up to SE n. º 52/2018 (to 30/12/2018) and considering the total incidence, shows that the state of MT has a medium incidence of dengue (284/100 thousand people). In 2018, there were 9,376 recorded probable cases of dengue, which suggests a reduction of 23.3% in relation to the same period of 2017 (MINISTÉRIO DA SAÚDE, 2018).

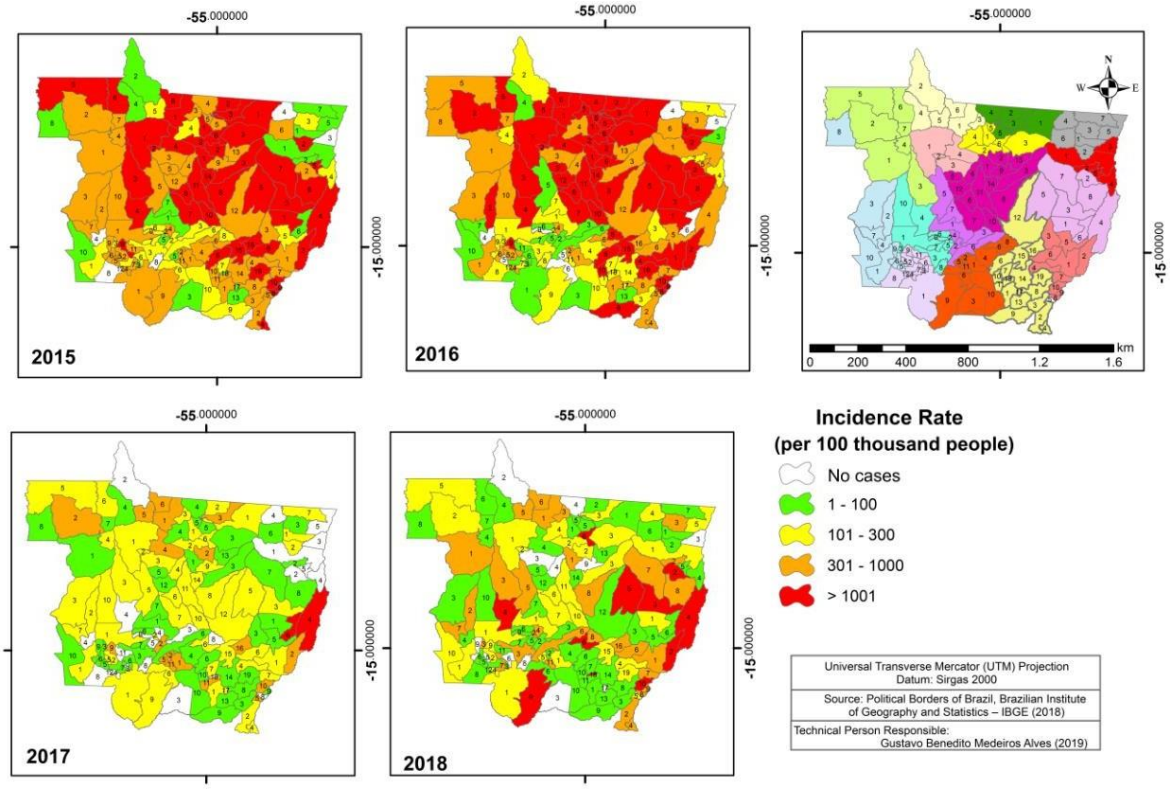
Figure 2 - Total number of probable dengue cases, incidence rate / 100 thousand inhabitants and confirmed deaths, by municipality of residence, from 2015 to 2018, in Mato Grosso state.



Source: Data obtained from SINAN (2015 - 2018).

The figure 3 shows the spatial distribution of incidence rates per 100 thousand inhabitants of probable dengue cases in the 141 municipalities regarding the Mato Grosso state with respect to their respective risk characterizations in the study period from 2015 to 2018.

Figure 3 - Shows the geographical distribution of the incidence rates for dengue, per 100 thousand people, in the 141 municipalities of MT, between 2015 and 2018.



According to the characterization of risk areas in geographic analysis, we see that in the year 2015 incidence of dengue was low in 24 municipalities, corresponding to 17.0% of the total for the state; 20 municipalities (14.2%) had medium incidence. 52 (36.9%) municipalities had high incidence, and 45 (31.9%) municipalities showed very high or epidemic incidence (defined as more than 1,000 cases/ 100 thousand people).

In the year 2015, the high risk of transmission of dengue was present in 68.79% of the municipalities of the state. All 16 Regional Health Offices of the state, in 2015, had at least one municipality with an incidence rate of 300 to 999/100 thousand people (high risk).

Stressing the critical point of the risk of transmission in the 16 Regional Health Offices, we see that 13 (81.25%) showed at least one municipality, in 2015, with an incidence rate over 1,000 cases/100 thousand people; consisting of a very significant or epidemic incidence, dependent on the number of municipalities covered by each Regional Health Office, we observed the following percentages of epidemic risk: Juara Regional Health Office (75%); Água Boa Regional Health Office (75%); Colíder Regional Health Office (66.66%); Sinop Regional Health Office (64.28%); Peixoto de Azevedo Regional Health Office (60%); Barra do Garças Regional Health Office (50%); Juína Regional Health Office (42.86%); Alta Floresta Regional Health Office (33.33%); Rondonópolis Regional Health Office (26.31%); São Félix do Araguaia Regional Health Office (20%); Cáceres Regional Health Office (16.66%); Porto Alegre do Norte Regional Health Office (14.28%); and Tangará da Serra Regional Health Office (10%). We also point out

that the highest incidence for the annual year has been associated with the municipality of Santa Carmem (6,513.76 cases/100 thousand people), in the catchment area of the Sinop Regional Health Office.

In the year 2016, in geographic analysis, we see that 26 municipalities of MT (18.44% of the total) showed low incidence of the disease; 25 (17.73%) has shown a medium incidence of dengue; 36 municipalities (25.53%) had high incidence of dengue, and 54 municipalities had incidence of very high or epidemic proportions (over 1,000 cases/100 thousand people). All 16 Regional Health Offices of MT, in 2016, had at least one municipality with incidence rate between 300 and 999/100 thousand people (high risk).

Giving emphasis to the critical point of transmission, in the 16 Regional Health Offices, we see that 14 Regional Health Offices showed at least one municipality, in 2016, with an incidence rate over 1,000 cases/100 thousand people; with a very high incidence rate in proportion to the number of municipalities subject to each Regional Health Office, the following percentages of epidemic risk were recorded: Juara Regional Health Office (100%), Peixoto de Azevedo Regional Health Office (100%), Sinop Regional Health Office (78.57%),

Água Boa Regional Health Office (75%), Colíder Regional Health Office (75%), Alta Floresta Regional Health Office (66.66%), Barra do Garças Regional Health Office (60%), Juína Regional Health Office (42.85%), Porto Alegre do Norte Regional Health Office (28.57%), Rondonópolis Regional Health Office (21.05%), Cáceres Regional Health Office (16.66%) and Tangará da Serra Regional Health Office (10%). Here we mention that the highest total incidence was recorded in the municipality of Terra Nova do Norte (5,413.28/100 thousand people), which is subordinate to the Peixoto de Azevedo Regional Health Office.

The geographic analysis for 2017 shows us that 70 municipalities (49.64%) of MT presented low incidence of dengue; 52 (36.88%) had medium incidence; 17 (12.06%) had high incidence, and two municipalities (1.42%) had incidence of very high or epidemic proportions (more than 1,000 cases/100 thousand people).

In 2017, nine (47.36%) of the 16 Regional Health Offices of MT had at the minimum one municipality consisted of an incidence rate between 300 and 999/100 thousand people (high risk). In proportion to the number of municipalities covered by each Regional Health Office, in the period the following percentages of high risk of transmission of dengue were recorded: Alta Floresta Regional Health Office (50%), Cuiabá Regional Health Office (36.36%), Juara Regional Health Office(25%), Barra do Garças Regional Health Office (20%), Juína Regional Health Office (14.28%), Diamantino Regional Health Office (14.28%), Rondonópolis Regional Health Office (10.52%), Cáceres Regional Health Office (8.33%) and Sinop Regional Health Office (7.14%).

Emphasising the critical point of transmission in the year 2017 with an incidence rate over 1,000 cases/100 thousand people, we see that very high or epidemic incidence was recorded in only two municipalities, namely Nova Nazaré (1,942.54/100 thousand people) and Cocalinho (1,174.35/100

thousand people), both within the area of the Água Boa Regional Health Office, corresponding to 25% of the total area of the State.

In 2018, the geographical distribution of incidence rates for dengue show that 68 of the municipalities in MT (48.23% of the total) showed low incidence, 32 municipalities (22.69%) showed medium incidence, 30 municipalities (21.28%) showed high incidence and 11 municipalities (7.80%) showed incidence rates of more than 1,000 cases per 100 thousand people.

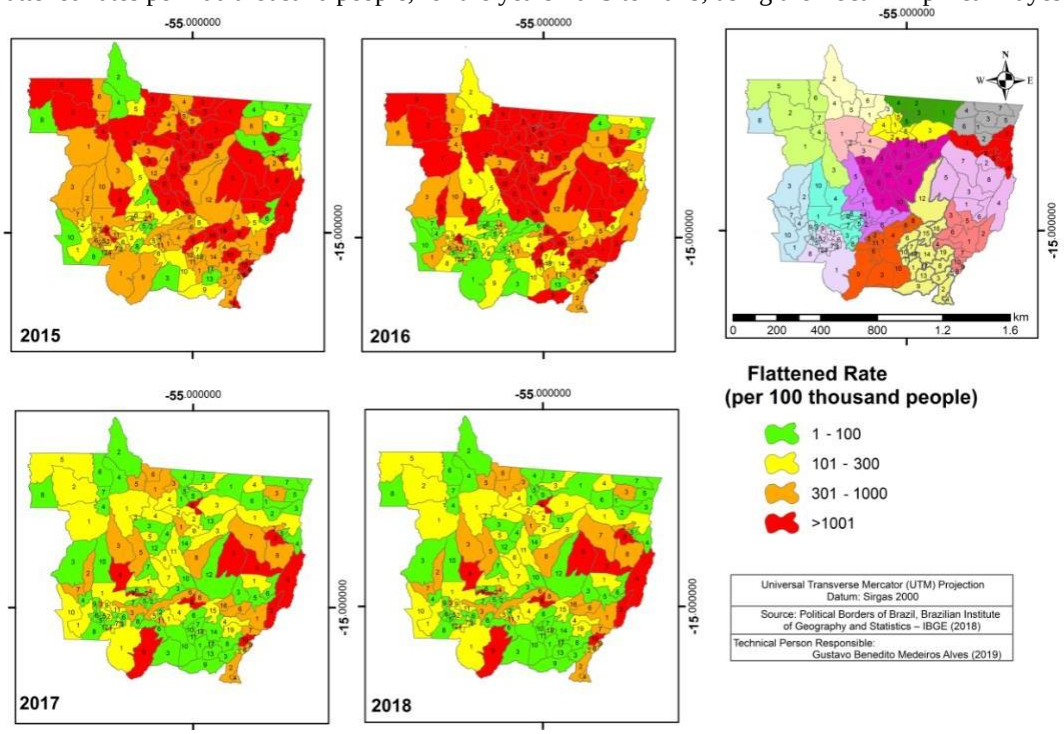
Out of the 16 Regional Health Offices of the state of MT in 2018, 13 of them (81.25%) had at least one municipality with an incidence rate between 300 and 999/100 thousand people, (high risk). In proportion to the number of municipalities covered by each Regional Health Office, the following percentages of high transmission risk were recorded in this period: Alta

Floresta Regional Health Office (66.66%), Barra do Garças Regional Health Office (50%), Regional de Diamantino (42.86%), Juara Regional Health Office(28.57%), Água Boa Regional Health Centre (25%), Tangará da Serra Regional Health Office (20%), Lacerda e Pontes Regional Health Office (20%), São Félix do Araguaia Regional Health Office (20%), Cuiabá Regional Health Office (18.18%), Rondonópolis Regional Health Office (15.78%), Porto Alegre do Norte Regional Health Office (14.28%), Sinop Regional Health Office (14.28%) and Cáceres Regional Health Office (8.33%).

Highlighting the critical point for transmission, in the 16 Regional Health Offices, in 2018, we see that 5 of these Regional Health Offices (31.25%) have demonstrated at the minimum one municipality recorded in 2016, with an incidence rate of more than 1,000 cases/100 thousand people, with a very high or epidemic incidence, in proportion to the number of municipalities covered by the respective Regional Health Office. The following percentages of epidemic risk were recorded: Água Boa Regional Health Office (50%), Barra do Garças Regional Health Office (20%), Tangará da Serra Regional Health Office (20%), Cuiabá Regional Health Office (18.18%) and the Colíder Regional Health Office (16,66%). Here we highlight that the highest accumulated incidence for 2018 was recorded in the municipality of Bom Jesus do Araguaia (3,606.77/100 thousand people), part of the Água Boa Regional Health Office.

The figure 4 the geographic analysis represents the flattened incidence rates per 100 thousand people, for the 141 municipalities of the Mato Grosso state, from 2015 to 2018.

Figure 4 - Flattened rates per 100 thousand people, for the years 2015 to 2018, using the Local Empirical Bayesian Method.



In 2015, comparing the maps of incidence rates with those generated by flattened rates, we see that the number of municipalities that presented zero risk passed from 5 to zero municipalities, while it could be noted an increase related to the total of municipalities with recorded low and medium incidence rates in 43 municipalities, distributed among the 16 Regional Health Offices of MT. The Regional Health Offices that showed very high incidence rates in 2015, in decreasing order of risk, were: Água Boa, Juara, Colíder, Sinop, Peixoto de Azevedo and Barra do Garças.

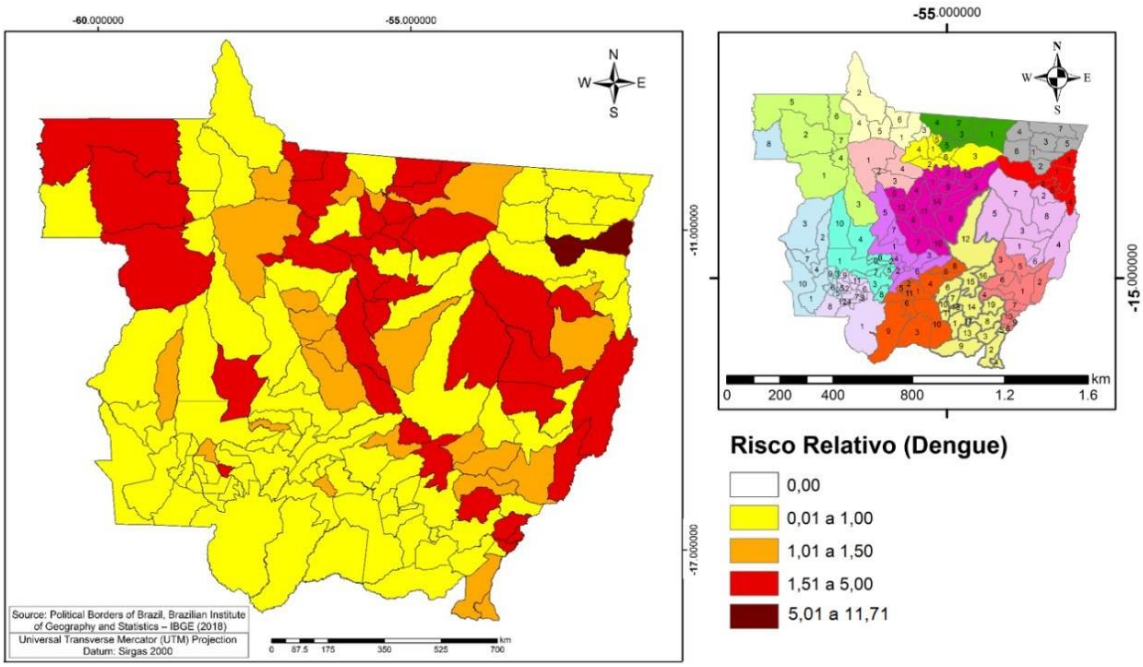
In 2016, the number of municipalities that presented zero risk fell from eight to zero, while this same year showed a rise from 43 to 52 in the number of municipalities reporting low incidence, also scattered among the 16 Regional Health Offices of MT. The Regional Health Offices with very high incidences in 2016, in descending order of risk, were: Porto Alegre do Norte, Juara, Sinop, Água Boa, Colíder, Alta Floresta and Barra do Garças).

In 2017, the number of municipalities that presented zero risk fell from 24 to zero, while this same year showed a rise from 98 to 124 in the number of municipalities reporting low incidence, also scattered among the 16 Regional Health Offices of MT. The Regional Health Offices with very high incidences in 2016, in descending order of risk, were Alta Floresta and Água Boa.

In 2018, the number of municipalities which presented zero risk fell from 14 to zero, while this same year showed a rise from 86 to 102 in the number of municipalities reporting low incidence, also scattered among the 16 Regional Health Offices of MT. The Regional Health Offices with high incidences were Alta Floresta and Barra do Garças, and the one with very high or epidemic incidence levels was the Água Boa Regional Health Office.

The figure 5 - Relative risk (RR) of the 141 municipalities distributed in the 16 health regions with respect to Mato Grosso state, in Brazil, 2015-2018 (Figure 5a). Analysis of the spatio-temporal scanning statistic in the identification of the statistically significant areas distributed in the clusters (Figure 5b).

Figure 5(a) - Relative risk (RR) of the 141 municipalities distributed in the 16 health regions in the state of Mato Grosso, Brazil, 2015-2018.



Organizer: Mário Ribeiro Alves (2020).

Figure 5(a) highlights the relative risk of 141 municipalities distributed in 16 health regions in the state of MT between 2015 and 2018. The purely spatial scanning methodology carried out by SaTScan found that 58.87% (N = 83) of the municipalities distributed in the 16 health regions, that have shown RR <1. The municipalities consisting of RRs values from 1.01 to 1.50 represented 16.31% (N = 23) distributed in 12 regional health regions in MT; the municipalities with RRs between 1.51 and 5.00 correspond to 23.40% (N = 33) also distributed in 12 health regions in the state. During the study period, the highest RR was registered in the municipality of Cana Brava do Norte belonging to the Regional Health of Porto Alegre do Norte and in the municipality of Luciara belonging to the Regional Health of São Felix do Araguaia, i.e., both municipalities with (RR = 11. 71) corresponding to 1.42% (N = 2).

Figure 5(b) – The SaTScan aims to identify the statistically significant areas distributed in the clusters.

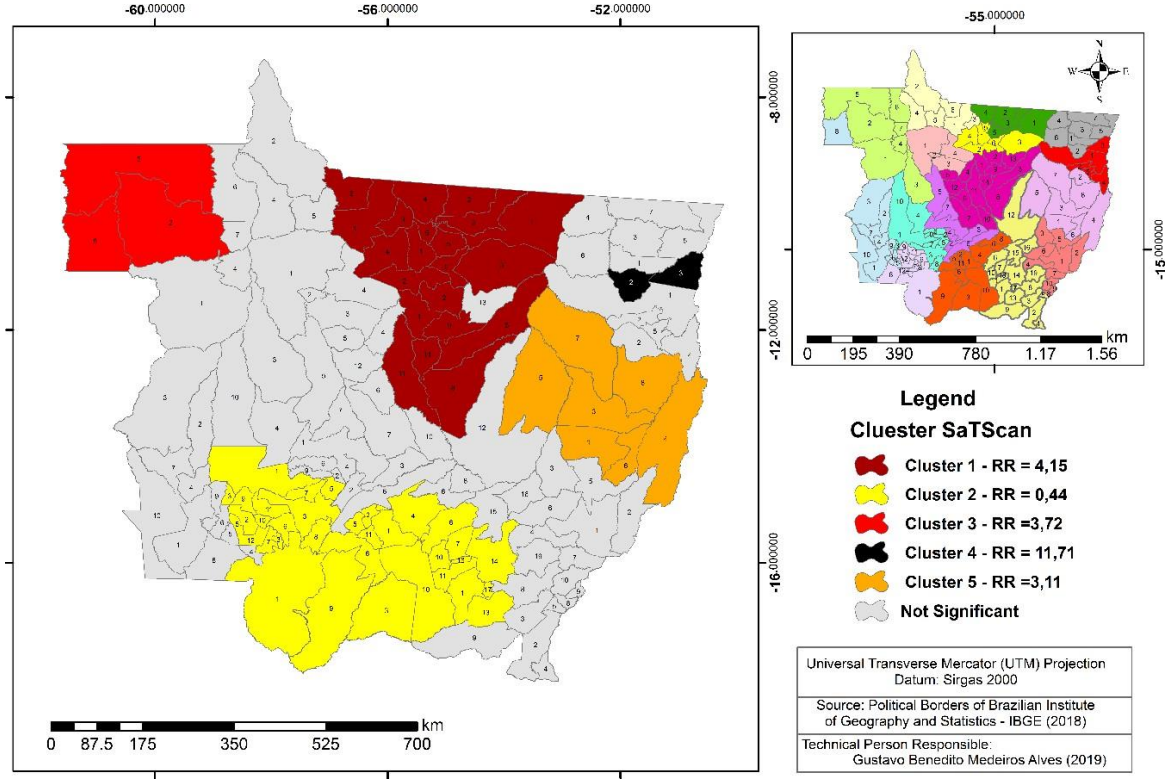


Figure 5 (b) - Analysis of the spatio scanning statistic in the identification of the statistically significant areas distributed in the clusters.

Cluster 1 Municipalities: Colíder, Itaúba, Nova Guarita, Nova Canaã do Norte, Nova Santa Helena, Carlinda, Terra Nova do Norte, Santa Carmem, Sinop, Novo Mundo, Vera, Cláudia, Alta Floresta, Guarantã do Norte, Feliz Natal, Peixoto de Azevedo, Matupá, Nova Ubiratã, Sorriso, Marcelândia and Paranaíta. Statistically significant cluster (p-value <0.01), with RR of 4.15.

Cluster 2 Municipalities: Várzea Grande, Santo Antônio do Leverger, Nossa Senhora do Livramento, Porto Estrela, Cuiabá, Jangada, Barão de Melgaço, Acorizal, São pedro da Cipa, Jaciara, Barra do Bugres, Poconé, Chapada dos Guimarães, Juscimeira, Lambari D'Oeste, Rondonópolis, Rio Branco, Salto do Céu, Dom Aquino, Curvelândia, Campo Verde, Pedra Preta, Reserva do Cabaçal, São José do Povo, Nova Olímpia, Mirassol D'Oeste, São José dos Quatro Marcos, Araputanga, Denise, Cáceres, Poxoréu, Tangará da Serra and Indiavaí. Statistically significant cluster (p-value <0.01), with RR of 0.44.

Cluster 3 Municipalities: Rondolândia, Aripuanã and Colniza. Statistically significant cluster (p-value <0.01), with RR of 3.72.

Cluster 4 Municipalities: Luciara and Canabrava do Norte. Statistically significant cluster (p-value <0.01), with RR of 11.71.

Cluster 5 Municipalities: Cocalinho, Nova Nazaré, Canarana, Água Boa, Ribeirão Cascalheira, Querência and Gaúcha do Norte. Statistically significant cluster (p-value <0.01), with RR of 3.11.

4 DISCUSSION

The present study demonstrates that in the evaluated period (2015 - 2018) the thematic maps (Figure: 3, 4 and 5) in general showed that the occurrence of dengue is dispersed in the 16 health regions of the state of MT, being the regional health with the highest number of accumulated notifications in decreasing order: Cuiabá (17454) number of cases, Sinop (16178) cases, Rondonópolis (9762) cases, Juína (5109) cases, Tangará da Serra (4885) cases, Água Boa (4358) cases, Alta Floresta (4134) number of cases, Peixoto de Azevedo (4121) number of cases, Barra do Garças (2937) number of cases, Colíder (2699) cases, Cáceres (1840) cases, Porto Alegre do Norte (1786) cases, Juara (1471) cases, Bridges and Lacerda (1215) cases, Diamantino (707) cases, however, the region with the least notification was that of São Felix do Araguaia (199) cases.

It is believed that in this period the number of probable dengue cases was higher than that reported and that there may have been diagnostic confusion with the Zika virus outbreak in 2015 and Chikungunya in 2016. On the contrary, it is noted that many dengue cases are underestimated, albeit it is a notifiable disease in the country.

In Figure 3, it was observed that 51 (36.17%) municipalities in MT that, according to the incidence rate, would present zero risk for dengue, as it does not correspond to reality. 5 (3.55%) municipalities did not register the disease in 2015, 8 (5.67) in 2016, 24 (17.02%) in 2017 and 14 (9.93%) in 2018. The analysis of the spatial distribution a dengue proved to c regions of MT. It is possible to identify areas of high occurrence of arbovirus in all years analyzed. Thus identifying the priority areas for control programs according to their risk classification. In view of the relevance of data from the studied areas, the use of the incidence rate without any treatment was considered little indicated due to its high random variability, especially when part of the studied geographical units has very low populations. The Local Spatial Empirical Bayesian Rate attributed greater influence to the geographically close municipalities, presenting more regionally consistent results, smoothing the extreme values presented in the sample.

The zero risk of the incidence rate was rectified by making a refinement making them safer for its evaluation. This method of spatial analysis proved to be viable for mapping large areas, and areas of risk detected were useful for directing public policies related to disease control.

In figure 4, with the smoothing of the dengue incidence rates seen, there was a reduction in the effects of fluctuations, revealing a trend of continuity of transmission to areas could be classified as very high, high and medium risk. The regional health centers that have the municipalities with the highest number of notifications and / or deaths from the disease are the regions of greatest concern for monitoring and formulating integrated risk analysis, control and prevention strategies by the public authorities.

In fact, it is observed that the Bayesian approaches applied for informing the dengue cases in Goiás for the flattening of indices as notified found similar results and reduced the random fluctuations of Gross Rates as calculated, showing that the Estimators minimize the influence of population size with respect to the municipalities of Goiás state. The Local Estimator reported a higher number of municipalities of Goiás

as having medium to high incidence of dengue fever, compared to the values recorded through the incidence Rates (NUNES, 2013).

On studying the geographical pattern of distribution of incidence of dengue fever concerning Manaus, there was also the application of the Local Bayesian method, and smoothened incidence rates were obtained, in a study where the neighborhood's represent their values based on their neighbours, following the reasoning that closer neighborhood's tend to have similar patterns of behaviour, while the districts further afield tend to behave somewhat differently, allowing the identification of which districts have a greater number of cases of the disease (ARAÚJO, 2014).

Reinforcing the view that the Bayesian estimator "smooths" the rates and that the census sectors nearby tend to behave similarly, and the more distant ones differ, agreeing with the pattern found in a study put into effect in the state of Goiás (CARVALHO et al, 2017).

After application of the local empirical Bayesian estimator, a greater number regarding census sectors with high and medium incidence could be identified, which demonstrates that this method reduces the random fluctuation caused by the calculation of the incidence rate, corroborating the study that deals with the spatial distribution related to the dengue cases in Rio de Janeiro state (Carvalho et al., 2017). From the use of the Bayesian estimator, the smoothing of the incidence rates was observed, which clarifies the proximity of tones of the microregions, showing more groupings, highlighting the number of homogenization rates among neighboring census sectors. Another study carried out in Espírito Santo, which also used this method corroborated this finding (HONORATO et al., 2014).

In this context, geographical statistical analysis is a relevant factor in the identification of possible correlations of the event and the space, with the stratification of risk areas for transmission of the disease. However, other factors should be monitored with the type of virus in circulation at the moment of the epidemic, and its track record, and other social, economic and environmental factors of the municipalities that could be key at the moment of an increase in the number of cases as notified at this point in time. These conditions could be taken into consideration as part of the context, as they are made up of a system of objects and actions that interact and have a dynamic relationship, showing historical variations. As time goes by, they undergo transformations through human actions (ROJAS, 2008; SANTOS, 2002).

Given the above, we observed that the state of MT has a similar behavior associated with the transmission profile of dengue disease when this state is compared to the rest of the other Brazilian states, with cycles of peak illnesses in Brazil that may occur from three to five years, almost regularly. Thus, as Brazil had its highest peak of cases and the highest number of deaths in 2015, in the state of MT that same year was a year considered epidemic, a situation that continued in 2016, in the two subsequent years 2017 and 2018 there was a decrease the incidence of the disease throughout Brazil, which was also monitored in the state of MT

In the figure 5(a), it could be noted that RR, i.e.,, measure applied in this study, comprises the proportion between the total of disease occurrence in a determinate area and time and total of people

exposed at the same point in time and location. To sum up, it is noted that this measure may be highly influenced by a reduced size or rare occurrences concerning the population exposed. Notwithstanding, in this study, regardless of these municipalities they may be considered small consisting of an indicator that could describe some random fluctuation as well as making comparisons weak with other municipalities, it is relevant to take into account the use of Bayesian rates, which may estimate the municipal rate, that considers the values related to the neighbor municipalities, thus making the interpretation associated with the municipal rates more trustworthy and also correcting this bias (SOUZA et al, 2018).

In the analysis of the results, the application of the spatial scanning technique in order to calculate the RR was suitable for the identification of municipalities at risk of dengue transmission.

In figure 5 (b), in decreasing order of RR values, we had the following distribution in the municipalities of the state of MT for the analysis of the spatio statistics of the clusters in SaTScan (66 municipalities with statistically significant areas). Thus distributed:

In cluster 4 registered the statistically significant value with (p-value <0.01) and the highest Relative Risk of the space-time analysis (RR of 11.71). Covering 2 (1.42%) municipalities distributed in 2 region health of MT. The municipality of Luciara belongs to the Regional Health Department of São Felix do Araguaia and the municipality of Canabrava do Norte belongs to the Regional Health Department of Porto Alegre do Norte.

In cluster 1, the value was statistically significant with (p-value <0.01) and RR of 4.15. Covering 21 (14.89%) municipalities distributed in 4 health regions of MT (Regional Health Department of: Alta Floresta, Colíder, Peixoto de Azevedo and Sinop).

In cluster 3, the value was statistically significant with (p-value <0.01) and RR of 3.72. Covering 3 (21.28%) municipalities distributed in 2 region health of MT. The municipalities of Aripuanã and Colniza belonging to Regional Health Department of Juína and the municipality of Rondolândia belonging to Regional Health Department of Pontes e Lacerda. In cluster 5, the statistically significant value was recorded with (p-value <0.01) and the RR = 3.11. Where 7 (4.96%) municipalities are: Cocalinho, Nova Nazaré, Canarana, Água Boa, Ribeirão Cascalheira, Querência and Gaúcha do Norte all belonging to the Regional Health Department of Água Boa.

In cluster 2, the value was statistically significant with (p-value <0.01) and RR of 0.44. Covering 33 (23.40%) municipalities distributed in 4 health region of the state (Regional Health Department of: Cáceres, Cuiabá, Rondonópolis and Tangará da Serra).

Some limitations of this study regarding the possibility of underreporting and diagnostic confusion in the probable cases of dengue with zika and chikungunya, were also described in another study carried out in the state of Maranhão (Costa et al., 2018).

5 FINAL CONSIDERATIONS

Spatial analysis helps to identify the regions with the greatest risks for the incident regarding the arboviruses through their periodic epidemic cycles in the state, this analysis can contribute to the formulation of integrated monitoring strategies and significantly within the scope of practices aimed primarily at promotion, prevention of arboviruses in the population of these territories.

This study proposed to minimize the problem associated with the use of crude incidence rates and its high instability in demonstrating the risk of rare events associated with the regions of population situated in small areas, consisting of the use of the Local Empirical Bayes Method that uses information from the entire region or neighborhood to estimate the risk of the event occurring in each area.

The incidence rates that may be smoothed by this local empirical Bayes method corrected the eventual oscillations resulting from the problem of estimating small areas, that may contribute to reducing the variation, the random and the natural, present in the gross rates, eliminating the zero risk of dengue, reducing the effects of random fluctuations in the monitored areas improving the analysis of transmission risk in the territories.

The spatial analysis of local associations of incidence rates identified, through thematic maps, the priority areas in the 141 municipalities of the state of Mato Grosso for Health Surveillance performance, identifying a heterogeneity in the incidence of reported cases, also pointing out the existence of epidemiological silence of the dengue notifications by some municipalities during the study period. The incidence rate maps showed that the high risk of transmission ranged from 12.76% to 68.79% in 2017 and 2015, respectively.

The use of the spatial scanning technique with the application of the SaTScan software has been used in order to calculate the RR, demonstrating statistically significant data in the identification of risk clusters for disease transmission in the study period.

Dengue control is a major challenge for global public health. In the search for integrated control, the use of spatial tools and the elaboration of risk maps that characterize the transmission areas can facilitate this assessment for decision-making in a timely manner, establishing priority areas for the development of control program actions.

ACKNOWLEDGMENTS

This study was carried out with the support of the Research Support Foundation of the State of Mato Grosso – FAPEMAT (Induced Bidding process: Aedes aegypti 007/2016-2), being part of the research project under the title of: Prevention and Control: Viral analysis in Aedes aegypti (Linnaeus, 1762), to identify risk areas and factors that could be conducive to arboviroses.

FINANCIAL SUPPORT

The Doctoral Course in Collective Health from the PPGSC / UFMT postgraduate program in public health is funded by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) (in English Coordination for the Improvement of Higher Education Personnel) Brazil.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

ARAÚJO, Mirélia R.; DESMOULIÈRE, Sylvain J. M.; LEVINO, Antônio. Padrão espacial da distribuição da incidência de dengue e sua relação com a variável renda na Cidade de Manaus, Estado do Amazonas, Brasil. Revista Pan-Amazônica de Saúde, 2014; p.11-20. DOI: 10.5123/S2176-62232014000200002.

BARBOSA, Isabelle R.; SILVA, Lúcio P. Influência dos determinantes sociais e ambientais na distribuição espacial da dengue no município de Natal-RN. Revista Ciência Plural, v. 1,

n. 3, p. 62-75, 2015. Disponível em: https://www.periodicos.ufrn.br/rcp/article/view/8583#:~:text=A%20precipita%C3%A7%C3%A3o%20pluviom%C3%A9trica%20mensal%20e,os%20indicadores%20sociais%20e%20amb ientais.

BARCELLOS, Christovam C. et al. Identificação de locais com potencial de transmissão de dengue em Porto Alegre através das técnicas de geoprocessamento. Revista da Sociedade Brasileira de Medicina Tropical, 2005; 38(3): 246-50. DOI: 10.1590/S0037-

86822005000300008.

BÖHM, Andrea W. et al. Tendência da incidência de dengue no Brasil, 2002-2012. Epidemiologia Serviços de Saúde [Internet]. 2016 Dec [cited 2020 Apr 15]; 25 (4): 725-733. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2237- 96222016000400725&lng=en. DOI: 10.5123/s1679-49742016000400006.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Coordenação-Geral de Desenvolvimento da Epidemiologia em Serviços. Guia de Vigilância em Saúde: volume único [recurso eletrônico] / Ministério da Saúde, Secretaria de Vigilância em Saúde, Coordenação-Geral de Desenvolvimento da Epidemiologia em Serviços. – 3ª. ed. – Brasília : Ministério da Saúde, 2019. p. 435 : il. Available at: http://bvsms.saude.gov.br/bvs/publicacoes/guia_vigilancia_saude_3ed.pdf. Acesso em: 14 abr. 2021.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Monitoramento dos casos de arboviroses urbanas transmitidas pelo Aedes (dengue, chikungunya e Zika) Semanas Epidemiológicas de 01 a 52 de 2019. Boletim Epidemiológico (BE - 02), vol. 51, jan. 2020. Disponível em: https://www.saude.gov.br/images/pdf/2020/janeiro/20/Boletim- epidemiologico-SVS-02-1-.pdf. Acesso em: 14 abr. 2021.

CÂMARA, Gilberto. et al. Análise espacial e geoprocessamento. In: DRUCK, S.; CARVALHO, M.S.; CÂMARA, G.; MONTEIRO, A.V.M. (editores). Análise espacial de dados geográficos. Brasília, EMBRAPA, 2004. Disponível em: http://www.dpi.inpe.br/gilberto/livro/analise/cap1-intro.pdf.

CARVALHO, Alexandre X. Y. et al. Mapeamento de taxas bayesianas, com aplicação ao mapeamento de homicídios nos municípios brasileiros. Rio de Janeiro: Ipea, set. 2011. (Texto para Discussão, n. 1.662). Disponível em: http://www.ipea.gov.br/portal/images/stories/PDFs/TDs/td_1662.pdf.

CARVALHO, Marília S. et al. Conceitos Básicos em Análise de dados Espaciais em saúde. IN: SIMONE, Maria S.; WAYNER, Vieira S. (Org). Introdução à Estatística Espacial para a Saúde Pública. Série: Capacitação e atualização em geoprocessamento em saúde. Ministério da Saúde. Brasília, cap. 1, pag. 13-25, 2007. Disponível em:

http://www.escoladesaude.pr.gov.br/arquivos/File/TEXTOS_CURSO_VIGILANCIA/capacitacao_e_atualizacao_em_geoprocessamento_em_saude_3.pdf.

CARVALHO, Camila O; RABELLO, Renata S; THOMÉ, Sandra M. G. Distribuição espacial da dengue no estado do Rio de Janeiro no período de 2001 a 2012. Revista Brasileira de Geografia Médica e da Saúde. Hygeia, v. 14, n. 27, p. 108 - 123, 2018. DOI: 10.14393/Hygeia142709.

CARVALHO, Silvia; MAGALHÃES, Mônica A. F. M; MEDRONHO, Roberto A. Análise da distribuição espacial de casos da dengue no município do Rio de Janeiro, 2011 e 2012. Revista de Saúde Pública, v. 51, e79, 2017. DOI: 10.11606/s1518-8787.2017051006239.

CASTANHA, Priscila M. S. et al.Placental Transfer of Dengue Virus (DENV)-Specific Antibodies and Kinetics of DENV Infection-Enhancing Activity in Brazilian Infants. Journal Infectious Diseases, 2016; p.265-272. DOI: 10.1093/infdis/jiw143.

COSTA, Silmery S. B. et al. Spatial analysis of probable cases of dengue fever, chikungunya fever and zika virus infections in Maranhão State, Brazil. Revista do Instituto de Medicina Tropical de São Paulo, v. 60, e62, 2018. DOI: 10.1590/S1678-9946201860062.

DRUCK, Suzana. et al. Análise Espacial de Dados Geográficos. Brasília: Embrapa, 2004. 209p. Disponível em: http://www.dpi.inpe.br/gilberto/livro/analise/. Acesso em: 21 set. 2021.

ESRI. What is GIS?. Disponível em http://www.gis.com/whatisgis/index.html. Acesso em: 11 de maio de 2020.

GUODONG, Liang; XIAOYAN, Gao & ERNEST, A Gould (2015). Factors responsible for the emergence of arboviruses; strategies, challenges and limitations for their control, Emerging Microbes & Infections, 4:1, 1-5, DOI: 10.1038/emi.2015.18.

GUZMAN, Maria G. et al. Dengue infection. Nature Reviews Disease Primers 2, 16055 (2016). DOI: 10.1038/nrdp.2016.55.

HONORATO, Taizi. et al. Spatial analysis of distribution of dengue cases in Espírito Santo, Brazil, in 2010: use of Bayesian model. Revista Brasileira de Epidemiologia, São Paulo, v. 17, p. 150-159, 2014. DOI: 10.1590/1809-4503201400060013.

IBGE – Instituto Brasileiro de Geografia e Estatística, Projeções demográficas 2018. Rio de Janeiro: IBGE; 2019. Disponível em: https://www.ibge.gov.br/. Acesso em: 20 de Ago. 2020.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. Brasil e Mato Grosso -

Cidades: síntese das informações. Rio de Janeiro: IBGE; 2019. Disponível em: https://cidades.ibge.gov.br/brasil/mt. Acesso em: 10 de Ago. 2020.

JONES, Stephen G; KULLDORFF Martin. Influence of spatial resolution on space-time disease cluster detection. PLoS One 2012; 7(10):e48036. DOI: 10.1371/journal.pone.0048036.

KALE, Pauline L; COSTA, Antônio J. L; LUIZ Ronir R. Medidas de Associação e Medidas de Impacto. In: MEDRONHO, Roberto, BLOCH, Kátia V; LUIZ, Ronir R; WERNECK, Guilherme L., editors. Epidemiologia. 2ª ed. Rio de Janeiro: Editora Atheneu; 2009. p. 181- 190.

KULLDORFF, Martin. A spatial scan statistic. Commun Stat - Theory Methods [Internet]. 1997 Jun 27 [cited 2015 Feb 4]; 26(6):1481-1496. Available from: http://www.tandfonline.com/doi/abs/10.1080/03610929708831995#.VNJkMmjF_4Y. DOI: 10.1080/03610929708831995.

LIMA, Virgília L. et al. Utilização de Sistema de Informações Geográficas na Rotina de Controle da Dengue. Boletim Epidemiológico Paulista, v.29, n.3, p.13, 2006. Disponível em: http://www.saude.sp.gov.br/resources/ccd/homepage/bepa/2006/29_maio_2006.pdf. Acesso em: 12 set. 2021.

MAROUN, Samara L. C. et al. Relato de Caso: Transmissão Vertical de Dengue. Jornal de Pediatria, 2008; p.556-559. DOI: 10.1590/S0021-75572008000700014.

MARSHALL, Robert J. Mapping disease and mortality rates using empirical Bayes estimators. J R Stat Soc Ser C Appl Stat, v. 40, p. 283-94, 1991. Disponível em: https://pubmed.ncbi.nlm.nih.gov/12157989/.

MCCULLAGH, P, Nelder JA. Generalized Linear Models. 2nd ed. London, New York: Chapman & Hall; 1989. DOI: 10.1201/9780203753736.

MINISTÉRIO DA SAÚDE. Secretaria de Vigilância em Saúde. Secretaria de Estado de Saúde de Mato Grosso. Vigilância Epidemiológica. Dengue, Febre de Chikungunya e Febre pelo Vírus Zika. Boletim Epidemiológico, n.° 35. Ed. 01, S.E. 50/2016, (2017a). Disponível em: http://www.saude.mt.gov.br/suvsa/arquivos/526/boletins-epidemiologicos?page=2. Acesso em: 06 de Ago. 2020.

MINISTÉRIO DA SAÚDE. Secretaria de Vigilância em Saúde. Secretaria de Estado de Saúde de Mato Grosso. Vigilância Epidemiológica. Dengue, Febre de Chikungunya e Febre pelo Vírus Zika. Boletim Epidemiológico, n.º 45. Ed. 01, S.E. 52/2017, (2017b). Disponível em: http://www.saude.mt.gov.br/suvsa/arquivos/526/boletins-epidemiologicos?page=2. Acesso em: 08 de Ago. 2020.

MINISTÉRIO DA SAÚDE. Secretaria de Vigilância em Saúde. Secretaria de Estado de Saúde de Mato Grosso. Vigilância Epidemiológica. Informe Epidemiológico n.° 31, SE n. 52/2018, (2018). Dengue, Febre de Chikungunya e Febre pelo Vírus Zika. Disponível em: http://www.saude.mt.gov.br/suvsa/arquivos/526/boletins-epidemiologicos?page=2. Acesso em 10 de Ago. 2020.

MINISTÉRIO DA SAÚDE. Secretaria de Vigilância em Saúde. Secretaria de Estado de Saúde de Mato Grosso. Vigilância Epidemiológica. Informe Epidemiológico n.º 18, SE n. 30/2019, (2019). Dengue, Febre de Chikungunya e Febre pelo Vírus Zika. Disponível em: http://www.saude.mt.gov.br/suvsa/arquivos/526/boletins-epidemiologicos?page=2. Acesso em 12 de Ago. 2020.

MINISTÉRIO DA SAÚDE. Vigilância Epidemiológica. Programa Nacional de Controle da Dengue (PNCD). Brasília (DF): 2002. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/pncd_2002.pdf. Acesso em: 25 de ago. 2020.

NUNES, Fabrizia G. Abordagem bayesiana na epidemiologia espacial de notificações de casos de dengue no Estado de Goiás. In: XVI SBSR- Simpósio Brasileiro de Sensoriamento Remoto, 2013, Foz do Iguaçu, PR. Anais... Foz do Iguaçu, PR, 2013. Artigo p.8554-8560. CD- ROM, On-line. Disponível em: http://marte2.sid.inpe.br/col/dpi.inpe.br/marte2/2013/05.28.23.33.42/doc/p0522.pdf Acesso em: 14 nov. de 2020.

PIGNATTI, Marta G. et al. Vulnerabilidade Espacial da Dengue no Estado de Mato Grosso no período 2007-2009. In: SANTOS, Marina A; PIGNATTI Marta G, CHAVES, A.L. Questões Ambientais em Saúde Coletiva. Cuiabá. EdUFMT. 2012. P. 73-94.

ROJAS, Luísa B. I. La diferenciacion territorial de la salud em la recuperacion de los contextos. In: BARCELLOS, Christovam. A geografia e o contexto dos problemas de saúde. Rio de Janeiro: ABRASCO: 2008; ICICT: EPSJV. Disponível em: http://www.retis.igeo.ufrj.br/conteudo/autor/luisa-basilia-iniguez-rojas/#.YjeNderMJPY

SANTOS, Milton. A natureza do espaço. 3.ed. São Paulo: Hucitec, 2002. Disponível em: https://bibliodigital.unijui.edu.br:8443/xmlui/bitstream/handle/123456789/1799/A%20natureza%20do%20Espa%C3%A7o.pdf?sequence=1&isAllowed=y.

SECRETARIA DE ESTADO DE PLANEJAMENTO DE MATO GROSSO – SEPLAN/MT.

Coordenadoria de Métodos Estatísticos, de Pesquisa e de Indicadores. Caderno de Indicadores Demográficos de Mato Grosso. 1ª. ed. 2018. 81p. Disponível em: http://www.seplan.mt.gov.br/documents/363424/5931254/Caderno+Indicadores+Demogr%C3%A1ficos_+2018.pdf/6bc0f6e9-0e31-0edd-157b-289ddf0b7b43. Acesso em: 14 nov. 2020.

SHERMAN Recinda L. et al. Applying spatial analysis tools in public health: an example using SaTScan to detect geographic targets for colorectal cancer screening interventions. Prev Chronic Dis 2014; 11:E41. DOI:10.5888/pcd11.130264.

SILVA, Alexandro M. et al. Modelagem Geoestatística dos Casos de Dengue e da Variação Termopluviométrica em João Pessoa, Brasil. Soc. nat., v. 27, p. 157- 169, 2015. DOI:10.1590/1982-451320150111.

SOUZA, Elaine C. O. et al. Socioeconomic factors and risk for hospitalisation due to asthma in children in the municipalities of Mato Grosso State, Brazil. Ciência e Saúde Coletiva [Internet]. 2018 Ago [citado 2020 Maio 07] ; 23(8): 2523-2532. DOI: 10.1590/1413-81232018238.18692016.

SOUZA, Wayner V. et al. Análise Espacial de Dados de Áreas. IN: SIMONE, Maria S.; WAYNER, Vieira S. (orgs). Introdução à Estatística Espacial para a Saúde Pública. (Série Capacitação e Atualização em Geoprocessamento em Saúde; vol. 3, cap.3. p. 61-78). Brasília: Ministério da Saúde, 2007. Disponível em: http://www.escoladesaude.pr.gov.br/arquivos/File/TEXTOS_CURSO_VIGILANCIA/capacitacao_e_atualizacao_em_geoprocessamento_em_saude_3.pdf .

SOUZA, Wayner V. et al. Introdução à Estatística Espacial para a Saúde Pública. Série: Capacitação e atualização em geoprocessamento em saúde. vol. 3, Ministério da Saúde. Brasília, 2007. 120 p. Disponível em: http://www.escoladesaude.pr.gov.br/arquivos/File/TEXTOS_CURSO_VIGILANCIA/capacitacao_e_atualizacao_em_geoprocessamento_em_saude_3.pdf.

WORLD HEALTH ORGANIZATION (WHO). Dengue and Severe Dengue. WHO; 2019..Fact.sheet.812,,Available.at: https://www.paho.org/bra/index.php?option=com_content&view=article&id=5963:folha- informativa-dengue-e-dengue-grave&Itemid=812. Updated March 2019. Accessed: 2020-09-

09.

CHAPTER 62

Effects of aromatherapy on menopausal symptoms: an integrative literature review

10.56238/rsfohsv1-062

Kenderly Camila Baltokoski
Medical Student, University Center of the Americas (FAM)
Rua Augusta, 1508, Bairro Consolação - São Paulo, SP, Zip Code: 01304-001
E-mail: kenderly.vda@gmail.com

Maísa Cristina de Lima Nascimento
Medical Student, University Center of the Americas (FAM)
Rua Augusta, 1508, Bairro Consolação - São Paulo, SP, Zip Code: 01304-001
E-mail: maisanascimento@protonmail.com

Gustavo Maximiliano Dutra da Silva
Master's and PhD in Research in Surgery from the Faculty of Medical Sciences of Santa Casa de São Paulo (FCMSCSP), with focus on Menopause, Metabolic Syndrome, Obesity and Female Sexual Dysfunctions. He is an obstetrician gynecologist for the State Health Secretariat (SES) of São Paulo - CRSM Hospital Pérola Byington and UGA IV Hospital Maternidade Leonor Mendes de Barros.
Rua Augusta, 1508, Bairro Consolação - São Paulo, SP, Zip Code: 01304-001
E-mail: gumaxy@yahoo.com.br

ABSTRACT
Introduction: Some symptoms related to menopause can be alleviated by hormone replacement therapy, but due to the side effects and risks that this therapy offers patients, complementary and alternative medicine, especially aromatherapy, has proved to be an option for the treatment of unwanted symptoms. of menopause. Aromatherapy is a technique that uses aromatic essential oils extracted naturally from plants that enter the body either topically or by inhalation. Objective: To review the literature on the effect of aromatherapy on unwanted menopausal symptoms. Methodology: This is an integrative literature review carried out by searching for scientific studies related to the topic, in the following databases: PubMed, MEDLINE, Cochrane and LILACS, with the following descriptors: "aromatherapy" and "menopause". Only clinical trials published between 2011 and 2021 and in English and Portuguese were considered. Results: In total, fifty-three articles were found from the search for descriptors and, according to the eligibility criteria, eleven studies were selected for this research. All studies considered the practice of aromatherapy as an intervention and showed a reduction in unwanted menopausal symptoms. Discussion: Based on the results found, it is observed that in all clinical trials analyzed, aromatherapy seems to be effective in reducing symptoms resulting from menopause. Conclusion: Aromatherapy can be effective in decreasing menopausal symptoms and therefore can improve the health, well-being and quality of life of menopausal women. However, the sample of clinical trials analyzed was limited and the effects were analyzed in the short term, and larger scale studies are needed in the future.

Keywords: Aromatherapy, Menopause, Volatile oils.

1 INTRODUCTION

Menopause is retrospectively defined as the last menstrual period followed by twelve months of amenorrhea, that is, it determines the permanent cessation of menstruation and occurs, on average, at the age of fifty-one years (KO, S.; KIM, H., 2020). However, with the increase in life expectancy, women have come to live in the period after menopause for more than a third of their lives (KHADIVZADEH, T. et al., 2018).

Regarding physiology, menopause occurs due to a primary ovarian insufficiency. There is depletion of ovarian follicles, probably secondary to apoptosis, and the ovary loses the ability to respond to pituitary hormones (folliculostimulating hormone (FSH) and luteinizing hormone (LH)), which causes the ovarian production of estrogen and progesterone to cease. In response to ovarian insufficiency and the absence of negative ovarian feedback, FSH levels increase, and this is an important sign of menopause. However, menopausal women continue to have low levels of circulating estrogens due to peripheral aromatization of

ovarian and adrenal androgens, with estrone being the main hormone in climacteric women (PEACOCK, K.; KETVERTIS, K. M.; DOERR, C., 2021).

Menopause is responsible for the emergence of some unwanted symptoms that affect the quality of life of women in this phase, such as vasomotor phenomena (heat waves and night sweats) and psychosomatic symptoms, experienced differently due to each person's distinct psychological, social, and cultural characteristics (KARGOZAR, R.; AZIZI, H.; SALARI, R., 2017).

According to Kargozar, R.; Azizi, H. and Salari, R. (2017), heat waves are the most common symptoms and are characterized by periodic flushing and sudden sweating disorder with chills, palpitations, anxiety, feeling of pressure in the head and chest, nausea, choking and lack of concentration. In addition, estrogen deficiency-induced atrophy of the urogenital tract occurs that can lead to specific symptoms such as pruritus, dyspareunia, urethritis, dysuria, incontinence, and increased frequency of urination (KARGOZAR, R.; AZIZI, H.; SALARI, R., 2017). Also, the dramatic reduction in circulating levels of estrogen and androgen can cause various sexual dysfunctions, including dyspareunia, reduced libido, lack of sexual desire, poor arousal, impaired orgasm, and reduced satisfaction (KHADIVZADEH, T. et al., 2018).

Vasomotor symptoms and other menopause-related complications can be alleviated by hormone replacement therapy (HRT), according to Roozbeh, N. et al. (2019). However, despite significant evidence of the benefits of HRT, some common side effects have been reported, such as breast cancer, coronary heart disease, and pulmonary embolism (ROOZBEH, N. et al., 2019). Because of the side effects and risks that HRT offers patients, complementary and alternative medicine, particularly aromatherapy, has been shown to be an option for unwanted menopausal symptoms (BABAKHANIAN, M. et al., 2018). Also, several studies have shown a significant propensity of women to complementary therapies and medicinal plants, including several plants have been studied for their effects on vasomotor and psychosomatic symptoms (KARGOZAR, R.; AZIZI, H.; SALARI, R., 2017).

In complementary medicine, aromatherapy is a technique that uses aromatic essential oils extracted naturally from plants that penetrate the body through the skin topically or by inhalation through the olfactory system (BABAKHANIAN, M. et al., 2018). Essential oils are composed of numerous substances, possessing unique chemical properties that give them peculiarities that cannot be replaced by other synthetic substances, despite the olfactory similarity (GNATTA, J. R. et al., 2016).

Aromatherapy has been used for thousands of years. Hippocrates, the father of modern medicine, advocated the use of aromatherapy because he believed that aromatic baths and scented massages were fundamental to good health (FARRAR, A. J.; FARRAR, F. C., 2020). Although the use of the therapeutic properties of essential oils is archaic, the term "aromatherapy" was first used in 1928 by French chemist René Maurice Gattefossé who investigated the analgesic, antibacterial and healing properties of essential oils (LUCENA, L. D. R., 2020).

One theory suggests that aromatherapy may be both psychologically and physiologically effective, because it is believed that aromas activate olfactory nerve cells and result in stimulation of the limbic system, which is responsible for emotions, feelings, and motivational drives. Depending on the type of aroma, nerve cells release different neurotransmitters, including enkephalin, endorphin, noradrenaline, and serotonin that generate an analgesic effect and produce a sense of well-being and relaxation (TAAVONI, S. et al., 2013).

Based on this explanation, this paper raises the following problem: does the practice of aromatherapy have a beneficial effect on the unwanted symptoms of menopause? As an objective, this paper sought to review the literature on the effect of aromatherapy on vasomotor phenomena, psychosomatic symptoms, and sexual dysfunction resulting from menopause.

2 METHODS

This is an integrative literature review conducted by searching for scientific studies related to the topic in the following published data sources: PubMed, MEDLINE, Cochrane and LILACS, with the following descriptors (DECs and MeSH): "aromatherapy" and "menopause". Only clinical trials published in the period from 2011 to 2021 were considered.

After screening the databases, duplicate studies that appeared in more than one database were excluded and a two-step screening was performed.

The following inclusion criteria were adopted: addressing the effect of aromatherapy on menopausal symptoms; being a clinical trial; being published in English or Portuguese; and having been published between 2011 and 2021.

In the first step of the screening, the titles and abstracts of the studies found were read. Studies with incongruent themes that did not address the practice of aromatherapy in menopausal symptoms and studies that did not fit the other inclusion criteria were excluded.

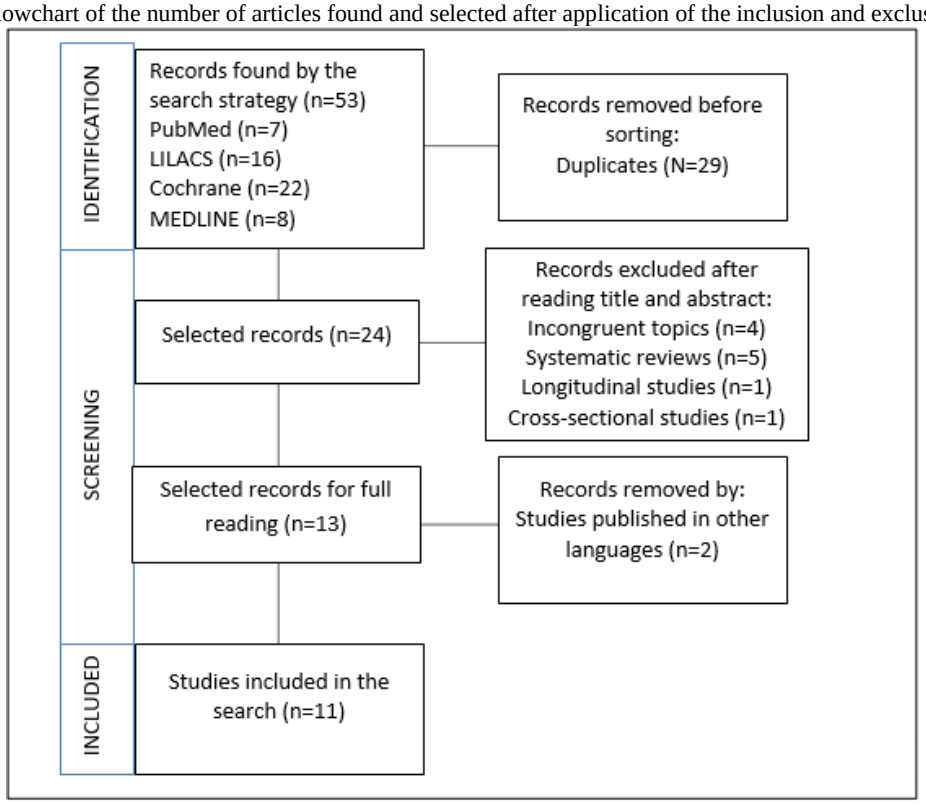
In the second stage, all the remaining studies from the previous stage were read in their entirety and the ones that made it possible to answer the questions of this research were selected.

After the articles were selected, data was collected through a critical reading, with the necessary impartiality and objectivity, seeking answers to the objectives of this research, and then an interpretative reading, in which the information and ideas of the authors were related to the problems raised by this study.

3 RESULTS

In total, fifty-three articles were found from the search for the descriptors. Of this total, seven were found in PubMed, sixteen in LILACS, twenty-two in Cochrane, and eight in MEDLINE. According to the eligibility criteria, eleven articles were selected for this research, as shown in Figure 1, based on the PRISMA model (PAGE, M. J. et al., 2020).

Figure 1: Flowchart of the number of articles found and selected after application of the inclusion and exclusion criteria



Source: PAGE, M. J. *et al.* The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. Doi: 10.1136/bmj.n71

The selected studies were classified according to Table 1 and categorized by author, title, country and year of publication, database, and type of study. Of these articles, seven were published in Iran, two in Brazil, one in Turkey, and one in South Korea. Regarding the year of publication, two studies were published in 2020, one in 2019, two in 2018, one in 2017, one in 2016, one in 2014, two in 2013, and one in 2012. Of the eleven studies selected, ten correspond to randomized clinical trials, while one is a non-randomized clinical trial, being nine articles, one master's dissertation (LUCENA, L. D. R., 2020) and one doctoral thesis (LYRA, C. S. de., 2013).

Table 1: Presentation of studies by authors, title, country and year of publication, database, and type of study.

Authors	Title	Country and year of publication	Database	Type of study
DARSAREH, F. *et al.*	*Effect of aromatherapy massage on menopausal symptoms: a randomized placebo-controlled clinical trial*	Iran, 2012.	Pubmed	Randomized Clinical Trial
LYRA, C. S. de.	Aromatherapy and yogatherapy in the climacteric period: the effects of aromatherapy and yogatherapy on quality of life, stress levels, and the intensity and frequency of hot flushes in women in the climacteric phase.	Brazil, 2013.	LILACS	Double-blind randomized clinical trial
TAAVONI, S. *et al.*	*The effect of aromatherapy massage on the psychological symptoms of postmenopausal Iranian women*	Iran, 2013.	Pubmed	Randomized Clinical Trial

CHOI, S. Y. *et al.*	*Effects of inhalation of essential oil of Citrus aurantium L. var. amara on menopausal symptoms, stress, and estrogen in postmenopausal women: a randomized controlled trial.*	South Korea, 2014.	Cochrane	Randomized Clinical Trial
KAZEMZADEH, R. *et al.*	*Effect of lavender aromatherapy on menopause hot flushing: a crossover randomized clinical trial*	Iran, 2016.	Pubmed	Double-blind randomized clinical trial
MALAKOUTI, J. *et al.*	*The impact of ginkgo biloba tablet and aromatherapy inhaler combination on sexual function in females during postmenopausal period: A double-blind randomized controlled trial.*	Iran, 2017.	Cochrane	Double-blind randomized clinical trial
NIKJOU, R. *et al.*	*The effect of lavender aromatherapy on the symptoms of menopause*	Iran, 2018.	Pubmed	Double-blind randomized clinical trial
JOKAR, M. *et al.*	*The effects of lavender aromatherapy on menopausal symptoms: a single blind randomized placebo controlled clinical trial.*	Iran, 2018.	Cochrane	Single-blind randomized clinical trial
BAKHTIARI, S. *et al.*	*Effect of lavender aromatherapy through inhalation on quality of life among postmenopausal women covered by a governmental health center in Isfahan, Iran: A single-blind clinical trial*	Iran, 2019.	Pubmed	Single-blind randomized clinical trial
LUCENA, L. D. R.	Effects of lavender essential oil on sleep in postmenopausal women with insomnia	Brazil, 2020.	Cochrane	Double-blind randomized clinical trial
GÜRLER, M.; KIZILIRMAK, A.; BASER, M.	*The effect of aromatherapy on sleep and quality of life in menopausal women with sleeping problems: a non-randomized, placebo-controlled trial.*	Turkey, 2020.	LILACS	Non randomized clinical trial

Source: Authors.

To better visualize the results found, Table 2 presents the purpose, the number of patients in the intervention and control groups, the average age of the sample, the intervention time, the measurement tools, and the main relevant findings of the studies included in this research.

In the eleven selected clinical trials, the samples consisted of no more than one hundred and eighty menopausal women ($n \leq 180$). About the intervention time, three studies lasted twelve weeks, one study six weeks, five studies four weeks, one study twenty-nine days, and one study five days. All studies considered inhaled or topical aromatherapy as an intervention, with two studies evaluating the effect of aromatherapy massage and the other seven studies evaluating the effect of inhaling essential oils on menopausal symptoms. In addition, one study evaluated olfactory aromatherapy alone and in combination with yogatherapy breathing exercises and another study looked at the effect of aromatherapy and *Ginkgo biloba*. Regarding the essential oils used in the studies, five studies used lavender essential oil alone, one study used lavender and lemon essential oils in synergy, another study used lavender, fennel, geranium and rose essential oils in synergy, another clinical trial used aromatherapy

combined with lavender, sage, geranium, rosemary and orange essential oils, two studies considered the topical application, in the form of massage, of lavender, geranium, rose and rosemary essential oils in synergy and one study used neroli essential oil alone.

Table 2: Presentation of the studies' objectives and outcomes.

Reference	Purpose of the study	No. of intervention and control patients	Average age of the sample	Intervention time	Measurement Tools	Major relevant findings
DARSAREH, Fatemeh *et al.*	Determine the effect of aromatherapy massage (lavender, geranium, rose, and rosemary) on menopausal symptoms.	Aromatherapy massage (n = 30), placebo massage (n = 30) and control (n = 30	45-60 years old	4 weeks	Menopause Rating Scale (MRS)	Both massage and massage with aromatherapy were effective in reducing menopausal symptoms, relative to the control ($p < 0.001$). However, massage with aromatherapy was more effective than massage alone ($p < 0.001$).
LYRA, C. S. de.	To verify and analyze the physiological and psychological clinical outcomes of olfactory aromatherapy (lavender, sage, geranium, rosemary, and orange) and yogatherapy breathing exercises, associated and individual, on quality of life, subjective *stress* levels, and the intensity and frequency of hot flushes in women in the climacteric stage.	Aromatherapy and Yogatherapy (n = 8), yogatherapy (n = 9), aromatherapy (n = 8) and control (n = 11)	40-60 years old	12 weeks	SF-36 quality of life questionnaire, women's health question Pittsburgh sleep quality index (PSQI), body resonance questionnaire (RESCOR) and visual analog scale for stress (VAS-stress	The results of the research showed statistically significant improvement in climacteric symptoms for all three intervention groups. There was a significant decrease in the symptom of hot flushes, as well as in the complaint of hot flushes, with hot flushes being eliminated in five subjects. The improvement in vasomotor climacteric symptoms (hot flushes and night sweats), was accompanied by significant improvement in subjective *stress* levels, sleep quality and quality of life in all intervention groups.
TAAVONI, S. *et al.*	To determine the effect of massage with aromatherapy (lavender, geranium, rose, and rosemary) on psychological symptoms during menopause.	Aromatherapy massage (n = 30), placebo massage (n = 30) and control (n = 30	45-60 years old	4 weeks	Menopause Rating Scale (MRS)	The aromatherapy massage decreased the psychological score more than the massage without aromatherapy.
CHOI, S. Y. *et al.*	To investigate the effects of inhaling *Citrus aurantium var. amara* essential oil (neroli oil) on menopausal symptoms, stress, and estrogen in postmenopausal women.	0.1% neroli oil (n = 22), 0.5% neroli oil (n = 19) and control (n = 22)	55.81 years	5 days	Menopause-specific quality of life questionnaire (MENQOL) and visual analog scale for sexual desire and stress (VAS)	Compared to the control group, both neroli oil groups showed significant improvements in MENQOL and sexual desire ($p <0.001$). These findings indicate that inhaling neroli oil helps relieve menopausal symptoms, increases sexual desire, and reduces blood pressure in postmenopausal women.
KAZEMZADEH, R. *et al.*	To determine the effect of lavender aromatherapy on menopausal flushing.	Aromatherapy (n = 50) and placebo (n = 50)	45-55 years old	12 weeks	Recording the frequency of heat waves and flushing by the patients	The frequency of blushing decreased significantly in the intervention group compared to the control group ($p < 0.001$).
MALAKOUTI, J. *et al.*	To evaluate the effect of *Ginkgo biloba* pill and combined lavender, fennel, geranium and rose aromatherapy on decreasing sexual dysfunction in postmenopausal women.	*Ginkgo biloba* (n = 60), aromatherapy (n = 60) and placebo (n = 60)	45-55 years old	6 weeks	Female Sexual Function Index (FSFI)	The combination of *Ginkgo biloba* tablet with aromatherapy improved sexual function in all subdomains of the sexual function score in postmenopausal women ($p < 0.003$), with the exception of the pain subdomain, compared to the control group.
NIKJOU, R. *et al.*	To evaluate the effect of lavender aromatherapy on menopausal symptoms.	Aromatherapy (n = 50) and placebo (n = 50)	45-55 years old	12 weeks	Green's Questionnaire	Significant reduction of unwanted menopausal symptoms: anxiety, depression, physical symptoms, vasomotor symptoms, and sexual dysfunction, in the intervention group compared to the control group ($p = 0.000$).

JOKAR, M. *et al.*	To evaluate the effects of lavender aromatherapy on menopausal symptoms.	Aromatherapy (n = 35) and placebo (n = 35)	-	4 weeks	Kupperman Menopausal Index (KMI)	Menopausal symptoms decreased significantly in the intervention group compared to the placebo group ($p < 0.05$).
BAKHTIARI, S. *et al.*	To determine the effect of lavender aromatherapy on the quality of life of postmenopausal women.	Aromatherapy (n = 31) and placebo (n = 31)	45-65 years old	4 weeks	Menopause-specific quality of life questionnaire (MENQOL)	Improvement in the mean total score of quality of life and its various dimensions in the intervention group compared to placebo ($p < 0.001$).
LUCENA, L. D. R.	To evaluate the effect of inhaling *Lavandula angustifolia* essential oil on sleep and menopausal symptoms in postmenopausal women with insomnia.	Aromatherapy (n = 17) and placebo (n = 18)	48-65 years old	29 days	*Stop-bang* questionnaire, hospital anxiety and depression scale (HADS), menopausal assessment scale (MAS), menopause-specific quality of life (SEMQ), Epworth sleepiness scale (ESS), insomnia severity index (IGI), Pittsburgh sleep quality index (PSQI), and polysomnography (PSG)	There was a trend toward improved time awake after sleep onset (WASO). Participants who used *Lavandula angustifolia* essential oil showed a significant increase in sleep efficiency and percentage of REM sleep and a significant decrease in sleep onset latency, level of depression, vasomotor symptoms, and hot flashes.
GÜRLER, M.; KIZILIRMAK, A.; BASER, M.	To determine the effects of lavender and lemon aromatherapy on the sleep quality and quality of life of women suffering from poor sleep quality during the menopausal period.	Aromatherapy (n = 27) and placebo (n = 30)	43.8-53 years	4 weeks	Pittsburgh Sleep Quality Index (PSQI) and the menopause-specific quality of life questionnaire (MENQOL)	For the intervention group, the median PSQI (sleep) scores and median total MENQOL (quality of life) scores after aromatherapy administration were significantly lower than those before administration ($p < 0.001$) and those in the placebo group ($p < 0.001$).

3.1 AROMATHERAPY IN MENOPAUSAL SYMPTOMS

Regarding vasomotor symptoms of menopause, a randomized clinical trial conducted by Kazemzadeh *et al.* (2016) with a sample of one hundred menopausal women indicated that the use of lavender aromatherapy reduced the frequency of hot flashes and flushing. In this clinical trial, the samples were randomly blocked and divided into two groups: intervention (lavender) and control (diluted milk). Lavender essential oil was inhaled for twenty minutes twice a day for a period of twelve weeks in the intervention group. The results showed that the frequency of heat waves and flushing significantly decreased in the intervention group compared to the control ($p < 0.001$). Also, according to Kazemzadeh *et al.* (2016), this reduction may be related to a decline in stress hormone and a stimulation of beta-endorphin secretion (KAZEMZADEH, R. *et al.* , 2016).

Another randomized clinical trial, conducted by Nikjou *et al.* (2018), evidenced that after inhaling lavender essential oil for twelve weeks, there was a significant reduction in the following unwanted menopausal symptoms: anxiety, depression, physical symptoms, vasomotor phenomena, and sexual dysfunction. The sample was composed of one hundred menopausal women and divided into two groups: intervention (lavender) and control (diluted milk). Lavender essential oil was inhaled for twenty minutes twice a day for a period of twelve weeks in the intervention group. The comparison of the level of unwanted menopausal symptoms before and after the use of lavender aromatherapy in the experimental group suggested that the percentage of symptoms decreased significantly ($p = 0.000$). The comparison of the average menopausal symptoms between the two groups after the intervention suggested that in the

experimental group the menopausal symptoms had a significant decrease compared to the control group (p = 0.000) (NIKJOU, R. *et al.* , 2018).

Regarding sexual dysfunction in postmenopausal women, a clinical trial, conducted by Malakouti *et al.* (2017), evaluated the effect of *Ginkgo biloba* tablet and combined aromatherapy (lavender, fennel, geranium and rose) for six weeks in one hundred and eighty women divided into three groups: *Ginkgo biloba (*n = 60), aromatherapy (n = 60) and placebo (n = 60). The study showed a significant improvement of sexual dysfunction in all subdomains of the female sexual function index (FSFI) ($p < 0.003$), with the exception of the pain subdomain, compared to the control group (MALAKOUTI, J. *et al.* , 2017).

A significant improvement in menopausal symptoms was found by a randomized clinical trial conducted by Jokar *et al.* (2018). In this trial, the sample consisted of seventy menopausal women who were randomly assigned to two groups: intervention and placebo. The women were given containers of 2% lavender essential oil or distilled water and were trained to apply two drops of the provided liquid to a piece of paper towel attached to the collar, twenty minutes before nighttime sleep, for four full weeks. The occurrence of symptoms was assessed using the Kupperman menopausal index (KMI), which considers eleven symptoms: hot flashes and sweats, paresthesia and tingling, insomnia, nervousness, depression, dizziness, fatigue, myalgia and arthralgia, headache, palpitations, and memory impairment. The results indicated that all menopausal symptoms assessed in both groups (intervention and placebo) significantly decreased during the study ($p < 0.05$), but the decrease in the intervention group was significantly greater than in the placebo group ($p < 0.05$) (JOKAR, M. *et al.* , 2018).

Bakhtiari *et al.* (2019) evidenced in their randomized clinical trial that inhalation of lavender essential oil can improve the quality of life of menopausal women. The menopause-specific quality of life questionnaire (MENQOL), which assesses vasomotor, psychosocial, physical symptoms, and dysfunction in sexual relationships, was used in this study. The sample consisted of sixty-two postmenopausal women who were divided into two groups: control (n = 31) and intervention (n = 31). The intervention group inhaled 2% lavender essential oil every night before bed for twenty minutes for one month, while the control group received placebo (distilled water) and proceeded in the same way as the intervention group. The results after the intervention, showed a significant difference in the mean total score of quality of life and its various dimensions (vasomotor, psychosocial, physical symptoms and dysfunction in sexual relationships) between the aromatherapy and placebo groups ($p < 0.001$) (BAKHTIARI, S. *et al.* , 2019).

Lyra (2013), in turn, verified the effects of olfactory aromatherapy (lavender, sage, geranium, rosemary and orange) and yogatherapy breathing exercises, associated and individually, on the quality of life, levels of subjective *stress* and the intensity and frequency of hot flushes in women in the climacteric phase, during twelve weeks. The sample was divided into: aromatherapy and yogatherapy (n = 8), yogatherapy (n = 9), aromatherapy (n = 8), and control (n = 11). The results of the research showed a statistically significant improvement in climacteric symptoms for all three intervention groups. There was a significant decrease in the symptom of hot flushes, as well as the complaint of hot flushes, with hot flushes

being eliminated in five women. The improvement of vasomotor climacteric symptoms (hot flushes and night sweats), was accompanied by significant improvement in subjective *stress* levels, sleep quality, and quality of life in all intervention groups (LYRA, C. S. de., 2013).

Choi et al. (2014) investigated the effects of inhaling neroli essential oil for five days on menopausal symptoms, stress, and estrogen in postmenopausal women. The sample was divided into: 0.1% neroli oil (n = 22), 0.5% neroli oil (n = 19), and control (n = 22). Compared to the control group, both neroli oil groups showed significant improvements in MENQOL and sexual desire ($p < 0.001$) (CHOI, S. Y. *et al.* , 2014).

An experimental study, of the randomized clinical trial type, conducted by Lucena (2020), evaluated the effect of inhaling lavender essential oil on sleep and menopausal symptoms. The sample consisted of 35 women with a clinical diagnosis of insomnia who were distributed into 2 groups: placebo, which inhaled sunflower vegetable oil before bedtime and aromatherapy, which inhaled *Lavandula angustifolia*

essential oil before bedtime, for 29 days. The results after the intervention indicated that there was no significant difference when comparing the groups in the post-intervention period in sleep quality. However, there was a trend toward improvement in time awake after sleep onset (WASO). Both groups showed improvement in sleep quality over time, but the participants in the aromatherapy group showed a significant decrease in sleep onset latency, level of depression, vasomotor symptoms, postmenopausal symptoms and, according to polysomnography data, a significant increase in sleep efficiency (LUCENA, L. D. R., 2020).

Still regarding sleep, another study, conducted by Gürler, Kizilirmak and Baser (2020), analyzed the effects of lavender and lemon aromatherapy for four weeks in women suffering from poor quality sleep during the menopausal period, divided into: aromatherapy (n = 27) and placebo (n = 30) and showed that aromatherapy improved the quality of sleep and quality of life of these women. For the intervention group, the median Pittsburgh Sleep Quality Index (PSQI) scores and median total MENQOL scores after aromatherapy administration were significantly lower than those before administration ($p < 0.001$) and those in the placebo group ($p < 0.001$) (GÜRLER, M.; KIZILIRMAK, A.; BASER, M., 2020).

Darsareh *et al.* (2012) analyzed aromatherapy massage with the essential oils of lavender, geranium, rose and rosemary (in synergy) and showed that this type of aromatherapy was also effective in reducing overall menopausal symptoms, analyzed through the menopause rating scale (MRS). The sample was divided into three groups: aromatherapy massage (n = 30), placebo massage (n = 30), and control (n = 30). Both massage and aromatherapy massage were effective in reducing menopausal symptoms compared to the control ($p < 0.001$). However, massage with aromatherapy was more effective than massage alone ($p < 0.001$) (DARSAREH, F. *et al.* , 2012). In another study, conducted by Taavoni *et al.* (2013), aromatherapy massage with the essential oils of lavender, geranium, rose and rosemary (in synergy), was also effective in reducing the psychological symptoms of menopause, analyzed through MRS. The sample was divided into three groups, being: aromatherapy massage (n = 30), placebo massage (n = 30), and control (n = 30).

Aromatherapy massage decreased psychological scores more than massage without aromatherapy (TAAVONI, S. *et al.*, 2013).

4 DISCUSSION

Based on the results found, it is observed that aromatherapy can be effective in decreasing unwanted menopausal symptoms, including vasomotor phenomena, psychosomatic symptoms, and sexual dysfunction, in all the clinical trials analyzed.

Regarding the vasomotor phenomena of menopause, characterized by hot flashes and flushing, five studies demonstrated through the analysis of validated questionnaires that these symptoms decreased significantly in the intervention group after aromatherapy (BAKHTIARI, S. et al., 2019; JOKAR, M. et al., 2018; KAZEMZADEH, R. et al., 2016; LUCENA, L. D. R., 2020; LYRA, C. S. de., 2013). Also, according to Lyra's (2013) study, the intervention was able to eliminate hot flushes in five patients and the improvement in vasomotor symptoms was accompanied by a significant improvement in stress levels. Another clinical trial also showed that the frequency of hot flashes decreased significantly in the intervention group compared to the control group, but the analysis of this study was performed through records made by the patients, indicating the number of times the hot flashes occurred before and after aromatherapy, without the use of a validated questionnaire (KAZEMZADEH, R. et al., 2016).

The intensity of psychosocial and physical symptoms of menopause decreased considerably after aromatherapy in all selected studies that evaluated these domains. Three authors assessed anxiety, depression, and other unspecified physical symptoms and evidenced that the level of these symptoms decreased significantly in the aromatherapy group (BAKHTIARI, S. et al., 2019; LUCENA, L. D. R., 2020; NIKJOU, R. et al., 2018). In another clinical trial conducted by Jokar et al. (2018), which obtained the same positive results as the previous studies, the psychosocial and physical symptoms assessed were further specified using the Kupperman menopausal index and included: nervousness, depression, insomnia, vertigo, paresthesia, tingling, fatigue, myalgia, arthralgia, headache, palpitations, and memory impairment. In addition, Taavoni et al. (2013), looked at aromatherapy massage and showed that this type of aromatherapy was also effective in reducing the psychological symptoms of menopause. Darsareh et al. (2012), on the other hand, evidenced that aromatherapy massage, with essential oils of lavender, geranium, rose, and rosemary (in synergy), was also effective in reducing overall menopausal symptoms.

Comparing the results found, sexual dysfunction also improved significantly in the intervention groups in all clinical trials analyzed that encompassed this domain (BAKHTIARI, S. et al., 2019; JOKAR, M. et al., 2018; KAZEMZADEH, R. et al., 2016; LUCENA, L. D. R., 2020; LYRA, C. S. de., 2013). The clinical trial by Malakouti et al. (2017), on the other hand, evaluated the effect of Ginkgo biloba tablet and combined aromatherapy of lavender, fennel, geranium, and rose in postmenopausal women, also evidencing a significant improvement in sexual dysfunction through the female sexual function index (FSFI).

Regarding the quality of sleep, Lucena (2020) showed that participants in the aromatherapy group had a significant decrease in sleep onset latency and a considerable increase in sleep efficiency, according to data obtained by whole night polysomnography. Another study, conducted by Gürler, Kizilirmak, and Baser (2020), looked at the effects of lavender and lemon aromatherapy (in synergy) on women who suffered from poor quality sleep during the menopausal period and showed that aromatherapy improved the quality of sleep and quality of life of these women through the PSQI and MENQOL.

Taking into consideration the results found and the relationship between unwanted menopausal symptoms and quality of life, it is noted that from the reduction of symptoms in the intervention groups, there was an improvement in the quality of life of these women, evidenced in four clinical trials, through the analysis of MENQOL or the SF-36 quality of life questionnaire (BAKHTIARI, S. et al, 2019; CHOI, S. Y. et al., 2014; GÜRLER, M.; KIZILIRMAK, A.; BASER, M., 2020; LYRA, C. S. de., 2013).

This integrative literature review can provide a detailed summary of the current evidence related to the effectiveness of aromatherapy on menopausal symptoms, as well as useful information about acceptability and applicability in the field of complementary and alternative medicine research for physicians and patients. However, there are some limitations that should be taken into consideration for future research. Although the search strategy was comprehensive, it is possible that there was a failure to detect some studies.

One of the main limitations was the small sample sizes. In addition, the studies included in this review reported only the short-term effects of aromatherapy on menopausal symptoms, consequently the long-term effects remain unknown. Not all of the clinical trials reviewed used reliable and validated tools to measure the outcomes presented. Furthermore, almost all studies compared the effect of aromatherapy with placebo, so it is suggested that the effect of aromatherapy be compared with another conventional treatment in future studies.

The present results suggested the effectiveness of aromatherapy in decreasing menopausal symptoms, improving the health, well-being, and quality of life of menopausal women. However, these results should be interpreted with caution in light of the limitations mentioned. New well-designed studies with larger sample sizes are needed for a definitive conclusion.

5 FINAL CONSIDERATIONS

The present review, seeking to answer whether the practice of aromatherapy has a beneficial effect on menopausal women, demonstrated that aromatherapy can be effective in decreasing unwanted menopausal symptoms, including vasomotor phenomena, psychosomatic symptoms, and sexual dysfunction, and therefore can improve the health, well-being, and quality of life of menopausal women. Moreover, considering the side effects and contraindications of hormone replacement therapy, aromatherapy can be used by menopausal women as an alternative therapy with noticeable benefits, as well as being a simple, non-invasive, and safe method. However, it is important to note that although the results

of the studies were positive, the sample size of all clinical trials analyzed was small and the effects were analyzed in the short term, and larger scale studies are needed in the future to evaluate the effectiveness of aromatherapy on menopausal symptoms.

REFERENCES

BABAKHANIAN, M. et al. Effect of aromatherapy on the treatment of psychological symptoms in postmenopausal and elderly women: a systematic review and meta-analysis. Journal of menopausal medicine, 2018, v. 24, n. 2, p. 127-132.

BAKHTIARI, S. et al. Effect of lavender aromatherapy through inhalation on quality of life among postmenopausal women covered by a governmental health center in Isfahan, Iran: A single-blind clinical trial. Complementary therapies in clinical practice, 2019, v. 34, p. 46-50.

CHOI, S. Y. et al. Effects of inhalation of essential oil of Citrus aurantium L. var. amara on menopausal symptoms, stress, and estrogen in postmenopausal women: a randomized controlled trial. Evidence-Based Complementary and Alternative Medicine, v. 2014, 2014.

DARSAREH, F. et al. Effect of aromatherapy massage on menopausal symptoms: a randomized placebo-controlled clinical trial. Menopause, 2012, v. 19, n. 9, p. 995-999.

FARRAR, A. J.; FARRAR, F. C. Clinical aromatherapy. The Nursing Clinics of North America, 2020, v. 55, n. 4, p. 489.

GNATTA, J. R. et al. Aromaterapia e enfermagem: concepção histórico-teórica. Revista da Escola de Enfermagem da USP, 2016, v. 50, p. 127-133.

GÜRLER, M.; KIZILIRMAK, A.; BASER, M. The effect of aromatherapy on sleep and quality of life in menopausal women with sleeping problems: a non-randomized, placebo-controlled trial. Complementary Medicine Research, 2020, v. 27, n. 6, p. 421-430.

JOKAR, M. et al. The effects of lavender aromatherapy on menopausal symptoms: a single blind randomized placebo controlled clinical trial. International Journal of Pharmaceutical Research, 2018, v. 10, n. 4, p. 182-188.

KARGOZAR, R.; AZIZI, H.; SALARI, R. A review of effective herbal medicines in controlling menopausal symptoms. Electronic physician, 2017, v. 9, n. 11, p. 5826.

KAZEMZADEH, R. et al. Efeito da aromaterapia de lavanda no afrontamento na menopausa: um ensaio clínico randomizado cruzado. Jornal da Associação Médica Chinesa, 2016, v. 79, n. 9, pág. 489-492.

KHADIVZADEH, T. et al. Aromatherapy for sexual problems in menopausal women: a systematic review and meta-analysis. Journal of menopausal medicine, 2018, v. 24, n. 1, p. 56-61.

KO, S.; KIM, H. Menopause-associated lipid metabolic disorders and foods beneficial for postmenopausal women. Nutrients, 2020, v. 12, n. 1, p. 202.

LUCENA, L. D. R. Efeitos do óleo essencial de lavanda na qualidade de sono em mulheres na pós-menopausa com insônia. Dissertação de mestrado. São Paulo, 2020. 94 pp.

CHAPTER 63

The vision of bioethical principles regarding immunization

10.56238/rsfohsv1-063

Alessandre Gomes de Lima
Faculty of Medicine, University of Porto, Portugal. Federal University of Acre, Brazil. Uninorte University Center, Brazil
E-mail: alessandregomes@hotmail.com

Ruth Silva Lima da Costa
Uninorte University Center, Brazil
E-mail: ruttylyma@gmail.com

João José Albuquerque de Sousa Júnior
Federal University of Acre, Brazil
E-mail: joaojrpersonal@hotmail.com

Gilvana de Jesus do Vale Campos
Faculty of Medicine, University of Porto, Portugal
E-mail: gilvalecampos@hotmail.com

Laércio Medeiros Silva Júnior
Faculty of Medicine, University of Porto, Portugal
E-mail: laerciomedsilvaj@hotmail.com

Leuda Maria da Silva Davalos
Medical School of the University of Porto, Portugal. Uninorte University Center, Brazil
E-mail: leudadav@hotmail.com

Osvaldo de Sousa Leal Júnior
Faculty of Medicine, University of Porto, Portugal. Federal University of Acre, Brazil
E-mail: osvaldo.junior@ufac.br

Cirley Maria de Oliveira Lobato
Federal University of Acre, Brazil
E-mail: cirleylobato@gmail.com

Dilza Terezinha Ambros Ribeiro
Federal University of Acre, Brazil
E-mail: dilzaambros@hotmail.com

Rui Manuel Lopes Nunes
Faculty of Medicine, University of Porto, Portugal
E-mail: ruinunes@med.up.pt

ABSTRACT
Advances in science have made many contributions to human development. Vaccines are one of the best examples of this, working as a tool capable of preventing infectious diseases. *Oğject'n e:* to analyze the principles of bioethics regarding the offer of vaccination to the population. *Method:* This is an integrative literature review, carried out through a survey of studies published in databases of the Electronic Science Library Online (ScIELO), Virtual Health Library (BVS), Brazilian Journal of Nursing (REBEn), in the period from 2016 to 2022. *Results.* The different authors discussed the relationship between the offer of mass vaccination and bioethics, showing that this practice can lead to non-observance of bioethical principles, since the common good that is the fact of offering immunization to all, can be understood as respect for the principle of justice, more than it can directly interfere with the principle of individual autonomy, since compulsory vaccination is defended based on the principle that, in the scope of collective health, the protection of the population must prevail over the autonomy of the individual. However, for this, the vaccine needs to have its effectiveness proven, in order to respect the principle of beneficence and non-maleficence in the act of its application. C'onc/usiori: One of the ways to ensure respect for bioethical principles regarding vaccination is to choose the path of health education for the population so that they can understand the importance and make their own choices, thus respecting the bioethical principle of autonomy.

Keywords: Bioethics, Autonomy, Justice, Vaccination.

1 INTRODUCTION

Bioethics, called the "ethics of life," can be broadly understood as a set of various factors that ethically value and legitimize human actions and that can impact life events" (Goldirn, 2006).

This area of interdisciplinary study is evolving as an applied ethics, proposing to resolve conflicts and moral dilemmas existing in the relationships and interactions between institutions, teams, environments, and individuals, configuring itself as a strong link between philosophy and the biological sciences, responsible for studying the effects of technological development on the environment, people, and public health, listing reflections on certain moral behavior (Nunes & Nunes, 2004; Schramm, 2017).

Vaccines are health technologies made from substances that, when used inserted into the human body, stimulate the immune system by producing antibodies to protect it against various diseases (Cohen, 2020). Vaccination is considered one of the world's greatest advances in health care, providing immunization against infectious-contagious pathologies, which characterize problems for public health due to the high spread and increased morbidity and mortality (Taschner, 2015).

In this sense, vaccines are instruments of public health policy, evidencing an important strategy in the world for the promotion and prevention of diseases, aiming to break the links in the chain of disease transmission through the administration of immunobiologicals. In Brazil, vaccination strategies have achieved high levels of efficiency and served as a parameter for similar initiatives in other countries (Souza, et al., 2015).

Therefore, the benefits of vaccines for public health are unquestionable, however, when addressing such aspects in a bioethical way, one can provide reflection on the understanding of the complexity of vaccination supply, in order to prevent the spread of disease, and the conflict with respect for the bioethical principle of autonomy, beneficence and non-maleficence (Lessa & Schramm, 2015).

Thus, the objective of this study is to analyze the principles of bioethics when it comes to offering vaccinations to the population.

2 METHODOLOGY

This study is an integrative literature review, conducted through a literature survey using data from secondary sources. The integrative literature review is a method that aims to synthesize results obtained in research on a topic or issue, in a systematic, orderly and comprehensive manner (Ercole, et al., 2014).

The guiding question adopted for this study was "what is the relationship of bioethics to the provision of vaccines to the population?"

The steps taken for the operationalization of this review were: 1-choosing the guiding question; 2-selecting the studies that made up the sample based on the inclusion and exclusion criteria of the research; 3- establishing the information that will be captured and classifying the studies; 4- analytical judgment of the articles included in the review; 5- critical analysis of the articles included and discussion of the results; 6- report of the review and synthesis of the information acquired during the other steps.

Data collection was performed from July 1 to July 30, 2022 and for the selection of articles the following databases were used:, Electronic Library of Science Online (ScIELO), Virtual Health Library (BVS), Brazilian Journal of Nursing (REBE@, published in the period of using the descriptors/Mesh: Bioethics and Vaccines and bioethics and vaccine , in the chronological period from 2016 to 2022.

The inclusion criteria used were: available electronically for free, articles published in Portuguese and English, full text with abstracts available, and published from 2016 to 2022. The exclusion criteria were as follows: articles that did not answer the research's guiding question and that were duplicated in the different databases.

After applying the mentioned criteria, a total of 61 articles were found. After reading the full text of the articles, 6 studies were selected that answered the research question and were selected to compose the scope of the results of this study, as shown in Chart 1.

Table 1. Selection of the anigos included in the study.

1st Search:	Criterion 01	Criterion 02	Criterion 03	Criterion 04	Criterion 05	TOTAL
Bioethics and Vaccines and bioethics and vaccine **SCIHLO** 32 Articles	**Available at** free **14 items**	**Language** Portuguese/English 4	**Year of Publication 2016 - 2022** 4	**Exclusion of** articles **duplicates** 3	**Response** to **question** North American	
Bioethics and Vaccines and bioethics and vaccine **BVS** 18 articles	**Available at** free 10	**Language** Portuguese/English 7	**Year of** **Publication 2012 - 2021** 7	**Exclusion of** articles **duplicates** 0	**Response** to **question** North American 4	4
Bioethics and Vaccines and bioethics and vaccine REBEn 11 Articles	**Available at** free 8	**Language** Portuguese/English 8	**Year of** **Publication 2012 - 2021** g	**Exclusion of** articles **duplicates** 0	**Response** to **question** North American	
Overall Total						6Arú OB

Source: Research Data (2022).

Data analysis was carried out descriptively, categorizing the data extracted from the selected studies into thematic groups, from the identification of variables of interest and key concepts. The results were categorized in a table adjusted for this purpose containing the following items: author, year, publication journal, and research title, with the purpose of providing a comparative analysis, in such a way as to enable the acquisition of answers to the study's problem.

The research was not submitted to the local Research Ethics Committee (REC) because it was a study in secondary sources and did not fit within the CONEP/MS legislation, resolution 466/2012.

3 RESULTS AND DISCUSSION

Chart 2 demonstrates the articles included in the sample that answered the guiding question proposed for the study, namely to know: what is the relationship of bioethics with the supply of vaccines to the population?

Table 2: Summary of articles included in the sample that answered the guiding question.

AUTHOR/YEAR	CO PERIODS	TITL'LO	OBJETŁ¥'O	RESULTS
Soiiza de Jesus et at., 2016	Acta bioethica,	Bioethical aspects dc vaccination in mass in Brazil	Report mrna disciissfio regarding the practice of mass vaccination under the optics of Bioethics Principialist considered the role of the State and the cultural aspects related aessa practice.	There is an undervaluation of ethical principles related to aiitonomy, nfio-maleficence,charity and justice, as well as mrna disregard for the aspects culture of those vaccinated by the State and health professionals.
Minski, & Longhini, 2016	Amis de Medicina	Vaccination: aiitonomy of patient to no vaccination.	Reflect on from bioethical principle of aiitonomiatantono àmbito of vaccination compulsory by the State how much in the power of refusal vaccination by the individual and in the resulting infancy of that decision in the relationship between "well-being collective versus individual.	It is inferred that the best choice, in to the detriment of sanctions and obligations, is the edition in saïide to be provided by all professionals in the area, as well as the availability, on the part of doctor to cout the patient, from all information about the benefits and possible risks of procedure, so that it can to grant consent or to opt out by receipt, thus respecting the bioethical principle of aiitonomy.
Pereira, Brito & Oak, 2018	Anais de Medicina	The bioethical view a about the vaccination.	Pointing out the bioethical view r about the nc vaccine àmbitoindividual collective.	Generally speaking, bioethicists and saiide professionals understand that in the interest of collective health, the protection from population should grex'a1ecer under autoaomia ¢Io individual.
Oliveiia & Oliveira, 2020	Revista de Bioética y Derecßo,	The beginning of nìños en Brasil: legal overview and reflexiòn bioética	Analyze the aspect* legal and bioethical dr mandatory vaccination d' Brazilian children.	a Bioethics at proposes a establish the coercive norms, but contributes to the solution of the moral conflicts identified in each concrete case by offering parameters. Ja the Brazilian law, seeks to ensure the right to health in its diniensäocoletiva, to establish the obligation of immiinìzation for children.
dos Santos, dos Anjos Mendonça, von Atzingen & Moina, 2020.	Revista Bioética	Vaccination in Brazil: refiexfio bioethics on accessibility.	Identify the meaning from vaccination for professionals and the population, assini how to approach qiiestàofrom access à off-grid immiinìzation pïiblica desaude, emphasizing a smlnerability social.	The Brazilian vaccine system was understood by the interviewees, as bout, in a general way, being the main criticisms focused on the lack of information and insufficiencies. As for the access, the data are correlated with economic factors, opening space for bioethical discussions about the social vulnerability of the majority from population, who don't even have conditions to pay for these imiinìzations.
Baena, 2020	Vacuums	Bioethics of vaccines and saïide publica	Emphasize the correlation of Bioethics of vaccines and public saïide.	Bioethics goes beyond the problems ethical issues that arise in clinical practice in relation to vaccination. From ucozöo with the principle of Jiistice, the vaccine is an appropriate way to achieve mm purpose, with the values and principles of bioethics should be mrna useful tool for health and, vaccination being part of the her, in the decision not to do it.

Source: Research Data, 2022

The studies that made up the sample were published in the years 2016 (2), 2018 (1) and 2020 (3), with 3 published in Brazil and 3 originating from other countries.

Different authors have discussed the relationship between bioethics and vaccination, where it was found that the offer of mass vaccination makes it possible not to observe bioethical principles, since the common good, which is the fact that vaccination is offered to all, can be understood as respect for the principle of justice, however, it directly interferes with the principle of individual autonomy (Souza de Jesus et al., 2016; Baena, 2020; Oliveira & Oliveira, 2020).

The findings of Pereira, et al., (2018), evidenced that bioethicists and health professionals understand that in the interest of collective health, the protection of the population should prevail over the autonomy of the individual. In this case, the benefit is justified by the fact that the vaccine is one of the most effective and economical means, used to control and prevent infectious diseases, as well as one of the most globalized and successful health tools, especially in developing countries with poor sanitation and scarce resources. (Centers for Disease Control and Prevention, 1999).

According to Minski, and Longhini (2016), one way to ensure respect for bioethical principles is instead of carrying out compulsory vaccination, opting for the path of health education for the entire population, in order to sensitize them about the importance of it, in addition to presenting its benefits and adverse effects, so that the individual can give their consent or choose to refuse, thus respecting the bioethical principle of autonomy.

The Principiologic Theory of bioethics, encompasses most of the discussions related to reducing ethical conflicts in vaccination policy. However, principles have been challenged for some time by bioethics in countries with a high degree of social exclusion, such as Brazil and others in Latin America, which are seeking ways to develop bioethics in the context of developing countries to effectively and fairly address their persistent and emerging moral problems, which are not few (Schramm, 2018).

In this sense, the Brazilian vaccination policy, to be morally fair and effective, should be studied with a social and political focus, which does not address the principalist bioethics. Thus, the importance of this new vision of bioethics presented by Latin American countries is recognized, which they call a new broad and critical analysis of ethical and moral phenomena, in order to guarantee the rights of citizens (Garrafa, 2012).

From this point of view, special attention is drawn to vulnerable people who lack the means to achieve maximum health potential, since in the field of health, public policies are implemented based on the application and adaptation of tools of bioethical knowledge to the conDicts and moral dilemmas that arise in public health, observing the limits of traditional bioethics (Schramm FR. 2018).

One of the bioethical principles, called beneficence, establishes that one should do good to the other, regardless of whether he/she wants it or not, giving him/her space to make his/her own decisions. However, this relationship may give rise to bioethical dilemmas, such as the conflict between respecting the freedom of individuals (autonomy) and doing what is best for them (beneficence). The balance in this relationship

would be the key to elucidate the decision-making process. However, patients' decisions and the desire to participate or not in treatment are also variables influenced by the cultural, social and family environment in which they are inserted, by the patient-professional relationship (Medeiros et al., 2020).

In this way, the bioethics of protection becomes a means of maintaining the recognition of each individual, especially the most vulnerable, defending the idea that the State is responsible for protecting needy populations and, consequently, the respect for the guarantees and fundamental rights inherent to the human condition for all people, having as one of the main foundations of the Universal Declaration on Bioethics and Human Rights (UDHRj (Kottow, 2005; Garrafa, 2012).

It is recognized that vaccination policies have contributed significantly to the success of vaccines, leading to increased vaccinations and, consequently, improved health. On the other hand, it should be noted that vaccines are not a vaccine.

Considered one of the most controversial and controversial means of health care, taking into account that ethical issues are present at all stages of the product life cycle, from the early stages of research to the development and implementation of vaccination programs. Therefore, a careful risk/benefit assessment is necessary in order to ensure respect for bioethical principles (Caplan, 2018; Orenste@ 2018, Skete, 2020).

As such, an expanded view of bioethics on vaccination, will provide a better understanding of this complex issue, considering the sense of companion responsibility of members of society, which allows the state, to rethink the policy of compensation to victims of post-vaccination side effects, who have fulfilled the government's obligations to promote the health of all.(Coleman, 2019).

These facts demonstrate the demand for a higher standard of safety for vaccines, since, unlike most pharmaceutical products, they are administered to healthy people. Thus, the scientific uncertainty that still exists about the mechanisms of action of vaccines and their effects on the body requires that their use also takes into account social and cost-benefit factors, at the risk of not observing the principle of beneficence and non-maleficence, which is not to cause any harm to the patient if this efficacy is not properly proven (Fisher, 2017).

Thus, the bioethical principle of beneficence requires that potential benefits for individuals and society be maximized and potential harms be minimized, involving both the protection of individual welfare and the promotion of common welfare. From another perspective, the principle of non-maleficence requires that harmful acts be avoided, along with the basic rules contemplated in common morality, recognizing that intentionally or negligently causing harm is a fundamental moral wrong, and that they must be taken into account by offering vaccination to the population (Beauchamp & Childress, 2019).

In light of this, and the assurance that the vaccine is effective and will not cause any harm to the individual, the most interesting ethical issues surrounding health care policies and behaviors and adherence to preventive measures arise (Giubilini, 2021).

Therefore, the guarantee of choice or not by vaccination, in a democratic society, this right should be guaranteed, where people should be free to make their choices, based on the correlation between their

rights and duties, thus respecting the bioethical principle of autonomy (Nunes, 2017). From another point of view, compulsory immunization programs tend to be morally justifiable, because the vaccine offer to the entire population can be considered one of the most effective and cost-effective public health policies used in the control and prevention of infectious diseases (Hsu & Chang, 2018).

4 CONCLUSION

The results point out that compulsory vaccination can compromise the observance of bioethical principles, since the common good, which is the fact that vaccination is offered to all, can be understood as respecting the principle of justice, but it can compromise the patient's right to choose, thus failing to observe the principle of autonomy.

Instead of carrying out compulsory vaccination, one possible way to ensure respect for bioethical principles regarding vaccination is to choose the path of health education for the population, making them aware of the importance of immunization, as well as respecting the bioethical principle of autonomy in the individual decision for the vaccine.

Therefore, the authors suggest the development of new studies that cover the theme in question, for a greater comprehensiveness of results, as well as studies with other approaches for a better diffusion of the theme, especially among health professionals.

REFERENCES

Baena A. fi’. (2020). Bioética de vacinas e saúde pública. lacunas (Edição Inglesa) , 21 (1), 5 7-63.

Beauchamp, T.. & Childrens, J. (2019). Principles of biomedical ethics: marking its fortieth annn-ersan'. The American Journal ofBioethics , 19(11), 9-12. Caplan. A. L.. & Schwartz, J. L. (2018). EtÕcs. In: Plothn, S. A., Orestein, R'. A., & Offit, P. A. (orgs.). fi’accines, 5,1677-83
Centers for Disease Control and Prevention (CDC. (1999). Impact of vaccines universally recommended for children--United States, 1990-1998. W
rbidij and mortalii) iieekl report. 48(12), 243-248.

Cohw D., & Carter, P. (2010). UTíO and the pandemic du "conspiracies °. Bmj. 340. Coleman E. (2019). EtIn'1mercun' in Vaccines. Pedriatics. 111, 922-923.
Dos Santos, C. R, dos Anjos Mendonça. A. R, von Atmngen, D. A. N. C., & Moura, E. C. (2020). Vacinação no Brasil: redexão bioética sobre acessibilidade.
Rei reta Bioética, 28(4), 752-759.

Ercole, F. F., Melo. L. S. D., & Alcoforado, C. L. G. C. (2014). Revisão tntearativa versus revisão sistemática. Re reta .Xneira de Enfermagem. 18(1), 9-12. Fisher, M. A. (2007). Medicine and industn : a necessan' but conflicted relationslEp. Perspecrii es in biology and medicine, 50(1). 1-6.
Garrafa V. (2012). O novo conceito de bioética. In: Garrafa V, Kottow U Saada A, oreanizadores. Bases conceituais da bioética: enfoque latino-americano. São Paulo: Gaia. 1-23.

Giubilini, A. (2021). Vaccmation ethics. British radical Bulletin. 137(1). 4-12.

Goldim, J. R (2006). Bioética: origens e complexidade. Clinical & Biomedical Research. 26(2).

Hsu, H. Y., & Chans, M. H. (2019). Hepatitis B virus infection and the proeress toward its elimination. The Journal ofPediatricz. 2os. 12-20.

Lessa, S. D. C., & Schr F. R (2015). Proteção individual versus proteção coletiva: análise bioética do programa nacional de vacinação infantil em massa. Ciência & Saúde Coleti›'a. 20. 115-124.

Medeiros, M. O. S. F. D., Meira, M. D. V.. Fraca. F. M. R.. Nascimento Sobrinho, C. L., Rosa, D. D. O. S., & Sih a, R. S. D. (2020). Condictos bioéticos en tos cuidados al final de ta vida. Revista Bioética, 28, 128-134.

M ski. B. M., & Lonehini, G. (2016). Vacinação: autonomia do paciente à não vacinação. Anais de Wdicina 10-26. Nunes, C. R. R., & Nunes, A. P. (2004). Bioética. Rm reta brasileira de Enfermagem. 57. 615-616.
Nunes, R. (2017). Ensaios em bioética. Conselho Federal de Medicina. Faculdade de Medicina da Universidade do Porto, 200-200.

Oliveim T. P.. & Oliveira. L. S. M. (2020). La mmunización de niños en Brasil: panorama jurídico y reflexión bioética. Ron ruta de Bioética y Derecho , (48), 227-243.

Orenstem, U'. A., Paulson, J. A.. Brady, M. T., Cooper, L. Z.. & Seib. K. (2013). Global vaccination recommendations and thimerosal. Pediatrics, 131(1), 149-151.

Pereira, E. L.. Brito, R. C., & Carvalho. M. T. M. (2018). A visão bioética a respeito da vacinação. Anais de .Medicina. 15-16. Schrarnm, F. R. (2006). A saúde é um direito ou um dever? Autocrítica da saúde pública. Remota Brasileira de Bioética. 2(2), 187-200.

Shete, P. B.. & mum. R. S. (2002). Real versus theoretical: assessing the risks and benefits of postponine the hepatitis B vaccine birth dose. Pediatrics,
109(4). 701-703.

Souza, F. D. O., Freitas, P. D. S. P.. Araújo, T. M D.. & Gomes, M. R (2015). 4’acinação contra hepatite B e Aníi-HBS entre Oabalhadores da saíide.
Cadernos Saúde Coletiva, 23. 172-179

Souza de Jesus. A., Rodrieues de Jesus, L., Vieira, V. D. O., da Sih a Sena. E. L., Sih a de Oliveira Boy , R. N.. & Yarid, S. D. (2016). Aspectos bioéticos de la vacunación en masa en Brasil. Acta bioethica.
22(2), 263-268.

Taschner N. (2015). O mnudo antes das i acinas. [Online]. http:. 'ivuwv.café-na-bancada.com.bt index.phd o-mundo-antesdas-vacinas.'.

CHAPTER 64

Knowledge of pregnant women about exclusive breastfeeding in front of COVID-19

10.56238/rsfohsv1-064

Aline Sedorko

Suellen Vienscoski Skupien

Fabiana Bucholdz Teixeira Alves

Laryssa De Col Dalazoana Baier

ABSTRACT

Pregnant and postpartum women up to the 14th day postpartum are considered a risk group for covid-19; therefore, it is essential to discuss the care management of this public, as well as breastfeeding. The aim of this study was to identify the knowledge of pregnant women regarding breastfeeding in the Covid-19 pandemic. A quantitative, cross-sectional study was carried out with 100 pregnant women referred to a maternal and child hospital for obstetric monitoring from March 2021 to February 2022. Regarding the pregnant women's knowledge about breastfeeding in the face of the Covid-19 pandemic, 61 (61%) did not receive guidance from doctors and nurses during prenatal care, 66 (66%) reported that the pandemic of COVID-19 did not influence their pregnancy, but 25 (37.8%) claimed a negative impact on breastfeeding, and 71 (71%) reported fear of having COVID-19 and having no symptoms. As for the confirmed diagnosis of COVID-19, 39 (39%) pregnant women reported that they would not have the attitude to breastfeed and 22 (22%) would look for a way to express breast milk. If they had any flu symptoms, 42 (42%) pregnant women would breastfeed and 31 (31%) would not, and 70 (70%) believed that it would be okay to stay in a room with other mothers and babies. The Pandemic caused by COVID-19 brought several changes in the assistance to women in their entire pregnancy-puerperal cycle. The study identified a (lack of) knowledge about breastfeeding in relation to COVID-19, which negatively impacts this process.

Keywords: Breastfeeding, COVID-19, Nursing, Pregnant Women.

1 INTRODUCTION

In January 2020 the WHO announced that the outbreak of the new coronavirus constitutes a Public Health Emergency of International Concern (PEMI). On February 11 this new coronavirus was named SARS-CoV-2, responsible for causing the disease COVID -19 and on March 11, 2020, COVID-19 was defined by the WHO as a pandemic (PAHO/WHO, 2021).

According to the Ministry of Health, pregnant and postpartum women up to the 14th day of postpartum are considered a risk group, and it is essential to discuss the management of covid-19 in this public (BRASIL, 2021).

Maternal-fetal transmission of SARS-CoV-2 can occur transplacentally, during delivery, and during breastfeeding, but is infrequent, as long as precautionary measures are maintained. There has been much debate about breastfeeding, because viral RNA fragments were found through RT-qPCR in some milk samples from mothers infected with SARS-CoV-2, but at the stage of virus isolation in milk, no viable viruses were found competent for replication and capable of causing infection (BRASIL, 2021).

Through breast milk the newborn baby receives water, nutrients, and antibodies, thus becoming healthy and protected from many infections. If a baby is exposed to covid-19 infection, the antibodies and bioactive factors in breast milk can fight this infection (RICH, 2021).

In the current pandemic condition, breastfeeding should be maintained, according to PAHO and WHO, even in cases of mothers suspected or confirmed to be infected with COVID-19. The benefits of

breastfeeding and skin-to-skin contact after birth outweighed 65 to 630 times any risk of death that coronavirus may pose to the baby, according to a study published in the Lancet, but to perform safely it is necessary to ensure breastfeeding with some precautionary measures, these being: hand hygiene, respiratory etiquette, and mask use (PAHO, 2021).

In this context, identifying the knowledge of pregnant women regarding breastfeeding in the Covid-19 pandemic will help prenatal care professionals and the maternity unit of reference of these pregnant women to see the importance of working even harder on the topic, informing, guiding, and thus encouraging exclusive breastfeeding, which is beneficial for the mother and the newborn, even during the COVID-19 infection.

2 METHODOLOGY

This is a quantitative, cross-sectional study, carried out with 100 pregnant women referred to a maternal and child hospital for obstetric follow-up, from March 2021 to February 2022.

Data collection was carried out through an individual interview, using sociodemographic, gestational, and breastfeeding questions, conducted by four researchers trained to gather the necessary information and accommodate doubts, without influencing the answers. The interview lasted an average of ten minutes and the participants were recruited while waiting for their obstetric appointment at the hospital. The interviews were conducted taking all precautions to protect against coronavirus infection, respecting social distancing, and using a mask and alcohol gel.

The inclusion criteria for the study were pregnant women in any gestational trimester, over 18 years of age, who were waiting for obstetric care at the aforementioned hospital and who agreed to participate in the research by signing the Informed Consent Form. Pregnant women with any acute or chronic condition that limited their ability to participate in the study were excluded.

As for the data analysis, descriptive statistics were obtained for all variables, by means of absolute and relative frequency.

It is worth mentioning that this study was approved by the Ethics Committee on Human Research of the State University of Ponta Grossa, under opinion number 4.038.202.

3 RESULTS

As to the sociodemographic profile of pregnant women, 87 (87%) came from the city of Ponta Grossa, 13 (13%) from other cities belonging to the 3rd Health Regional Office and 93 (93%) lived in the urban area. The predominant age group was around 18 to 28 years old with 64 (64%) pregnant women, 61 (61%) said they were white, 32 (32%) brown and 7 (7%) between black, yellow and indigenous. As for marital status, 62 (62%) pregnant women were married/stable union and 35 (35%) were single. 48 (48%) had completed high school. Regarding occupation, 60 (60%) were housewives and 23 (23%) had a registered job.

As for the obstetric profile, 52 (52%) answered that the pregnancy was unplanned and 48 (48%) planned, and 98 (98%) pregnant women had family support to conduct the pregnancy, 61 (61%) were multiparous and 39 (39%) primiparous. Regarding the gestational trimester, 74 (74%) of pregnant women were in their third trimester, 14 (14%) in the second trimester and 12 (12%) in the first trimester, presenting as comorbidities Gestational Diabetes Mellitus 13 (13%), Systemic Arterial Hypertension 12 (12%) and thyroid alterations 11 (11%).

Regarding the pregnant women's knowledge about breastfeeding in face of the COVID-19 pandemic, 61 (61%) did not receive orientation from physicians and nurses during prenatal care. It is noteworthy that 66 (66%) pregnant women reported that the pandemic of COVID-19 did not influence their pregnancy, but 25 (37.8%) claimed a negative impact on breastfeeding and 71 (71%) reported fear of having COVID-19 and having no symptoms.

As for the confirmed diagnosis of COVID-19, 39 (39%) pregnant women reported that they would not have the attitude to breastfeed and 22 (22%) would look for a way to express breast milk. If they had any symptoms of influenza, 42 (42%) pregnant women would breastfeed and 31 (31%) would not, and 70 (70%) believed that it would be okay to stay in a room with other mothers and babies.

4 DISCUSSION

The present study points out that most of the interviewed pregnant women did not receive guidance from health professionals during prenatal care about breastfeeding in the COVID-19 pandemic, with the beginning of this public health event, health education activities performed in groups, such as education about breastfeeding, were canceled due to the fact that crowding is a risk for contamination by the coronavirus, in the study by CUNHA et al. (2022) the professionals who provided prenatal care were concerned because such actions were important for mother and baby care, so these professionals continued to provide guidance in the office during consultations.

According to MISQUITA et al. (2020) promoting health during prenatal care through educational practices is necessary even during the pandemic of COVID-19, with it the health professional can bring necessary information to contribute to the prevention of transmission of the virus causing COVID-19.

It is worth mentioning that the nursing professional is qualified to guide, evaluate, and monitor the practice of breastfeeding, contributing to the achievement of good results to establish exclusive breastfeeding (SANTOS et al. 2021).

In our study 66 (66%) pregnant women reported that the pandemic of COVID-19 did not influence their pregnancy, however, the integrative review of AMARAL; MACHADO; REICHERT (2022) shows that there was a great impact on the mental health of pregnant women, with increased anxiety, insomnia, stress and depression due to the fear of contracting COVID-19, and the little information about the virus. The cancellation of prenatal appointments was also observed, being related to the fear and anxiety caused by the pandemic.

In addition to the impact on prenatal care and pregnancy, the pandemic affected the mode of delivery, birth, puerperium, growth and development of children. Resulting from COVID-19 clinical conditions, social conditions, and the limitations of care capacity, it can multiply morbidity and mortality rates (PINHEIRO et al. 2022).

Regarding breastfeeding, it is known that it is a protective factor against potentially serious transmissible infections in early childhood. Thus, promoting breastfeeding is a health strategy. Mothers' fear of being contaminated by the coronavirus and transmitting it through breast milk can interfere in the breastfeeding process and stimulate the mother's desire not to breastfeed, as well as increase anxiety and stress (PINHEIRO et al., 2022; OLIVEIRA; MELO; MUSSARELLI, 2022).

In the study by Yahya et al. (2021) some mothers intended to discontinue breastfeeding due to concerns about the safety of breastfeeding and lack of in-person professional support. The confirmed diagnosis of COVID-19 in puerperal women does not prevent the practice of breastfeeding, it should only be interrupted if the mother is not well or presenting unstable clinical picture (OLIVEIRA; MELO; MUSSARELLI, 2022), in these cases one can perform the milking of the breasts to offer the extracted milk to the NB (YAHYA et al. 2021 and PINHEIRO et al. 2022).

In the joint housing, puerperae who present clinical suspicion or who are confirmed for COVID-19 need to be in isolation, if stable with the NB. During breastfeeding, the mother must wear a surgical mask provided by the care team and comply with hygiene measures, such as hand washing, before and after the breastfeeding process (OLIVEIRA et al., 2021). In the study by BRITO et al. (2021) the rooming-in contributed to a high breastfeeding rate (exclusive or mixed) (97%).

5 CONCLUSION

The pandemic caused by COVID-19 brought several changes in the assistance to women throughout their pregnancy-puerperal cycle. The study identified a (lack of) knowledge about breastfeeding in relation to COVID-19, which negatively impacts this process.

To establish the practice of exclusive breastfeeding in the Pandemic scenario, prenatal care providers need to strengthen their guidance on hygiene and precautions during breastfeeding to provide knowledge and safety to pregnant women who wish to breastfeed.

REFERENCES

AMARAL, Patrick Colissi do. MACHADO, Caroline Duarte. REICHERT, Taíse Gabriele. Impactos na saúde e na assistência à gestante durante a pandemia da COVID-19: revisão integrativa**. Revista Científica Multidisciplinar Núcleo do Conhecimento.** Ano. 07, Ed. 06, Vol. 08, pp. 62-81. Junho de 2022. ISSN: 2448-0959.

Brasil. Ministério da Saúde. Secretaria de Atenção Primária à Saúde. Departamento de Ações Programáticas e Estratégicas. Manual de recomendações para a assistência à gestante e puérpera frente à pandemia de Covid-19 [recurso eletrônico] / **Ministério da Saúde, Secretaria de Atenção Primária à Saúde, Departamento de Ações Programáticas e Estratégicas**, – 2. ed. – Brasília: Ministério da Saúde, 2021.

BRITO, I. *et al.* Alojamento Conjunto , Amamentação e Seguimento Neonatal de Recém-Nascidos de Mãe com COVID-19. **Acta Med Port.** 2021 Jul-Aug;34(7-8):507-516.

CUNHA, C. S. da. Assistência multiprofissional à gestante no contexto da pandemia pela COVID-19. **Revista Nursing,** 25 (288): 7770-7774, 2022.

MISQUITA, M.S. *et al*. Atendimento de gestantes na atenção primária a saúde pela enfermagem durante a pandemia do SARS-COV-2. **Revista Nursing**, 2020; 23 (269): 4723-4726
OLIVEIRA, M. A. de *et al*. Recomendações para assistência perinatal no contexto da pandemia de COVID-19. **Rev. Bras. Saúde Matern. Infant**., Recife, 21 (Supl.1): S77-S87, fev., 2021.

OLIVEIRA, T. A. da C.; MELO, A. G.; MUSSARELLI, Y. F**.** Aleitamento Materno Frente à pandemia de COVID-19: uma revisão integrativa. **Revista Faculdades do Saber**, 07 (14): 1079-1088, 2022.

OPAS. Histórico da pandemia de covid-19, **OPAS**, 2021.

OPAS. OPAS destaca importância de participação de toda sociedade na promoção do aleitamento materno, em lançamento de campanha no Brasil, **OPAS**, 2021.

PINHEIRO, J. *et al*. COVID-19: Desafios para assistência maternoinfantil e amamentação exclusiva no período neonatal. **Revista Ciência Plural**, 8 (1): e24776, 2022.

RICH, M. Amamentar com segurança durante a pandemia de covid-19: Como nutrir o bebê seguindo as orientações de especialistas, **OPAS**, 2021.

SANTOS, R. C. dos. Aleitamento materno exclusivo em tempos de pandemia da COVID-19: revisão integrativa. Research, Society and Development, v. 10, n. 3, e28310313167, 2021

YAHYA, N. F. S. Association between Breastfeeding Attitudes and Postpartum Depression among Mothers with Premature Infants during COVID-19 Pandemic, **International Journal of Environmental Research and Public Health**, 18, 10915, 2021.

CHAPTER 65

Level of physical activity and quality of sleep among high school students in Maranhão

10.56238/rsfohsv1-065

Leonardo Pereira da Silva
State University of Maranhão, Degree in Physical Educatio, São João dos Patos, Maranhão, Brasil. Grupo de Pesquisa em Saúde, Atividade Física e Educação (SAFE).
Lattes: http://lattes.cnpq.br/8314390947889162
E-mail: leonardopds14@hotmail.com

Mayara Raíssa de Miranda Bezerra
State University of Maranhão, Degree in Physical Educatio, São João dos Patos, Maranhão, Brasil. Grupo de Pesquisa em Saúde, Atividade Física e Educação (SAFE).
Lattes: https://lattes.cnpq.br/8950550230724938
E-mail: mayararaissasjp@hotmail.com

Francisca Aline dos Santos Dias
State University of Maranhão, Degree in Physical Educatio, São João dos Patos, Maranhão, Brasil. Grupo de Pesquisa em Saúde, Atividade Física e Educação (SAFE).
Lattes: http://lattes.cnpq.br/6286493934969275
E-mail: alinedias44099@gmail.com

Bianca Caroline Damasceno Sousa
State University of Maranhão, Degree in Physical Educatio, São João dos Patos, Maranhão, Brasil. Grupo de Pesquisa em Saúde, Atividade Física e Educação (SAFE).
Lattes: http://lattes.cnpq.br/7298615124427231
E-mail: biancadamasceno74@gmail.com

Regina Célia Vilanova-Campelo
State University of Maranhão, Degree in Physical Education, São João dos Patos, Maranhão, Brasil. Grupo de Pesquisa em Saúde, Atividade Física e Educação (SAFE).
Lattes: http://lattes.cnpq.br/3577397196124251
E-mail: reginacampelo@professor.uema.br

ABSTRACT
We aimed to analyze the level of Physical Activity (PA) and Quality of Sleep (QS) of High School students (MS) from a public school in São João dos Patos - MA during the pandemic of COVID-19. This was a cross-sectional study, with a quantitative approach. PA level and QS were assessed by the International PA questionnaire (short version) and Pittsburgh QS Index, applied online, between November and December 2021. Analyses were conducted by descriptive data, Chi-square, and Pearson's Correlation tests. A total of 138 students participated in the study, with a mean age of 16 ± 1.05 years, distributed by groups: 1st (n=50), 2nd (n=57), and 3rd (n=31) year of MS. In the 1st year, 66% of the sample attested to very active and active adjuncts, while in the 2nd year, 75% of the participants were considered physically active. In 3rd grade, students reported levels considered to be PA (78%). Students in 1st grade showed the highest percentage for poor QS, at 58%. This poor QS was also frequent in 2nd grade and 3rd grade, at 65% and 68%, respectively. QS and PA levels in 1st grade showed a weak, negative association. However, the 2nd and 3rd years showed a strong and positive correlation. Most of the investigated students are physically active (72.4%). However, poor QS (63%) is frequent in most of the participants. Classifications of PA and sleep, showed $p<0.0001$. The level of PA and QS of the investigated population may be associated with changes caused by the pandemic.

Keywords: Physical activity. Sleep. COVID-19. High school.

1 INTRODUCTION

The practice of physical activity (PA) and sleep quality (QS) are two factors that can influence the quality of life (QL) of students during adolescence, especially in a period of great challenges such as High School (EM) (SOUZA NETO et al., 2021).

In this sense, it can be highlighted that there are numerous benefits of PA for the physical and mental health of these individuals (BEZERRA et al., 2021). The World Health Organization (WHO) defines PA as any bodily movement produced by skeletal muscles that require energy expenditure, including those performed during work, household chores, games, leisure activities, and travel (WHO, 2020).

On the other hand, sleep is a fundamental biological process of the human being in which it manifests important functions in the restoration of homeostasis of organic activities, characterized by an unconscious period that can influence behavioral and physiological factors (LOPES). et al., 2018).

Still, it urges to point out that under normal conditions, it is possible to denote two divergent states of sleep: the rapid eye movement (REM), in which rapid eye movements occur, and the non-rapid eye movement (NREM), which does not happen these eye movements (BERRY et al., 2012). Thus, in a normal human being, NREM sleep and REM sleep are periodically separated throughout the night, repeating on average every 100 minutes (min), for 5 to 6 cycles (CARSKADON, DEMENT, 2011).

With this, related to these factors, adolescence is the stage of the life cycle between childhood and adulthood, in which it is shown as a period marked by several changes in habits, such as the decrease in PA practice and related aspects of sleep deprivation, whether intrinsic, through regulatory processes or extrinsic, through concerns regarding school and social responsibilities (TRINDADE, RAMOS, 2020).

In addition, during this phase, most individuals who wish to enter Higher Education (ES) later need to attend EM the final stage of Basic Education, considered a private-public right of every Brazilian citizen (WELLER, SILVA, 2021). The country's educational system has portrayed that this phase represents an enormous opportunity to guarantee the right to education and, consequently, the generalization of the offer, has been essential and relevant for the teaching and learning process of students, as well as for their permanence. at school, responding to their demands and expectations, whether present and/or future (BRASIL, 2018).

The EM presents itself as a very challenging period of the student's educational and personal life, mainly because it is a population predominantly composed of adolescents, it is necessary to have a different look at the various factors that involve the teaching and learning process (SANTOS, SILVA, 2021). Therefore, it is up to the school, as a physical and social environment, to value the different characteristics of adolescents, supporting them to understand reality, face the new designs of contemporary society and make ethical and reasoned decisions (BRASIL, 2018).

In addition, another very relevant factor that changed the life routine of people in general, especially students, was the emergence of serious pneumonia caused by the SARS-CoV-2 virus, a disease popularly called COVID-19 (coronavirus disease 2019) (CESPESDES, SOUSA, 2020). The appearance of first case of this disease emerged in the city of Wuhan, China, spreading to several countries, leading to the declaration of pandemic status by the WHO on March 11, 2020, after the registration of more than 118,000 cases and 4,292 deaths around the world (WHO, 2020).

Therefore, some preventive measures had to be implemented by health agencies (OLIVEIRA et al., 2020). Among them, social distancing was seen as an effective way to combat the contagion of COVID-19, but it has shown several side effects related to mental health, leading to the lack of control of other clinical problems and negative influences on socio-cultural, economic, intellectual, educational spheres and labor (GONZALEZ, 2020).

Thus, according to scientific studies, the practice of PA demonstrates a significant relationship with SQ and may have several benefits, especially during this teaching and pandemic phase (PANCOTTO et al., 2021). However, the reduction of PA levels, as well as the restriction of healthy sleep habits in the long term, can lead to a decrease in physical preparation and an increase in the chances of acquiring cardiovascular diseases (BERNARDO et al., 2018).

Therefore, the present study aimed to analyze the level of PA and SQ in high school students from a public school in São João dos Patos - Maranhão (MA) during the COVID-19 pandemic.

2 MATERIALS AND METHODS

This is a cross-sectional study with a quantitative approach. Students of both sexes, regularly enrolled at the Instituto Federal do Maranhão (IFMA), Campus São João dos Patos, participated in this study. This research site was chosen for convenience for the application of the study and for presenting an audience from various locations (cities) surrounding the institution's pole.

With this, the students were chosen in a simple random way, using the lists provided by the institution, so that any student could be selected. The sample of this study consisted of 138 students, subdivided according to the years in which they attended high school. Therefore, we obtained: 50 individuals belonging to the 1st year, 57 to the 2nd year, and 31 to the 3rd year.

The following inclusion criteria were considered: being an effective student enrolled in the IFMA, both sexes, delivery of the informed consent form (TALE) to the students, and the informed consent form (ICF) attested by the parents or legal guardians. On the other hand, we adopted exclusion criteria: students who did not have access to the internet were suspended from the institution's activities due to any punishments, and had 25% + 1 absence about the general workload of disciplines.

The director responsible for the selected school received a formal request to carry out the study through the authorization letter. The aspects inherent to the study were also passed on to the participating parents/guardians and students, formally via TALE/ICF and informally via clarifications made by the researchers. The study was submitted for evaluation by the Research Ethics Committee of the Universidade Estadual do Maranhão (UEMA) through the registration on Plataforma Brasil and was started only after its approval, with the opinion of No. 5,013,955.

Data collection was carried out between November and December 2021. With this, the research participants were submitted to an assessment of the socio-demographic profile, PA level, and SQ through questionnaires, applied virtually through google Forms (google forms).

Thus, concerning sociodemographic variables, age (years), sex (male/female/other), skin color, self-reported weight (kg) and height (m), year of high school (1st, 2nd, and 3rd), integrated course, experiences in preventive measures against COVID-19 (social distancing and social isolation), consumption of alcoholic beverages and whether or not to smoke.

The analysis of the students' PA level was performed through the responses to the International PA Questionnaire (IPAQ), a short version, validated by Matsudo et al. (2012). The IPAQ is an instrument applied to estimate the weekly time used to perform physical activities of moderate to vigorous intensity in different circumstances of life, whether at work, in household chores, for transportation, or leisure. Also, through it, it is possible to estimate the time spent on less strenuous activities, such as those performed with the person sitting down. The questions in the questionnaire are related to the physical activities performed by the students in the week before completing the questionnaire.

On the other hand, the QS assessment was analyzed using the Pittsburgh QS Index (PSQI) instrument, where sleep disturbances present one month before the date of application of the questionnaire are investigated (BUYSSE et al., 1989; BERTOLAZI, 2008). This tool allows you to classify the individual's sleep as good, bad, or indicative of a disorder.

For descriptive analysis, data were presented as mean values ± standard deviation, frequencies, and percentages. Pearson's chi-square test was used to compare the results and Pearson's correlation test (r), which may have a range of values from +1 to -1. Thus, a value of 0 indicates that there is no association between the two variables. A value greater than 0 reports a positive association. Also, a value less than 0 indicates a negative association. The closer to +1 or -1 is the value of r, the stronger the association is considered. In contrast, the closer the value of r is to 0, the weaker the correlation.

In addition, values of $p \leq 0.05$ were indicative of statistical significance. In addition, data were manipulated using the Microsoft Excel spreadsheet editor and the statistical program Stata 13.0 (Corporation College Station, TX, USA) for analysis. The results were presented in tables and figures.

3 RESULTS

The study sample consisted of 138 participants with a mean age of 16 ± 1.05 years. Information on the characterization of the sample, by groups, is detailed in Table 1. More than 60% of the samples from the 1st, 2nd, and 3rd-grade groups declared themselves brown in terms of skin color. In addition, a little more than 24% of the students participating in this study are in social distancing for the three years of EM. With social isolation, the 3rd year stands out with 16.2% of the participants experiencing this preventive measure.

It is important to point out that factors such as the consumption of alcohol and tobacco did not influence the analysis of the main variables of this study (sleep and PA), since most participants for all levels of education (1st, 2nd, and 3rd) showed high relevance for non-consumption of these chemical substances, as can be seen in Table 1.

Table 1. Characterization of the sample composed of high school students from a federal public school in Maranhão (n=138)

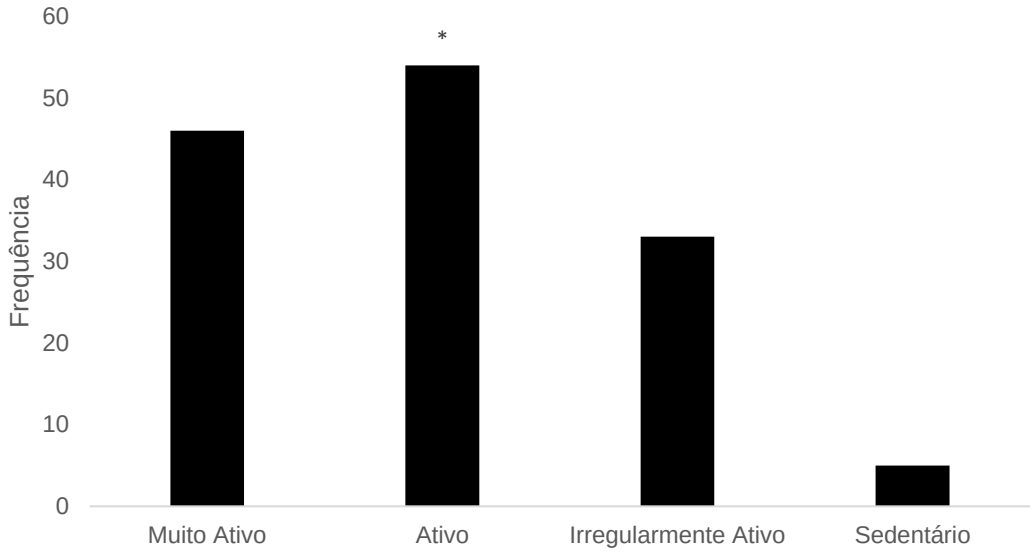
VARIABLES	1º YEAR (n=50)		2º YEAR (n=57)		3º YEAR (n=31)		Total n (%)
	Male	Female	Male	Female	Male	Female	
n (%)	26 (52,0)	24 (48,0)	28 (49,1)	29 (50,9)	17 (54,9)	14 (45,1)	138 (100)
Age (years)	16±0,86	16±0,83	17±1,03	16±0,59	17±0,70	17±0,63	16±1,05
Body mass (kg)	61,31±11,07	54,71±9,31	64,96±10,56	53,05±10,28	64,65±8,85	54,79±6,51	58,92±10,88
Height (m)	1,70±0,08	1,62±0,05	1,74±0,09	1,62±0,06	1,74±0,07	1,63±0,06	1,68±0,09
Skin color							
White	5 (10,0)	2 (4,0)	11 (19,3)	6 (10,6)	2 (6,5)	2 (6,5)	28 (20,3)
Black	4 (8,0)	6 (12,0)	1 (1,7)	4 (7,0)	2 (6,5)	3 (9,7)	20 (14,5)
Brown	16 (32,0)	16 (32,0)	16 (28,1)	19 (33,3)	12 (38,7)	9 (28,9)	88 (63,8)
Yellow	1 (2,0)	-	-	-	1 (3,2)	-	2 (1,4)
Integrated Technical Course							
Food	2 (4,0)	7 (14,0)	2 (3,1)	13 (23,0)	1 (3,2)	3 (9,7)	28 (20,3)
Logistics	10 (20,0)	9 (18,0)	9 (16,0)	10 (17,3)	13 (42,0)	11 (35,4)	62 (44,9)
Computer networking	14 (28,0)	8 (16,0)	17 (30,0)	6 (10,6)	3 (9,7)	-	48 (34,8)
Been in social isolation							
Never been	12 (24,0)	7 (14,0)	8 (14,0)	4 (7,0)	2 (6,5)	2 (6,5)	35 (25,3)
1 year ago	6 (12,0)	11 (22,0)	12 (21,1)	12 (21,1)	9 (28,9)	6 (19,2)	56 (40,6)
9 months ago	1 (2,0)	1 (2,0)	3 (5,3)	1 (1,7)	-	2 (6,5)	8 (5,8)
6 months ago	3 (6,0)	1 (2,0)	1 (1,7)	4 (7,0)	2 (6,5)	1 (3,2)	12 (8,7)
3 months ago	2 (4,0)	4 (8,0)	3 (5,3)	5 (8,8)	2 (6,5)	3 (9,7)	19 (13,8)
1 month ago	2 (4,0)	-	1 (1,7)	3 (5,3)	2 (6,5)	-	8 (5,8)
Currently in social isolation							
Yes	3 (6,0)	2 (4,0)	3 (5,3)	3 (5,3)	2 (6,5)	3 (9,7)	16 (12,0)
No	23 (46,0)	22 (44,0)	25 (43,8)	26 (45,6)	15 (48,4)	11 (35,4)	122 (88,0)
Has been in social withdrawal							
Never been	10 (20,0)	6 (12,0)	8 (14,0)	5 (8,8)	2 (6,5)	1 (3,2)	32 (23,2)
1 year ago	5 (10,0)	8 (16,0)	12 (21,1)	12 (21,1)	9 (28,9)	3 (9,7)	49 (35,6)
9 months ago	-	4 (8,0)	3 (5,3)	1 (1,7)	2 (6,5)	-	10 (7,2)
6 months ago	4 (8,0)	2 (4,0)	1 (1,7)	4 (7,0)	-	2 (6,5)	13 (9,4)
3 months ago	5 (10,0)	4 (8,0)	1 (1,7)	3 (5,3)	2 (6,5)	6 (19,2)	21 (15,2)
1 month ago	2 (4,00)	-	3 (5,3)	4 (7,0)	2 (6,5)	2 (6,5)	13 (9,4)
Currently on social withdrawal							
Yes	3 (6,0)	8 (16,0)	8 (14,0)	8 (14,0)	4 (12,9)	4 (12,9)	35 (25,4)
No	23 (46,0)	16 (32,0)	20 (35,1)	21 (36,9)	13 (42,0)	10 (32,2)	103 (74,6)
Consumes alcoholic beverages							
No	21 (42,0)	21 (42,0)	22 (38,5)	25 (43,9)	16 (51,7)	11 (35,4)	116 (84,0)
Yes, regularly	2 (4,0)	2 (4,0)	3 (5,3)	1 (1,7)	-	3 (9,7)	11 (8,0)
Yes, but not regularly	3 (6,0)	1 (2,0)	3 (5,3)	3 (5,3)	1 (3,2)	-	11 (8,0)
Are you a smoker							
No	26 (52,0)	24 (48,00)	27 (47,4)	29 (50,9)	17 (54,9)	14 (45,1)	137 (99,3)
Yes, but not regularly	-	-	1 (1,7)	-	-	-	1 (0,7)

Data presented as mean ± standard deviation; -: no data reported.

Figure 1 depicts the aspects linked to the general PA level of the participants. It is observed that 33.3% (n=46) and 39.1% (n=54) of the individuals were classified respectively in the very active and active categories, indicating that a little more than 72% of the total sample of the study were physically active. Thus, 24% (n=33) were irregularly active and only 3.6% (n=5) were sedentary. Furthermore, through the

application of Pearson's Chi-square test, a significant difference was found between the classification categories with p<0.0001.

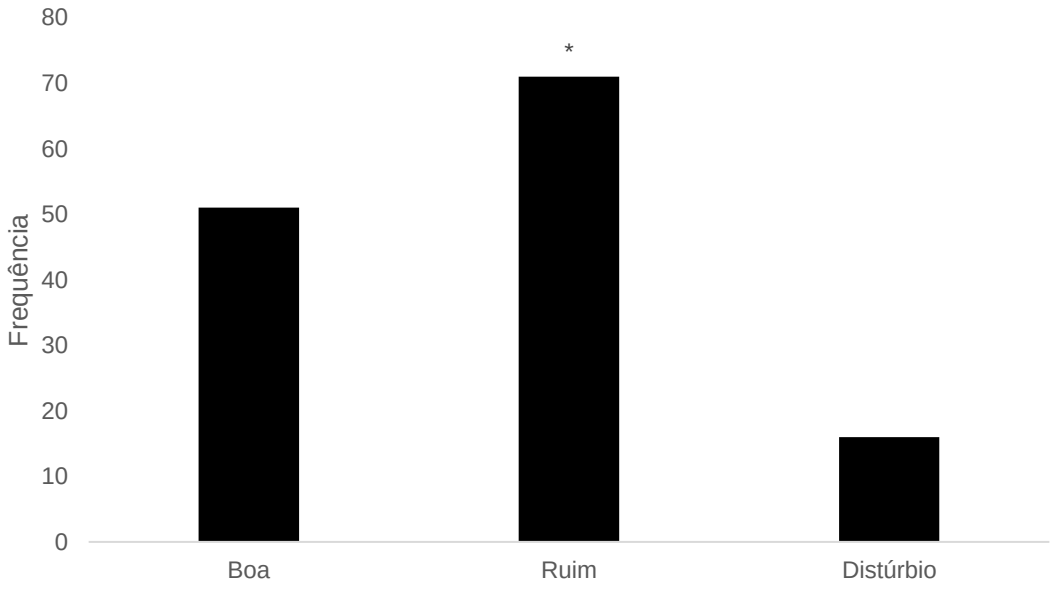
Figure 1. Classification of the general physical activity level of high school students (n=138)



Data expressed in frequency. Statistical analysis performed by Pearson's chi-square. *p<0.0001.

The student's general SQ is shown in figure 2. Thus, it is urged to point out that 37% (n=51) of the participants appeared to be good SQ. On the other hand, 51.4% (n=71) and 11.6% (n=16) of the overall study sample were classified as having poor quality and indicative of sleep disturbance, respectively. In addition, with the application of Pearson's chi-square test, there was a significant difference between the classification categories with p<0.0001.

Figure 2. Classification of the general sleep quality of high school students (n=138)



Data expressed in frequency. Statistical analysis performed by Pearson's chi-square. *p<0.0001.

The PA level and the students' QS were analyzed specifically concerning the year of the course in the EM as reported in Table 2. Therefore, in the 1st year, individuals reported a percentage of 66%, with the higher for the very active and adjunct active (physically active) categories. Regarding the PA level in the 2nd year, the participants also showed a higher percentage for the classification of very active and active associates, with 75% being considered physically active. In the 3rd year, most students presented themselves at levels considered for the practice of PA (78%).

In addition, it is worth noting that 1st-year students attested to the highest percentage for poor SQ (bad classification and adjunct disorder), 58%. This bad SQ (bad classification and adjunct disorder) was also frequent in the 2nd year, with 65% of the sample. Also, in the last year, EM students showed a higher percentage (68%) for bad QS (bad classification and adjunct disorder).

Furthermore, through the application of Pearson's chi-square test, a value of $p>0.05$ was verified, consequently presenting no statistically significant difference between the analyzed classification categories.

Table 2. Classification of physical activity level and sleep quality by year of high school (n=138)

Variables	**1° year n (%)**	**2° year n (%)**	**3° year n (%)**	**p-Value***
Physical activity level				
Very active	19 (38)	17 (29)	10 (33)	0,55
Active	14 (28)	26 (46)	14 (45)	
Irregularly active	15 (30)	13 (23)	5 (16)	
Sedentary	2 (4)	1 (2)	2 (7)	
Sleep Quality				
Good	21 (42)	20 (35)	10 (32)	0,92
Bad	24 (48)	30 (53)	17 (55)	
Disorder	5 (10)	7 (12)	4 (13)	

Data presented in frequency and percentage; * Pearson's chi-square test.

The Pearson(r) Correlation analysis is shown in Table 3. In the 1st year (r=-0.259) of the EM, the results indicate a negative, but weak, the association between the variables. However, in the 2nd (r=0.937) and 3rd year (r=0.999), the SQ presents a positive and strong correlation with the students' PA level**s.**

Table 3. Correlation values between sleep quality and students' physical activity level (n=138)

	LEVEL OF PHYSICAL ACTIVITY		
	1° year (n=50)	2° year (n=57)	3° year (n=31)
SLEEP QUALITY	-0,259	0,937	0,999

Statistical analysis performed by Pearson's Correlation.

4 DISCUSSION

The impact of PA and sleep duration on the QOL of EM students has shown extremely relevant aspects. Individuals considered physically active report some categories of their QOL as being better when relating to people who are not physically active (CAMPOS et. al., 2021). From this perspective, aiming to improve emotional and mental health, in addition to physical well-being, the practice of PA has a positive influence related to these aspects (MACHADO et al., 2020).

In this sense, there are numerous benefits of PA practice, among them, the improvement of physical fitness and mental health (OLIVEIRA et al., 2018), a decrease in adipose tissue, strengthening of the musculoskeletal system, and also, it can prevent of chronic diseases. non-communicable diseases (NCDs) (AGOSTINIS SOBRINHO, VILAN, 2021).

With that, the main results of the present study indicated that the level of PA and the SQ are important variables as preponderant requirements for a good QOL. It is observed that in this research, 72.4% of the general sample proved to be physically active, while 27.6% are outside the standards of being physically active, as highlighted by the instrument used for the assessment (IPAQ – short version). Silva et al., 2021 (30 children and adolescents evaluated) found divergent findings in this study. In their research, the level of PA, assessed through the IPAQ short version (questionnaire), revealed that 64.6% of children and adolescents self-reported as sedentary.

This was also noticeable in the study by Santana et al., 2021 (102,072 evaluated), in which the results showed a high prevalence of sedentary lifestyle (56.3%) and physical inactivity (78.1%) among Brazilian schoolchildren. Adolescents whose parents or legal guardians always checked physical activities at school were less likely to be sedentary and inactive compared to parents or guardians who never supervised the practices.

On the other hand, the writing by Gomes et al., (2017) presents different results regarding the sleep variable. In their study, carried out with 309 adolescents aged between 10 and 19 years, they denoted a prevalence of poor QS of 28.2% of the study sample. Thus, this prevalence differs from the findings found in this research, as 63% of the adolescents reported poor QS.

In the study by Santiago et al., 2015, the initial diagnosis regarding SQ in adolescents portrayed that even at this average age, cases related to sleep disorders are found. Thus, research has shown a high prevalence of insufficient sleep and poor SQ among young students. Furthermore, in the state of Santa Catarina, an investigation was carried out with the adolescent public of the EM, between the years 2001 and 2011, in which Hoefelmann et al., (2013) identified prevalences of poor QS (26.3% and 34, 5%) and insufficient duration (37% and 57%) in students of this level of education.

On the other hand, a study carried out with adolescents from the EM points out that the uncertainties of the future, social support, and vocational identity, are directly related to mental impairments, such as depression and anxiety, impairing the quality of sleep and life of these individuals and consequently, school performance (FRANCINE, DIANE, 2016).

These doubts about the future were even worse with the advent of the COVID-19 pandemic. As a result, social distancing is one of the most effective preventive measures implemented by health organizations around the world against the proliferation of this infectious disease (WHO, 2020), but reports suggest that adolescents in their free time, away from school, colleagues and friends, whether on weekends, holidays or vacations, tend to be less physically active, showing a greater interest in digital technologies and consequently problems related to healthy sleeping and eating habits (WANG et al., 2019).

Therefore, there is a need to acquire healthy lifestyle habits, since this phase of the life cycle with excellent behaviors can be decisive for the construction of a society marked by a good QOL (SILVA et al., 2019). Thus, in recent years, some studies have sought to identify the importance of regular PA practice related to SQ of young students (OLIVEIRA et al., 2018).

The results of this study may be associated with changes caused by the COVID-19 pandemic through the restrictions implemented through preventive measures, denoting free time to carry out the practice of PA and the emergence or evolution of psychological problems resulting from various feelings raised by the disease requirement and/or instruction of having to isolate themselves in their respective homes, thus affecting QS.

Therefore, our findings may be important in supporting educational and public health mechanisms, denoting that SQ and PA in adolescents are more strongly related to QOL. In addition, the association between SQ and PA level is influenced by psychological burdens and demands from society in general due to strong demands on studies.

5 CONCLUSION

Thus, the data from this study showed that most of the students investigated are physically active. However, poor SQ is frequent in the lives of most participants. Furthermore, the results obtained in this study suggest a positive relationship between SQ and the PA level of most EM students. With this, the PA level seems to be highly responsive to the improvement of the adolescents' QS, especially during the pandemic period, and dedication to studies at the level of education itself, as well as related to preparation for entry to higher education.

Therefore, given the results of this research, the application of intervention studies becomes notorious, to research possible effects of PA in the improvement of SQ in adolescents in a detailed way, as they are of extreme relevance and necessity in what it concerns contributions to public health and educational management through the data to be found.

REFERENCES

AGOSTINIS SOBRINHO, César Aparecido; VILAN, Katiane. Pressão Arterial em Crianças. O Papel Fundamental da Atividade Física e da Gordura Corporal. **Arquivos Brasileiros de Cardiologia**. v. 116, n. 5, p. 957-958, 2021. Disponível em: https://www.scielo.br/j/abc/a/HNZpfDPS7fZfC3P6dqPtRgC/?lang=pt#ModalArticles. Acesso em: 21 jun. 2021.

BERNARDO, Valdeni Manoel; SILVA, Franciele Cascaes da; FERREIRA, Elizandra Goncalves; BENTO, Gisele Graziele; ZILCH, Mauro Cezar; SOUSA, Bianca Andrade de; SILVA, Rudney da. Atividade física e qualidade de sono em policiais militares. **Revista Brasileira de Ciências do Esporte**, [*s. l*], v. 40, n. 2, p. 131-137, 2018. Disponível em: https://www.sciencedirect.com/science/article/pii/S0101328916302128. Acesso em: 21 jun. 2021.

BERRY RB; BROOKS R; GAMALDO CE; HARDING SM; MARCUS CL; VAUGHN BV et al. The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications, Version 2.0. Darien (IL): **American Academy of Sleep Medicine**, 2012. Disponível em: http://arkansas-sleep.squarespace.com/s/Brooks-Scoring-Manual-Updates-1-19-17.pdf. Acesso em: 22 de jan. 2022.

BERTOLAZI, Alessandra Naimaier. Tradução, Adaptação Cultural e Validação de dois Instrumentos de Avaliação do Sono: Escala de Sonolência de Epworth e Índice de Qualidade de Sono de Pittsburgh. 2008. 93 f. **Dissertação** (Mestrado) - Curso de Medicina, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2008. Disponível em: https://lume.ufrgs.br/bitstream/handle/10183/14041/000653543.pdf?sequence=1&isAllowed=y. Acesso em: 07 jul. 2021.

BEZERRA, Myrtis Katille de Assunção; CARVALHO, Eduardo Freese de; OLIVEIRA, Juliana Souza; CESSE, Eduarda Ângela Pessoa; LIRA, Pedro Israel Cabral de; CAVALCANTE, Jonathan Galvão Tenório; LEAL, Vanessa Sá; SANTOS, Marcos Pereira. Estilo de vida de adolescentes estudantes de escolas públicas e privadas em Recife: erica. **Ciência & Saúde Coletiva**. v. 26, n. 1, p. 221-232, 2021. Disponível em: https://www.scielo.br/j/csc/a/9p4r969whRrhSzvGGBmY3Rc/?lang=pt. Acesso em: 01 jul. 2021.

BRASIL. Ministério da Educação. Base Nacional Comum Curricular. Brasília, 2018. Disponível em: http://basenacionalcomum.mec.gov.br/. Acesso em: 08 jun. 2021.

BUYSSE, Daniel J.; REYNOLDS, Charles F.; MONK, Timothy H.; BERMAN, Susan R.; KUPFER, David J.. The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. **Psychiatry Research**, [S.L.], v. 28, n. 2, p. 193-213, 1989. Disponível em: https://pubmed.ncbi.nlm.nih.gov/2748771/. Acesso em: 07 jul. 2021.

CAMPOS, Cezenário Gonçalves; CARLOS, Fabiangelo de Moura; MUNIZ, Luciene Aparecida; BILA, Wendell Costa; DAMASCENO, Vinícius de Oliveira; ROMANO, Márcia Christina Caetano; LAMOUNIER, Joel Alves. Atividade física na adolescência e maturidade sexual: uma revisão sistemática. **Ciência & Saúde Coletiva**. v. 26, n. 5, p. 1823-1832, 2021. Disponível em: https://www.scielosp.org/articlecsc/2021.v26n5/1823-1832/. Acesso em: 15 jul. 2021.

CARSKADON MA, DEMENT WC. Normal Human Sleep: An Overview. In: Kryger MH, Roth T, Dement WC, editors. Principles and Practice of Sleep Medicine. 5th ed. St. Louis: **Elsevier Saunders**; p. 16- 26, 2011. Disponível: https://www.sciencedirect.com/science/article/pii/B9781416066453000025?via%3Dihub. Acesso em: 22 fev. 2022.

CESPEDES, Mateus da Silveira; SOUZA, José Carlos Rosa Pires de. Coronavirus: a clinical update of covid-19. **Revista da Associação Médica Brasileira**. v. 66, n. 2, p. 116-123, 2020. Disponível em: https://www.scielo.br/j/ramb/a/x5Rp3mzfnhc9xVPq7zFhX9B/?lang=en. Acesso em: 02 jul. 2021.

FRANCINE, Germain; DIANE, Marcotte. Sintomas de depressão e ansiedade na transição do ensino secundário ao ensino médio: evolução e fatores influentes. **Rev. Adolesc. Saúde (Online)**, [*s. l*], v. 13, n. 1, p. 19-28, 2016. Disponível em: https://pesquisa.bvsalud.org/portal/resource/pt/abr-593. Acesso em: 26 jun. 2021.

GOMES, Gabriel Cordeiro; PASSOS, Muana Hiandra Pereira dos; SILVA, Hítalo Andrade; OLIVEIRA, Valéria Mayaly Alves de; NOVAES, Wbinayara Alves; PITANGUI, Ana Carolina Rodarti; ARAðJO, Rodrigo Cappato de. QUALIDADE DE SONO E SUA ASSOCIAÇÃO COM SINTOMAS PSICOLÓGICOS EM ATLETAS ADOLESCENTES. **Revista Paulista de Pediatria**, [S.L.], v. 35, n. 3, p. 316-321, 31 jul. 2017. Disponível em: https://www.scielo.br/j/rpp/a/7CxdWDvSLgrXJ5gTRPrNcLR/?lang=pt#:~:text=Assim%2C%20os%20achados%20deste%20estudo,e%20os%20sintomas%20psicol%C3%B3gicos%20avaliados. Acesso em: 31 mar. 2022.

GONZÁLEZ, José Javier Elizalde. SARS-CoV-2 y COVID-19. Una revisión de la pandemia. **Medicina Crítica**. v. 33, n. 1, p. 53-67, 2020. Disponível em: https://www.medigraphic.com/cgi-bin/new/resumenI.cgi?IDARTICULO=93281. Acesso em: 02 jul. 2021.

HOEFELMANN, Luana Peter; LOPES, Adair da Silva; SILVA, Kelly Samara da; MORITZ, Pablo; NAHAS, Markus Vinicius. Sociodemographic factors associated with sleep quality and sleep duration in adolescents from Santa Catarina, Brazil: what changed between 2001 and 2011?. **Sleep Medicine**, [S.L.], v. 14, n. 10, p. 1017-1023, out. 2013. Disponível em: https://pubmed.ncbi.nlm.nih.gov/23890599/. Acesso em: 05 abr. 2022.

LOPES, Higor Santos; MEIER, Denise Andrade Pereira; RODRIGUES, Renne. Qualidade do sono entre estudantes de enfermagem e fatores associados. **Ciências Biológicas e da Saúde**. v. 39, n. 2, p. 129-136, 2018. Disponível em: http://www.uel.br/revistas/uel/index.php/seminabio/article/view/32236/24760. Acesso em: 20 jun. 2021.

MACHADO, Leonel; ANDRADE, Ana; ALBUQUERQUE, Carlos. Relação entre atividade física e qualidade de vida em alunos do ensino superior. **Millenium**. p. 77-84, 2020. Disponível em: https://revistas.rcaap.pt/millenium/article/view/21508. Acesso em: 20 jun. 2021.

MATSUDO, S.; ARAÚJO, T.; MATSUDO, V.; ANDRADE, D.; ANDRADE, E.; OLIVEIRA, L. C.; BRAGGION, G. QUESTIONÁRIO INTERNACIONAL DE ATIVIDADE FÍSICA (IPAQ): ESTUDO DE VALIDADE E REPRODUTIBILIDADE NO BRASIL. **Revista Brasileira de Atividade Física & Saúde**, [S. l.], v. 6, n. 2, p. 5–18, 2012. Disponível em: https://rbafs.org.br/RBAFS/article/view/931 . Acesso em: 21 jul. 2022.

OLIVEIRA, Luciano Machado Ferreira de; OLIVEIRA, Tenório de; SILVA, Alison Oliveira da; SANTOS, Marcos André Moura dos; RITTI-DIAS, Raphael Mendes; DINIZ, Paula Rejane Beserra. Exercício físico ou atividade física: qual apresenta maior associação com a percepção da qualidade do sono de adolescentes? **Revista Paulista de Pediatria**. v. 36, n. 3, p. 322-328, 2018. Disponível em: https://www.scielo.br/j/rpp/a/BJ6hm6dNfsXvYQvfQvVnHtS/?lang=pt#. Acesso em: 20 jun. 2021.

PANCOTTO, Heloísa Pereira; TOME, Camila Akemi; ESTEVES, Andrea Maculano. Influência da prática de natação no sono e na qualidade de vida de pessoas com deficiência visual. **Rev Bras Med Esporte**. v. 27, n. 2, p. 179-183, 2021. Disponível em:

https://www.scielo.br/j/rbme/a/CyLkmxkgMy99t8MyWC7MZ6b/?lang=pt&format=pdf. Acesso em: 01 jul. 2021.

SANTANA, Clara Pereira; NUNES, Hiago Alessandro Soares; SILVA, Aline Natália; AZEREDO, Catarina Machado. Associação entre supervisão parental e comportamento sedentário e de inatividade física em adolescentes brasileiros. **Ciência & Saúde Coletiva**, [S.L.], v. 26, n. 2, p. 569-580, fev. 2021. Disponível em: https://www.scielo.br/j/csc/a/SPJpPYbG9sHwcBr3MXpgQzx/?lang=pt. Acesso em: 30 mar. 2022.

SANTIAGO, Ladyodeyse da Cunha Silva; LYRA, Maria Julia; CUNHA FILHO, Moacyr; CRUZ, Pedro Weldes da Silva; SANTOS, Marcos André Moura dos; FALCAO, Ana Patrícia Siqueira Tavares. EFEITO DE UMA SESSÃO DE TREINAMENTO DE FORÇA SOBRE A QUALIDADE DO SONO DE ADOLESCENTES. **Revista Brasileira de Medicina do Esporte**, [*s. l*], v. 21, n. 2, p. 148-152, 2015. Disponível em: http://rbme.org/detalhes/41/efeito-de-uma-sessao-de-treinamento-de-forca-sobre-a-qualidade-do-sono-de-adolescentes. Acesso em: 10 abr. 2022.

SANTOS, Isabele Ferreira; SILVA, Marcos Antonio Carneiro da. O corpo no ensino médio: uma análise da percepção corporal dos estudantes do rio de janeiro. **Journal Of Physical Education**. v. 32, n. 1, p. 1-12, 2021. Disponível em: https://www.scielo.br/j/jpe/a/CS633xsKR9HTvRQ477RVXtd/?lang=pt#. Acesso em: 01 jul. 2021.

SILVA, Leticia Tosts da; PEREIRA, Ramon da Silva; VIDAL, Pamela; LIBERATO, Fernanda Mayrink Gonçalves; ARPINI, Luana da Silva Baptista; BARBOSA, Roberta Ribeiro Batista. Capacidade de exercício e nível de atividade física diária de crianças e adolescentes com fibrose cística: associação com estado nutricional, função pulmonar, hospitalização e uso de antibióticos. **Fisioterapia e Pesquisa**, [S.L.], v. 28, n. 2, p. 193-200, jun. 2021. Disponível em: https://www.scielo.br/j/fp/a/wzGmmFXkwf9XWbmXDZTjVkx/?lang=pt#. Acesso em: 30 mar. 2022.

SILVA, Nayra Suze Souza e; SANTOS, Bruna Nathália; LEÃO, Luana Lemos; SILVA, Rosângela Ramos Veloso; SILVA, Carla Silvana de Oliveira e. Nível de atividade física em adolescentes: uma revisão sistemática. **Revista Brasileira de Nutrição Esportiva**. v. 13, p. 839-847, 2019. Disponível em: http://www.rbne.com.br/index.php/rbne/article/view/1453/1123. Acesso em: 20 jun. 2021.

SOUZA NETO, João Miguel de; COSTA, Filipe Ferreira da; BARBOSA, Arthur Oliveira; PRAZERES FILHO, Alcides; SANTOS, Elaine Valdna Oliveira dos; FARIAS JÚNIOR, José Cazuza de. Physical activity, screen time, nutritional status and sleep in adolescents in northeast Brazil. **Revista Paulista de Pediatria**. v. 39, p. 1-8, 2021. Disponível em: https://www.scielo.br/j/rpp/a/55jYBPz37XFnDc3wNYGZy5x/?lang=en#. Acesso em: 01 jul. 2021.

TRINDADE, Carla Sofia Sobral; RAMOS, Ana Lúcia Caeiro. Influência dos programas de educação sobre o sono de crianças e adolescentes: revisão integrativa. **Acta Paulista de Enfermagem**. v. 33, p. 1-9, 2020. Disponível em: https://www.scielo.br/j/ape/a/WwNQdXZ6nFdTDLpJLGZ4zgv/?lang=pt#. Acesso em: 20 jun. 2021.

WANG, Guanghai; ZHANG, Jihui; LAM, Siu Ping; LI, Shirley Xin; JIANG, Yanrui; SUN, Wanqi; CHAN, Ngan Yin; KONG, Alice Pik Shan; ZHANG, Yunting; LI, Shenghui *et., al*. Ten-Year Secular Trends in Sleep/Wake Patterns in Shanghai and Hong Kong School-Aged Children: a tale of two cities. **Journal Of Clinical Sleep Medicine**. v. 15, n. 10, p. 1495-1502, 2019. Disponível em: https://jcsm.aasm.org/doi/10.5664/jcsm.7984. Acesso em: 26 jun. 2021.

WELLER, Wivian; SILVA, Cilene Vilarins Cardoso da. Ensino médio público no passado e no presente: visões de docentes de distintas gerações do distrito federal. **Revista Brasileira de Estudos Pedagógicos**. v. 102, n. 260, p. 63-81, 2021. Disponível em: https://www.scielo.br/j/rbeped/a/ycCF6mNPR5chFfPYRRd5dYH/?lang=pt. Acesso em: 01 jul. 2021.

WORLD HEALTH ORGANIZATION (WHO). Diretrizes da OMS para atividade física e comportamento sedentário, 2020. Disponível em: https://apps.who.int/iris/bitstream/handle/10665/337001/9789240014886-por.pdf?sequence=102&isAllowed=y. Acesso em: 01 jul. 2021.

WORLD HEALTH ORGANIZATION (WHO). Coronavirus disease (COVID-19) Pandemic. [Internet]. World Health Organization, 2020. Disponível em: https://www.who.int/emergencies/ diseases/novel-coronavirus-2019. Acesso em: 28 jun. 2021.

CHAPTER 66

Assistance for the newborn in the birth room

10.56238/rsfohsv1-066

Michelle Carneiro Fonseca
Federal University of Rio Grande do Norte (UFRN)

Nathália Torres Costa de Souza
Federal University of Rio Grande do Norte (UFRN)

Mariana Furtado Barros de Souza
Potiguar University (UNP)

Carmem Cristina Torquato Nunes
Potiguar University (UNP)

Alyson Soares Santana
Potiguar University (UNP)

Polliana Carvalho de Souza
Federal University of Rio Grande do Norte (UFRN)

Liva Gurgel Guerra Fernandes
Federal University of Rio Grande do Norte (UFRN)

Daniella Santos Guedes Alcoforado
Federal University of Rio Grande do Norte (UFRN)

Priscilla Pereira de Menezes
Federal University of Rio Grande do Norte (UFRN)

Kadija Gentil Nogueira Garcia
Federal University of Rio Grande do Norte (UFRN)

Alessandra Gurgel Câmara
Federal University of Rio Grande do Norte (UFRN)

Maria de Lourdes Pontes Neta
Federal University of Rio Grande do Norte (UFRN)

ABSTRACT
Newborn (NB) care consists of assistance from a trained professional. Health promotion, prevention and care actions aimed at pregnant women and newborns have great relevance, as they influence the health condition of individuals, from the neonatal period to adulthood. It can be seen, therefore, that the performance of health professionals in the care of the newborn can positively or negatively interfere with the transition and bonding with the mother. Integrative literature review study. it is necessary to recognize the importance of adequate assistance in delivery rooms for newborns so that the team can perform all procedures for the newborn.

Keywords: Newborn. childbirth. Health.

1 INTRODUCTION

According to Souza, Gaiva, and Modes (2011), humanizing birth care implies attitudes such as monitoring the physiology of childbirth, offering emotional support to women and their families, informing all procedures to be performed, and empowering women to that she exercises their autonomy during labor, making this moment as less medicalized as possible, using care practices that guarantee the physical and psychological integrity of this woman who is in a fragile moment and who requires care from the entire team.

Ordinance No. 371 of May 7, 2014, establishes that care for newborns (NB) consists of assistance by a trained professional, a doctor (preferably a pediatrician or neonatologist), or a nursing professional (preferably an obstetric or neonatal nurse), including the period immediately before delivery until the NB is sent to rooming-in, along with his mother, or the Neonatal Unit - or even, in the case of birth in a pre-delivery, delivery, and puerperium (PPP) room, is maintained with his mother, under the supervision of the professional team responsible for the PPP. Care for the health of the NB is essential for reducing infant mortality, which is still high in Brazil.

Therefore, for comprehensive care of the NB, care provided by a multidisciplinary team is necessary. And this immediate assistance after birth is relevant to the health of the newborn and his mother. Since it is at this moment that, among other actions, there is skin-to-skin contact, breastfeeding in the first hour of life, among others.

Promotion, prevention, and healthcare actions aimed at pregnant women and newborns are of great importance, as they influence the health condition of individuals, from the neonatal period to adulthood. And more and more, the determining relationship between intrauterine life, health conditions at birth and in the neonatal period, and chronic-degenerative problems in adult life, such as obesity, diabetes, cardiovascular diseases, and mental health, among others, has been highlighted (BRASIL, 2012; BRASIL, 2017).

It is advised that the care provided to the baby must be linked to its survival, to the affective/emotional bond with its mother, to the gradual and non-traumatic adaptation to the new environment, to early breastfeeding, to the evaluation of vital signs, to the recording of anthropometry, prevention of hemorrhages and diseases such as HIV, syphilis, among other care. These procedures present excellent results immediately and throughout your life, contributing to the reduction of the disparity between what science proves and the clinical practice of professionals, who normally do not perform assistance based on scientific evidence (LIMA; CASTRO, 2017; MOREIRA, 2014).

It is clear, therefore, that the role of health professionals in caring for the newborn can positively or negatively interfere with the transition and bonding with the mother. Professionals must promote the newborn's transition to extrauterine life in safety and tranquility, ensuring benefits for their physical and emotional health (LARA; GOULART; CARMO, 2010).

This work is relevant because it essentially allows us to understand that the first care for newborns must be fully carried out, offering less risk to the child's health, together with the importance that health professionals play in this first care in the delivery room.

Given the above and aiming to contribute to the construction of knowledge on the performance of the first care for newborns performed in the delivery room, this study aims to highlight the actions of the multidisciplinary health team, especially the nursing team, in immediately and mediate to the newborn in delivery rooms, to know, reflect on and contribute to care practice, emphasizing the importance of ensuring adequate care for the NB.

2 DEVELOPMENT

2.1 METHODOLOGICAL PROCEDURES

This is an integrative literature review, produced through the following steps: definition of the guiding question; establishment of criteria for inclusion and exclusion of studies; definition of information to be extracted and categorization of studies; assessment of included studies; interpretation of results and presentation of the review and synthesis of knowledge.

The guiding question of this study was: What nursing assistance is needed for humanized care for newborns after birth? The research was carried out between August 2022 and November 2022, in the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS), and the Scientific Electronic Library Online (SCIELO) virtual library. The research was carried out from the intersection of the following Descriptors in Health Sciences (DeCS): "Newborn"; Nursing Assistance"; "delivery" and the Boolean operator AND was used as a search strategy among the descriptors. Inclusion criteria were: studies published in full in the period between 2012 and 2022, with free access and that corresponded to the research theme.

As exclusion criteria were used: duplicate articles in the databases, and those that did not correspond to the research objective. The articles found were submitted to the inclusion and exclusion criteria, and subsequently had their information recorded in a specific form, containing the article title, authors, year of publication, objective, type of study, method, results, and conclusion.

After analyzing and interpreting the data, a synthesis of the knowledge obtained in these publications was carried out, which produced results in narrative form.

3 RESULTS AND DISCUSSION

According to the Federal Nursing Council (COFEN), it is necessary to reinforce the importance of qualified nursing care for safe childbirth care, since one of the pillars of the Stork Network is linked to the qualified performance of nurses, associated with greater satisfaction of the parturient, decreasing the rates of unnecessary interventions and increases in vaginal deliveries (ASCON, 2019).

Immediate care is that performed right after the birth of the child, involves the first contact of the NB with the mother, care with the umbilical cord (delayed clamping and cutting), stimulation of the first breastfeeding, performing the Apgar score of the first, fifth and tenth minutes and care procedures in the simplified physical examination, application of the Hepatitis B vaccine, application of silver nitrate, vitamin K and aspiration of the mouth and nose when necessary (XIMENES et al, 2016; TREVISAN et al, 2018; WHO, 2017).

In addition, the NB (Newborn) must be identified and the anthropometric measurements (weight, length, head, chest, and abdominal perimeters) verified and recorded in the appropriate medical record, and after immediate care, the child must be sent to rooming-in with the mother (RUCHEL; PEDRINI; CUNHA, 2018; ROCHA et al., 2018).

Among the preventive measures that parents/guardians should be guided on regarding care, are exclusive breastfeeding, asepsis of the umbilical stump with 70% alcohol three times a day, dorsal sleeping position, the follow-up to routine consultations, adherence to the calendar of vaccination and learn to recognize the danger signs, such as weight below 2,500g at birth, weakness or absence of maternal breast suction, difficulty breathing, purulent secretion in the navel, hypo reaction, diarrhea or feces, fever or hypothermia, severe vomiting quantity, jaundice and cyanosis (BRASIL, 2012).

Knowing that exclusive breastfeeding is essential for the health of the NB and strengthens the mother-baby bond, it is necessary to emphasize the correct positioning of the baby during breastfeeding, emphasizing that the newborn must be properly held. And many factors influence this proper attachment, such as the baby's position and the mother's position. The newborn needs to be well supported, with head and body aligned, body very close and facing the mother, belly to belly, chin touching the chest, and mouth open facing the nipple (LIMA et al., 2017).

The application of vitamin k, intramuscularly, is important to prevent early bleeding due to this vitamin deficiency, hemorrhagic disease of the NB, and to avoid subsequent bleeding. It should be performed routinely in all newborns (BRASIL, 2014).

The BCG vaccine (Bacillo Calmette-Guérin), administered intradermally, is a prophylactic measure of immunization of the newborn that according to Brasil (2014), is indicated to prevent tuberculosis, mainly in the miliary and meningeal forms, being important for health public health due to its impact on reducing morbidity and mortality in severe forms of this disease.

Immediate care is performed after clinical stabilization of the newborn in the delivery room, with basic body cleaning (if necessary), complete physical examination, and assessment of breastfeeding ability and weight loss, among others. One of the first immediate measures is the administration of 1mg of vitamin K, intramuscularly or subcutaneously, to prevent bleeding. (FIGUEIREDO 2008; BRASIL, 2012; PELLENZ, 2019).

Regarding the performance of umbilical cord clamping. The World Health Organization (WHO) recommends clamping the umbilical cord after the complete cessation of the pulsation, with a period of one and three minutes after birth, defining it as timely or late clamping. When it occurs before this period, clamping is defined as early/immediate. The benefits of late/timely clamping of the umbilical cord for the full-term newborn include an increase of 80 ml of placental blood, when clamping occurs 60 seconds after birth, increasing to 100 ml when there is a wait of up to three minutes to perform the practice. Furthermore, it provides an iron supply of 40 to 50 mg/kg, which contributes to the reduction of iron deficiency in the first year of life. Noting that higher rates of exclusive or predominant breastfeeding after hospital discharge and assistance in maintaining body temperature and better neurological outcomes are observed in full-term newborns from birth to 4 years of age. Despite the benefits shown, high rates of early/immediate clamping are still identified, which is considered an outdated care protocol (STRADA, 2020).

The promotion of skin-to-skin contact should be early, that is, soon after birth, since a few hours after birth newborns are drowsy (SANTOS et al., 2014) - prioritizing routine care, which could be postponed (KOLOGESKI; STRAPASSON; SCHNEIDER; RENOSTO, 2017).

For this, it is recommended that the clinically stable baby be placed in direct contact with the mother's or father's abdomen or chest, face down, during the first hour of life, without the use of clothes or fabrics that prevent touching between the parents' bodies. and sons. Skin-to-skin contact should not be

limited to the first hours of life and should be encouraged whenever possible in the baby's first days of life (GÓES, 2021; BRASIL, 2013).

Care for the umbilical cord stump is essential, as it prevents infection at this location. You should clean it and always observe if there is any type of secretion. Cleaning the umbilical stump should be done after bathing the baby, a process that ends with the healing of the area, using 70% alcohol and enough cotton to gently make circular movements (FERREIRA et al., 2021)

The conducts related to the thermoregulation of newborns are basic for those responsible for their care in the maternity ward since the maintenance of heat is considered a physiological difficulty, in the case of routine knowledge in neonatology. In this way, several factors can influence the loss of heat in the neonate, among them are: radiation, conduction, convection, or evaporation. Other conditions likewise may predispose them to heat loss, such as the large surface area to weight ratio, inefficient thermal insulation due to the thin layer of fat, and the mechanism of heat production, i.e., nonshivering thermogenesis. (FRANÇA et al., 2021; LIMA; REIS; SILVA; MOURA, 2020).

Immediate care is performed after clinical stabilization of the newborn in the delivery room, usually corresponding to basic body cleaning (if necessary), performing a complete physical examination, assessing the ability to breastfeed and weight loss, among others (CARVALHO; PELLENZ, 2019; FIGUEIREDO, 2008). One of the first immediate measures is the administration of 1 mg of vitamin K, intramuscularly or subcutaneously, to prevent bleeding (BRASIL, 2012).

At the end of immediate care, before the child is sent to rooming-in, she must receive the appropriate clothing, it is noteworthy that, according to the World Health Organization, the first bath must take place after 24 hours of birth to benefit the colonization of the microbiota mother for the NB, to preserve the skin and to maintain the thermal stability of the NB. However, if it is not feasible, it should happen at least six hours after delivery (WHO, 2017).

The role of the nursing professional, in this context, begins with the health care of women and newborns, seeking to ensure humanized, individualized, and comprehensive care. In addition, it is also up to the nurse to promote actions that aim to assist the parturient in her complexity, allowing her autonomy regarding matters related to prenatal care, childbirth, first care with the baby, and the puerperium (Camillo et al., 2016).

The nursing team plays an important role in the lives of parturients and, among many challenges, supporting pregnant women during breastfeeding is a believable example, in which the objective is to help women experience the entire delivery process in a way that all meet their needs. biological, psychological, and spiritual, with safety for themselves and the baby (GOMES, 2020).

The nursing team is composed of nurses, nursing technicians, nursing assistants, and midwives and they are the most professional in health establishments. When caring for newborns in delivery rooms, they perform postpartum care together with the medical team.

4 FINAL REMARKS

The model of child health care determines care, to ensure that all newborns are cared for according to their needs.

Humanizing newborn care should not be confused with personal feelings and/or sensitivities, but with the technical qualification of nursing professionals performing all the necessary procedures for maintaining the health of NBs.

Given all the factors and concepts presented, it is necessary to recognize the importance of adequate care in delivery rooms for newborns and that the team is trained to carry out all procedures and conversations. Therefore, providing humanized, quality care that is free of risks and damages.

BIBLIOGRAPHIC REFERENCES

ASCON. Enfermeiros estão habilitados para assistência ao parto, reforça COFEN. 2019. <http://www.coren-ro.org.br/enfermeiros-estao-habilitados-para-assistencia-ao-parto-reforca-cofen_10578.html>.

BRASIL. Ministério da Saúde. Atenção à saúde do recém-nascido: guia para os profissionais de saúde. Gerais. Brasília (DF): Secretaria de Atenção à Saúde, 2012a.

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas e Estratégicas. Além da sobrevivência: práticas integradas de atenção ao parto, benéficas para a nutrição e a saúde de mães e crianças / Ministério da Saúde, Secretaria de Atenção à Saúde, Área Técnica de Saúde da Criança e Aleitamento Materno. – 1. ed., 1. reimp. – Brasília: Ministério da Saúde, 2013. 50p, ISBN 978-85-334- 1774-8. Disponível em: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1248172 acesso em: 04 de julho de 2021.

BRASIL. Ministério da Saúde. Atenção à saúde do recém-nascido: guia para os profissionais de saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas e Estratégicas. 2. ed. atual. Brasília, 2014.

BRASIL. Ministério da Saúde. Diretriz nacional de assistência ao parto normal. Relatório de recomendação. Secretaria de Ciência, Tecnologia e Insumos Estratégicos [Internet]. Brasília: Ministério da Saúde; 2017. Disponível em: https://bvsms.saude. gov.br/bvs/publicacoes/diretrizes_nacionais_assistencia_parto_ normal.pdf

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas. Atenção à saúde do recém-nascido: guia para os profissionais de saúde [Internet]. Brasília: Ministério da Saúde; 2012. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/atencao_saude_ recem_nascido_profissionais_v1.pdf

CAMILLO, B. S. et al. Ações de educação em saúde na Atenção Primária a Gestantes e puérperas: revisão integrativa. Rev enferm ufpe, recife, 10(6), 4894-901, 2016.

CARVALHO, G. E.; PELLENZ, D. C. Assistência de enfermagem ao recém-nascido na sala de parto. Revista Saberes UNIJIPA, Ji-Paraná, v. 13, n. 2, fev./jul. 2019. Disponível em: https://unijipa.edu.br/wp-content/uploads/sites/2/2019/07/ARTIGO-3- ASSIST%C3%8ANCIA-DE- ENFERMAGEM-AO-REC%C3%89M-NASCIDO.pdf. Acesso em: 08 fev. 2021.

DUTRA, A. K. R; FLAUSINO, B. L. C; SILVA, D. C. Capacitação humanizada de enfermagem frente aos cuidados neonatais no vínculo biônimo mãe e filho. Revista fasem ciências. 2016;9(01):56-81. Disponível em: https://revista.fasem.edu.br/index.php/fasem/article/view/97

FERREIRA, B. L. R et al. Assistência de enfermagem na infecção puerperal: revisão integrativa. Revista Interação, v.21, n.2, p. 160-169. 2021.

FIGUEIREDO, N. M. A. Ensinando a cuidar da mulher, do homem e do recémnascido. São Caetano do Sul, SP: Yendis Editora, 2008.

FRANÇA, D. C. A. et al. Termorregulação no recém-nascido: uma revisão integrativa na literatura. Saúde Coletiva, v. 11, n. 60, p. 4620-4629, 2021. Disponível em: http://dx.doi.org/10.36489/saudecoletiva.2021v11i60p4620-4629. Acesso em: 25 mar. 2021.

GÓES, Fernanda Garcia Bezerra et al. Boas práticas no cuidado ao recém-nascido com boa vitalidade na sala de parto: revisão integrativa. Rev. Pesqui .(Univ. Fed. Estado Rio J., Online), p. 899-906, 2021.

GOMES, C. M., OLIVEIRA, M. P. S., & LUCENA, G. P. de. O papel do enfermeiro na promoção do parto humanizado. Revista Recien - Revista Científica de Enfermagem, 10(29), 2020.

KOLOGESKI, T. K.; STRAPASSON, M. R.; SCHNEIDER, V.; RENOSTO, J. M. Contato pele a pele do recém-nascido com sua mãe na perspectiva da equipe multiprofissional. Rev. Enferm. UFPE on line, v. 11, n. 1, p. 94-101, 2017. Disponível em: 10.5205/reuol.9978-88449-6-1101201712. Acesso em: 24 mar. 2021.
LIMA, L. S.; REIS, E. A. F.; SILVA, E. M.; MOURA, J. P. G. Cuidados de enfermagem na termorregulação de recém-nascidos prematuros: revisão integrativa. Cogitare Enferm., v. 7, n. 25, p. 1-13, 2020. Disponível em: http://dx.doi.org/10.5380/ce.v25i0.70889. Acesso em: 25 mar. 2021.

ROCHA, L. B. Aleitamento materno na primeira hora de vida: uma revisão da literatura. Revista de Medicina e Saúde de Brasília, 6(3):384-94, 2018. Disponível em: https://portalrevistas.ucb.br/index.php/rmsbr/article/view/8318

RUCHEL, L. M; PEDRINI, D. B; CUNHA, M. L. C. Hypothermia, and the newborn's bath in the first hours of life. Rev. gaúch. Enferm, n;39:e20170263, 2018. DOI: https://doi.org/10.1590/1983-1447.2018.20170263

SANTOS, L. M. et al. Vivenciando o contato pele a pele com o recém-nascido no pós-parto como um ato mecânico. Rev Bras Enferm, v. 67, n. 2, p. 202-7, 2014. Disponível em: 10.5935/0034-7167.20140026. Acesso em: 24 mar. 2021.

SILVA, J. M et al. Cuidado de enfermagem ao recém-nascido pré-termo em uma Unidade de terapia neonatal. Revista educação meio ambiente e saúde. 2020;10(3):73-84. Disponível em: http://faculdadedofuturo.edu.br/revista1/index.php/remas/article/view/303/pdf_35. Acesso em: 01 nov. 2022.

SILVA, R. C. M et al. Cuidados de enfermagem no pós-parto imediato: prática educativa realizada no hospital municipal de Ji-Paraná/RO. Rev. saberes. Disponível em: . Aceso em: 05 out. 2020.

STRADA, J. K. R et al. Factors associated with umbilical cord clamping in term newborns* * Extracted from the dissertation “Fatores associados ao clampeamento do cordão umbilical em um Hospital Universitário”, Escola de Enfermagem da Universidade Federal do Rio Grande do Sul, Revista da Escola de Enfermagem da USP, v. 56, 2020. Disponível em: <https://doi.org/10.1590/1980-220X-REEUSP-2021-0423>. Acesso em: 07 de nov. 2022.

Trevisan CM. Lawlor GCO, Righi NC, Kurtz FM, Porto BSS. Caracterização de variáveis clínicas e do desenvolvimento motor de recém-nascidos prematuros. Rev. APS. 2018;21(2):177-81. DOI: https://doi.org/10.34019/1809-8363.2018.v21.16060

WHO. World Health Organization. Recommendations on newborn hearth: guidelines approved by the who guidelines review committee. Geneva: WHO; 2017. Disponível em: https://www.who.int/publications/i/item/WHO-MCA-17.07. Acesso em: 07 nov. 2022.

XIMENES, V. L et al. Promoção do aleitamento materno na primeira hora de vida do recém-nascido por profissionais da enfermagem. Arquivos de ciências da saúde da UNIPAR. 2016;20(02):137-43. DOI: https://doi.org/10.25110/arqsaude.v20i2.2016.5386

CHAPTER 67

Implications of vaginal and elective cesarean deliveries in the formation of the oral microbiota of the individual as a subject of rights

10.56238/rsfohsv1-067

Maria da Conceição Ferreira
Dentistry undergraduate student at the Estácio Juiz de Fora University Center - MG.
E-mail: mferreira.jf@icloud.com

Rogério de Souza Torres
Lawyer, Medical Hospital Advocate, and Specialist in Business Law from the Federal University of Juiz de Fora.

Giovanni Cerrone Junior
Advisor and Professor at the Estácio Juiz de Fora University Center

ABSTRACT
The present article aimed to verify the consequences of the delivery vaginal and cesarean sections for the oral microbiota composition. This theoretical reflection was carried out based on congresses annals, technical reports from institutional websites, and scientific articles published in English and Portuguese language since 2015 indexed to the ResearchGate, SciELO, and PubMed databases, and using the following health descriptors “cesárea”, “parto normal”, “sistema imunitário”, “newborn”, “microbiota”, “bacteria”, “cesarean section”, “immune system”. Studies have demonstrated that mi-crobial colonization in the infant's mouth begins shortly following birth. Delivery vaginal is more bene-ficial than cesarean section because of the infant's exposure to resident bacteria and fungi in the maternal vaginal microbiomes, reducing immune imbalances in the future. During birth, bacteria that colonize the skin, and oral and nasal mucous membranes, will help in the maturation and develop-ment of the immune system, looking for higher efficiency to fight exogenous microorganisms that affect, oral health. The appropriate choice by the mode of delivery influences positively the oral mi-crobiota architecture, improving people’s lives and reducing pro futuro economic and social costs, with the purpose of full realization of the right to health.

Keywords: Vaginal delivery; Cesarean section; Oral health.

1 INTRODUCTION

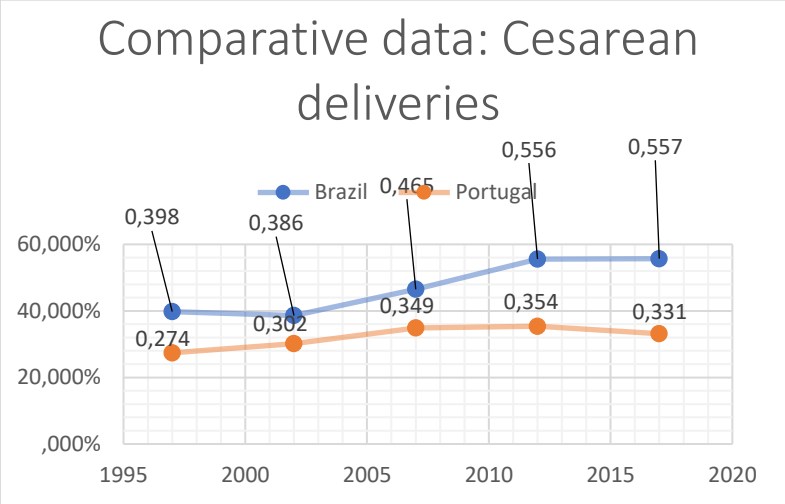
With the end of World War II, several international agencies linked to the United Nations Organization (UNO) were created, among them the World Health Organization (WHO), which, in 1948, established the concept of health as the existence of physical, mental, and social well-being (the mere absence of disease not being enough).

In the current panorama, it is necessary to expand the original conceptual spectrum, adding concepts of biological, social, political, legal, economic, religious, and cultural order, considering the sub-individual, individual, and collective levels, all depending on the time, environment, and socioeconomic conditions of the person.

The Constitution of 1988 established the right to health in the chapter on social rights (art. 6) and better defined its limits in art. 196, when it established that health is a right of all and a duty of the State, which is responsible for acting to reduce the risk of disease and other illnesses, offering universal and equal access to actions and services for promotion, protection, and recovery. The violation of this guarantee not only harms the right to health itself but, especially, denatures the supra-principle of human dignity that stems from the construction of a humanistic valuation incorporated by the international systems of human rights.

The right to a safe, assisted, humanized, and dignified birth interacts with multiple human rights[1] , especially with the right to health[2] of the mother and the newborn.

Chart 1: Comparative data of cesarean deliveries between Portugal and Brazil.



Data published in the BMJ Global Health, in May 2021[3] , indicate that the majority of births in Brazil occur by cesarean section[4] . This information confirms the thesis that Brazil has systematically disregarded the orientation of the international agency of the WHO[5] Currently, according to BMJ Global Health, Brazil (55.7%) is in second place in the world ranking of countries that most perform non-vaginal deliveries, behind only the Dominican Republic (58.1%). Between the third and fifth positions, respectively, are Cyprus (55.3%), Egypt (51.8%), and Turkey (50.8%).

As if the BMJ Global Health data were not enough, the National Health Agency (ANS)[6] reveals a scenario that is also worrisome indicating that in 2019, 69.97% of deliveries were by cesarean section against 30.03% of normal deliveries[7] .

[1] Childbirth relates to fundamental human rights, where the rights to life, equality, intimacy, liberty, security, and personal integrity are highlighted. Available at: https://www. corteidh.or.cr/tablas/24841.pdf. Accessed on: 16 Oct. 2021.

[2] MANTILLA, A. S. and CARDOZO, R. V. Derecho a la vida: Diálogo sobre Justicia, Igualdad de Género y Derechos Reproductivos en América Latina. III Congreso Latinoamericano Jurídico sobre Derechos Reproductivos. Cuernavaca, Morelos - México 14, 15 y 16 de octubre de 2013. Available at: https://promsex.org/publicaciones/derecho-a-la-vida-dialogo-sobre-justicia-igualdad-de-genero-y-dere chos-reproductivos-en-america-latina/ . Accessed on: 16 Oct. 2021.

[3] The Ministry of Health (MH) and the National Supplementary Health Agency (ANS) are aware of the WHO's position that recommends a limit of 15% for cesarean deliveries.

[4] A modality that contributes to the increase in neonatal and maternal mortality.

[5] According to the study "Trends and projections of cesarean section rates: global and regional estimates" published in BMJ Global Health, in Latin America and the Caribbean, rates reach four cesarean sections for every 10 births. If the trend continues to increase, the current average for Latin American and Caribbean countries could catapult from 43% to 54% by 2030. Available at: https: /gh.bmj.com/content/6/6/e005671.full?ijkey=JgilzebteZPF03j&keytype=ref. Accessed on: 16 Oct. 2021.

[6] Data published in the Maternal and Neonatal Care Indicators Panel. Available at: https://app.powerbi.com/view?r=eyJrIjoiNDAyZmU5MjktMGQyNS00MmY2LWEwNDQtZjQ5N2ZkYzQxYmMwIiwidCI6IjlkYmE0ODBjLTRmYTctNDJmNC1iYmEzLTBmYjEzNzVmYmU1ZiJ9. Accessed on: 15 Oct. 2021.

[7] The present ANS data are from private health facilities, regardless of the form of payment for the delivery: health plan, SUS, and direct disbursement. However, in DATASUS, in 2019, data reveal that the average number of births by cesarean section is set at around 56.5%, according to the release available at: http://tabnet.datasus.gov.br /cgi/tabcgi.exe?sinasc/cnv/nvuf.def. Accessed on: 15 Oct. 2021.

In an attempt to encourage vaginal birth - which, as a rule[8] , brings greater benefits to all (mothers, newborns, families, and health professionals) - a set of normative acts[9] and public policies with the legitimate expectation of promoting improvements through the use of new technologies, consolidating women's sexual and reproductive rights, and promoting the right to life of the mother and the newborn[10] have been launched in the last twenty years[11] .

To change a mistaken model that is contributing to continuous and subsequent imbalances since the child's birth[12] , it would be necessary to understand beforehand which factors have been determinants for the persistence of the problem. With this in mind, Fernanda Copelli and her team produced a study to try to identify the origin of this situation, and this ended up exposing some variables: *i)* asymmetry of information, *ii)* unilateral convenience of professionals, *iii)* absence of literature that discusses the risks and demonstrates the complications in cesarean sections, *iv)* professional agenda, *v)* excess of unnecessary interventions, *vi)* obstetric violence, *vii)* fear of the parturient woman of not being able to bear the pain, *viii)* absence of physical and psychological support, and ix*)* socioeconomic progress of the families.

This trend added to the probability of worsening the crisis[13] , however, reveals a risk: the possibility of increasing state intervention, either by the Legislative Power (by issuing new laws), by the Executive Power (with the creation of other public policies), or by the Judiciary Power (by judicial activism that replaces the will of the legislator and the public administrator). What could be solved by the improvement of medical practice can end up being remedied by an intervention of the State, whose residual result is almost always negative, because the solutions are adopted by those who, concretely, do not have the necessary scientific knowledge.

2 DEVELOPMENT

2.1 OBJECTIVE

Although it has already been superficially pointed out that the different types of birth can increase or decrease costs for the health of the human person throughout his or her life, it is necessary to go even deeper into the discussion.

[8] Where there is no fetal distress, prolonged labor, or abnormal position of the baby.
[9] The typical function of the Federal and State Legislative Branches.
[10] Currently, Bill 768/2021 is in the House of Representatives, which aims to guarantee pregnant women the right to receive anesthesia during normal birth, in cases where there is no medical impediment, or to opt for a cesarean section after the 39th week.
[11] For example, Laws 11.108/2005, 11.634/2007, and 12.401/2011 and Ordinances 569/2000 and 2.418/2005 intend to guarantee standards of conduct in the health area to consolidate practices, such as *i)* access to adequate and timely information based on scientific evidence; *ii)* transparency; *iii)* safety; and *iv)* humanization.
[12] According to art. 7 of Law 8069/90, Statute of the Child and Adolescent, every child is the holder of several rights, among them the right to life and health, through the implementation of public social policies that allow their birth and healthy and harmonious development.
[13] According to a study published in the BMJ Global Health, there is a prediction that cesarean rates in Latin American and Caribbean countries may catapult from 43% to 54% in 2030. Available at: https:/ /gh.bmj.com/content/6/6/e005671.full?ijkey=JgilzebteZPF03j&keytype=ref. Accessed on: 16 Oct. 2021.

By analyzing the formation of the microbiota according to the type of delivery that the newborn underwent, this theoretical reflection intends to find out what implications the model of delivery adopted can bring to the formation of oral microbial communities that act in the development of the child's immune system, what type of delivery is more beneficial for the development of the respective system in the individual, and what scientific and dental arguments may be able to help transform the current scenario, which undoubtedly requires multidisciplinary action and permanent dialogue between the different fields of knowledge.

3 METHODOLOGY

The methodology adopted was that of theoretical reflection, based on data recently published on the websites of the WHO, Pan American Health Organization, ANS, DATASUS, and on the Report of the International Congress on Human Rights in Latin America (2013), as well as on scientific articles published in Portuguese and English, less than 10 years old, accessible on the Google Scholar, SciELO, and PubMed platforms that bring plenty of material on the correlations between the type of delivery a child has undergone and the development of its oral microbiota.

The descriptors used on the Google Academic, SciELO, and PubMed platforms, according to the DeCS - Descriptors in Health Sciences and MeSh - Medical Subject Headings lists, were "cesarean section", "normal delivery", "immune system", "newborn", "newborn", "microbiota", "bacteria", "cesarean section", "immune system", "newborn".

4 RESULTS

The material researched led us to conclude that hundreds of microbial species present in the oral cavity only appear after birth. Before this, the fetus is aseptic and its oral cavity is entirely sterile. At the moment of birth, this cavity will be prone to receive several microorganisms, which is why the choice of delivery modality must be careful and made together with the doctor.

The analysis of the articles and materials selected for this article led us to understand that birth by vaginal route exposes the neonate to early contact with bacteria and fungi residing in the maternal genital tract[14] which matures the immune system[15] , activates the infant's adaptive immune response more, develops antibodies more rapidly, increases defenses against pathogenic microorganisms initiate colonization of the gastrointestinal tract, and facilitates digestion[16] .

[14] In a 2018 study, Hongping LI proved that infants who passed through the vaginal canal had *Lactobacillus, Prevotella*, and *Gardnerella*. The first environmental event corresponding to birth promotes an allogenic succession of microorganisms within the initially sterile oral cavity. Therefore, soon after birth, *Streptococcus salivarius* and *Streptococcus mitior* are present. On the second day of life, Streptococcus and *Staphylococcus*. And in the third month, due to the development of the host, *Streptococcus*, *Staphylococcus, Pneumococcus*, *Lactobacillus,* and *Neisseria are* already present. JORGE (2012)

[15] Of extreme importance to the immune system, the microbiota is responsible for: inducing regulatory T cells (TReg) that control inflammatory responses, stimulating macrophages that fight pathogens, and limiting pathogen colonization.

[16] *Bacteroides* are the microorganisms responsible for the digestion of breast milk and their absence in the gastrointestinal tract can promote digestive problems (COELHO, 2021).

In contrast, when the child is born by elective cesarean section, at the very least, it no longer has contact with the microbial species of the maternal genital tract[17] , which is why the literature has identified, among the harmful effects, predisposition to the development of neonatal depression from general anesthesia, fetal injury, respiratory difficulties, delayed development of the microbiota of the gastrointestinal tract (LIMA, 2019), among others that may appear soon after birth or in the course of life.

Because of the slow maturation of the immune system (which is responsible for confronting exogenous microorganisms through innate or acquired immune responses), people who are born via C-section have high risks[18] to develop alterations in metabolic responses and intestinal permeability, inflammatory bowel diseases, autoimmune diseases, type 1 diabetes *mellitus*, obesity, immune deficiencies, asthma, eczema, allergic rhinitis, etc. (LIMA, 2019).

5 DISCUSSION

Birth is the moment when the baby's immune system will be exposed for the first time to exogenous microorganisms that will come into contact with the child's skin and mucous membranes and where a homeostatic relationship between the colonizing microbiota and the host will begin (COELHO, 2021). It is necessary to pay attention to the circumstance that the type of delivery chosen may favor or disfavor the construction of microbial communities that increase or decrease the quality of life and opportunity costs of the human person (because good health is inversely proportional to the high cost of medical treatments, and vice-versa).

If, in the first days of life, those born from vaginal delivery have a much richer concentration of microorganisms, similar to those in the maternal vaginal tract - *Firmicutes, Bacteroides, Actinobacteria, Bifidobacterium*, *Lactobacillus, Prevotella, Corynebacterium Gardnerella*, and *Ureaplasma* - C-section neonates have impoverished concentrations of microorganisms that resemble those that the mother has on her skin and/or those that inhabit the hospital environment - *Bacteroidetes, Proteobacteria, Firmicutes, Staphylococcus*, *Streptococcus*, and *Clostridium* (LI, 2018).

Therefore, vaginal delivery[19] is more beneficial to the maturation and development of the immune system of the newborn, because children born by elective cesarean section have delayed maturation of the microbiota in the neonatal phase[20] , lower diversity of microorganisms[21] and, diachronically, "lower phylogenetic richness" (COELHO, 2021). This positioning continues to reinforce research conducted, by

[17] And she also does not experience the results of an emergency cesarean section, whose effects are similar to those of normal labor.
[18] Some authors relate this increased risk to the hygiene hypothesis (HH) proposed in 1989 by epidemiologist David P. Strachan.
[19] As long as there is no risk to the life of the mother and the fetus.
[20] An inadequate microbiota can prolong immune immaturity that affects the action of TReg cells and macrophages, contributing to the development of immune system-related diseases (COELHO, 2021).
[21] Gabriela Coelho and her team's research explains that among this smaller variety, a significant portion of microorganisms, besides being resistant to antibiotics, also coincides with species endemic to hospital environments.

Lif Holgerson, in 2011, in which greater bacterial taxa were found in the oral microbiota of infants born by vaginal delivery than in neonates of cesarean section.

However, such benefits of vaginal delivery may be compromised by the execution of a single protocol (LI, 2018). A group of researchers reported that the long stay in delivery rooms induces repetitive pelvic exams. The risk lies in the recurrent application of large amounts of Povidone Iodine that disseminates into the vagina of the parturient woman, damaging the vaginal microbiota and consequently affecting the transfer of bacteria to the babies passing through the birth canal.

For dentistry, the choice of delivery is also decisive because it determines whether the child will have greater or less resistance to certain bacteria in the oral cavity. Important research directed by Yihong Li[22] found that children born by cesarean section have less contact with beneficial bacteria, find it more difficult to develop resistance to the harmful bacteria in the oral cavity, have more signs of decay, and the bacteria *Streptococcus mutans has the* potential on the surface of the teeth to accelerate its activity.

If caries is the second largest cause of tooth loss and can lead to a list of diseases that go beyond the limits of the oral cavity[23] , the transformation of the current scenario requires multidisciplinary commitment and a permanent dialogue between different fields of knowledge to discourage the indiscriminate practice of cesarean sections, which will avoid health risks and oral diseases for future generations.

6 CONCLUSION

If birth directly interferes with the formation of the microbiota, it is determinant that the choice is rational and a little invasive, so as not to harm the transfer of maternal bacteria to the baby.

Vaginal delivery creates a natural and early exposure of the infant to a variety of beneficial microorganisms found in the maternal genital tract. This phenomenon is crucial for the proper formation of the newborn's microbiota because it activates the adaptive immune response more quickly and effectively, matures the immune system, allows antibodies to develop more rapidly, increases defenses against pathogenic microorganisms, initiates colonization of the gastrointestinal tract, simplifies digestion, decreases the risk of immunological diseases, and contributes to the formation of a microbiota that is more resistant to systemic and oral pathologies, such as caries.

Under the Dentistry approach, it is of utmost importance that the Federal and Regional Councils, in Brazil, encourage through state and national campaigns, dental prenatal care to *i)* reduce the asymmetry of the information reported in several studies; *ii)* start promoting the health of the unborn child; *iii)* contribute to a higher quality of life of the child to be born; *iv)* reverse behaviors that contribute to systemic and oral diseases in future patients; and *v)* encourage a technical choice of delivery model, based on evidence and not on convenience.

[22] Published in the Journal of Dental Research, 2005.
[23] Requiring the intervention of other medical specialties.

BIBLIOGRAPHIC REFERENCES

ANS – AGÊNCIA NACIONAL DE SAÚDE SUPLEMENTAR: **Painel de Indicadores de Atenção Materna e Neonatal**. Disponível em: https://app.powerbi.com/view?r=eyJrIjoiNDAyZmU5MjktMGQyNS00MmY2LWEwNDQtZjQ5N2ZkYzQxYmMwIiwidCI6IjlkYmE0ODBjLTRmYTctNDJmNC1iYmEzLTBmYjEzNzVmYmU1ZiJ9. Acesso em: 10 Oct. 2021.

BRASIL. **Lei 8.069, de 13 de julho de 1990**. Dispõe sobre o Estatuto da Criança e do Adolescente e dá outras providências. Disponível em: http://www.planalto.gov.br /ccivil_03/leis/l8069.htm. Acesso em: 10 Oct. 2021.

_____. **Lei 11.108, de 7 de abril de 2005**. Altera a Lei nº 8.080, de 19 de setembro de 1990, para garantir às parturientes o direito à presença de acompanhante durante o trabalho de parto, parto e pós-parto imediato, no âmbito do Sistema Único de Saúde - SUS. Disponível em: http://www.planalto.gov.br/ccivil_03/_ato2004-2006/ 2005/lei/ l11108.htm. Acesso em: 10 Oct. 2021.

_____. **Lei 11.634, de 27 de dezembro de 2007**. Dispõe sobre o direito da gestante ao conhecimento e a vinculação à maternidade onde receberá assistência no âmbito do Sistema Único de Saúde. Disponível em: http://www.planalto.gov.br/c civil_03/ _Ato2007-2010/2007/lei/l11634.htm. Acesso em: 10 Oct. 2021.

_____. **Lei 12.401, de 28 de abril de 2011**. Altera a Lei nº 8.080, de 19 de setembro de 1990, para dispor sobre a assistência terapêutica e a incorporação de tecnologia em saúde no âmbito do Sistema Único de Saúde - SUS. Disponível em: http://www.planalto.gov.br/ccivil_03/_ato20112014/2011/ lei/l12401.htm. Acesso em: 10 Oct. 2021.

_____. **Portaria nº 569, de 1º de junho de 2000**. Disponível em: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2000/prt0569_01_06_2000_rep.html. Acesso em: 16 Oct. 2021.

_____. **Portaria nº 2.418, de 02 de dezembro de 2005**. Regulamenta, em conformidade com o art. 1º da Lei nº 11.108, de 7 de abril de 2005, a presença de acompanhante para mulheres em trabalho de parto, parto e pós-parto imediato nos hospitais públicos e conveniados com o Sistema Único de Saúde - SUS. Disponível em: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2005/prt2418_02_12_2005.html. Acesso em: 10 Oct. 2021.

_____. Câmara dos Deputados. **Projeto de Lei 768, de 05 de março de 2021**. Garante a gestante o direito de optar pela realização de parto por cesariana, no Sistema Único de Saúde – SUS, bem como a utilização de analgesia, mesmo quando escolhido o parto normal, desde que observada à indicação médica para o caso. Disponível em: https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra;jsessionid=node0uy4vu250ehhz1n9od3n3tb6xb5775017.node0?codteor=1972016&filename=PL+768/2021. Acesso em: 10 Oct. 2021.

_____. Ministério da Saúde. Banco de dados do Sistema Único de Saúde - **DATASUS**. Informações de Saúde, Sistema de Informações sobre Tipos de parto. Disponível em: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sinasc/cnv/nvuf.def. Acesso em: 10 Oct. 2021.

BETRAN, A. P. *et al*. Trends and projections of cesarean section rates: global and regional estimates. **BMJ Global Health**. 2021; 6:e005671. Disponível em: https://gh.bmj.com/content/6/6/e005671.full?ijkey=JgilzebteZPF03j&keytype=ref. Acesso em: 12 Oct. 2021.

COELHO, G.D.P., *et al*. Acquisition of microbiota according to the type of birth: na integrative review. Rev. Latino-Am. Enfermagem. 2021; 29:e3446. Disponível em: https://www.scielo.br/j/rlae/a/r959F4dwG98qnXMgf3Y8wBb/. Acesso em: 12 Oct. 2021.

COPELLI, F. H. *et al*. Fatores determinantes para a preferência da mulher pela cesariana. Texto & Contexto – Enfermagem. Florianópolis. 24 (2). Apr-Jun 2015. p. 336-343. Disponível em: https://doi.org/10.1590/0104-07072015000430014. Acesso em: 14 Oct. 2021.

JORGE, A. O. C. **Microbiologia e imunologia oral**. Rio de Janeiro: Elsevier, 2012.

LIF, H. P., Harnevik, L., Hernell, O., Tanner, A. C. & Johansson, I. Mode of birth delivery affects oral microbiota in infants. **Journal of Dental Research**. **90**, Aug. 2011. p. 1183–1188. Disponível em: https://doi.org/10.1177/0022034511418973. Acesso em: 15 Oct. 2021.

LI, H., *et al.* The impacts of delivery mode on infant's oral microflora. **Scientific Reports 8,** 11938. Aug. 2018. Disponível em: https://doi.org/10.1038/s41598-018-30397-7. Acesso em: 14 Oct. 2021.

LI, Y. C. *et al*. Mode of Delivery and Other Maternal Factors Influence the Acquisition of Streptococcus mutans in Infants. **Journal of Dental Research**. 84. 806-11. 2005. Disponível em: https://doi.org/10.1177/154405910508400905. Acesso em: 15 Oct. 2021.

LIMA, F. J. et al. Relação do tipo de parto na constituição da microbiota infantil. **Anais do XII Encontro de Extensão, Docência e Iniciação Científica (EEDIC) – Unicatólica**. [S.l.], v. 5, n. 1, mar. 2019. ISSN 2446-6042. Disponível em: http://publicacoesacademicas.unicatolicaquixada.edu.br/index.php/eedic/article/view/3144. Acesso em: 16 Oct. 2021.

MANTILLA, A. S. e CARDOZO, R. V. **Derecho a la vida**: Diálogo sobre Justicia, Igualdad de Género y Derechos Reproductivos en América Latina. III Congreso Latinoamericano Jurídico sobre Derechos Reproductivos. Cuernavaca, Morelos - México 14, 15 y 16 de octubre de 2013. Disponível em: https://promsex.org/publicaciones/derecho-a-la-vida-dialogo-sobre-justicia-igualdad-de-genero-y-derechos-reproductivos-en-america-latina/. Acesso em: 16 Oct. 2021.

CHAPTER 68

Unusual case of intentional ingestion of foreign body in patient with mental retardation

10.56238/rsfohsv1-067

Mahomed Sidique Abdul Cadar Dadá
Academic education
• Degree in Medicine from Eduardo Mondlane University (UEM)
• Specialist in Otorhinolaryngology and Cervico Maxillofacial Surgery by the Ministry of Health (MISAU)
• Master in Public Health from Eduardo Mondlane University (UEM)
• PhD in Morphology from the Universitat Atònoma de Barcelona (UAB)
Current Institution
Anatomy Service, Eduardo Mondlane University, Maputo, Mozambique.
Address: Serviço de Anatomia, Faculdade de Medicina, Universidade Eduardo Mondlane (Av. Salvador Allende nº. 702, C. Postal 257, Maputo, Moçambique)
Email: motiar786@gmail.com

Abdul Habib Mahomed Dadá
Academic education
• Degree in Dental Medicine from the Higher Institute of Science and Technology of Mozambique (ISCTEM)
• Resident in Epidemiology at the University of Lisbon
Current Institution
• Anatomy Service, Eduardo Mondlane University, Maputo, Mozambique
• DentalCare, Maputo, Moçambique.
Address: Serviço de Anatomia, Faculdade de Medicina, Universidade Eduardo Mondlane (Av. Salvador Allende nº. 702, C. Postal 257, Maputo, Moçambique)
Email: abdulhabibdada@gmail.com

Zulaikhah Mahomed Sidique Dadá
Academic education
• Degree in Pharmacy from the Higher Institute of Science and Technology of Mozambique (ISCTEM)
Current Institution
• Pharmacology Service, Eduardo Mondlane University, Maputo, Mozambique
• Higher Institute of Science and Technology of Mozambique, Maputo, Mozambique.
Address: Serviço de Farmacologia, Faculdade de Medicina, Universidade Eduardo Mondlane (Av. Salvador Allende nº. 702, C. Postal 257, Maputo, Mozambique)
Email: zulaikhahdada786@gmail.com

ABSTRACT
Introduction: In developing countries the problem of foreign bodies in Otorhinolaryngology Services (ENT) is poorly studied. The foreign body is common in children but may occur in adults with mental disorders or in prisoners. Objective: To describe the case of a patient with psychiatric problems who ingested a metallic object. Psychiatric observation was requested that diagnosed an "anxiety crisis" after family conflict. Results: Esophagoscopy was performed for uncomplicated extraction. Discussion: Voluntary (intentional) ingestion of objects occurs in patients with psychiatric disorders, especially schizophrenia, mental retardation or in the inmate population. However, the ingestion of a large foreign body is related to parasuicidal behaviour. Conclusions: Always suspect the presence of a foreign body in patients with psychiatric disorders with odynophagia in the absence of pharyngotonsillitis.

Keywords: Foreign body, Mental retardation, ENT.

1 INTRODUCTION

The presence of foreign bodies in the esophagus is a common nosological entity in hospital emergency services. Depending on the type of ingestion of foreign bodies, they are classified as patients with voluntary (intentional) ingestion or accidental ingestion.

Accidental ingestion is common in children , while voluntary or intentional ingestion is rare and appears mainly in adults (prisoners and patients with mental retardation) (1). The attending physician must solve the problem conservatively or surgically and then solve the cause of this episode, especially of a psychiatric nature, in order to avoid the repetition of these incidents (1).

2 CASE REPORT

A 20-year-old male patient with a history of mental retardation arrives at the Emergency Department with odynophagia, severe dysphagia and 24-hour drooling after intentional ingestion of a foreign body (FB) the day before. The clinical exploration demonstrates that the patient was conscious and oriented, but with signs of anxiety.

General physical exploration did not reveal cyanosis, dyspnea, stridor. Exploration of the oropharyngeal region also did not show remarkable changes.

The thorax radiological study revealed the presence of a large metallic object (a round metallic piece larger than a coin of about 40 mm in length) lodged in the thoracic esophagus (Fig 1).

Fig 1: Radiographic image of the foreign body



A rounded FB with 39.1 mm of diameter, coloured, with a smooth surface, was extracted by rigid esophagoscopy, under general anesthesia, with a favorable postoperative evolution, without complications (Fig 2 and Fig 3). A psychiatric observation was requested, which diagnosed an “anxiety crisis” after family conflict. The patient was discharged 3 hours after admission.

Fig 2: Photograph of the foreign body after removal



Fig 3: Foreign body measurement with caliper



3 DISCUSSION

During esophagoscopy, it should be remembered that the esophagus has 4 physiological narrowing's that are the preferred sites for FB constriction. They are the cricopharyngeal muscle, the aorta, the left bronchus and the diaphragm (2).

The ingestion of foreign bodies frequently appears in the pediatric population (3)(4), and rarely in adults. In adults, incidents are often caused by placing objects in the mouth, such as needles or pins, or by impeding the normal passage of the food bolus due to a decrease in the diameter of the esophagus due to a tumor or stenosis (5)

The patient of this study, suffered from a mental retardation known to his family, and ingested a metallic object of 39.1 mm in diameter. The fact that no lacerations of the oral cavity mucosa were found is justified because the object was as smooth as a large coin. This object, known as a Pokémon tazo, was a gift that came out of the child's potato chip packets that was very popular in the past decade. This practice was discontinued, but it had risks of accidental ingestion in children and intentional ingestion in others, despite its large size to be ingested.

Because not all patients report the incident of voluntary ingestion, in the presence of sudden high dysphagia, in an adult, it is necessary to think about ingestion of a foreign body, carrying out a detailed anamnesis that allows us to arrive at the diagnosis, to know the possible location of the body. This object, being metallic, was possible to observe in a preoperative radiograph, but the great challenge is in the cases of non-metallic FBs.

FUNDING

The authors report no involvement in the research by the sponsor that could have influenced the outcome of this work.

ACKNOWLEDGEMENTS

The authors acknowledge Tatiana Issufo Khan Jamal for reviewing the English.

BIBLIOGRAPHY

1. Vallejo GS, Iván E, Correa O, Madeleine A, López B, Cardona CA. Cuerpos extraños en tracto gastrointestinal asociados a trastorno mental . Reporte de caso Associated mental upheaval to ingestion of strange bodies . Case report. 2009;79–85.

2. Garg K, Mittal P, Chandrupatla M. BD Chaurasia. Human Anatomy. Regional an Applied. Disection and Clinical. Upper Limb. Thorax. Seventh. Vols 1 NV-4. India: CBS Publisher & Distribuitors Pvt Ltd; 2016.

3. Costa KC, Duarte BB, Vida MLB, Signorini MAT, Carlos F, Schaffer C, et al. Corpos Estranhos em Otorrinolaringologia: Aspectos Epidemiológicos de 346 Casos. Arq Int Otorrinolaringol. 2007;11(2):109–15.

4. Figueiredo R, Azevedo A, Ávila Kós A, Tomita S. Complicaçoẽs de corpos estranhos em otorrinolaringologia: um estudo retrospectivo. Rev Bras Otorrinolaringol. 2008;74(1):7–15.

5. Menchen P, Castellanos D, Senent C, Santos L, A DD. Cuerpos extraños en esófago. Terapéutica endoscópica. Ponencia Oficial. Urgencias en Otorrinolaringología. Acta Otorrinolaring Esp. 1991;42(número extraordinario):69–71.

CHAPTER 69

Social isolation and common mental disorders among nursing academics at the federal university in the municipality of Rio

10.56238/rsfohsv1-069

Jorge Luiz Lima da Silva
Teacher. Department. Maternal and psychiatry - UFF.
Ph.D. in Public Health/ Fiocruz. PPGSC-UFF.

Wallace Henrique Pinho da Paixão
Nurse. A resident of oncology at the National Cancer Institute - Inca.

Maria da Soledade Simeão dos Santos
Teacher. Department. Nursing methodology - UFRJ. Ph.D. in Nursing/ USP.

Claudia Maria Messias
Teacher. Department. Maternal and psychiatry - UFF.
Ph.D. in Nursing / UFRJ.

Gustavo Martins Lemos Tavares
Nursing academic -UFF.

Kevin Sousa Barbosa
Nursing academic -UFF.

ABSTRACT
Introduction: the social isolation imposed by the pandemic brought damage to physical and mental health as a common mental disorder designated as states of stress, anxiety, depression, signs, and somatic symptoms. Objective: to evaluate the prevalence of CMD among nursing students from a federal university in Rio de Janeiro. Methodology: a cross-sectional study with a sample of 259 students. Data collection occurred online, through the form with 16 questions, containing sociodemographic characteristics, life habits, and data on the routine of studies, in addition to the Self Reporting Questionnaire (SRQ-20). Results: The suspicion for CMD was 182 (70.3%) when in the case of sociodemographic data, there was a significant association with gender; the number of residents in the household; living with people in need of care; schooling. When it comes to life habits, there was a significant association between smoking and regular alcohol consumption. Regarding the variables of academic life, there was a significant association with the period, amount of available resources, quality of internet access at home; activities carried out in the remote model; the existence of factors that influence the study routine. As for the variables related to covid, there was an association with self-perception of mental health as poor; diagnosis of chronic disease; the fact of having someone close infected; taking care of someone with covid-19, and possessing someone who died by covid-19. Conclusion: the study contributed to the knowledge of the prevalence of CMD among nursing students at the beginning of isolation. The findings may contribute to the development of preventive strategies.

Keywords: Nursing students; Nursing; Mental health.

1 INTRODUCTION

In December 2019, an outbreak of coronavirus disease caused by severe acute respiratory syndrome was reported in Wuhan, China. The high virulence of the new virus, associated with the lack of effective treatment for the disease, has led to the adoption of preventive emergency measures capable of protecting the health and saving lives around the world, such as quarantine and social isolation. (RODRIGUES et al, 2020)

Although such measures of social isolation are widely recommended by the scientific communities, systematic reviews and current theoretical-reflexive essays have highlighted their potential negative impacts on mental health. These implications may be even more intense for population portions that already present vulnerabilities in mental health. (MOTA et al, 2021)

In recent years, there has been an exponential increase in the statistics of mental symptoms in several nations in this period, such as the feeling of guilt, sleep disorders, generalized sadness, changes in eating

patterns, lack of concentration, irritability, difficulty in memory, fatigue, and somatic complaints. These manifestations characterize common mental disorders (CMD), a set of somatic, anxious, and depressive symptoms that can be triggered by stressful factors (GOLDBERG, 1994)

The pandemic has brought serious behavioral changes, showing that levels of anxiety, health status, and stress worsened by about 70%, 35%, and 62%, respectively. As a result, affected students present mental alterations, which can even be identified as CMD. (HEIFER, 2021) Specifically, for nursing students, strangeness, in the face of the new, can lead to the development of the disorder. This contributes negatively to the use of the course and personal and professional development. (BUBLITZ et al, 2012)

The prevalence of CMD is 40.9% among nursing students. (GOMES, 2016) The university lives with particularities of the profession and requirements of health services, go through situations of academic context related to the lack of time to meet the demands that the university requires, period of tests, extracurricular tasks, performance requirements in activities, and also reconcile them with personal responsibilities such as work; house; and children. They deal with characteristic situations of the profession of experiences with death, responsibility for people's lives, interpersonal relationships, feeling of fear in practical classes and professional internships, considered events considered stressful factors (DAMASCENA et AL, 2020)

The process of adaptation to higher education requires attention because there are changes in the personal, academic, and health of university students. It is necessary to take into account the complexity of the problems that may arise throughout training and their risk factors. Therefore, the present study aimed to investigate the occurrence of CMD among nursing students from a federal university located in the city of Rio de Janeiro, during the period of isolation from the pandemic.

2 MATERIAL AND METHOD

The research was carried out through a descriptive epidemiological study of cross-sectional design. The sample calculation was performed, considering an error of 5%, and a confidence level of 95%, with a value resulting from 259 of the universe of 600 undergraduate students.

For the approach of the participants, the purposes of the research and presentation of the informed consent form (Informed Consent) were explained. The study included adults aged 18 to 60 years, of both sexes, aware of the purposes of the study, and who signed the Informed Consent Form. Those who were irregularly enrolled in the course, those who dropped out of college (absences for six months), and recently transferred from other universities (less than a semester ago) were excluded.

The instrument used was a structured questionnaire with open and closed questions. The form was composed of blocks with issues related to the coronavirus pandemic, life habits, sociodemographic profiles, and questions about academic life before and during the health crisis.

The VARIABLE CMD was evaluated according to twenty closed questions of the *reduced version of the Self Reporting Questionnaire* (SRQ-20), created to identify suspected cases of CMD in populations.

The instrument was developed by Harding et al. (1980). In the validation of the instrument, the cutoff point of five positive responses for men and seven for women was recommended. The SRQ was validated by Mari and Williams (1986), and Ludermir and Lewis (2003) with sensitivity and specificity of around 80%. In the present study, the cut-off point of seven was adopted for suspicion of CMD, based on previous studies that used values stipulated in the validation of the instrument (ARAÚJO et al, 2003, SOUZA et al, 2017). The feature used was an online electronic *form* made available through the Google *Docs platform.*

To perform the bivariate analyses of the variables of interest, some options were grouped. Each stage of the data analysis process was performed using the *Statistical Package for the Social Sciences* version 21 (SPSS) program®. During the bivariate analysis, the chi-square test (x^2) was used to verify differences between the groups analyzed. The significance of $p \leq 0.05$ was considered. The research was approved by the Ethics Committee of the Anna Nery School of Nursing, under the opinion: of 4,263,701.

3 FINDINGS

The overall prevalence of CMD found was 70.3% (N = 182), which indicates the high degree of suspicion for these disorders. Regarding the measures of central trend, the average was 10.13 (SD ± 4.67), the median of 10, and fashion was 13. The Cronbach's alpha value was 0.862.

3.1 ANALYSIS BETWEEN THE PREVALENCE OF CMD AND VARIABLES OF INTEREST.

From the bivariate analysis, it was possible to observe the prevalence of CMD, according to sociodemographic and lifestyle variables, presented in table 1, below. The female group had a higher prevalence, with 70.3% (n = 182).

The association between CMD and: female gender was verified; those who have a partner (a); the number of three residents or more in the residence; the presence of people in need of permanent care; is, who already have higher education.

Table 1- Prevalence of CMD with statistical significance, according to sociodemographic variables of nursing students, Rio de Janeiro -RJ, 2020 (N= 259)

VARIABLES	N	n	%	P-value
Sex				**0,005***
Female	236	172	72,9	
Male	23	10	43,5	
Marital status				**0,013***
With companion (a)	28	25	89,3	
No mate (a)	231	157	67,9	
Number of residents in the household				**0,006**
Up to 3 residents	121	75	61,9	
Over 3 residents	138	107	77,5	
Lives with someone in need of permanent care				**0,001**

Yes	64	55	85,9	
No	195	127	65,1	
Schooling				**0,055***
Incomplete higher education	246	176	71,5	
Complete higher education	13	6	46,1	

N = total on the line; n = total suspects above 7; %= prevalence; P=Pearson chi-square test;
*Fischer test values.

Regarding variables related to life habits, non-smokers and non-smokers were in greater numbers, and presented significant prevalences, as described in Table 2.

Table 2- Prevalence of CMD with statistical significance, according to health units of nursing students, Rio de Janeiro -RJ, 2020 (N= 259)

VARIABLES RELATED TO LIFESTYLES	N	n	%	P-value
Smoking				**0,027***
Yes	10	10	100,0	
No	249	172	69,1	
Regular elitist				**0,04**
Yes	86	54	62,8	
No	173	128	74,0	

N = total on the line; n = total suspects above 7; %= prevalence; P=Pearson chi-square test;
*Fischer test values.

As for academic life, the highlights were the deperiodized ones; those with few resources for online study; poor quality of internet access; no activity in the remote model (being without studying due to isolation); and the presence of factors that hindered the routine of studies, Table 3.

Table 3- Prevalence of CMD with statistical significance, according to the number of academic life of nursing students, Rio de Janeiro -RJ, 2020 (N= 259)

ACADEMIC LIFE VARIABLES	N	n	%	P-value
The period that is attending				**0,001**
First period	54	32	59,2	
Second period	41	36	88,0	
Third period	30	21	70,0	
Fourth period	23	19	82,6	
Fifth period	53	36	67,9	
Sixth period	16	14	87,5	
Seventh period	17	7	41,2	
Eighth period	16	8	50,0	
Deperiodized	9	9	100,0	
Number of online resources available				**0,003**
One	33	27	90,0	
Two	185	135	72,9	

Three	39	20	51,3	
Four	2	0	0,00	
Five	0	0	0,00	
Quality of internet access in the residence				**0,004**
Great	36	18	50,0	
Good	113	75	66,4	
Regular	84	66	78,6	
Bad	22	20	91,0	
Bad	4	3	75,0	
Activities performed in the remote model				**0,017**
None	77	62	80,5	
One	121	77	63,6	
Two	45	35	77,7	
Three	15	8	53,3	
Four	0	0	0,00	
Five	1	0	0,00	
Some factors make it difficult for routine studies				**0,000**
Yes	160	125	78,1	
No	99	57	57,6	
It has its environment for study				**-**
Yes	259	182	70,3	
No	0	0	0,0	

N = total on the line; n = total suspects above 7; %= prevalence; P=Pearson chi-square test.

Regarding the aspects of covid-19, differences were observed between mental self-assessment as poor; among those who report having the chronic disease; have someone close to them who has contracted the pandemic disease; cared for someone with covid; and, among those who have lost loved ones, table 4.

Table 4-Prevalence of CMD with statistical significance, according to the number of nursing students, Rio de Janeiro -RJ, 2020 (N= 259)

VARIABLES ON COVID-19	**N**	**n**	**%**	**P-value**
How do you rate your mental health?				**0,000**
Very good	5	0	0,00	
Good	32	6	18,7	
Regular	102	59	57,8	
Bad	90	87	96,6	
Very bad	30	30	100,0	
Diagnosis of chronic disease				**0,000**
Yes	63	57	90,5	
No	181	114	63,0	
You prefer not to answer	15	11	73,3	
Has someone close infected by covid-19				**0,013***

Yes	239	173	46,0	
No	20	9	15,0	
Took care of someone with covid-19				**0,001***
Yes	50	44	88,0	
No	209	138	66,0	
Has someone close to him passed away from covid-19				**0,031**
Yes	170	127	74,7	
No	89	55	61,8	

N = total on the line; n = total suspects above 7; %= prevalence; P=Pearson chi-square test;
*Fischer test values.

4 DISCUSSION

CmD is sometimes observed when the student enters university, there is a high frequency of these disorders among undergraduate students of health science courses. (ANSOLIN et al, 2015) The general prevalence of CMD found indicates a high degree of suspicion as symptoms related to depression, anxiety, and somatotrópicos, indicating the need for better organization of primary care and family health in the development of actions to promote the mental health of the population. (LUCCHESE et al, 2014)

The data of this study are higher than the similar one performed in São Paulo, which identified 55%. (CACHOEIRA et al, 2016) Another study showed that nursing students had the highest prevalence of positive SCREENING for CMD (56.9%). (SOUSA et al, 2021) Physiotherapy and nursing students have a higher willingness to CMD, whencompared to other courses in the health area. (FACUNDES; LUDERMIR, 2005) The highest values found in this survey can be explained, in part, by the fact of social isolation during the pandemic period.

Sleep patterns disorders can result in a high risk for the involvement of somatic and psychological disorders, which negatively affect the quality of life. (BASTOS, 2019) Headaches and impaired sleep patterns influence patient care, contributing to higher chances of incidents that compromise patient and professional safety. (DAMASCENA et al, 2020, ARAÚJO et al, 2006)

The symptoms presented by CMD can trigger cognitive problems such as concentration problems; memory and decision-making; sleep disorders; stress; fatigue, and somatic symptoms such as headache; lack of appetite, tremors, and gastrointestinal symptoms, which can cause problems in individual, interpersonal, professional and social income. (DAMASCENA et al, 2020) This is added to the fact that the presence of at least one of the complaints, which are measured by the SRQ-20, corroborates the idea of the need to identify the prevalence of disorders and investigate isolated complaints, which can be potentially disabling. (ANSOLIN et al, 2015) It should be considered that the SRQ-20 tracks suspected cases of CMD, as it does not establish diagnostic categories such as the International Classification of Diseases - 10 (ICD-10), *and the Diagnostic and Statistical Manual* - V (DSM-V). (FERREIRA; ANDRETO; FERREIRA, 2021)

In this investigation, 236 (91%) were female, among this group, there is a higher risk to develop CMD. A study conducted with nursing students from the university in Pernambuco identified that 86.6% of the interviewees were female. This result is because the course is mostly composed of women, although the rates of suspicion increase according to age for both sexes. (DAMASCENA et al, 2020, GOMES; PEAR TREE; CARDOSO, 2020)

Among women, a higher prevalence of stress can be observed due to work and family burdens, since they commonly imply renunciation of one's care to devote to others, culminating in situations of consternation, anxiety, frustration, anguish, illness; and, above all, the occurrence of mental disorders. (LUCCHESSE et al, 2014) The association of women with exposure to an overload of roles implies socio-family issues, where women perform a double working day, at home and in college and/or internship/work. (NEGREIROS et al, 2016)

About having a partner(a), it is a protective factor for the development of CMD, because people with partners (as) generally have a greater social integration and a positive perception of the meaning of life. The partner is seen as an important support point to face obstacles, in addition to favoring family economic stability. (OLIVEIRA et al, 2020) In this investigation, the opposite was observed, which can be explained by social isolation having prevented encounters or active social life, which could favor the lack of positive feelings.

The number of residents in the household and the coexistence with individuals who need permanent care was variables of emphasis. Students who live with their parents and with good family relationships are easier to adapt to the changes that occur when entering higher education. In addition, the family offers social support and assists in the decision-making of young people, which can be interpreted as positive in this phase of life. (SILVA et al, 2009) Moreover, each household has its singularities, which translate the way that family lives, its habits, its beliefs, and values, and that need to be understood and respected. (HERMANN; BIRTH; LACERDA, 2014)

As for schooling, it is known that the female gender is economically more disadvantaged, and even with low schooling and no employment, has a higher prevalence of the outcome of this study. (WIEMANN; MUNHOZ, 2015) CMDs are associated with low schooling, poor housing conditions, low income, and participation in the productive process as a manual worker, or unemployed. (LUDERMIR, 2008) Individuals who had never studied or had a small number of studies, up to three years, had a higher prevalence of CMD, while individuals aged 12 years and over of studies had a prevalence of three times lower. (MEDEIROS, 2010) Exposure to factors such as feeling insecure and lack of hope, and rapid social changes explain the greater vulnerability of individuals with low socioeconomic levels and schooling. (FRYERS et al, 2005)

Regarding alcohol intake and tobacco use, this research corroborates similar findings in the literature, where it was found that more than half avoid it. Science shows a greater relationship between alcohol use and suspicion of CMD, as observed in this investigation. The importance of strategies to prevent

alcohol consumption and support to young people is ratified, considering the implications/consequences on social aspects, health care, and in the implications for the training process. (OLIVEIRA et al, 2020)

There is a close association between nicotine dependence and the concomitant presence of psychiatric disorders. The characteristics of the psychoactive effect of nicotine with decreased anxiety, euphoria, and other sensations perceived as pleasurable by the smoker tend to reinforce its use. (CALHEIROS; OLIVE TREE; ANDRETTA, 2006)

When it comes to the variables of academic life, the period you are attending; few online resources available; poor quality of internet access; at that time not being in academic activity, in the remote model; as well as the presence of some factors that hindered the studies were associated with the outcome.

Academics from the initial and final periods, as well as the deperiodized ones, presented greater suspicion. This data corroborates a study that identified that the incoming university students presented a higher occurrence of disorders than the other periods. (CARLETO et al, 2018) Anxiety and depression are found at high rates among university students, being higher among the population, in the first years, a phase where depressive or anxiety symptoms arise. Therefore, impacting factors are observed in the lives of young people, such as the sudden environmental change; the transition from high school to higher education; and, the reading load in large proportion. The last periods may impose overload, due to the anxiety of the completion of the course, the dedication and psychological pressure, during the preparation of the final monograph, and the uncertainty about the future professional, which may offer risks to mental health. (CALAIS et al, 2007, SILVA; NETO, 2014)

Due to the pandemic, immediate changes had to be adopted in education, so the teaching modality due to the circumstances became remote. (COSTA et al, 2022) In developing countries, there were difficulties regarding the lack of infrastructure and knowledge on how to operate virtual platforms, finding a silent environment for studies in the residence; and, the absence of access to virtual teaching materials. (RODRIGUES et al, 2021) Most families used various technologies, during study times or for other activities, before the quarantine. (GROSSI; MINODA; FONSECA, 2020)

The quality of the internet can vary, depending on the location and great demand. It was identified that the worse, the greater the suspicion of CMD among the study population. The internet facilitates the learning process, and when its use is easy, practical, and accessible it increases engagement, contributing to adaptation to different rhythms. (MEDICI; TATTO; LEÃO, 2020, GONÇALVES; MILK; ARAÚJO, 2021)

As for the difficulty in the routine of studies, insecurity in the context of the pandemic; problems with internet access; continuity and greater involvement in professional activities; and, the absence of an environment conducive to learning as the main factors that hinder the achievement of the objectives related to the study routine. (SOARES; SOUZA; GUIMARÃES, 2021) And one can also mention the lack of routine of students, lack of electronic devices, lack of interactive classes, difficulties in communicating with teachers at the time of remote activity, and lack of motivation caused by the absence of future

perspectives since they experienced moments of uncertainty and difficulties at the beginning of the pandemic.

According to the variables related to covid-19, there was an emphasis: on self-assessment of mental health as poor; diagnosis of previous chronic disease; someone close infected; caring for someone with covid-19; near death.

When it comes to self-perception of mental health, in general, students who report general dissatisfaction with their health have mental disorders. (ESTEVES et al, 2021) A study with university hospital residents identified an association with changes in sleep, appetite, lack of concentration, and extreme tiredness, being higher among students who do not undergo mental health follow-up. (GONÇALVES et al, 2021)

Subjective perception of health involves several areas of the individual's life, such as functional ability; physical capacity; social condition; economic and social, in addition to the perception of the general state of health. The social distancing, lived as a function of the pandemic, caused a reduction in the quality of social relations. (ESTEVES et al, 2021)

When a student has a positive perception of their skills and competencies to learn, employ study strategies and manage time, this factor can constitute a protective factor for mental health. It is also known that the perception of experience and academic difficulties are relevant because the way students face academic stressors also impacts their health. (CHAU; VILELA, 2017)

Although the majority of the students in this study did not report chronic disease, among those who reported presenting, suspicion was observed above 90% for CMD. This finding corroborates the fact that chronic disease is a risk factor for mental disorders. (CAMPANHOLO; RITTER, 2021) The data may be justified due to the strong correlation between Sars-Cov2 infected and comorbidities, as there is a higher risk of severe cases of covid and diseases such as heart diseases, hypertension, respiratory problems, diabetes, and conditions that accelerate a poor prognosis. (LERNER et al, 2022)

It was identified that 170 students had some close acquaintances who died at the beginning of the pandemic. Of these, 127 (74.7%) had high suspicion of CMD. The degree of proximity of someone infected by covid-19 increased the chances of encouraging social isolation. The degree of increase in social isolation increases with the perception of proximity to the risk of death. (PEREIRA; MAN; BERTHOLINI, 2020)

It is important to reflect that these students will be nurses working on the front line, and will live with the constant changes in health teams, due to illness or death of workers, which can trigger fear and anxiety. (FONTES et al, 2020)

The fact that people who die from covid-19 infection are treated as statistics by the community and the media can cause suffering and complications in the mourning of those who have lost a close person. Therefore, initiatives aimed at creating virtual memorials to give meaning and importance to these deaths can help in the mourning process. (WALLACE et al, 2020)

As a limitation, it should be emphasized that cross-sectional studies are preferred to determine the prevalence of diseases or risk factors, but do not determine associations of the cause-effect type, since exposure (isolation) and outcome (CMD) measurements are performed simultaneously. On the other hand, they can identify characteristics that can be pass íveis of the intervention.

5 CONCLUSION

It was observed that the pandemic affected, in a negative way, several aspects of the life of academics, from social, economic, and academic points of view. The pandemic caused by the coronavirus brought a mixture of fear, anxiety, and stress in the academic environment, and some factors, as previously seen, had contributed to the aggravation of these conditions, proceeding with a greater suspicion of developing CMD.

Having more electronic resources, the better quality of the Internet, performing activities in remote periods, and having a favorable environment for studies proved to be conditions that reduce the risk of developing CMD.

This study allowed contributed to the understanding of the prevalence of CMD among students during the pandemic period, a fact that can contribute to the development of preventive strategies, even with the temporal limitation of the type of cross-sectional study.

Further in-depth investigations are expected to be developed on the impact of CMD among university students, as future professionals should be prepared to deal with strategies aimed at preserving their mental health.

REFERENCES

ANSOLIN, A. G. A. et al. Prevalência de transtorno mental comum entre estudantes de psicologia e enfermagem. **Arq. Ciênc. Saúde.** v. 22, n. 3, p. 42-45, 2015. https://www.researchgate.net/publication/282669560_Prevalence_of_common_mental_disorder_between_psychology_and_nursing_students.

ANSOLIN, A. G. A. et al. Prevalência de transtorno mental comum entre estudantes de psicologia e enfermagem. Arq. Ciênc. Saúde. v. 22, n. 3, p. 42-45, 2015.

ARAÚJO, T. M. et al. Transtornos psicológicos em mulheres: um estudo comparativo entre donas de casa e trabalhadoras. Revista Enfermagem UERJ. v. 14, n. 2, p. 260-269, 2006.

BASTOS, T. F. F. **Saúde mental de estudantes de enfermagem de uma universidade pública.** TCC (Bacharelado em Enfermagem) – Universidade federal de campina grande, centro de educação e saúde, unidade acadêmica de enfermagem, p. 1-48, 2019. http://dspace.sti.ufcg.edu.br:8080/jspui/handle/riufcg/8203.

BEZERRA, G. D. et al. O impacto da pandemia por covid 19 na saúde mental dos profissionais de saúde: revisão integrativa. **Revista de Enfermagem Atual**, edição especial covid19, p. 1-20, 2020. Disponível em: <https://revistaenfermagematual.com.br/index.php/revista/article/view/758/714>.

BRONDANI, M. A. et al. Depressão em estudantes universitários: fatores de risco e protetivos e sua relação nesse contexto. **Disciplinarum Scientia**. v. 20, n. 1, p. 137-149, 2019.

BUBLITZ, S. et al. Estresse em estudantes de enfermagem: uma revisão integrativa.Revista de Enfermagem da UFSM. v. 2, n. 3, p. 530-538, 2012.

CACHOEIRA, D. V. A. de C. et al. Relação do perfil sociodemográfico com o risco de adoecimento por transtornos mentais comum em alunos do curso de enfermagem. **Rev. enferm. UFPE [online]**. v. 10, n. 12, p. 4501-4508, 2016. https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/11516.

CALAIS, S. L. et al. Stresse entre calouros e veteranos de jornalismo. **Revista Estudos de Psicologia**. v.24, n.1, p.69-77, 2007.

CALHEIROS, P. R. V.; OLIVEIRA, M.S.; ANDRETTA, I. Comorbidades psiquiátricas no tabagismo. **Aletheia**, [s/v], n.23, p.65-74, 2006.

CAMPANHOLO, E. M.; RITTER, G. P. **Avaliação da condição de saúde mental de estudantes de medicina perante o cenário da pandemia da Covid-19.** TCC (medicina) – PUC Goiás, Escola de Ciências Médicas e da Vida, 2021. https://repositorio.pucgoias.edu.br/jspui/handle/123456789/3336.

CAMPANHOLO, E. M.; RITTER, G. P. **Avaliação da condição de saúde mental de estudantes de medicina perante o cenário da pandemia da Covid-19.** TCC (medicina) – PUC Goiás, Escola de Ciências Médicas e da Vida, 2021. https://repositorio.pucgoias.edu.br/jspui/handle/123456789/3336.

CARLETO, C. T. et al. Adaptação à universidade e transtornos mentais comuns em graduandos de enfermagem. **Revista Eletrônica de Enfermagem**, v.20, n.1,p. 1-11, 2018.

CEDRO, G. **In**: Mostra Científica: retratos da pandemia em contexto. **Anais de evento.** v. 1, p. 1-19, 2020. https://ifce.edu.br/cedro/campus_cedro/grupos-de-pesquisa/anais-i-mostra-cientifica-gipea-final-1.pdf.

CHAU, C.; VILELA, P. Determinantes de la salud mental en estudiantes universitarios de Lima y Huánuco. **Revista de Psicología**. v. 35, n. 2, p. 387-422, 2017. http://dx.doi.org/10.18800/psico.201702.001.

COSTA, J. B. et al. Entraves e benefícios na utilização do ensino remoto para os acadêmicos do curso de enfermagem durante a pandemia de covid-19: revisão integrativa. **Research, Society and Development**, v.11, n.1, p. 1-18, 2022.

DAMASCENA, N. S. et al. Prevalência de Transtorno Mental Comum (TMC) em estudantes de enfermagem decorrentes do estilo de vida acadêmico. **Pesquisa, Sociedade e Desenvolvimento**. v. 9, n. 12, p. 1-21, 2020.https://doi.org/10.33448/rsd-v9i12.11004.

DAMASCENA, N. S. et al. Prevalência de Transtorno Mental Comum (TMC) em estudantes de enfermagem decorrentes do estilo de vida acadêmico. **Research, Society and Development**, v. 9, n.12, p. 1-21, 2020. https://doi.org/10.33448/rsd-v9i12.11004.

ESTEVES, C. S. et al. Avaliação de sintomas depressivos em estudantes durante a pandemia do covid-19. Revista Família, Ciclos de Vida e Saúde no Contexto Social, v. 9, n. 1, p. 9-17, 2021.

ESTEVES, C. S. et al. Avaliação de sintomas depressivos em estudantes durante a pandemia do covid-19. **Revista Família, Ciclos de Vida e Saúde no Contexto Social**, v.9, n.1, p. 9-17, 2021.

FACUNDES, V. L. D.; LUDERMIR, A. B. Common mental disorders among health care students. **Ver. Bras. Psiquiatr.** v. 27, n. 3, p. 194-200, 2005. https://doi.org/10.1590/S1516-44462005000300007.

FERREIRA, L. L.; ANDRETO, L. M.; FERREIRA, T. C. M. **Transtornos mentais comuns em estudantes de saúde.** TCC (Graduação em Enfermagem) - Faculdade Pernambucana de Saúde, p. 1-15, 2021. http://tcc.fps.edu.br:80/jspui/handle/fpsrepo/1016.

FONTES, W. H. de A. et al. Perdas, Mortes e Luto Durante a Pandemia de Covid-19: Uma Revisão da Literatura. **Rev. Mult. Psic.** v.14, n. 51, p. 303-317, 2020. https://doi.org/10.14295/idonline.v14i51.2557.

FRYERS, T. et al. The distribution of the common mental disorders: social inequalities in Europe. **Clin. Pract. Epidemiol. Ment. Health**, v.1, n.1, p. 1-14, 2005.

GOLDBERG, D. A bio-social model for common mental disorders. **Acta PsychiatrScand.** v. 90, e385, p. 66-70, 1994.

GOMES, C. F. M.; PEREIRA, J. R. J.; CARDOSO, J. V.; SILVA D. A. Common mental disorders in university students: epidemiological approach about vulnerabilities, **Rev Eletrônica Saúde Mental Álcool Drog.**, v.16, n.1, p.1-8, 2020.

GOMES, L. A. **Prevalência e fatores associados a Sofrimento Psíquico entre estudantes de Enfermagem, Medicina e Nutrição do campus de Botucatu**. Dissertação (mestrado) – faculdade de medicina da universidade estadual paulista "Júlio de Mesquita Filho", 2016.

GONÇALVES, G. da S. et al. Interface entre saúde mental e pandemia da covid-19: o olhar dos profissionais de saúde. **Research, Society and Development**, v.10, n.16, p. 1-10, 2021.

GONÇALVES, J. T. F.; LEITE, A. de S.; ARAÚJO, M. dos S. Aulas remotas durante a pandemia da covid-19 no curso de Ciências Biológicas no Instituto Federal do Maranhão. **Revista de Ensino de Ciências e Matemática,** v.12, n.1, p. 1-15, 2021.

GROSSI, M. G. R.; MINODA, D. de S. M.; FONSECA, R. G. P. Impacto da pandemia do covid-19 na educação: reflexos na vida das famílias. **Teoria e Prática da Educação**, v.23, n.3, p. 1-21, 2020.

HERMANN, A. P.; NASCIMENTO, J. D.; LACERDA, M. R. Especificidades do cuidado domiciliar apreendidas no processo de formação profissional do enfermeiro. **Revista Mineira de Enfermagem**, v. 18, n.3, p. 545-550, 2014.

LERNER, A. R. et al. **Prevalência das reações adversas entre os acadêmicos vacinados de um centro universitário.** TCC (graduação em enfermagem). Centro universitário UNIVAG, 2022.

LUCCHESE, R. et al. Prevalência de transtorno mental comum na atenção primária. Acta Paul Enferm. v. 27, n. 3, p. 200-207, 2014. https://doi.org/10.1590/1982-0194201400035

LUCCHESE, R. et al. Prevalência de transtorno mental comum na atenção primária**. Acta Paul Enferm**. v. 27, n. 3, p. 200-207, 2014.

LUDERMIR, A. B. Desigualdades de classe e gênero e saúde mental nas cidades. **Physis Revista de Saúde Coletiva**, v.18, n.3, p.451-467, 2008.

MEDEIROS, D. **Tabagismo e Transtorno Mental Comum na População de São Paulo – SP: um estudo a partir do Inquérito de Saúde no Município de São Paulo**. Dissertação (mestrado) - Faculdade de Saúde Pública da Universidade de São Paulo, 2010.

MÉDICI, M. S.; TATTO, E. R.; LEÃO, M. F. Percepções de estudantes do Ensino Médio das redes pública e privada sobre atividades remotas ofertadas em tempos de pandemia do coronavírus. **Revista Thema**, v.18, [s/n], p.136-155, 2020.

MOTA, D. C. B. et al. Saúde mental e uso de internet por estudantes universitários: estratégias de enfrentamento no contexto da covid-19. **Ciência & Saúde Coletiva [online]**. v. 26, n. 6, p. 2159-2170, 2021.

NEGREIROS, N. et al. Relação do perfil sociodemográfico com o risco de adoecimento por transtornos mentais comum em alunos do curso de enfermagem**. Revista de Enfermagem UFPE online**, v. 10, n. 12, p. 4501-4508, 2016.

OLIVEIRA, E. B. et al. Common mental disorders in nursing students of the professionalizing cycle. **Revista Brasileira de Enfermagem**, v.73, n.1, p. 1-6, 2020.

OLIVEIRA, E. et al. Transtorno mental comum em usuários de substâncias psicoativas. **Enferm. Foco**. v. 11, n. 1, p. 99-105, 2020.

PEREIRA, C.; MEDEIROS, A.; BERTHOLINE, F. O medo da morte flexibiliza perdas e aproxima polos: consequências políticas da pandemia da covid-19 no Brasil. **Revista de Administração Pública.** v. 54, n. 4, p. 952-968, 2020. https://doi.org/10.1590/0034-761220200327

RODRIGUES, B. B. et al. Aprendendo com o Imprevisível: Saúde Mental dos Universitários e Educação Médica na Pandemia de covid-19. Rev. bras. educ. med. [online]. v. 44, e0149, p. 1-5, 2020.

RODRIGUES, P. S et al. Aprendizagem baseada em problemas no ensino remoto: vivências de estudantes de enfermagem na pandemia covid-19. **Revista Mineira de Enfermagem**, v.25, 2021.

SANTOS, L. S.; RIBEIRO, I. J. S.; BOERY, E. N.; BOERY, R. N. S. O. Qualidade de vida e transtornos mentais comuns em estudantes de medicina. **Cogitare Enfermagem**, vol. 22, n. 4, 2017.

SILVA, A.O; NETO, J. L. C. Associação entre níveis de atividade física e transtorno mental comum em estudantes universitários. **Motricidade**, v.10, n. 1, p. 49-59, 2014.

SILVA, S. de L. R. da; FERREIRA, J. A. G. Família e ensino superior: que relação entre dois contextos de desenvolvimento? **Educação/formação**, [s/v], [s/n], p. 101-126, 2009.

SOARES, C. S.; GUIMARÃES, D. E. L.; SOUZA, T. V de. Ensino remoto emergencial na percepção de alunos presenciais de Ciências Contábeis durante a pandemia de Covid-19. **Revista Catarinense da Ciência Contábil**, v.20, e3182, p. 1-19, 2021.

SOUSA, A. R. et al. Relação entre Transtornos Mentais Comuns e a ingestão dietética de universitários da área da saúde. **Ciência & Saúde Coletiva [online]**. v. 26, n. 9, p. 4145-4152, 2021.https://doi.org/10.1590/1413-81232021269.07172020.

SOUZA, A. N. M.; MEURER, A. M.; COSTA, F.; MUSIAL, N. T. K. Utilização de metodologias ativas e elementos de gamificação no processo de ensino-aprendizagem da contabilidade: experiência com alunos da graduação**. Desafio Online**, v. 8, n.3, p. 502-523, 2020.

WALLACE, C. L. et al. Grief During the COVID-19 Pandemic: Considerations for Palliative Care Providers. J Pain Symptom Manage. v. 60, n. 1, p. 70-76, 2020.

WIEMANN, I.; MUNHOZ, T. Prevalência de Transtornos Mentais Comuns e Fatores Associados nos Usuários do Centro de Referência de Assistência Social de São Lourenço do Sul, RS. **Ensaios Cienc., Cienc. Biol. Agrar. Saúde**, v. 19, n. 2, p. 89-94, 2015.

CHAPTER 70

Knowledge of nurses working in primary health care: prenatal and puerperium

10.56238/rsfohsv1-070

Marina Lefol Nani Carvalho
Academic of the undergraduate nursing course of the Federal University of Alfenas (UNIFAL-MG), Alfenas-MG

Lucélia Terra Chini
PhD, Nurse, School of Nursing, Federal University of Alfenas (UNIFAL-MG), Alfenas-MG

Jéssica Goretti da Silva
Academic of the undergraduate nursing course of the Federal University of Alfenas (UNIFAL-MG), Alfenas-MG

Mariana Mendes Oliveira Lima
Academic of the undergraduate nursing course of the Federal University of Alfenas (UNIFAL-MG), Alfenas-MG

Christianne Alves Pereira Calheiros
PhD Professor, School of Nursing, Federal University of Alfenas (UNIFAL-MG), Alfenas-MG

Patrícia Scotini Freitas
PhD Professor, School of Nursing, Federal University of Alfenas (UNIFAL-MG), Alfenas-MG
E-mail: patricia.freitas@unifal-mg.edu.br

ABSTRACT
Objective: to evaluate the knowledge of nurses working in primary health care in municipalities belonging to the Regional Superintendence of Health of Alfenas on Nursing Care in the Prenatal Care of Habitual Risk and the Puerperium. **Method**: a descriptive study, of the quantitative approach, carried out at the Federal University of Alfenas (UNIFAL-MG), at the face-to-face Training course in Prenatal Care of Habitual and Puerperium Risk, a partnership between the Nursing Course of UNIFAL-MG and Regional Superintendence of Health (SRS) of Alfenas. The 120 nurses who work in primary health care in the municipalities belonging to the Regional Health Superintendence of Alfenas and who took the training course were invited to participate in the study. To evaluate the knowledge about nursing care in prenatal care at usual risk and in the puerperium of nurses, two instruments were applied on the last day of the face-to-face training course, namely: sociodemographic characterization and an evaluative questionnaire with 20 objective questions related to the topics addressed. **Results:** 60 nurses participated in the study, with a mean age of 33.86 years. The questions with the highest percentage of correct answers refer to the themes of humanization in prenatal/puerperium (98%) and the use of medication to prevent congenital deformities in the neural tube (98%). On the other, the questions with the lowest percentage of correct answers are related to gestational diabetes (47%) and the calculation of the probable date of delivery (53%). **Conclusion: gaps** in the knowledge of these professionals about some contents of nursing care in prenatal and puerperium were identified. The realization of this study brings to contributions the orientation of the team involved in the preparation of the course to review their teaching strategies as well as to seek more relevant forms of dynamics for the next events.

Keywords: Nursing Consultation; Education; Prenatal; Puerperium.

1 INTRODUCTION

Pregnancy is a phase marked by changes in the woman's life and body. Such changes cause various feelings such as joy, anxiety, doubt, expectation, and even fear. Therefore, it is a time rich in learning, since the woman is receptive to information due to the longing to understand all the changes that have occurred. Thus, it is necessary for a follow-up that ensures the safety and passes confidence to the pregnant woman, rescuing her doubts and ensuring a good development of the mother-child binomial. In this context, prenatal care is the follow-up aimed at pregnant women characterized by a set of actions that precede delivery and that promote quality of life preventing complications (ROCHA; ANDRADE, 2017). In addition, prenatal care is very efficient in reducing maternal and perinatal morbidity and mortality, contributing in a

remarkable way to public health. This care aims to welcome the pregnant woman from the beginning of pregnancy, because, according to the Ministry of Health (2006) the reception is essential in the humanization policy and occurs from the reception of women in the basic health unit, where she will be heard and will have space to express her complaints and concerns, ensuring comprehensive and articulated care with other health services that provide continuity of care if necessary (BRAZIL, 2006).

The Code of Ethics of Nursing Professionals has as fundamental principles: commitment to the quality of life of the person, family, and collectivity; integrality of care, resolution, and preservation of the autonomy of the person; respect for life, dignity, and human rights in all its dimensions (FEDERAL NURSING COUNCIL, 2017). Thus, good prenatal care, performed by a qualified professional and attentive to humanization ensures improvement in care and satisfactory obstetric and perinatal results (BARBOSA; GOMES, GOHETS DAYS, 2011).

Qualified prenatal care contributes to the reduction of mortality in addition to benefiting maternal and child health in general, through periodic consultations with nurses. This qualification is acquired by an educated and trained professional, with the ability to attend to and follow up on pregnancies. The Ministry of Health guarantees the standardization of procedures and conducts to those professionals who provide care to pregnant women, defining a type of care for each level of the health system. In addition, the Law of Professional Nursing Practice states that low-risk prenatal care can be fully monitored by the nursing profession since it has a theoretical-scientific basis and legal support for the provision of this service (BRASIL, 2013; CUNHA et al., 2009). Nursing consultations are based on the prevention, promotion, recovery, and rehabilitation of health. Nursing care to pregnant women, parturients, and puerperal women covers both physical and mental follow-up, from conception to the beginning of delivery and postpartum, preventively and intending to identify pathologies or abnormalities. This follow-up prevents complications during pregnancy, ensuring the humanization and integrality of care, since, when oriented, pregnant women feel more security and autonomy over this phase of their life (RODRIGUES; BIRTH; Araújo, 2011).

However, it is worth mentioning that prenatal nursing care is not yet well established in primary care services, due to the lack of human and material resources that allow this follow-up to be effectively carried out. The lack of human resources is due to the low qualification of nurses who are unwelcoming in order not to establish bonds that pass trust. Another factor is the overload of nurses' activities, resulting in inefficient care that prevents continued follow-up (SOUZA; ROECKER; MARCON, 2011). Therefore, greater attention is needed to the qualification of professionals who promote systematic, contextualized, and individualized care, which guarantees humanized and quality practice in the care of prenatal consultations in basic health units (GUERREIRO et al., 2012).

In this context, the conduction of the present study was justified, for the safety and health of pregnant women, from the pregnancy period to the puerperal, necessary for the participation of a professional, especially the nurse who guarantees humanized care and attentive to complaints and is qualified for quality care. Therefore, this study aimed to assess and identify gaps in the knowledge of nurses working in primary

health care in municipalities belonging to the Regional Superintendence of Health of Alfenas on Nursing Care in the Prenatal Care of Habitual Risk and the Puerperium.

2 METHOD

This is a non-experimental, descriptive, quantitative study.

The research was carried out at the Federal University of Alfenas (UNIFAL-MG), on the last day of face-to-face training of the Course of Training in Prenatal Care of Habitual and Puerperium Risk, a partnership between the Nursing Course of UNIFAL-MG and Regional Health Superintendence (SRS) of Alfenas. This course aimed to train nurses working in primary health care in municipalities belonging to the Regional Superintendence of Health of Alfenas on Nursing Care in the Prenatal Care of Habitual Risk and the Puerperium.

The study population refers to 58 nurses participating in the Habitual and Puerperium Risk Prenatal Training course, taught at UNIFAL-MG, from April to October 2018.

To evaluate the knowledge about nursing care in the prenatal care of habitual risk and the puerperium of nurses working in primary health care in the municipalities belonging to the Regional Superintendence of Health of Alfenas, two instruments were applied on the last day of the face-to-face moment of the training course, namely: sociodemographic characterization and an evaluative questionnaire of the Course of Prenatal Training of Habitual and Puerperium Risk, this consists of 20 objective questions, with four alternatives each, on subjects addressed during the course.

The data was encoded in the Microsoft Excel Program®. Descriptive analyses were performed for all variables, and categorical variables were analyzed by simple frequency as numerical variables by measures of central tendency and dispersion.

For Resolution No. 466/2012 of the National Health Council (BRASIL, 2012) regarding research with human beings, this research project was authorized by the Regional Superintendence of Health of Alfenas. After this authorization, the research project was forwarded to the Research Ethics Committee (CEP) of the Federal University of Alfenas (UNIFAL-MG) through the Brazil Platform, obtaining a favorable opinion CAAE 92599218.0.0000.5142. After accepting to participate in the study, the participants signed the Free and Informed Consent Form, in two ways, one of which was in the possession of the researchers and the other with the participant.

3 FINDINGS

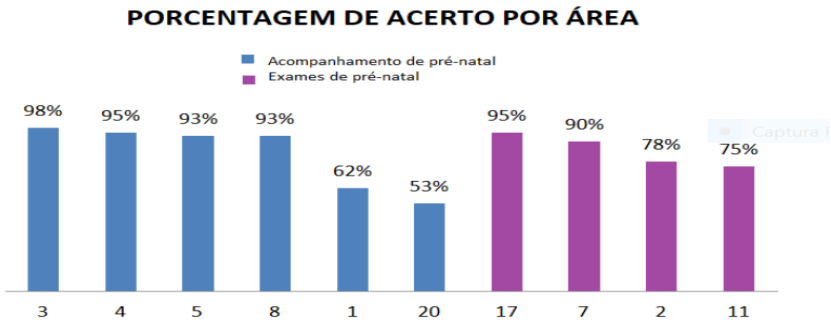
Regarding sociodemographic characteristics, 58 nurses working in primary health care in the municipalities belonging to the Regional Health Superintendence of Alfenas participated in the Training Course in Prenatal Care. A majority of females (54; 93.10%) were observed, with a mean age of 33.86 (SD=5.18) being the lowest equal to 24 years and the highest equal to 51, and married (37; 63.79%). The nurses participating in the research completed graduation on average of 8.84 years (SD=4.36) with the

shortest time equal to two years and higher equal to 26 years of graduation, most of them in private higher education institutions (47; 81.03%), with specialization (47; 81.03%) on average in two areas (P=0.73), the majority being in the management area, administration and audit. Moreover, among the nurses participating in the research, only three (5.17%) have master's/doctorate students, all with less than five years of completion at eerp-USP, UNIFAL-MG, and IBRATI institutions. The mean time spent in primary health care is 5.61 years (SD= 4.21) the shortest time equal to six months and the highest equal to 15 years and the majority working in the morning and night shifts (48; 84.48%). Only eight participants reported having another job, being in the area of management, in the hospital area, endoscopy, urgency, and emergency, and as a service provider.

The research was conducted through an evaluation questionnaire of the Course Prenatal Training of Habitual and Puerperium Risk containing 20 objective questions related to the themes taught in the course. The questions with the highest number of correct answers were those related to the National Program of Humanization of Prenatal Care and Birth and those related to the medication administered for the prevention of congenital defects, with 98% of the correct answers. The questions that addressed topics such as maternal nutritional status, tests, and procedures allowed and necessary during prenatal care, and information regarding breastfeeding and medications administered to newborns obtained between 80 and 95% correct. On the other hand, the questions that dealt with knowledge related to fetal health, the control of sexually transmitted infections, maternal edema, and eclampsia reached 60 to 80% of the right. The themes with the lowest percentage of correct answers were those related to the prevention of Rh sensitization, calculation of the probable date of delivery, and gestational diabetes, being 58%, 53%, and 47% correct, respectively.

In the following graphs, the questions were separated by areas that were worked during the Prenatal and Puerperium Training Course and their respective percentages of hit, being divided by the areas by color, and in the horizontal axes the number referring to the question described in Chart 1.

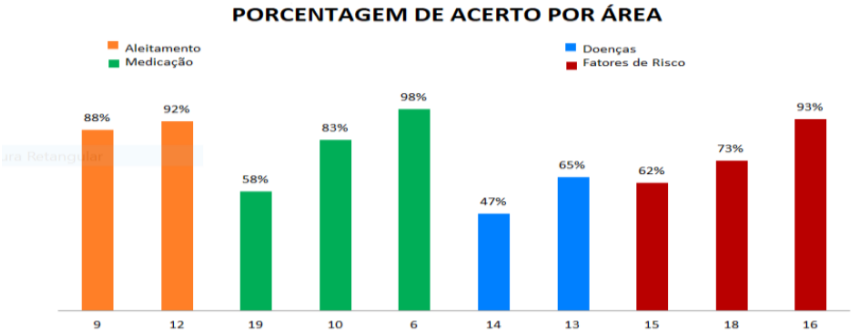
Graph 1 - Percentage of hit by issues divided into areas.



Acompanhamento pré natal - prenatal care
Exames pré natal - prenatal exams

Source: of the authors.

Graph 2 - Percentage of hit-by questions, divided by areas.



Source: of the authors.

Table 1: Questions applied in the technical questionnaire, divided into areas, with the number of answers per question and their respective percentage.

In	QUESTION	AREA	N	%
1	Prenatal care (early uptake) in Primary Health Care should be initiated at which week	Prenatal follow-up	37	62
2	What fetal heart rate is considered normal	Prenatal examination	47	78
3	What the National Prenatal and Birth Humanization Program provides for	Prenatal follow-up	59	98
4	Continuous vomiting in pregnant women that compromises nutritional status	Prenatal follow-up	57	95
5	Procedures that must be observed to ensure effective prenatal care	Prenatal follow-up	56	93
6	What medication is administered to prevent defects in the congenital neural tube	Medication	59	98
7	Prenatal screening tests that assess maternal exposure to pathogens	Prenatal examination	54	90
8	Prenatal consultations should be scheduled every two weeks after the 36th week of gestation	Prenatal follow-up	56	93
9	Reflexes that make milk go down are due to hormones	Suckling	53	88
10	Vitamin K is given to the newborn to prevent	Medication	50	83
11	About controlling sexually transmitted infections	Prenatal examination	45	75
12	Concerning breastfeeding, mark the correct option	Suckling	55	92
13	High-risk HPV subtypes that cause cervical cancer	Sickness	39	65
14	About diabetes, mark the right alternative	Sickness	28	47
15	Eclampsia is characterized by the presence of	Risk factor	37	62
16	Which of the risk factors is not related to prematurity	Risk factor	56	93
17	This should not be performed during physical examination in pregnant women with placenta previa	Prenatal examination	57	95
18	When generalized edema is observed in pregnant women, the professional's conduct should be	Risk factor	44	73
19	Prevention of Rh factor sensitization should be carried out in the following situations, except	Medication	35	58
20	According to the last menstruation, what is the probable date of delivery	Prenatal follow-up	32	53

Source: of the authors.

4 DISCUSSION

The sociodemographic characterization of the nurses participating in the research, despite a majority of the female sex, all other characteristics had a great diversity, which is proven by the high values of standard deviation.

Regarding the percentage of correct answers related to the questions on topics addressed in the Prenatal and Puerperium Training Course, they obtained a satisfactory result, mostly, because the rate of correct answers is higher than 60%, but some questions should receive greater attention, due to the low percentage of correct answers, such as the prevention of HR sensitization, calculation of the probable date of delivery and gestational diabetes, being 58%, 53% and 47% of correct, respectively, proving the existence of gaps in these subjects.

The prevention of Rh sensitization is a topic that should be dominated and addressed by nurses during prenatal care, as this professional plays an important role in the prevention measures of diseases from Hr sensitization, for example, fetal erythroblastosis, maternal-fetal hemorrhage (FMH) and hemolytic disease of the fetus and newborn (HFDN), the latter being an important cause of perinatal death. Fetal erythroblastosis occurs due to the incompatibility of the Rh factor between mother and fetus, with the mother with RH negative and the rh-positive father generating a child also Rh negative causing alloimmunization. Thus, the maternal organism produces antibodies that attack the red blood cells of the fetus, which can lead to the increase of organs such as the liver and spleen, cause anemias, jaundice, and other deficiencies and even lead to death, still during pregnancy, or after birth (SILVA; ALCÂNTARA, 2017). Therefore, the trained nurse must be able to pass all the information on rh sensitization in the prenatal consultation, because through them prophylactic measures can be taken, such as the performance of laboratory tests of blood typing, the indirect coombs test, and information of the need for the administration of anti-D immunoglobulin after the birth of an RH positive child son of a negative RH mother.

Another issue that should be taken care of is the calculation of the probable date of delivery, which was a low number of correct. Perinatal morbidity and mortality may be associated with preterm delivery, post-term and intrauterine growth restriction (IUR), so knowledge of gestational age and the probable date of delivery is fundamental for the best orientations during prenatal care that ensures safety for the mother and child binomial (MATIAS; THIAGO; MONTENEGRO, 2002).

The issue with the lowest rate of the hit was related to gestational diabetes, which is a worrisome fact, because according to the World Health Organization (WHO) gestational diabetes is the most common metabolic problem in pregnancy, with a prevalence of 3 to 25% of pregnancies, depending on the ethnic group. Gestational diabetes is defined by the WHO as intolerance to carbohydrates of varying severity, which begins during pregnancy without necessarily being previously diagnosed. It is at great risk in pregnancy for both mother and fetus and newborn and in the emergence of future diseases such as the increased risk of children developing obesity, metabolic syndrome, and diabetes in the future life.

Gestational diabetes is usually diagnosed in the second or third trimester of pregnancy and may be transient or persist after delivery, thus being a risk factor for the development of type 2 diabetes mellitus. In the last two decades, there has been an increase in the number of women with diabetes of childbearing age and during the pregnancy cycle, as a consequence of the high development of industrialized foods, increased maternal age, lack of physical activity, and growth of obesity cases. Thus, it is essential that nurses, when performing the prenatal consultation, request fasting glucose. If gestational diabetes is detected, the pregnant woman should be instructed to monitor capillary glycemia four times a day (fasting, and after the three main meals) besides being oriented in other care (BRASIL, 2017).

Thus, it can be concluded that the themes addressed in this research are extremely important for the realization of adequate and safe prenatal care follow-up that is the best quality of life for pregnant women and puerperal women from Alfenas and region. Therefore, the themes with a lower rate of hits should receive special attention so that the gaps observed during the performance of this research are addressed.

5 CONCLUSION

The accomplishment of this work allowed the evaluation of the knowledge of nurses working in primary health care in the municipalities belonging to the Regional Superintendence of Health of Alfenas on Nursing Care in prenatal care of Habitual Risk and puerperium, besides identifying some gaps regarding topics that should be addressed during the follow-up of prenatal care of the habitual risk.

Thus, the accomplishment of this work allowed the observation of the importance of continuing education and pointed out themes that can be prioritized in future educational actions.

REFERENCES

BARBOSA, T. L. de A.; GOMES, L. M. X.; DIAS, O. V. O Pré-Natal realizado pelo enfermeiro: a satisfação das gestantes. Cogitare Enfermagem, v. 16, n. 1, p. 29-35, 2011.

BRASIL. Ministério da Saúde Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012. Brasília, DF, 2012

BRASIL. Organização pan-americana da saúde. Rastreamento e diagnóstico de diabetes mellitus gestacional no Brasil. Federação brasileira das associações de ginecologia e obstetrícia e sociedade brasileira de diabetes. Brasília: Ministério da Saúde, 2017.

BRASIL. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Área Técnica de Saúde da Mulher. Pré-natal e Puerpério: atenção qualificada e humanizada – Manual técnico. Caderno 5. Brasília: Ministério da Saúde, 2006.

BRASIL. Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Atenção ao pré-natal de baixo risco. Brasília: Ministério da Saúde, 2013.

CONSELHO FEDERAL DE ENFERMAGEM (COFEN). Código de Ética dos Profissionais de Enfermagem. Resolução COFEN Nº 0564/2017. Disponível em: <http://www.cofen.gov.br/resolucao-cofen-no-5642017_59145.html>.
Acesso em: 27 maio 2018.

CUNHA, M. de A. et al. Assistência pré-natal: Competências essenciais desempenhadas por enfermeiros. Escola Anna Nery, v. 13, n. 1, p. 145-153, 2009.

GUERREIRO, E. M. et al. O cuidado pré-natal na atenção básica de saúde sob o olhar de gestantes e enfermeiros. REME – Revista Mineira de Enfermagem, v. 16, n. 3, p. 315-323, 2012.

MATIAS, A.; THIAGO, P.; MONTENEGRO, N. Cálculo da idade gestacional: Métodos e Problemas. Acta Médica Portuguesa, v. 15, p. 17-21, 2002.

ROCHA, A. C.; ANDRADE, G. S. Atenção da equipe de enfermagem durante o pré-natal: percepção das gestantes atendidas na rede básica de Itapuranga-GO em diferentes contextos sociais. Journals Bahiana – School of medicine and public health. Revista Enfermagem Contemporânea, v. 6, n. 1, p. 30-41, 2017.

RODRIGUES, E. M.; NASCIMENTO, R. G. do; ARAÚJO, A. Protocolo na assistência pré-natal: ações, facilidades e dificuldades dos enfermeiros da Estratégia de Saúde da Família. Revista da Escola de Enfermagem da USP, v. 45, n. 5, p. 1041-1047, 2011.

SILVA, T. S.; ALCÂNTARA, P. F. P. Papel do enfermeiro frente a eritroblastose fetal: estudo de caso enfermeiros em hospitais e clínicas do distrito federal. Simpósio de TCC e Seminário de IC, v. 1, p. 986, 2017.

SOUZA, V. B. de; ROECKER, S.; MARCON, S. S. Ações educativas durante a assistência pré-natal: percepção de gestantes atendidas na rede básica de Maringá-PR. Revista Eletrônica de Enfermagem, v. 13, n. 2, p. 199-210, 2011.

CHAPTER 71

Connecting extension, teaching and research through a broad academic project

10.56238/rsfohsv1-071

Bruna Karas
Undergraduate
Current institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: brunakaras3@gmail.com

Ana Carla Dlugosz
Undergraduate
Current institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: anacdlugosz@gmail.com

Larissa Almeida Busnello
Undergraduate
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: busnellolarissa@gmail.com

Alice Magro Koscianski
Undergraduate
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: alicemkos@gmail.com

Camilla Mattia Calixto
Undergraduate
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: calixtocamilla@gmail.com

Francielle Nocera Viechineski
Undergraduate
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: fran.nocera@hotmail.com

Paola Gonçalves Moreira de Oliveira
Undergraduate
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: paolagmoliveira@gmail.com

Mariana Fonseca
Undergraduate
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: mari_fonseca102@hotmail.com

Amy Sakakibara
Undergraduate
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: amy.sak.22@gmail.com

Gilberto Baroni
PhD
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: gbaroninefro@gmail.com

Gianna Carla Alberti Schrut
Master's Degree
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: gicaalberti@gmail.com

Mário Cláudio Soares Sturzeneker
PhD
Present institution: Universidade Estadual de Ponta Grossa
Address: Av. General Carlos Cavalcanti, 4748 - Uvaranas, Ponta Grossa, PR, Brazil – ZIP: 84030-900
Email: mcssturzeneker@gmail.com

ABSTRACT
Cardiovascular diseases are the leading causes of death worldwide and obesity as well as type 2 diabetes mellitus are emerging as a global epidemic. Prevention is the basis for addressing cardiovascular disease to reverse this grim scenario, and raising awareness through information can increase the adherence of the general population to changes in lifestyle habits that are fundamental in this context. The information obtained in a basic care, such as a compact and objective anamnesis, blood pressure measurement, and capillary glycemia evaluation, as a parameter for individualized orientations, associated to educational lectures with accessible language, can help to break the barrier between scientific knowledge and the population. The full involvement of health academics in this knowledge transmission process, under the coordination of a professor and researcher, allows the full connection between research, teaching, and extension. Under these foundations, the extension project was created under the title: Primary and secondary prevention of cardiovascular diseases and

type 2 diabetes with the objective of taking scientific knowledge to the population in an appropriate language, having the health academic as one of the main vehicles.

1 INTRODUCTION

Changes in lifestyle habits form the basis of preventive and curative treatment of cardiovascular diseases (CVD) and metabolic diseases such as type 2 diabetes mellitus (DM2). CVD are the leading causes of death worldwide and obesity as well as DM2 are emerging as a global epidemic. Moreover, they are frequently associated and consequently have important negative impact on public health regardless of regional characteristics. Prevention is the basis for reversing this grim scenario, and awareness through information can increase the adherence of the general population to changes in lifestyle habits that are fundamental in this context.

The information obtained in a basic care, such as compact and objective anamnesis, blood pressure measurement and capillary blood glucose assessment, as a parameter for individualized guidance, associated with educational lectures with accessible language, can help break the barrier between scientific knowledge and the population, allowing access to well-established concepts related to the prevention of CVD and DM2. The full involvement of health academics in this process of transmitting knowledge at different levels and the multidisciplinary nature of the proposal allow several approaches with positive perspectives for those involved in the coordination and execution as well as for the population in general. Apparently it would be natural to aim for these objectives with an extension project and these were the first two pillars of this project.

As the goal of the respective project is to bring scientific knowledge with appropriate language to the population, having as one of the main vehicles the academic health area, the periodic immersion in this world of scientific knowledge would be a natural evolution of the process as a whole. From this reflection came the formation plan of the third pillar of the extension project in question, the cardiovascular disease and related diseases study group. The interest and subsequent participation of students from the Department of Medicine since the initial phase of organizing ideas, structuring programs, and planning actions with the community were extremely important and determinant in the whole process of creating this extension project.

During the development period, the demand of some students for proposals of eminent scientific nature, such as the completion and submission of work in congresses of the regional medical specialty society as the congress of the Cardiology Society of Paraná and by eminently extensionist actions such as the World Hypertension Day 1st edition (VIECHINESKI et al., 2021) further increased the motivation, influenced the formation of groups, the definition of goals and work plan of the extension project in question. With the sedimentation of this set of ideas, perspectives and goals this extension project was submitted in the Pró-reitora de Extensão e Assuntos Culturais (PROEX) of our institution, Universidade Estadual de Ponta Grossa (UEPG) and started in the 1st semester of 2019, under the coordination of professor Mário Cláudio Soares Sturzeneker initially as an academic league of diabetes and cardiovascular

disease prevention and later by institutional issues again submitted as an extension project under the title: primary and secondary prevention of cardiovascular diseases and type 2 diabetes.

As a natural evolution, other extensionist actions such as World Heart Day 1st edition (DE OLIVEIRA et al., 2021) and World Diabetes Day 1st edition (CALIXTO et al., 2022) were carried out in our city, in their respective dates defined by the related societies. The need for specialized care in cardiology with molds aimed at the full care of the population, providing prescription assistance and emphasizing the need for changes in lifestyle habits in an individualized way, as well as meeting the social demands, motivated the organization of the cardiology outpatient clinic as an extensionist service, characterized by multidisciplinarity with the participation of social work and pharmacy together with medicine.

The study group on cardiovascular diseases and related diseases linked to this extension project constitutes the eminently scientific basis of this initiative. As a supplement to academic training, it promotes research in the area of cardiology and related diseases, from experimental research to clinical research with production of papers for presentation in local, regional, national and international events, as well as for publication in journals. As part of this process, the medical students at UEPG are oriented in all phases of scientific production, from bibliographic survey to manuscript submission, as well as during the development of material for oral presentations. With similar objective, the electrocardiogram (ECG) club was created aiming at the basic mastery of the interpretation of this very important test in medical practice, always correlating it with the respective clinical picture in clinical sessions open to medical students from UEPG and other institutions.

2 OBJECTIVES

The league's activities are programmed aspiring to achieve three basic correlated objectives: to help prevent cardiovascular disease and related diseases such as DM2, scientific production, and the further education of health academics.

3 METHODS

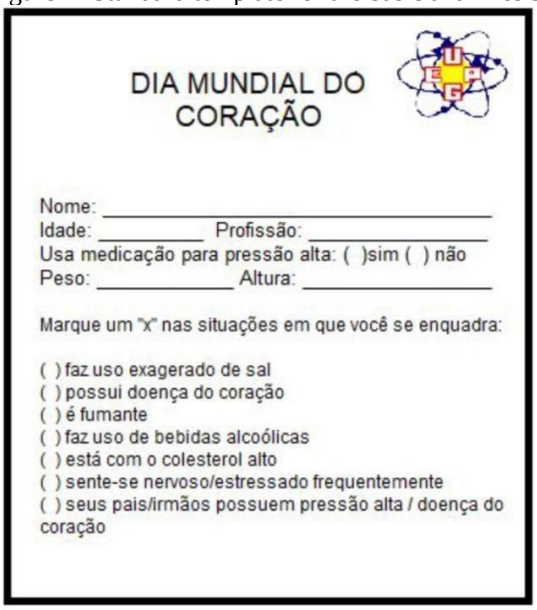
2.1 ASSISTING IN THE PREVENTION OF CARDIOVASCULAR AND RELATED DISEASES

Through actions with the population that allow them to become aware of the preexistence of CVD and related diseases, estimate their presence when apparent, as well as the predisposition to develop them through the identification of their risk factors and within this context formulate a set of individualized guidelines. To facilitate the individual approach, we use a basic questionnaire for identification and anamnesis, and we note on the same form the blood pressure and capillary blood glucose levels (FIGURE 1). In addition to individualized guidance, informative lectures are given with accessible language adapted to the population, addressing in a basic way the CVD and associated diseases such as obesity and DM2, their risk factors, and how to approach them, focusing mainly on sustainable changes in lifestyle habits. This methodology was applied in all the actions with the population, with minor adaptations inherent to the

central theme of the respective action. These actions were carried out, as far as possible, on the dates defined worldwide by the related societies for campaigns against hypertension: World Hypertension Day 1st edition (VIECHINESKI et al. , 2021), prevention of CVD in general: World Heart Day 1st edition (DE OLIVEIRA et al. , 2021), prevention of T2D: World Diabetes Day 1st edition (CALIXTO et al. , 2022).

Consultations at the cardiology outpatient clinic, besides the usual medical approach, allow the recognition of factors that may contribute to poor adherence to medical recommendations, whether socioeconomic, cultural, or cognitive, through a multidisciplinary approach performed by a team composed of a physician, medical students, pharmacists, and social workers. These factors are then addressed by the professional involved with the aim of minimizing their negative impact. Tools to facilitate the understanding of the prescription were developed by the pharmacy team, and changes in lifestyle habits are encouraged through information.

Figure 1- Standard template for the basic anamnesis.


DIA MUNDIAL DO CORAÇÃO

Nome: _____
Idade: _____ Profissão: _____
Usa medicação para pressão alta: ( )sim ( ) não
Peso: _____ Altura: _____

Marque um "x" nas situações em que você se enquadra:

( ) faz uso exagerado de sal
( ) possui doença do coração
( ) é fumante
( ) faz uso de bebidas alcoólicas
( ) está com o colesterol alto
( ) sente-se nervoso/estressado frequentemente
( ) seus pais/irmãos possuem pressão alta / doença do coração

2.2 SCIENTIFIC PRODUCTION AND SUPPLEMENTARY TRAINING OF HEALTH ACADEMICS

The study group on cardiovascular and related diseases linked to the mentioned extension project works under the guidance of the coordinating professor, in the context of the respective research line (Cardiovascular and related diseases: from experimental model to clinical research) based on the needs of the institution, for example the need for a specific experimental model, on topics of interest of the scientific community for production, presentation and publication of papers and in the further education of medical students in the area of cardiology. In regular meetings and frequent communication via application are defined the goals, division of tasks and the sequence of development of all work, as well as training for their respective presentations.

3 RESULTS

3.1 WORLD HYPERTENSION DAY 1ST EDITION

World Systemic Hypertension Day was held on May 17 and 18, 2019 in Ponta Grossa (Paraná). The first day of the event attended 28 patients at the Governador Manoel Ribas Environmental Complex, and the average age of these was 52.7 years. From the anamnesis, 42.85% of patients were found to be taking antihypertensives and 25% presenting dyslipidemia. The most prevalent risk factor for cardiovascular disease was a positive family history, identified in 67.85% of patients. Regarding BMI 38.28% of patients were classified as overweight and 32.14% with some degree of obesity. On the second day, lectures were given addressing the limitations of hypertension treatment and the impact of changes in lifestyle habits on the prevention and treatment of cardiovascular disease.

Table 1. Data from the patients seen.

Variable	Percentage (%)
Use of antihypertensive medications	42,85%
Dyslipidemia	25%
Family history of cardiovascular disease	67,85%
Overweight (BMI 25-29.9)	39,28%
Obesity grade I, II and III (BMI > 30)	32,14%

Source: VIECHINESKI (2021).

3.2 WORLD HEART DAY 1ST EDITION

World Heart Day was held on October 18 and 19, 2019 and consisted of two stages. The first stage was held in a central location with a large flow of people, where 70 patients were seen, 52.86% of whom were men. Through the directed anamnesis 40% of the patients were found to be confirmed hypertensive and 18.57% with dyslipidemia. The most prevalent risk factor for cardiovascular disease was a positive family history reported by 58.57%. Regarding BMI, 60% of the patients presented an inadequate weight for height, being 36.92% classified as overweight and 23.06% with some degree of obesity. Each patient was oriented about lifestyle and had their questions answered by the participating students and the coordinating professor. The second stage took place in the auditorium of the State University of Ponta Grossa Campus, where four lectures were held addressing the risk factors for obesity cardiovascular diseases, healthy habits, and guidance on exercise and healthy eating.

Table 2. Data from the patients seen.

Variable	Percentage
Use of antihypertensive medication	34,1%
Dyslipidemia	18,57%
Family history of cardiovascular disease	58,57%
Confirmed Hypertensives	40%
Overweight (BMI 25-29.9)	36,92%
Obesity grade I, II and III (BMI >30)	23,06%

Source: DE OLIVEIRA (2021).

3.3 WORLD DIABETES DAY 1ST EDITION

Thirty-six patients participated in the event, 16 (44.44%) women and 20 (55.55%) men. The average age among women was 50.05 years and among men 52 years. Among the patients, 5 (13.89%) were being treated for diabetes mellitus (DM) and 15 (41.67%) had DM family members. Regarding lifestyle habits, 9 individuals (25%) used alcoholic beverages, 7 (19.44%) were smokers, 14 (38.89%) reported a high-sodium diet, 15 (41.67%) a low-sodium hyperglycemic, 25 (69.45%) felt nervous/stressed frequently, and only 23 (63.89%) had regular medical monitoring (table 1).

Analyzing the data referring to the body mass index (BMI), it was observed that 80% of the patients evaluated were overweight for their height.

Table 3 - Description of the population.

Variable	Men	Women
Number of participants	20 (55,55%)	16 (44,44%)
Average age	52	50,05
Use of diabetes medication	1 (2,77%)	4 (11,11%)
Family history of DM	8 (22,22%)	7 (19,44%)
Alcohol Consumption	6 (16,66%)	3 (8,3%)
Smoking	6 (16,66%)	1 (2,77%)
Hypersodium diet	9 (25%)	5 (13,88%)
Hyperglycemic diet	8 (22,22%)	7 (19,44%)
Frequent stress and nervousness	14 (38,88%)	11 (30,55%)
Regular medical follow-up	14 (38,88%)	9 (25%)

Source: CALIXTO (2022).

Among the diabetics, 2 (40%) had random capillary blood glucose lower than 100 mg/dl, 1 (20%) was in the range between 100 mg/dl and 139 mg/dl, 1 (20%) between 140

mg/dl and 199 mg/dl and 1 (20%) above 200 mg/dl. Among the non-diabetics 64.5% had random capillary blood glucose less than 100 mg/dl, 32.2% were in the range between 100 mg/dl and 139 mg/dl, 3.2% between 140 mg/dl and 199 mg/dl, and none above 200 mg/dl. The average among men was 95 mg/dl, and 144.125 for women (Table 5).

Table 4 - Random capillary blood glucose in the evaluated population.

Blood glucose (mg/dl)	Diabetics	Non diabetics
< 100	2 (40%)	20 (64,5%)
100 a 139	1 (20%)	10 (32,2%)
140 a 199	1 (20%)	1 (3,2%)
> 200	1 (20%)	0 (0%)

Source: CALIXTO (2022).

Table 5- Average capillary blood glucose levels of the evaluated population.

Total Population Average	Average among men	Average among women
103.5 mg/dl	95 mg/dl	144.125 mg/dl

Source: CALIXTO (2022).

In addition to the clinical evaluation, each patient was given personalized guidance on lifestyle changes. They were also encouraged to ask questions of the students who attended them and of the coordinating professors.

At the end of the event, the medical students from the Medical School of the Universidade Estadual de Ponta Grossa gave four lectures about diabetes, under the coordination of three professors from the Medical School. Afterwards, a space was opened for questions from the participants, contributing both to the students' teaching and to the population's education.

3.4 CARDIOLOGY OUTPATIENT CLINIC

In the population seen at the cardiology outpatient clinic, we observed a higher proportion of CVD and its risk factors in men than in women, the opposite being observed regarding the prevalence of hepatic steatosis and DM2. When analyzing lifestyle habits, it is noted that men are more likely to consume alcohol in excess.

Table 6 shows the prevalence in percentage of CVD and its risk factors among the patients seen in the cardiology outpatient clinic.

Table 6 - CVD prevalence and risk factors.

Variable	Men n (%)	Women n (%)	Total n (%)
Number of patients	35 (55,55%)	28 (44,45%)	63 (100,00%)
Active smoking	6 (17,14%)	4 (14,28%)	10 (15,87%)
Former smoker	15 (42,85%)	13 (46,43%)	28 (44,44%)
Ethylist	3 (8,57%)	0 (0,00%)	3 (4,76%)
Former ethylist	7 (20,00%)	2 (7,14%)	9 (14,28%)
HAS	35 (100%)	27 (96,43%)	61 (96,82%)
DM	12 (34,28%)	15 (53,57%)	27 (42,85%)
Established CVD	29 (82,85%)	20 (71,43%)	49 (77,77%)
Family history of CVD	4 (11,43%)	4 (14,28%)	8 (12,70%)
Dyslipidemia	27 (77,14%)	23 (82,15%)	50 (79,36%)
Confirmed hepatic steatosis	4 (11,42%)	7 (25,00%)	11 (17,46%)
Heart Failure	9 (25,71%)	6 (21,43%)	14 (40,00%)
Altered electrocardiogram	12 (34,28%)	9 (32,14%)	22 (34,92%)
Psychiatric illnesses	5 (14,28%)	4 (14,28%)	9 (14,28%)

Source: KOSCIANSKI (2022).

3.5 DEVELOPMENT OF AN ANIMAL MODEL OF NON-SMALL CELL FATTY LIVER DISEASE ALCOHOLIC

In a pilot study for the development of an animal model of non-alcoholic fatty liver disease (NAFLD) was performed in 16 Wistar rats divided into 4 groups: baseline control (BC), normal control (NC), cholesterol and hyperlipidic diet (HD), each containing 4 animals. The normal control group was fed with standard Nuvilar® chow, the cholesterol group received the standard chow plus 3% cholesterol and the hyperlipidic diet group received chow developed at the State University of Ponta Grossa (LIPINSKI, et. al., 2017). Except for the baseline control group, sacrificed at baseline, half of each group was euthanized at week 8 and the other half at week 12. Based on the score system for histological analysis of NAFLD, there were no changes characterizing the development of NAFLD in any animal used in the proposed

model, suggesting a probable resistance of the Wistar rat to the proposed induction method (hypercholesterolemic diet).

3.6 PRESENTATION OF PAPERS AT CONFERENCES

In terms of academic participation in congresses, the group covered local, regional, national and world congresses. The papers, presented in oral or poster form, can be seen in Table 7. Since 2019, the group works promoting important presentations in the context of cardiology and related diseases.

Table 7: Presentations in Congresses.

Year	Congress	Job Title	Mode
2022	77ºBrazilian Congress of Cardiology & World Congress of Cardiology	SARS-COV-2 pandemic and mass vaccination: impact on morbidity and mortality from acute myocardial infarction in the brazilian southeast	Poster
2022	77ºBrazilian Congress of Cardiology & World Congress of Cardiology	Impact of the COVID-19 pandemic on morbidity and mortality from heart failure in the southeast region of Brazil	Poster
2022	77ºBrazilian Congress of Cardiology & World Congress of Cardiology	Impact of the COVID-19 pandemic on mortality from heart failure in southern region of Brazil	Poster
2022	48th Paranaense Congress Cardiology & International Cardiology Meeting	The influence of the SARS pandemic CoV-2 in heart failure mortality in the South and Southeast regions of Brazil	Oral presentation
2022	48th Paranaense Congress Cardiology & International Cardiology Meeting	Blockade of the renin angiotensin system via ACE inhibitors or ARBs in an experimental model of non-alcoholic fatty liver disease, which is the best therapeutic target?	Oral presentation
2021	76ºBrazilian Congress of Cardiology	Pandemic SARS-COV-2 and Acute Myocardial Infarction in Southeastern Brazil: Basic Data Collected from DATASUS	Poster

2021	76ºBrazilian Congress of Cardiology	Endocarditis bacterial of common etiology with atypical clinical presentation	Poster
2021	76ºBrazilian Congress of Cardiology	Acute myocardial infarction in southern Brazil: general data related to the SARS-COV-2 pandemic	Poster
2021	76ºBrazilian Congress of Cardiology	Aortic dissection type A: Fourteen years of satisfactory clinical evolution	Poster
2021	76ºBrazilian Congress of Cardiology	The morbidity and mortality of heart failure in Brazil from 2002 to 2019 and the potential influence of the main guidelines	Poster
2021	76ºBrazilian Congress of Cardiology	Pandemic SARS-COV-2 and heart failure mortality in the southeastern region of BRAZIL	Poster
2021	76ºBrazilian Congress of Cardiology	Impact of the SARS-COV-2 pandemic on heart failure mortality in southern Brazil	Poster
2021	XIX Brazilian Congress on Obesity and Metabolic Syndrome	Blocking the renin-angiotensin system with an angiotensin-converting enzyme inhibitor as a therapeutic target in non-alcoholic fatty liver disease: results of an experimental model	Poster
2021	47th Paranaense Congress Cardiology & International Cardiology Meeting	Potential choice criteria for antihypertensives in the context of nonalcoholic fatty liver disease: results of an experimental model	Oral presentation
2021	9th CBEU - Brazilian Congress of University Extension: Networks to Promote and Defend Human Rights	World Heart Day 1st edition	Oral presentation

2021	9th CBEU - Brazilian Congress of University Extension: Networks to Promote and Defend Human Rights	World Hypertension Day: 1st edition	Oral presentation
2020	75th Brazilian Congress of Cardiology	Analysis of the epidemiological profile of the population under 35 years of age hospitalized for acute myocardial infarction in the last decade in the southern region of Brazil	Poster
2020	75th Brazilian Congress of Cardiology	Analysis of the epidemiological profile of the population hospitalized for heart failure in the last decade in the southern region of Brazil	Poster
2019	International Cardiology Meeting Curitiba 2019	Basic research as a reference for the development of criteria for choosing antihypertensives in patients with nonalcoholic fatty liver disease	Oral presentation

Source: Data provided by the respective authors.

Within the presentations, there were also important awards within the Paraná Congress of Cardiology, as can be seen in Table 8. They encompassed first places in the years 2019 and 2022, and second place in the year 2021.

Table 8- Regional Congress Awards.

Year	Congress	Job Title	Category	Award
2019	International Cardiology Meeting Curitiba 2019	Basic research asreference to the development of criteria for choosing antihypertensives in patients with non-alcoholic fatty liver disease	Basic research	1st place
2021	47th Paranaense Congress Cardiology & International Cardiology Meeting	Potential choice criteria for antihypertensives in the context of non-alcoholic fatty liver disease: results of an experimental model	Basic research	2nd place
2022	48th Paranaense Congress	Blockade of the renin angiotensin system via ACE inhibitors or ARBs	Basic research	1st place

	Cardiology & International Cardiology Meeting	in an experimental model of non-alcoholic fatty liver disease, which is the best therapeutic target?		

Source: Data provided by the respective authors.

3.7 EKG CLUB

The electrocardiogram (ECG) club, in its first edition, promoted regular meetings via Google Meet platform from November 2020 to November 2021. Its second edition began on March 22, 2022 and, so far, six meetings have been held, also via the Google Meet platform. The organization continues to be done by the academics of the group, however, the novelty was the greater dissemination to other academics and health professionals through social networks WhatsApp and Instagram, which increased access to the GCS club and consequently the number of participants.

Table 9 - ECG 2nd edition club meetings

Topic	Date	Participants
Atrial fibrillation	22/03/2022	48
AMI without QT interval elevation	29/03/2022	23
AMI with QT interval elevation	25/05/2022	39
Tachycardia with wide QRS	09/06/2022	21
Supraventricular tachycardia by nodal reentry	21/06/2022	18
AMI of inferior wall and right ventricle	21/07/2022	14

Source: Data provided by the respective authors.

4 DISCUSSION

The main limitation of the project in question is to show objective results related to the prevention of CVD and DM2, since this is only possible with prospective studies with adequate number of participants and duration to obtain consistent results. However, actions with the population using appropriate tools to obtain information about the individual and population risk profile, which allows both individualized approach at the time of care, as well as general, through the dissemination of essential information for the understanding of CVD and T2DM, its complications and the necessary care for primary and secondary prevention of these highly prevalent diseases, will certainly contribute to the reduction of related morbidity and mortality. Actions such as World Hypertension Day (VIECHINESKI et al, 2021), World Heart Day (DE OLIVEIRA et al. , 2021), and World Diabetes Day (CALIXTO et al. , 2022) should be encouraged and disseminated so that in the long term we will have the expected result.

The results of the cardiology outpatient clinic, as an extension service, can be effectively shown, since we evaluated patients through quality of life questionnaires and their history of care and

hospitalizations for decompensation of their condition before the multidisciplinary intervention (social work, pharmacy, and medicine) and 6 months after this intervention. However, although the cardiology outpatient clinic linked to the extension project has been serving patients at the university hospital of our institution since 2019, the multidisciplinary care was initiated in May 2022 and the first data analysis is scheduled for November 2022. Therefore, currently we can only present the clinical characterization of these patients (KOSCIANSKI et al., 2022).

A proper, adequately validated, and cost-effective experimental model has been developed in our institution, and the Wistar rat is the most commonly used animal model for experiments in various areas. However, we encountered some difficulties in the first experiment aimed at developing the Wistar model of non-alcoholic fatty liver disease (NAFLD) due to a possible resistance of rats and mice to hyperlipidic diet (WARDANI et al., 2020). In this experiment the hyperlipidic diet used, consisting of 39.1% low calorie carbohydrate, 16% protein and 46% fat, did not induce NAFLD in 12 weeks (MOTA et al., 2022). However, it would possibly induce some degree of liver disease if used for a few more weeks. The 3% cholesterol feed also did not induce NAFLD used in the same period, suggesting a possible resistance of the Wistar rat to these induction methods, either by composition and/or exposure time to the diet. In previous experiments using rabbits on a 1% cholesterol diet, the development of the full histological spectrum of NAFLD was observed to be similar to what is observed in humans (STURZENEKER et al., 2011,2019). The importance of a suitable experimental model makes it necessary to continue this process, so we will initiate a new experiment using 5-month-old male Wistar rats with longer exposure time to the potentially disease-inducing diet (16 weeks) and a more aggressive dietary composition associating 3% cholesterol to the cited hyperlipidic diet.

The presentation of papers in congresses was characterized by the protagonism of the students from the choice of theme, the bibliographical survey, through preparation and culminating with the presentation. In all the stages mentioned above, the coordinating professor acted as a guide and promoted effective training so that the best of each student could be revealed at the time of the presentations. As a consequence, the group won the best free theme award in the basic research category in the 2019 and 2022 Paraná congresses, and 2nd place overall in the 2020 Paraná congress. No less relevant, many other papers were presented in local, regional and national congresses, and the qualitative evolution of the work presented is reflected by the awards and the growing number of papers accepted in congresses of recognized scientific excellence.

The electrocardiogram, despite being an inexpensive test, easy to perform, and widely useful for the diagnosis of various diseases of the cardiovascular system, is still undervalued, inadequately worked from the point of view of learning and mistakenly seen as an exclusive test of the cardiology specialty. The electrocardiogram club demystifies this important test by providing

Gradual assimilation of the basic concepts linked to their clinical applicability. Once again the students are the protagonists, doing the research to select the best case reports, preparing the presentation,

organizing and promoting the sessions of the electrocardiogram club, always under the direct supervision of the coordinating professor.

5 CONCLUSIONS

The extension project in question provides broad contact between the population and the medical student, facilitating the population's access to scientific knowledge through facilitated communication. It encourages the students to immerse themselves in the world of scientific research with the objective of producing works not only for the scientific community, but also works adapted for the population. Its central focus is the population and the academic as the protagonist, therefore, it provides a broad connection between extension, teaching, and research

REFERENCES

CALIXTO, C. M. et al. Dia mundial da Diabetes: 1ª Edição / World diabetes day: 1st Edition. Brazilian Journal of Development, 8(4), 29118–29125, 2022.

DE OLIVEIRA, P. G. M. et al. Dia mundial do coração 1ª edição / World heart day 1st edition. Brazilian Journal of Development, 7(12), 118088–118094, 2021.

KOSCIANSKI, A.M. et al. Ambulatório de cardiologia: 2ª Edição. 20º CONEX, 2022, Ponta Grossa. Anais eletrônicos do CONEX, 2022. Disponível em: https://www.conex2022.com.br/.

MOTA, J. A. S. et al. Desenvolvimento de modelo animal de doença hepática gordurosa não alcoólica: experimento piloto / Development of an animal model of non- alcoholic fatty liver disease: pilot experiment. Brazilian Journal of Development, 8(4), 28639–28653, 2022.

VIECHINESKI, F. N. et al. Dia Mundial de Hipertensão: 1ª edição / World Hypertension Day: 1st edition. Brazilian Journal of Development, 7(11), 104993–104998, 2021.

WARDANI, H. A. et al. Development of nonalcoholic fatty liver disease model by high- fat diet in rats. Journal of Basic and Clinical Physiology and Pharmacology, v. 30, n. 6, 1 nov. 2020.

STURZENEKER, M.C. et al. Olmesartan severely weakened the development of NASH in an animal model of hypercholesterolemia. Atherosclerosis, 216(1), 97-102, 2011.

STURZENEKER, M.C.S. et al. Ramipril significantly attenuates the development of non-alcoholic steatohepatitis in hyperlipidaemic rabbits. Am J Cardiovasc Dis, 9(2), 8-17, 2019.

CHAPTER 72

Perception of pregnant women about labor and childbirth during prenatal care

10.56238/rsfohsv1-072

Wankarla Barbosa Chaves

Suellen Vienscoski Skupien

Laryssa De Col Dalazoana Baier

ABSTRACT

Introduction: The national guidelines for normal delivery care recommend humanized care to women in prepartum, childbirth and postpartum care. The present study aims to identify whether pregnant women are receiving guidance regarding good practices of care for childbirth and birth. Methodology: this is a quantitative study conducted through a structured interview with 60 pregnant women, which included questions about good practices. Results: Of the pregnant women interviewed, 38 (63.3%) were not oriented regarding the delivery plan, 37 (61.7%) were instructed regarding the right to accompany, 33 women (55%) were oriented regarding non-pharmacological methods of pain relief, 29 (48.33%) were oriented to free movement and 30 (50%) pregnant women were oriented as to "golden hour". Discussion: Who stimulates the delivery plan, which is a document prepared by the pregnant woman herself during the prenatal consultation. Nurses can encourage the elaboration of this plan and adopt the use of non-pharmacological methods for pain relief, effective also to stimulate contractions and accelerate dilation. In addition, there is the "Golden Hour" that prevents hypothermia and prolong the duration of breastfeeding. Conclusion: This study found that most of the women interviewed were not informed about the good practices of delivery and birth care, presenting failures regarding orientation for childbirth. In this sense, the discussion about normal delivery should be further intensified, so that pregnant women make a conscious choice at this time.

Keywords: prenatal care; obstetric nursing; humanized birth.

1 INTRODUCTION

Prenatal care aims to ensure the proper development of pregnancy, allowing the mother to have the necessary assistance during pregnancy, childbirth and the puerperium. Therefore, several health actions are recommended, with educational and preventive activities including addressing psychosocial aspects, in order to ensure a healthy delivery, without impact on maternal health (BRASIL, 2012).

Childbirth has undergone several transformations, from hospital institutionalization to mobilization for the humanization of childbirth, and this is mainly due to the advancement of scientific studies and the use of new techniques that enable the reduction of pain, the use of methodologies that allow facilitating its realization and more humanized care to women. (KAPPAUN, COSTA, 2020).

However, it is necessary to distinguish the types of vaginal delivery, which is the normal delivery that usually uses interventions such as episiotomy, serum use, blocking food intake, trichotomy, etc., and humanized natural delivery that allows women who use non-pharmacological methods for pain relief and have access to more humanized care, respecting their choices (SOUZA, *et. al.*, 2020).

The Ministry of Health, in accordance with the recommendations of the World Health Organization (WHO), prioritizes humanized care for women in prepartum care, during childbirth and also in the postpartum period, also indicating that the ideal situation is that the one with the least possible intervention

should be applied, and a protocol of non-pharmacological methods should be applied for pain relief and humanized care for pregnant women (GAZINEU *et. al.*, 2019).

The search for the humanization of care for women during childbirth is part of a new concept of care for women, which prioritizes their well-being, allowing them to have a choice, to be heard, welcomed and allows them to actively participate in this unique moment in their life. Humanized childbirth can bring countless benefits to the mother and baby, transforming this act into a truly human experience (POSSATI, *et. al.*, 2017).

One of the main ways to ensure humanized care for women during childbirth is the adoption of good practices of delivery and birth care based on scientific evidence, whose procedures seek to naturalize childbirth, reduce interventions, reduce the administration of drugs and mainly avoid unnecessary cesarean sections. Among the best practices most commonly used are non-pharmacological methods for pain relief, respecting the physiology of childbirth. (AZEVEDO, *et. al.*, 2020).

In fact, in the delivery room the newborn should also be welcomed in the best possible way. In view of this, Ordinance No. 371, of May 7, 2014, instituted the guidelines for the organization of comprehensive and humanized care for newborns in the Unified Health System (SUS). This ordinance recommends that for the healthy born term newborn, immediate and continuous skin-to-skin contact between mother and baby should be performed at room temperature of 26 °C; umbilical cord clamping after the pulsations (approximately one to three minutes) have ceased; encouraging breastfeeding in the first hour of life; and that routine procedures (administration of vitamin K, physical examination of the newborn) should be performed after the first hour of life.

The present study aims to identify whether pregnant women are receiving guidance regarding good practices of care for childbirth and birth, recommended by the national guidelines for normal delivery care of the Ministry of Health.

2 METHODOLOGY

This is a quantitative study conducted in a maternity hospital of a university hospital in the municipality of Ponta Grossa/Paraná, from April to May 2022. Data collection was through a structured interview with 60 pregnant women during the nursing consultation. The inclusion criteria were pregnant women submitted to normal delivery or cesarean section at the institution and who had six or more prenatal consultations.

The questionnaire included questions about cesarean section and good practices in childbirth and birth. The data were entered in excell spreadsheet and expressed in simple frequencies.

This study is part of a larger project entitled Health Education in the pregnancy and puerperal cycle, approved by the Research Ethics Committee of the State University of Ponta Grossa, under opinion no. 3,234,262/2019.

3 FINDINGS

We interviewed 60 women, being pregnant or postpartum women, of these 38 (63.3%) were not oriented regarding the delivery plan and 22 women (36.7%) were oriented. Regarding the free-choice companion, 37 women (61.7%) were instructed about the right of a companion during the hospitalization period and 23 (38.3%) did not receive this information.

Regarding non-pharmacological methods of pain relief in labor, 33 women (55%) were oriented and 27 (45%) were not oriented. Regarding free movement, freedom to walk and choose the position of delivery, 31 women (51.7%) were not oriented, 37 (61.7%) were also not oriented regarding fluid intake (water and juice) and feeding during labor.

Also in relation to vaginal delivery, 30 (50%) women were instructed to perform skin-to-skin contact with mother/baby skin after birth.

Regarding cesarean section, 42 (70%) women were instructed on the right to choose cesarean section and the criteria for this; 32 (53.3%) women were instructed regarding the risks of cesarean section, only 21 (35%) women were instructed on the need for fasting and 28 (46.7%) were instructed regarding recovery and care after cesarean section.

4 DISCUSSION

Since 1986, the World Health Organization (WHO) has been encouraging the delivery plan, which is a document prepared by the pregnant woman herself during the prenatal consultation. Nurses can encourage the preparation of the delivery plan to exchange information, such as the right to a companion of their choice, labor and the risks of cesarean section (MINISTÉRIO DA SAÚDE, 2019).

The Delivery Plan, in addition to allowing women to have more humanized care can also help reduce cases of obstetric violence, because in it the pregnant woman will express her expectations regarding parturition, signaling their preferences in relation to the route of delivery, to possible interventions if necessary, being a strategy capable of minimizing acts (MACHADO, *et al* 2020).

Among the various actions, one that generates many benefits to pregnant women in humanized care is the right to a companion, guaranteed by Law 11,108 of April 7, 2005. The presence of the companion according to the woman's choice, can bring security, confidence and tranquility at the time of delivery. (SOUSA, *et. al.*, 2020).

Soares et al. (2017) in their study on the satisfaction of postpartum women attended in a normal delivery center, demonstrated that the interviewed parturients felt safer, supported and encouraged to give birth, when they could have a companion chosen by them during the birth process.

Another strategy during parturition is the adoption of non-pharmacological methods for pain relief. Among the most commonly used methodologies are shower bathing, permission of a companion, ambulation, freedom to choose positions, breathing exercises or massages (AZEVEDO, *et. al.*, 2020; SOUSA, *et. al.*, 2020).

In this sense, movement is not only one of the pain relief techniques used by parturientwomen, but also very effective to stimulate contractions and accelerate cervical dilation (SOUSA, *et. al.*, 2020). Thus, parturients can traditionally avoid the lithotomic position and prefer other positions, such as in the shower, standing or sitting, four supports on the bed, lateral decubitus, squatting or sitting on the Swiss ball (FIOCRUZ, 2021). Changes in position at the time of labor and vertical posture favor the physiology of women, because it reduces the risk of vaginal laceration, edema of the vulva and the use of episiotomy (PAIVA, et al 2018; BRASIL, 2017).

With regard to postpartum action, there is the "Golden Hour" (Golden Hour) which is about skin-to-skin contact and the late/timely clamping of the umbilical cord. Skin-to-skin contact between the mother and newborn in the first hour of life prevents hypothermia and prolongs the duration of breastfeeding. Breastfeeding is still in the delivery room essential for establishing the mother and baby bond. For the puerperal it is advantageous because it decreases the risk of postpartum hemorrhage and contributes to the discharge of the placenta. (SENAR, 2020).

Among the benefits of late/timely umbilical cord clamping for the full-term newborn is increased levels of hematocrit and hemoglobin, which reduces the risk of iron deficiency anemia if umbilical cord clamping is after pulsations are ceased (GOES, 2017).

5 CONCLUSION

This study found that most of the women interviewed were not informed about good practices of delivery and birth care. Thus, prenatal care showed failures regarding orientation and preparation for delivery.

Therefore, it is understood that it is essential to encourage the elaboration of the delivery plan. In this sense, the discussion about normal delivery should be further intensified, already during prenatal consultations and should be reoriented during labor and delivery so that pregnant women make a conscious choice at this time.

Starting from this study, it was understood that for qualified prenatal care it is necessary that in addition to evaluations and guidance, there is a respectful nurse who practices good practices, with the objective of reducing unnecessary interventions.

REFERENCES

AZEVEDO, L. S.; COSTA, S.; DONADUZZI, D. S. S.; FETTERMANN, F. A.; BORDIGNON, J.; ROSA, A. B. Conhecimento de enfermeiras obstétricas em relação aos métodos não farmacológicos para o alívio da dor no trabalho de parto. Revista Vivências Erechim, 2020, v. 16, n. 30, p. 115-125. Disponível em: < http://revistas.uri.br/index.php/vivencias/article/view/118/93>

BRASIL. Ministério da Saúde. Secretaria de atenção à Saúde. Departamento de atenção básica. Atenção ao pré-natal de baixo risco. Série A. Normas e Manuais Técnicos. Cadernos Atenção Básica, n.32. Brasília: Ministério da Saúde, 2012. Disponível em:< https://bvsms.saude.gov.br/bvs/publicacoes/cadernos_atencao_basica_32_prenatal.pdf>

BRASIL. Ministério da Saúde. Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Departamento de Gestão e Incorporação de Tecnologias em Saúde.Diretrizes nacionais de assistência ao parto normal: versão resumida [recurso eletrônico] / Ministério da Saúde, Secretaria de Ciência, Tecnologia e Insumos Estratégicos, Departamento de Gestão e Incorporação de Tecnologias em Saúde. – Brasília : Ministério da Saúde, 2017. Disponível em:<https://bvsms.saude.gov.br/bvs/publicacoes/diretrizes_nacionais_assistencia_parto_normal.pdf>

BRASIL. Portaria nº371, de 7 de maio de 2014. Institui diretrizes para a organização da atenção integral e humanizada ao recémnascido (RN) no Sistema Único de Saúde(SUS). Disponível em: < https://bvsms.saude.gov.br/bvs/saudelegis/sas/2014/prt0371_07_05_2014.html>

GAZINEU, C R.; ROCHA DE ALMEIDA AMORIM, K.; TORRES DA PAZ, C.; CALFA VIEIRA GRAMACHO, R. DE C. Benefícios do parto normal para a qualidade de vida do binômio mãe-filho. Textura, v. 12, n. 20, p. 121 - 129, 20 fev. 2019.Disponível em: < https://textura.famam.com.br/textura/article/view/287/255>

FIOCRUZ. Posições da mulher durante o trabalho de parto e parto: benefícios da livre movimentação. Rio de Janeiro: Fiocruz, 2021. Disponível em: https://www.arca.fiocruz.br/bitstream/icict/48914/2/posicoestppartolivremovimentacao.pdf.

GOES, Juliana Fionda. Clampeamento tardio do cordão umbilical: Estudo de coorte. Dissertação (Mestrado). Fundação Oswaldo Cruz. Instituto Nacional de Saúde da Mulher, da Criança e do Adolescente Fernandes Figueira. Rio de Janeiro. 2017. Disponível em: .<https://www.arca.fiocruz.br/bitstream/handle/icict/26357/juliana_goes_iff_mest_2017.pdf;jsessionid=8D82CB7308D0231B32E187D4C6507E00?sequence=2>

KAPPAUN, A.; DA COSTA, M. M. M. A institucionalização do parto e suas contribuições na violência obstétrica. Revista Paradigma, [S. l.], v. 29, n. 1, p. 71–86, 2020. Disponível em: https://revistas.unaerp.br/paradigma/article/view/1446.

MACHADO KS, SARAIVA APC, LIMA LKOL. Plano de parto: uma estratégia para reduzir atos de violência obstétrica?. Interdisciplinary Journal of Health Education. 2020 Jul-dez;5(2):53-63. Disponível em:< https://ijhe.emnuvens.com.br/ijhe/article/view/408>

MINISTÉRIO DA SAÚDE. Saúde da mulher na gestação, parto e puerpério. 1. ed. São Paulo: Ministério da Saúde, 2019. E-book. Disponível em: < https://atencaobasica.saude.rs.gov.br/upload/arquivos/202001/03091259-nt-gestante-planificasus.pdf>

PAIVA, E. F.; STHAL, H. C.; PAULINO, V. C. P.; LEITE, G. R. POSIÇÕES ASSUMIDAS DURANTE O PARTO NORMAL: percepção de puérperas atendidas numa maternidade de jataí-Goiás. Itinerarius

Reflectionis, Goiânia, v. 14, n. 4, p. 01–21, 2018. DOI: 10.5216/rir.v14i4.54977. Disponível em: https://revistas.ufg.br/rir/article/view/54977. Acesso em: 25 set. 2022.

POSSATI, A. B.; PRATES, L. A.; CREMONESE, L.; SCARTON, J.; ALVES, C. N.; RESSEL, L. B. Humanização do parto: significados e percepções de enfermeiras. Esc Anna Nery, 2017, v.21, n.4. Disponível em:< https://www.scielo.br/j/ean/a/VVsfXjcBCgnXBYVNf7m68XS/abstract/?lang=pt>

SENAR. P. de; SouzaG. N. de; MonteiroL. A. O.; SouzaY. P. R. de; SantosY. de L. M. dos; AraújoM. R. de S.; SilvaS. C. S. da; SilvaR. M. da; ParenteJ. S. Ação educativa para as gestantes na promoção da "Golden hour": relato de experiência. Revista Eletrônica Acervo Saúde, n. 40, p. e2291, 14 fev. 2020. Disponível em: https://acervomais.com.br/index.php/saude/article/view/2291

SOUSA, A. G. N. S.; SilvaJ. E. G. da; SilvaM. R. de S.; SilvaR. S. de S.; FontineleA. da S.; SilvaF. W. de S.; SáG. R. de; RibeiroB. E. de S.; CarvalhoS. N. L. de; NascimentoL. C. Avaliação dos Métodos Não Farmacológicos para Alívio da Dor (MNFAD) no trabalho de parto por puérperas. Revista Eletrônica Acervo Saúde, n. 50, p. e2583, 12 jun. 2020. Disponível em: < https://acervomais.com.br/index.php/saude/article/view/2583/2089>

SOARES, Y. K.C.; MELO, S. S. S.; GUIMARÃES, T. M. M.; FEITOSA, V. C.; GOUVEIA, M. T. O. Satisfação das puérperas atendidas em um centro de parto normal. Rev. enferm. UFPE online, 2017; n. 11, p. 4563-4573. Disponível em: < https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/231195/25187> diovasc Dis, 9(2), 8-17, 2019.

CHAPTER 73

Epidemiological profile of acquired, gestational and congenital syphilis in Brazil between 2011 and 2020 with emphasis on the southeastern region

10.56238/rsfohsv1-073

Catarina Osue Ide Silva
Undergraduate student in Nursing at Associação Educacional do Vale do Jurumirim - Faculdade Eduvale de Avaré (SP).
E-mail: idesilva.catarina@gmail.com
ORCID ID: 0000-0002-7153-5366

Elaine Cristina Navarro
Graduation in Biological Sciences at Universidade Estadual Paulista Júlio de Mesquita Filho (FC/Unesp), Bauru (SP). PhD in Tropical Diseases from the Universidade Estadual Paulista Júlio de Mesquita Filho - (FMB/Unesp) - Botucatu (SP). Professor at Faculdade Eduvale de Avaré - Avaré (SP) e Centro Paula Souza - Botucatu (SP). E-mail: elainenavarro.bio@gmail.com ORCID ID 0000-0001-6638-1713.

Ednaldo Alexandre Zandona
Graduation in Medical Physics at Universidade Estadual Paulista Júlio de Mesquita Filho (IBB/Unesp), Botucatu (SP). Master and PhD in General Applied Biology at Universidade Estadual Paulista Júlio de Mesquita Filho - (IBB/Unesp) - Botucatu (SP). Professor at Faculdade Eduvale de Avaré – Avaré alex.zandona@gmail.com ORCID ID: 0000000343899004

Carolaine Sousa Novaes
Undergraduate student in Nursing at Associação Educacional Vale do Jurumirim - Faculdade Maria

Thereza Ward de Santi Melo
Undergraduate student in Nursing at Associação Educacional do Vale do Jurumirim - Faculdade Eduvale de Avaré (SP).
E-mail: mah-ward@hotmail.com
ORCID ID: 0000-0002-7237-8817

Eduvale de Avaré
E-mail: carolainenovaes200@live.com
ORCID ID: 0000-0002-7237-8817

Larissa Matias Lopes
Undergraduate student in Nursing at Associação Educacional Vale do Jurumirim - Faculdade Eduvale de Avaré (SP). E-mail: larissa.lopes@ead.eduvaleavare.com.br ORCID ID: 0000-0002-7336-6690

Carlos Cesar Marques Collela
Undergraduate student in Nursing at Associação Educacional do Vale do Jurumirim - Faculdade Eduvale de Avaré (SP). Nursing intern of the Secretaria Municipal da Saúde de Avaré (SP).
E-mail: carlos.collela@avare.sp.gov.br ORCID ID: 0000-0001-9383-7149

ABSTRACT
Syphilis is an infectious disease whose etiological agent is Treponema pallidum. Its evolution is chronic and often asymptomatic, and it can affect all organs and systems. It became known in Europe in the late fifteenth century, its rapid spread made it one of the major global plagues (TABISZ, et.al., 2012)..

1 INTRODUCTION

Syphilis is an infectious disease whose etiological agent is Treponema pallidum. Its evolution is chronic and often asymptomatic, and it can affect all organs and systems. It became known in Europe in the late fifteenth century, its rapid spread made it one of the major global plagues (TABISZ, et.al., 2012).

There are two possible theories about its appearance. In the first, also known as Colombian, syphilis would have been brought to Europe by Spanish sailors who had participated in the discovery of America. In the second, it was believed that syphilis would be a mutation and adaptation suffered by endemic treponemes from the African continent (MORTON & RASHID, 2001).

The marketing of birth control pills favored changes in sexual behavior from the 1960s onwards, resulting in an increase in syphilis cases (AVELLEIRA, 2006). With the growing increase of the disease and the harm it can cause, in 1986 congenital syphilis became part of the National Compulsory Notification

List (LNNC). In 2005, syphilis in pregnancy was added to the list and, in 2007, acquired syphilis (BRASIL, 2009).

Treponema pallidum is a bacterium of the genus Treponema and of the Treponemataceae family. This genus has four pathogenic species (Treponema pallidum, subsp pallidum - causing syphilis, Treponema carateum - causing pinkeye and Treponema pertenue - causing bouba or raspberry) and at least six non-pathogenic species. This bacterium is spiral shaped (10-20 turns), about 5-20µm long and 0.1 to 0.2 µm thick. It does not have a cell membrane and is protected by an outer envelope that has three layers rich in N-acetyl muranic acid and N-acetyl glucosamine. They have flagella on their distal ends that help the bacterium to rotate its body and thus move around (SINGH & ROMANOWSKI, 1999; AVELLEIRO & BOTTINO, 2006).

The most common way of syphilis dissemination is through sexual contact, when condoms are not used, and through the transplacental route from the infected pregnant woman to the fetus. Other ways are through kissing, when there is the presence of lesions in the mouth, during professional practice, when biosafety is not followed properly or can occur indirectly, through contaminated objects, tattoos and blood transfusion (PORTH, 2004; LEÃO, 2006; HINRICHSEN, 2009).

Considering that syphilis is a disease that has asymptomatic and latent phases, its diagnosis becomes a little more complicated, and the physical examination and anamnesis are an imprecise form of diagnosis. Thus, laboratory tests are the most indicated, such as VDRl (Venereal Disease Research Laboratoy), RPR (Rapid Plasma Reagin) and TRUST (Toluidine red Unheated Serum Test) which are non-specific, qualitative, low-cost tests, where positive results may appear from the first days of infection. The treponemal tests, such as FAT- Abs (Fluorecent Treponemal Antibody Absorption), TPHA (Treponema Pallidum Hemagglutinatio Test) and the enzyme-linked immunosorbent assay (ELISA) are specific and qualitative, the positive result appears from the second week after the appearance of syphilitic canker and remain positive for life (serological scar) (NADAL & FRAMIL, 2007; BRASIL, 2022).

In cases of suspected congenital syphilis, radiographic examinations of the long bones are performed to obtain the diagnosis, since the signs and symptoms are confused with other diseases (BRASIL, 2022).

In primary syphilis there is the appearance of a characteristic lesion, called hard canker, syphilitic/luetic canker or protossyphiloma, which presents as a papule or nodule, measuring approximately 1 to 2 cm in diameter. In most cases it is single, painless, with an erosion or ulceration appearance, with fibrous consistency edges, smooth and shiny background. It is an extremely infectious lesion and highly rich in treponemes that can be seen under a dark field microscope (GUIDI, 2007; MACHADO, 2001).

In 90 to 95% of cases the cancer is located in the genital region, in men it is more common in the foreskin, balanoprepucial groove and urethral meatus. In women it frequently presents itself in the labia minora, vaginal wall and in the cervix. In other cases, it can be located in the anal region, mouth, tongue, mammary region and chirodactyls (SANCHEZ, 2003; AZULAY et.al., 2004).

The secondary phase appears from six weeks to six months after the appearance of the first lesion, in this phase the patient may present scalp alopecia, erythematous lesions (roseolae) in the palmar regions, ophthalmological, auditory, renal, hepatic, cardiopulmonary manifestations, fever, headache, malaise, pharyngitis, hoarseness, hepatosplenomegaly, loss of appetite, and muscle weakness that disappear in a few weeks (VERONESI, 2015; BRAZIL, 2020).

The tertiary phase appears after a latency interval of up to 40 years after the beginning of the infection, occurring in patients who have not received treatment or have received inadequate treatment. In this phase any organ can be affected. Painless lesions (gums) occur, with irregular edges of slow progression and hardening on palpation, and may be located anywhere in the body, besides affecting the cardiovascular system, which can cause aneurysm of the ascending aorta due to aortitis, ventricular hypertrophy and congestive heart failure (PINTO, 2004; BEREK & NOVAK, 2008). The central nervous system can also be affected, called neurosyphilis, which can lead to a slow degeneration of neurons and nerve fibers responsible for carrying sensory information to the brain, which can lead the individual to dementia, psychosis, paresis, unilateral or bilateral paresthesia of the trigeminal nerve, facial nerve or even lead the carrier to death (LEÃO, 2006).

Gums are lesions that appear more frequently in patients with tertiary syphilis (representing about 17% of cases) and consist of a focal granulomatous inflammatory process with central necrosis, usually affecting the skin, mucous membranes and internal organs (LEÃO, et.al., 2006; ISRAEL, et.al., 2008;). The characteristic of this lesion is the formation of non-infectious granulomas that can vary from 1mm to several centimeters. It is a painless lesion, appears as a hardened, nodular and ulcerated lesion (GUIDI, 2007).

Congenital syphilis can occur in a transplancental way, where the infected mother passes T. pallidum to the fetus while it is still in the belly, or it can occur at the time of delivery, when the fetus can come into contact with a wound on the mother's genitals and become infected (AVELLEIRA & BOTTINO, 2006).

This type of transmission corresponds to 40% of infected fetuses, which can lead to fetal death, neonatal death or children with syphilis (BRASIL, 2005). According to the Ministry of Health, in the primary and secondary phases, the transmission rate is 70% to 100% and a 30% chance in later phases. According to the WHO, the transmission rate in the early stages is 80%. In pregnant women whose treatment was not done or was done inadequately, the rate of miscarriage or stillbirth is 25%, prematurity or low birth weight is 13%, neomortality 11% and asymptomatic infants 20% (O'CONNOR, et.al., 2008; HAWKES, et. al., 2011).

The newborn's clinical picture will vary according to the pregnancy phase in which the infection occurred. When the contamination occurs in the third trimester, the chance of infection the child being born asymptomatic is higher (COSTA, et.al., 2010).

According to the Ministry of Health, early congenital syphilis occurs when the mother transmits T. pallidum to the fetus after the 9th week of gestation. In early congenital syphilis, besides prematurity and low birth weight, some characteristics can be observed, such as hematomegaly (accompanied or not by splenomegaly), syphilides (skin lesions similar to primary acquired syphilis), periosititis, osteitis or osteochondritis, pseudoparalysis of the limbs, respiratory problems, which may or may not have pneumonias, serosanguinous rhinitis, jaundice and anemia (BRASIL, 2006; GUIDI, 2007).

The way to obtain the diagnosis is through physical examination, anamnestic and serological examination of the maternal situation, in addition to laboratory evaluation and imaging tests of the child. Arriving at a diagnosis of this child is a complex process, since most of them are asymptomatic, or present small and little specific signs (LORENZI, et.al., 2001; BRASIL, 2006).

According to the São Paulo State Department of Health, late syphilis appears after the second year of life, does not present clinical manifestations most of the time due to the early healing of the systemic disease, and may involve several organs. The most important manifestations of this phase are: triad of interstitial keratitis characteristics, Hutchinson's teeth (deformed upper median incisor teeth) and deafness of the eighth cranial pair, besides other characteristics such as "saber blade" tibia, Clutton's joints, "olympic" forehead, "saddle" nose, "mulberry" molars, perioral rágades, short mandible and elevated palatine arch (BRAZIL, 2006).

The medication used for the treatment of syphilis is benzathine penicillin, its dosage varies according to the stage of the disease. The Ministry of Health recommends that in the first stage the infection be treated with benzathine penicillin 2,400,000 IU (1,200,000 IU in each buttock), intramuscular, in a single dose. In the second stage (secondary syphilis), the treatment is the same, benzathine penicillin, what will change is the dosage of the drug, it becomes 2,4000,000 IU intramuscular with an interval of one week between the first and second dose, totaling a dose of 4,800,000 IU. And finally, for the treatment of the last stage of syphilis, benzathine penicillin 2,400,00 IU is used intramuscularly weekly for 3 weeks, the total dose being 7,200,000 IU (NEVILLE, et.al., 2004).

The elevation of the VDRL titers in relation to the last test justifies a new treatment. It must be verified if the partner is being treated, even if his serology results negative. In this case, benzathine penicillin is administered 2,400,000 IU. When the partner is positive and is not treated it characterizes an inadequate maternal treatment and consequently when the child is born it will be considered a case of congenital syphilis (SARACENI & LEAL, 2003).

The most effective form of prevention is to interrupt the chain of transmission and prevent new cases. The WHO advocates the importance of people who are sexually active to be regularly tested for syphilis, as well as for other types of STIs (SARACENI et al, 2007). Another form of prevention is the adoption of strategies and advice on the importance of using condoms, especially for the most vulnerable population (sex workers, drug users, etc.), alerting about the importance of partner treatment so that there is no recontamination and show the importance of following the treatment correctly. Explain to pregnant

women the risk of the child being born with the disease, the risk of abortion and malformation (BRASIL, 1999; ROMPALO, 2001).

The objective of this study was to describe the epidemiological situation of acquired, gestational, and congenital syphilis in the five Brazilian macroregions and to verify the sociodemographic profile of pregnant women with positive serology for syphilis in the four states that make up the southeastern region.

2 METHODOLOGY

This is a cross-sectional study with a descriptive and quantitative analytical approach on the evolution of epidemiological data correlated to syphilis cases, recorded in the different Brazilian macro-regions, with emphasis on the southeastern states between 2011 and 2021.

The data were extracted from the Sistema de Informação de Agravos e Notificações DATASUS whose information is public domain and made available through epidemiological bulletins. The following data were analyzed: number of cases, gestational age, age of the pregnant woman, education, clinical classification of the disease, and treatment regimen.

This research used aggregated data, making it impossible to identify individual subjects. The statistical analyses were performed using Microsoft Excel 2016 software.

The five Brazilian macro-regions and the four states of the Federation that make up the Southeast Region were considered as inclusion criteria for the research: São Paulo, Espírito Santo, Minas Gerais, and Rio de Janeiro.

The literature review was conducted in PubMed (United States National Library of Medicine) and SciELO (Scientific Electronic Library Online). The bases for the consolidation of the work were structured by searching the descriptors "Syphilis Acquired", "Syphilis Pregnant"", "congenital syphilis" "epidemiology" and "Treponema Pallidum".

3 RESULTS AND DISCUSSIONS

Between 2011 and 2021, 1,035,942 cases of acquired syphilis were reported in Brazil (BRASIL, 2022). According to the Ministry of Health (2018), the detection rate of acquired syphilis increased from 2% in 2010 to 58.1% in 2017.

It was possible to observe the progressive increase in cases until 2019, and in 2020 there was a drop in the number of notifications. In 2021 the number of cases exceeded the number of cases observed in 2019 (graph 1).

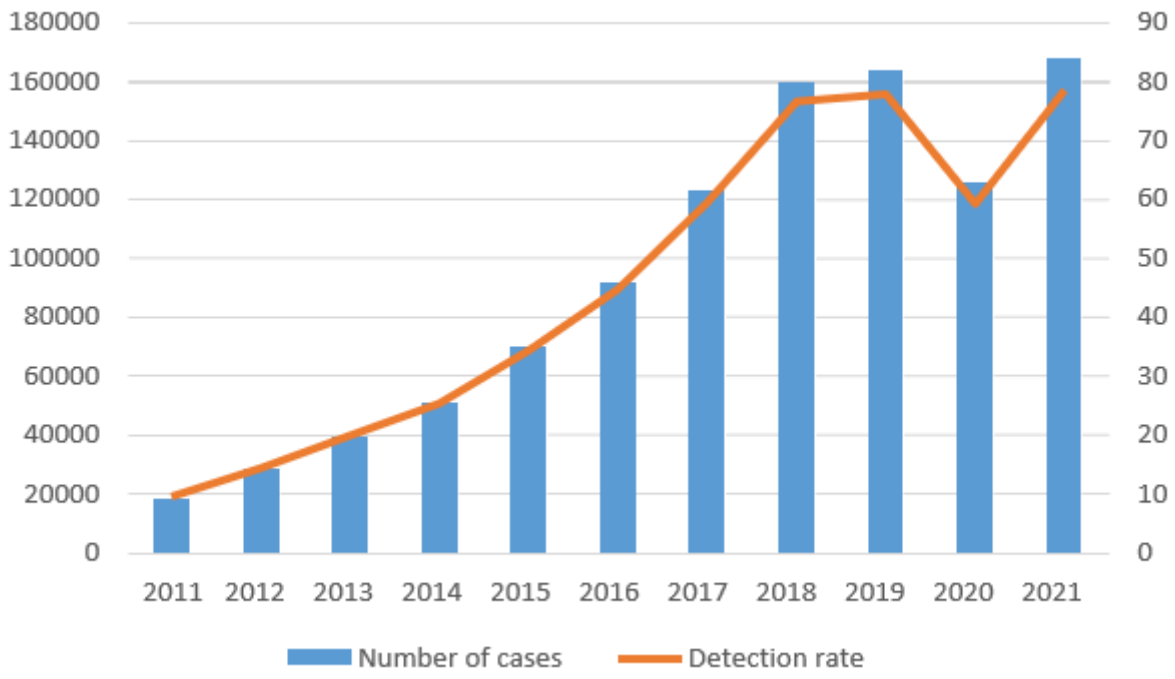
The increase in the number of notifications from 2011 is related to acquired syphilis being inserted in the list of compulsorily notifiable diseases. The significant drop in 2020 is probably related to the pandemic of COVID-19. In this year the country was experiencing a collapse in health services due to the intensity of new cases and hospitalizations of those infected with the coronavirus. Due to this situation,

many services, which were fully established in primary care, had to be temporarily interrupted or had their operation reduced. Among these services is the Center for Testing and Counseling (CTA), a place where most individuals are spontaneously tested for syphilis, without the need for a doctor's order. The detection rate of acquired syphilis has seen a 736% increase between 2011 and 2019 (chart1). According to data from the Department of Chronic Diseases and Sexually Transmitted Infections (DCCI) acquired syphilis was more prevalent in males who accounted for 60.6% of those infected (BRAZIL, 2022).

Gestational syphilis, which became a compulsory notification disease in 2005. Between 2012 and 2021, 452,826 cases were reported. In graph 2 we can observe that the cases of syphilis in pregnant women increased throughout the period studied, because even with the reduction in care to the population of some health services such as CTAs, prenatal and VDRL testing at birth continued to be performed and, thus, the chance of not identifying the infection by Treponema pallidum during pregnancy was reduced.

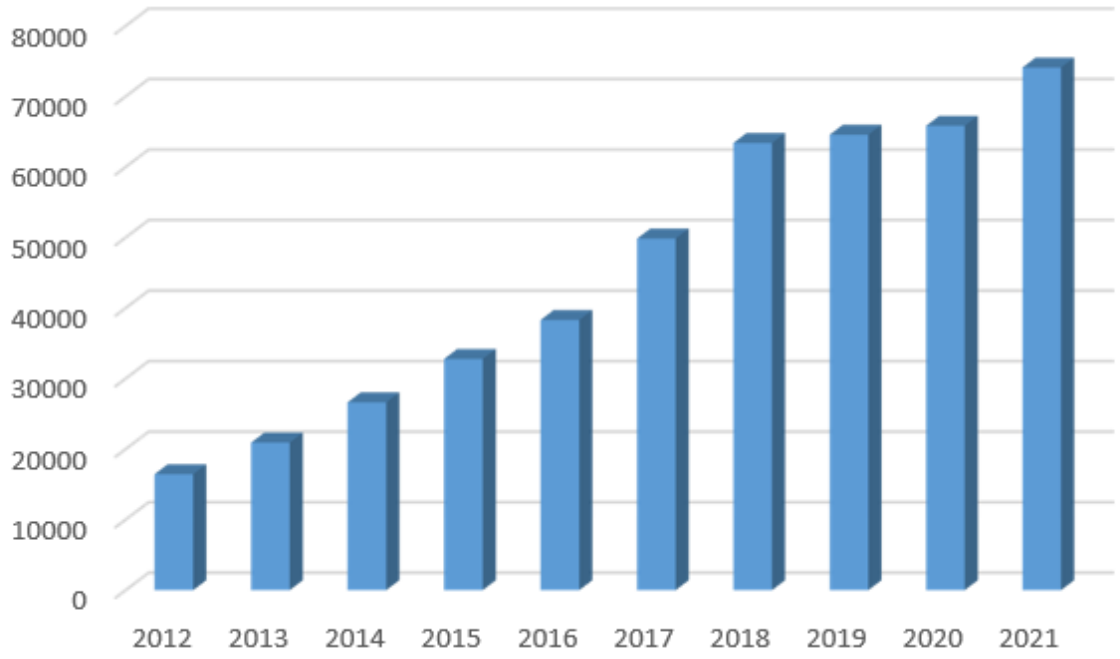
Most infections were diagnosed in the first trimester (38%) and the profile of women was: age group 20 to 29 years (54.6%), complete high school education (28.3%), brown (49.9%). Most pregnant women were classified with latent syphilis (33.1%), followed by primary syphilis (27.5%).

Chart 1 - Cases and detection rates (per 100,000 population) of acquired syphilis by year of diagnosis. Brazil 2011-2021



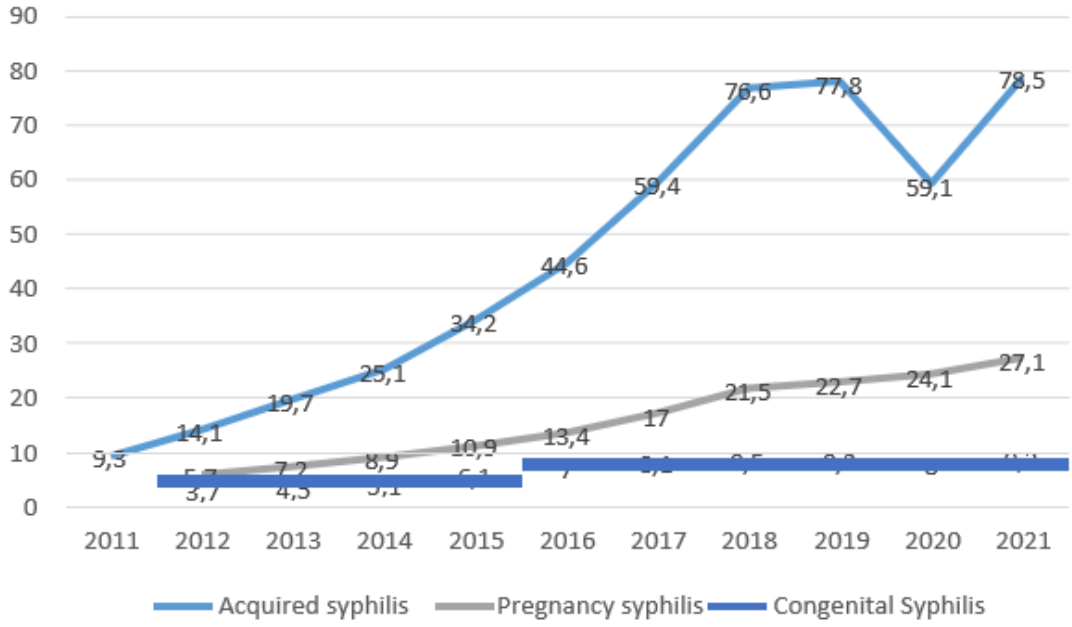
Source: MS/SVS/Department of Chronic Conditions Diseases and Sexually Transmitted Infections

Graph 2 - Detection of gestational syphilis (per 100,000 live births) of pregnant women by year of diagnosis. Brazil, 2011 to 2021



Source: MS/SVS/Department of Chronic Conditions Diseases and Sexually Transmitted Infections

Graph 3 - Comparison of the detection rate of acquired, pregnant and congenital syphilis between 2012 and 2021



Source: MS/SVS/Department of Chronic Conditions Diseases and Sexually Transmitted Infections

When we compare the detection rate of acquired, gestational, and congenital syphilis, we observe a discrepancy in data. Acquired syphilis, which became compulsory notification in 2010, had an increase of 736%, with a sharp drop in 2020, the year in which there was a reduction or paralysis of most non-emergency services. Syphilis in pregnancy had an increase of 298% and congenital syphilis 148%. Both gestational and congenital syphilis suffered less with the pandemic, because prenatal care is considered an

essential service and testing in pregnant women is done three times, in the first exam, at thirty weeks, and at the time of delivery, and thus, if the pregnant woman tests positive, the newborn is tested.

In a study conducted in Cascavel/PR in a Health Reference Center between April 2012 and March 2017, 884 patients were diagnosed with acquired syphilis. In the period studied, it was observed that the prevalence jumped from 8.37% in April 2012 to 21.83% in March 2017. In this study, heterosexual men between 20 and 39 years old, single, and with an education level of more than eight years were the most affected by the infection (PEDER et al, 2017).

The data on gestational and congenital syphilis vary greatly in the different regions of the country, and sometimes even within the same macro-region.

In the Midwest the study by Nunes et al (2021) analyzed the secondary data of gestational syphilis and congenital syphilis between 2007 and 2017 in the state of Goiás and found that gestational syphilis increased 428% and congenital syphilis 866%. The data from the study signals a major flaw in the quality of the service provided.

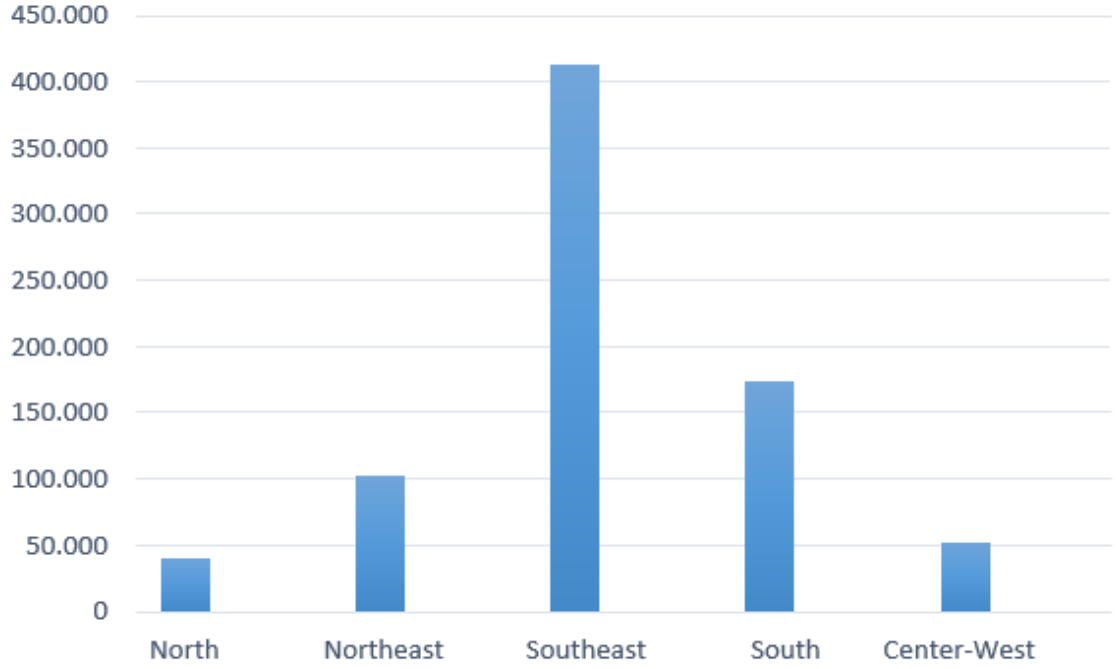
In the study conducted by Gomes et al (2020) in the northern macroregion between 2014 and 2019, it found an increase in pregnant syphilis from 12.28% in 2014 to 18.21% in 2019. According to the study the state of Pará notified the highest number of cases (42.08%) followed by Amazonas (29.5%) and Tocantins (13.08).

Between 2014 and 2018, the northeastern region notified 41,605 cases of gestational syphilis and the state of Bahia contributed the most to the number of new cases. During the period studied there was an increase of 59.6% in cases of gestational syphilis (SOUZA et al, 2021). Another study conducted in the same macroregion by Silva et al (2019) evaluated the epidemiological profile of congenital syphilis in Recife (PE) between 2011 and 2015 and found that, despite the 7.4% reduction in new cases, the municipality still exceeds the target of the Ministry of Health, respectively 6.72/1000 live births and 1/1000 live births. The two studies point to the need for revision of prenatal care protocols and of active searches for pregnant women with positive serology so that they can get the proper treatment and, thus, reduce the chance of the child developing congenital syphilis.

Padilha and Caporal (2020) who analyzed the cases of congenital syphilis in five municipalities in Paraná between 2014 and 2017 and observed that despite the increasing number of new cases, the detection rate was lower than the national average, respectively 3.99/100,000 live births and 6.8 cases/100,000 live births, suggesting that the implemented prenatal care system is efficient.

Regarding the distribution of acquired syphilis in the Brazilian macro-regions, it can be observed that the southeast region is the one that notifies the most cases of syphilis in the country, and this can be justified because it is the most populous macro-region (graph 4).

Graph 4 - Distribution of cases of acquired syphilis in the five Brazilian macro-regions between 2011 and 2021



Source: Department of Chronic Conditions Diseases and Sexually Transmitted Infections

The southeastern region, the most populated in the country, was the one that recorded the highest number of notifications of acquired syphilis, followed by the southern region. All macro-regions studied showed an increase in the incidence of acquired syphilis.

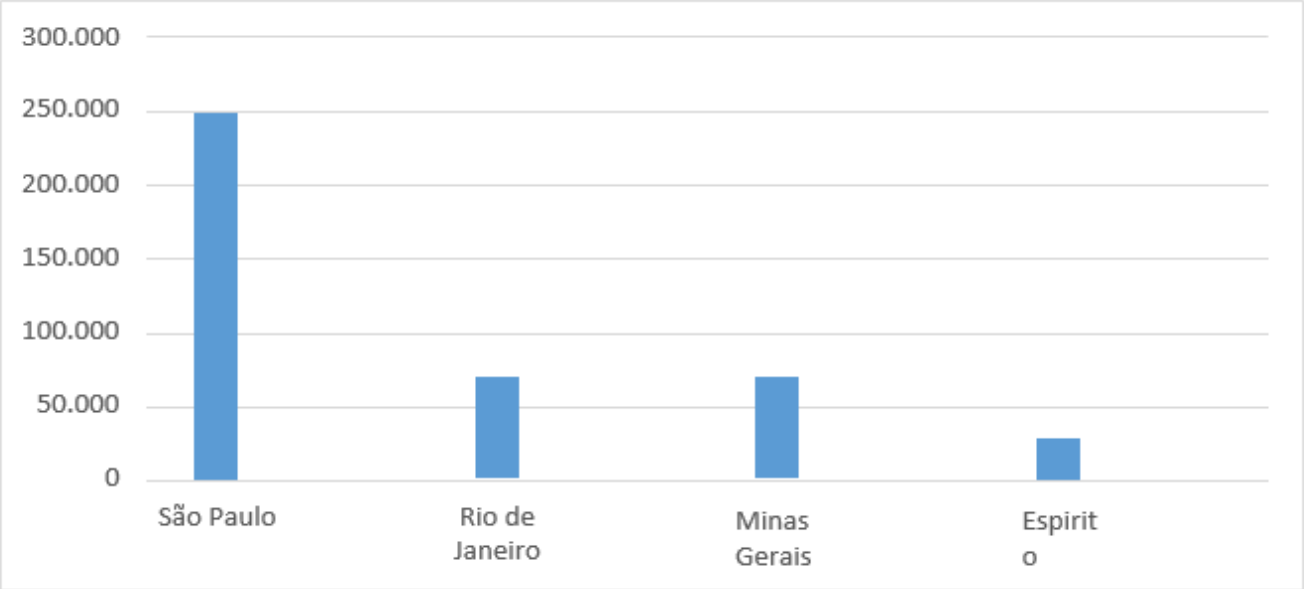
The number of notifications is related not only to the population, but also to the efficiency of the health service provided. Besides the notification

Another variable that signals the quality of care is the percentage of pregnant women with syphilis and their partners who have received adequate treatment.

In the state of São Paulo, it was observed that acquired syphilis was more prevalent in males (63.3%). Both gestational syphilis and congenital syphilis had the highest number of notifications in 2018, 37 945 cases and 12 415 cases, respectively. Gestational syphilis was most prevalent in the age group between 20 and 29 years (54%) and 25% of them had complete high school education and had the latent clinical form.

At Hospital Padre Albino, in the municipality of Catanduva/SP, a study was conducted with 3000 pregnant women between 2014 and 2016. In the first semester of 2014, it was observed that the vertical transmission rate was 73.6% and the incidence of congenital syphilis was 14.5/1000 live births. When analyzed throughout the period it was found that the gestational syphilis had an increase of 35%, but the lack of raw materials for the global production of penicillin and, consequently, the lack of this drug in health facilities, contributed to the occurrence of lack of adequate treatment for pregnant women and increased incidence of congenital syphilis (TANNOUS et al, 2017).

Graph 5 - Distribution of cases of acquired syphilis in the states of the southeastern region between 2011 and 2021



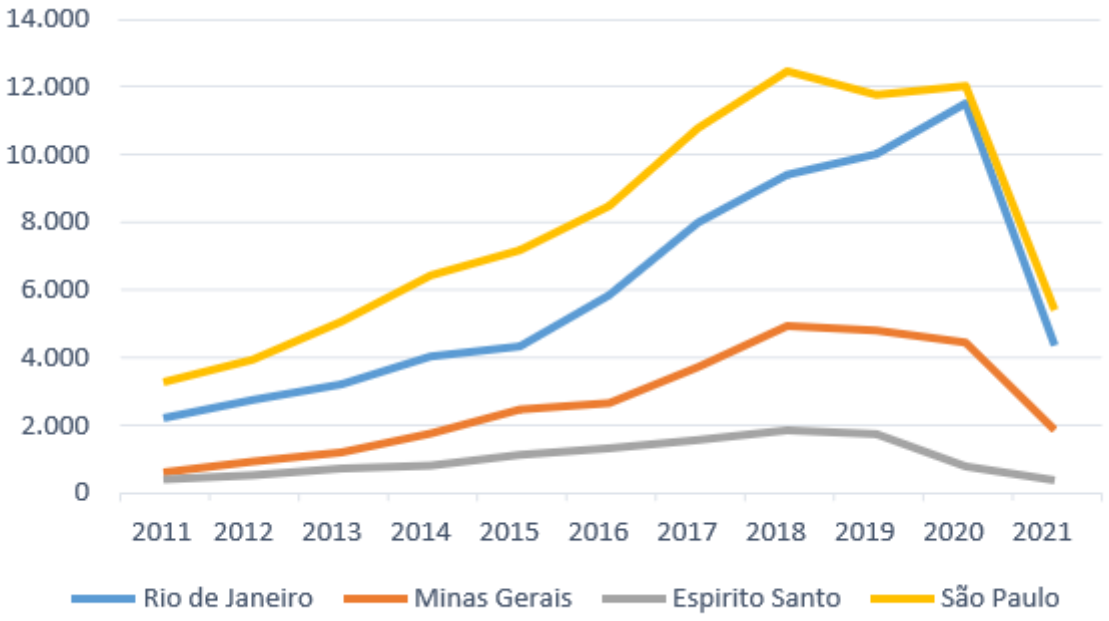
Source: Department of Chronic Conditions Diseases and Sexually Transmitted Infections

In analyzing each state of the southeastern region, it can be seen that the state of São Paulo has the highest rate of cases, followed by the states of Rio de Janeiro, Minas Gerais, and Espírito Santo (graph 5). We can attribute this high rate in the state of São Paulo to the number of inhabitants and to its territory, which is larger than that of the other states of the southeastern macro-region.

Chart 6 shows that in the southeast region, São Paulo and Rio de Janeiro were the states that reported the most cases of syphilis in pregnant women and the states with the highest detection rates.

Carvalho et al (2022) analyzed the notifications of congenital syphilis in the municipality of Franca/SP between 2010 and 2020. In the period evaluated, there were 362 cases, with emphasis on the year 2017 that presented 54 cases (14.92%) with a detection rate of 10.8 per 1,000 live births, the highest amount recorded in the period evaluated. In contrast, the year 2012 showed the lowest number, with 23 (6.35%) cases and 5.1% detection rate per 1,000 live births

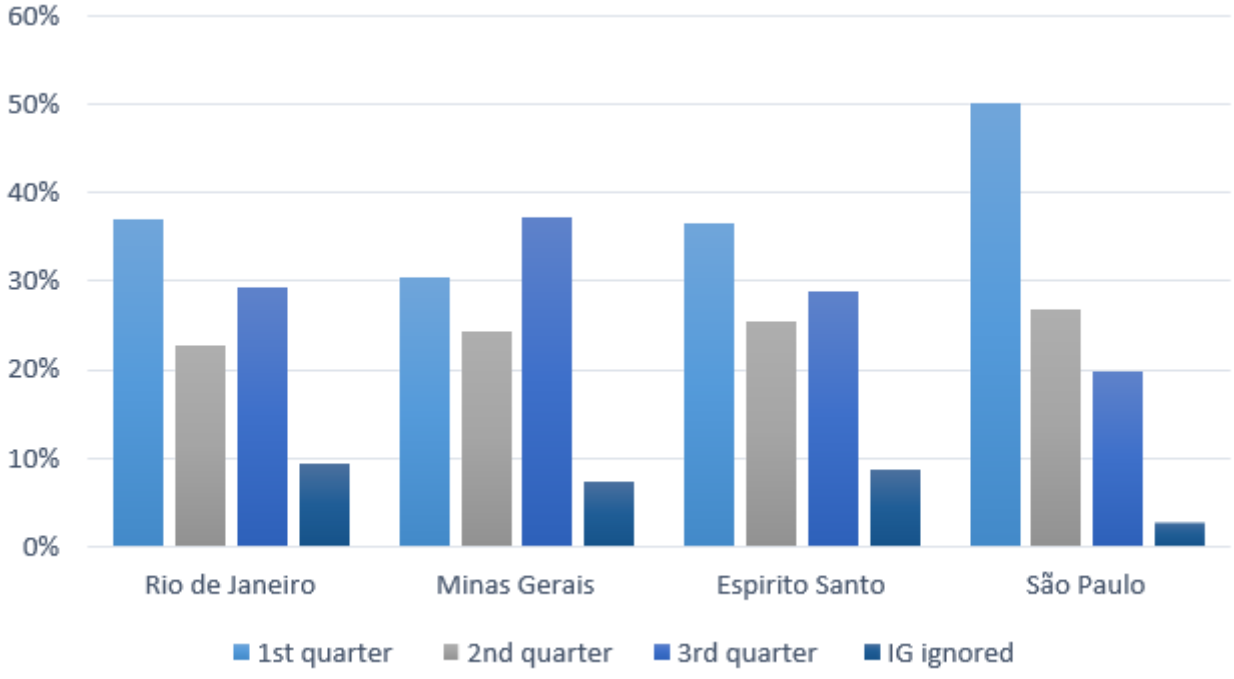
Graph 6 - Distribution of cases of syphilis in pregnant women in the states of the southeastern region of Brazil, between 2011 and 2021



Source: Department of Chronic Conditions Diseases and Sexually Transmitted Infections

In the southeast region it was observed that the diagnosis of syphilis in pregnant women occurred in the first trimester in São Paulo, Rio de Janeiro, and Espírito Santo, suggesting that women start prenatal care as soon as they discover their pregnancy, but in the state of Minas Gerais most pregnant women were diagnosed in the third trimester, suggesting that prenatal care was started late or there were failures in the care and the diagnosis was made late, possibly compromising the health of the fetus (graph 7).

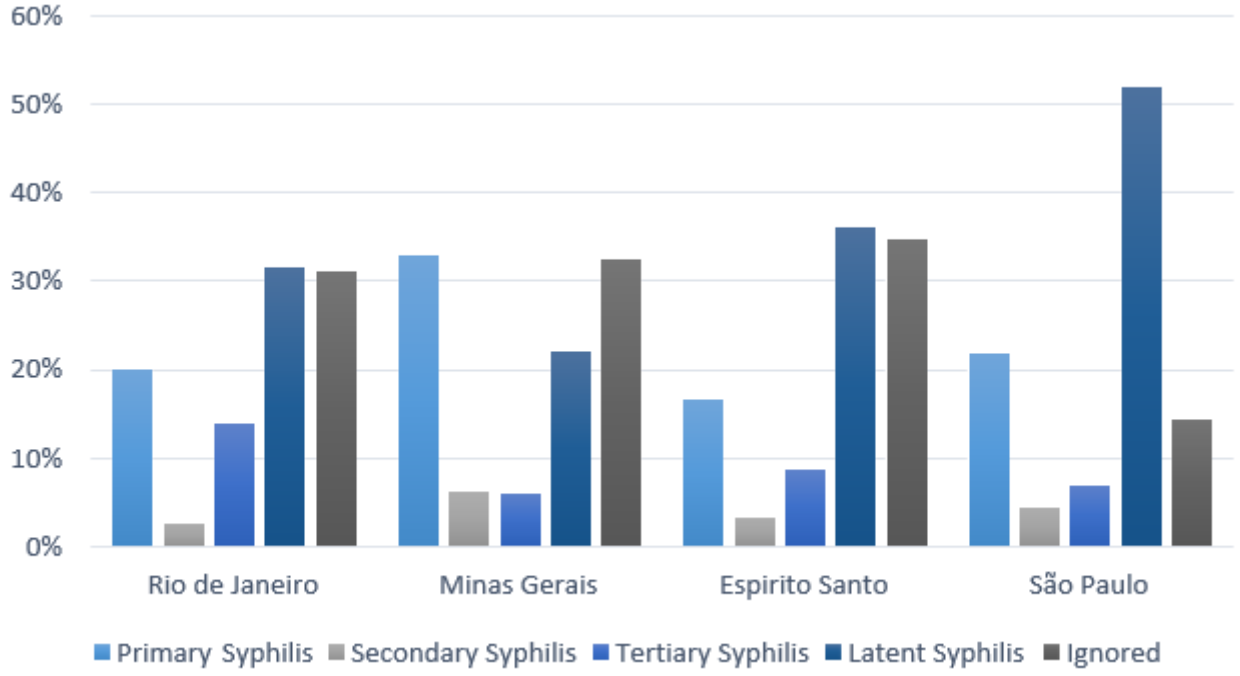
Graph 7 - Distribution of pregnant women with syphilis according to gestational age classification in the southeastern region of Brazil between 2011 and 2021



Source: Department of Chronic Conditions Diseases and Sexually Transmitted Infections

A retrospective study was conducted in the municipality of Itapeva/SP, with the help of DATASUS and the Ministry of Health System of the Health Surveillance Secretariat. Between 2015 and 2019, 107 cases of congenital syphilis were reported. Of this total, 46 (42.99%) pregnant women acquired in the first trimester of pregnancy, 48 (44.86%) pregnant women acquired in the second trimester, 12 (11.21%) in the third trimester and 01 (0.93%) had the gestational age ignored (COSTA & MELO, 2020).

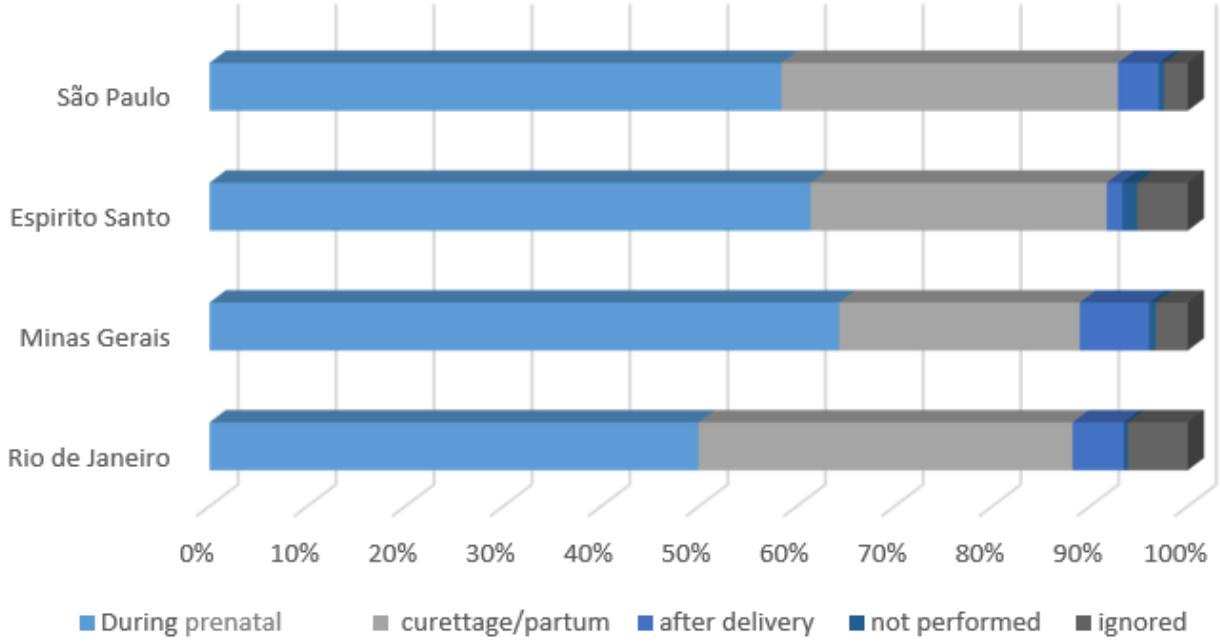
8 - Detection rate of pregnant women with syphilis according to clinical classification in the southeastern region of Brazil between 2011 and 2021



Source: Department of Chronic Conditions Diseases and Sexually Transmitted Infections

When we analyze the clinical classification of each of the states that make up the southeastern region, we can see that in the states of São Paulo, Espírito Santo, and Rio de Janeiro, the most prominent stage of classification is latent, followed by the primary stage, as shown in graph 8. On the other hand, we can evaluate that the number of ignored cases still remains high, showing failures in the health system

Graph 9 - Distribution of congenital syphilis according to the time of maternal diagnosis in the southeastern region of Brazil between 2011 and 2021

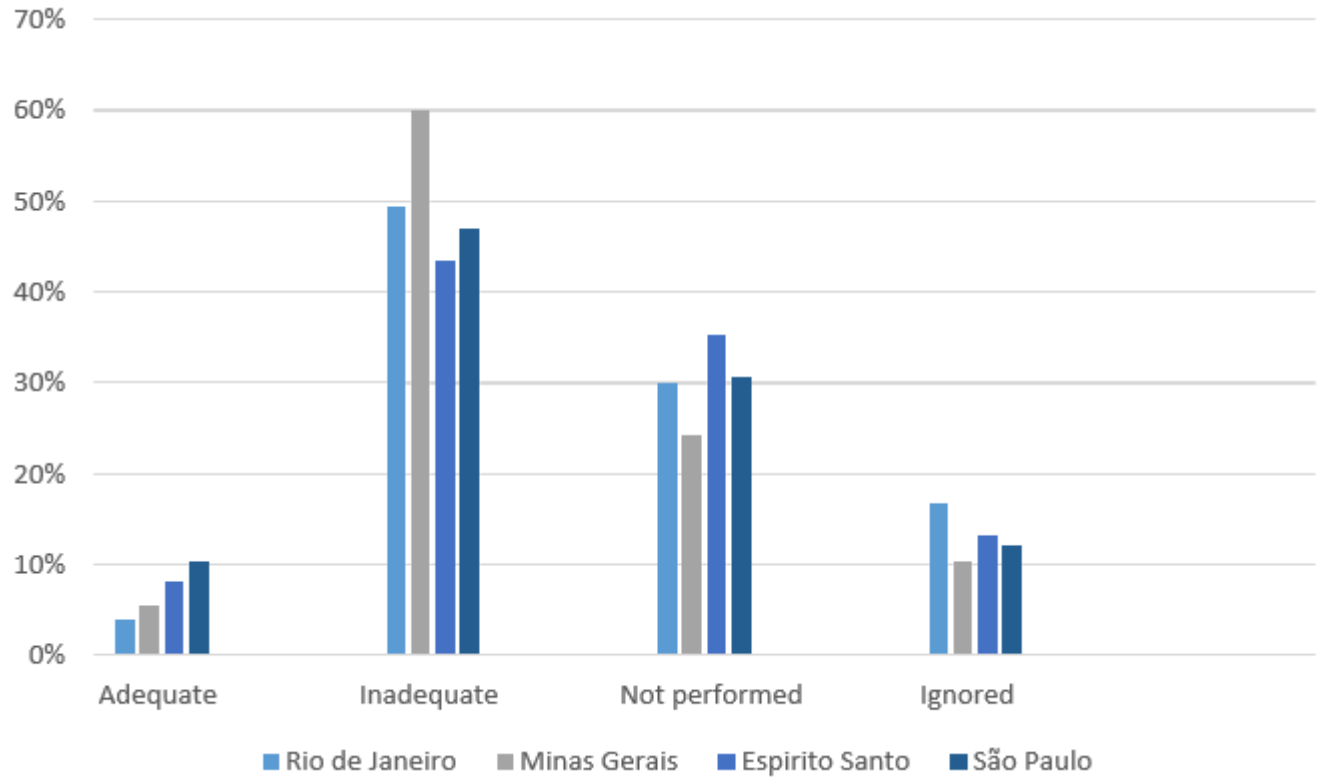


Source: Department of Chronic Conditions Diseases and Sexually Transmitted Infections

When we analyze the distribution of cases of congenital syphilis in the southeastern region according to the moment of diagnosis of the mother, we can see that most pregnant women were diagnosed in the first trimester of pregnancy, but a considerable portion (more than 25%) was diagnosed at the moment of delivery or curettage, which suggests that this pregnant woman may not have received proper treatment or did not have prenatal care. In the state of Rio de Janeiro, the diagnosis at delivery or curettage and the percentage of ignored data was the most expressive.

According to Chinazzo and Leon (2015), through a case-control study conducted with data collected by reviewing medical records, it was observed that of a sample of 3,842 (n=3,842) live births, 88 (2.29%) were identified as maternal syphilis, in a University Hospital in Canoas, RS. From 2013 to 2014, it is observed that of the 88 confirmed cases, 56 (63.6%) were diagnosed during prenatal care and 32 (36.4%) cases were diagnosed at the time of delivery. Regarding the cases diagnosed during prenatal care, it is observed that, 6 (10.7%) did not undergo penicillin treatment during pregnancy and, among the 50 (89.3%) who did only 30 (53.8%) completed the therapeutic resource.

Graph 10 - Congenital syphilis detection rate according to the treatment regimen of the pregnant woman in the southeastern region of Brazil between 2011 and 2021



Regarding the treatment regimen, it was observed that most cases received inadequate treatment or no treatment at all. The state of São Paulo treated properly only 10% of the diagnosed women while Rio de Janeiro treated only 4%. It is worth noting the high percentage of ignored data, signals the need for better preparation of the health team in filling out the notifications, since these data are used by public managers to make decisions related to disease control.

At Hospital Padre Albino, in the municipality of Catanduva/SP, a study was conducted with 3000 pregnant women between 2014 and 2016. In the first semester of 2014, it was observed that the vertical transmission rate was 73.6% and the incidence of congenital syphilis was 14.5/1000 live births. When analyzed throughout the period it was found that the gestational syphilis had an increase of 35%, but the lack of raw material for the global production of penicillin and, consequently, the lack of this drug in health facilities, contributed to the occurrence of lack of adequate treatment for pregnant women and increased incidence of congenital syphilis (TANNOUS et al, 2017).

Maschio-Lima et al (2019) analyzed the cases of gestational and congenital syphilis in São José do Rio Preto between 2007 and 2016 and observed that 94% of pregnant women had inadequate treatment and 82% of partners were untreated, with direct relation to the 441.6% increase in congenital syphilis cases.

In the microregion of Sumaré/SP, a study was carried out to investigate congenital syphilis and the factors associated with it. The authors report that of the 45 pregnant women with positive serology for syphilis only 39 had prenatal care, and of these, 29 had fewer than five consultations. Furthermore, according to the data recorded, only 18 pregnant women received the appropriate treatment and only 2

partners were treated. The failure to fill out medical records and notification forms was also highlighted, which signals a deficiency in prenatal care (DONALÍSIO, FREIRE, MENDES, 2007).

At Maternidade Carmela Dutra - Florianópolis/SC, a retrospective study identified a prevalence of 3.6% of gestational syphilis. Of 161 pregnant women with positive tests for Treponema pallidum, only 71 (44%) were adequately treated, and 70% of the partners of these pregnant women also underwent treatment (ROEHRS et al 2020).

According to a report published by the Ministry of Health in July 2015, almost half of the Brazilian states were short of PB. In the North and Northeast, the stock has been depleted. One of the main factors that contributed to this shortage in 2014 was the lack of raw material for its production (CARDOSO, et.al., 2017; Secretariat of the State of São Paulo, 2008; Pan American Health Organization, 2016). Another factor is that in late 2015 Anvisa withdrew the good practice certificate from the API supplier for the production of penicillin and was not granted again until late 2016. With this many companies delayed the re-entry of the drug to the market (NURSE-FINDLAY, et.al., 2017; GOMEZ, et.al., 2013). With all this deadlock, many companies stopped producing this drug, leaving only 3 Chinese industries and one Austrian and consequently causing the drug to have to be imported (MITIDIERI, et.al., 2015).

4 CONCLUSION

The data analysis showed that the cases of acquired, gestational, and congenital syphilis remain at very high levels and are still a serious public health problem. Despite the limitation due to the use of secondary data, it can be observed the need to review the prenatal protocol, with more effective actions, especially by primary care professionals. Thus, the training for the health team should advocate the proper reception of pregnant women and their partners, the screening of pregnant women and their partners, and the early infection and raising awareness to break the cascade effect caused by inadequate treatment.

REFERENCES

AVELLEIRA, J. C. R.; BOTTINO, G. Sífilis: Diagnóstico, tratamento e controle. Na Bras Dermatol. 2006; 81(2): 111-26.

AZULAY, M. M.; AZULAY D. R. Treponematoses. In: Azulay e Azulay. Dermatologia. 3.ed. Rio de Janeiro: Guanabara. Koogan; 2004. p. 240-51.

BARSANTI, C.; VALDETARO, F.; DINIZ, E. M. A.; SUCCI, R. C. M. Diagnóstico de sífilis congênita: comparação entre testes sorológicos na mãe e no recém-nascido. Ver Soc Bras Med Trop. 1999;32(6):605-11.

BRASIL. Ministério da Saúde. Manual de Controle das Doenças Sexualmente Transmissíveis. 3. ed. Brasília (DF): Ministério da Saúde; 1999. p. 44-54.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Programa Nacional de DST e Aids. Manual de Controle de Doenças Sexualmente Transmissíveis / Ministério da Saude, Secretaria de Vigilância em Saúde, Programa nacional de DST e Aids. Brasília: Ministério da Saúde. 2006. 140p.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Programa Nacional de DST e Aids. Diretrizes para controle da sífilis congênita: manual de bolso / Ministério da saúde, Secretaria de Vigilância em Saúde, Programa Nacional de DST/Aids. – 2. ed. Brasília (DF): Ministério da Saúde; 2006. p.72.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico de Sífilis. [Internet]. 2018 [acessado em 1º de setembro de 2019]; 49(45). Disponível em: http://www.aids.gov.br/pt-br/pub/2018/boletim- epidemiologico-de-sifilis-2018.

BRASIL, Ministério da Saúde. Sífilis: o que é, causas, sintomas, tratamento, diagnóstico e prevenção. 2020. Disponível em: https://saude.gov.br/saude-de-a- z/sifilis.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Doenças de Condições Crônicas e Infecções Sexualmente Transmissíveis. Protocolo clínico e diretrizes terapêuticas para atenção integral às pessoas com infecções sexualmente transmissíveis (IST)./ Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Doenças de Condições Crônicas e Infecções Sexualmente Transmissíveis. Brasília: Ministério da Saúde. 2022. 44p.

CARDOSO A, SANTANA G, COSTA E. A.; ARAÚJO P. S.; LIM, Y. O. R.

Desabastecimento da penicilina e impactos para a saúde da população. Salvador, BA: Observatório de Análise Política em Saúde; 2017 [citado 5 fev 2020]. Disponível em: https://analisepoliticaemsaude.org/oaps/documentos/ pensamentos/desabastecimento-da-penicilina-e-impactos-para-a-saude-da- populacao/.

CARVALHO, I. S. et. al. Aspectos Epidemiológicos da Sífilis Gestacional e Congênita em Município do Nordeste Paulista. Brazilian Journal Of Development, , Curitiba, v.8, n.2, p. 10398-10410, feb. 2022. DOI: 10.34117/bjdv8n2-129. Disponível em: <https://brazilianjournals.com/ojs/index.php/BRJD/article/view/43891>. Acesso em: 28 out. 2022.

CHINAZZO, L. K.; LEON, C. A. de. Perfil clínico e epidemiológico da sífilis congênita na unidade de internação de um hospital universitário. Boletim Científico de Pediatria, v. 4, n. 3, p. 65-69, 2015. Disponível em: <https://www.sprs.com.br/sprs2013/bancoimg/160529234110bcped_v4_n3_a4. pdf>. Acesso em: 28 out. 2022.

COSTA, M. C.; DEMARCH, E. B.; AZULAY, D. R.; PÉRISSÉ, A. R. S.; DIAS, M. F. R. G.; NERY, J. C. A. Doenças sexualmente transmissíveis na gestação: uma síntese de particularidades. Na. Bras Dermatol. 2010;85(6):767-85. https://dx.doi.org/10.1590/S0365-05962010000600002.

COSTA, F. M. S.; MELO, L. B. A evolução da sífilis no município de Itapeva- SP no período entre 2015 e 2019. Ver.Cientifica eletrônica de ciências aplicadas da Fait. n.2. 2020.

DONALÍSIO, M. R.; FREIRE, J. B.; MENDES, E. T. Investigação da sífilis congênita na microrregião de Sumaré, estado de São Paulo, Brasil- desvelando a fragilidade do cuidado à mulher gestante e ao recém-nascido. Epidemiol. Serv. Saúde, Brasília, 16(3):165-173, jul-set, 2007.

Gomez, G. B.; Kamb, M. L.; Newman, L. M.; Mark, J.; Broutet, N.; Hawkes, S. J. Untreated maternal syphilis and adverse outcomes of pregnancy: a systematic review and meta-analysis. Bull World Health Organ. 2013;91(3):217-26. https://doi.org/10.2471/blt.12.107623.

GUIDI, R. Manifestações bucais da sífilis: estudo retrospectivo. 2007. 87f. Dissertação (Mestrado em cirurgia Buco-Maxilo-Facial) – Programa de Pós- Graduação em Odontologia, Universidade Federal de Uberlândia, 2007.

HAWKENS S, MARTIN N, BROULET N, LOW N. Effectiveness of interventions to improv screening for syphilis in pregnancy: a systematic review and meta-analysis. Lancet infect Dis 2011;11(9):684-91. https://dx.doi.org/10.1016/S1473-3099(11)70104-9.

ISRAEL, M. et al. Diagnóstico da Sífilis a partir das manifestações bucais. Rev. Bras Odontol., Rio de Janeiro, v62, n. 2, p. 159-164, Jul/Dez. 2008.

LEÃO, J. C.; GUEIROS L. A.; PORTER, S. R. Oral manifestations of syphilis. Clinics., São Paulo, v.61, n. 2, p. 161-166, 2006.

LIMA, T. M.; MACHADO, I. L. L.; SIQUEIRA, J. P. Z.; ALMEIDA, M. T. G. Perfil epidemiológico de paciente com sífilis congênita e gestacional em um município do estado de São Paulo. Rev. Bras. Saúde Mater. Infant., Recife, 19 (4): 873-880 out-dez., 2019.

LORENZI, D. S.; MADI, J. M. Sífilis Congênita como indicador de Assistência Pré-natal. Rev. Bras. Ginecol. Obstet., Rio de Janeiro, v. 23, n. 10, dez. 2001.

MACHADO, G. S. Doenças infecto contagiosas de fácil transmissão em odontologia. 2001. 35f. Monografia (Especialização em Gestão em Serviço de Saúde) – Diretoria de projetos especiais, Universidade Candido Mendes, Rio de Janeiro, 2001.

MITIDIERI, T.L.; PIMENTEL, V. P.; BRAGA, C. A.; PIERONI, J. P. Há espaços competitivos para a indústria farmoquímica brasileira? Reflexões e propostas para políticas públicas. BNDES Setorial. 2015;(41):43-78 [citado 5 fev 2020]. Disponível em: http://web.bndes.gov.br/bib/jspui/ handle/1408/4286.

MORTON, R. S.; RASHID, S. “The syphilis enigma”: the riddle resolved? UK, Sex Transm Inf 2001;77:322–324.

NADAL, S. R.; FRAMIL, V. M. S. Interpretação das reações sorológicas para diagnóstico e seguimento pós-terapêutico da sífilis. 2007. Ver. Brasileira de Coloproctologia, Rio de Janeiro, v.27, n 4, p. 479-48, 2007. Disponível em; https://www.scielo.br/pdf/rbc/v27n4/18.pdf. Acesso em: 30 Ago. 2020.

NEVILLE, Brad W. et al. Infecções Bacterianas. In: NEVILLE, Brad W et al. Patologia Oral & Maxilofacial. 2. ed. Rio de Janeiro: Guanabara Koogan, 2004. Cap. 5, p. 157-182.

NUNES, P. S.; GUIMARÃES, R. A.; ROSADO, L. E. P.; MARINHO, T. A. et.al.
Tendência temporal e distribuições espacial da sífilis gestacional encongênita em Goiás, 2007-2017: um estudo ecológico. Epidemiol. Serv. Saude, Brasília, 30(1):e2019371, 2021.

Nurse-Findlay, S.; Taylor M. M.; Savage M.; Mello, M. B.; Saliyou, S.; Lavayen, M., et al. Shortages of benzathine penicillin for prevention of mother-to- child transmission of syphilis: an evaluation from multi-country surveys and stakeholder interviews. PLoS Med. 2017;14(12):e1002473. https://doi.org/10.1371/journal.pmed.1002473

OLIVEIRA, F. L.; SILVEIRA, L. K. C. de B.; NERY, J. A. da C. As diversas apresentações da sífilis secundária. Relado de casos. Rev. Bras. Clin. Med., São Paulo, v. 10, n. 6, p. 550-553, Nov-Dez 2012.

O'REGAN, A. W.; CASTRO, C.; LUKEHART, S. A.; KASZNICA, J. M.; RICE, P. A.; JOYCE-BRADY, M. F. Barking up the wrong tree? Use of polymerase chain reaction to diagnose syphilic aortitis. Thorax. 2002;57:917-8.

PADILHA, Y.; CAPORAL, A. S. Incidência de casos de sífilis congênita e análise do perfil epidemiológico. 2019. FAG Journal of Health – ISSN 2674- 550X, 2020, v.2, n.1, p. 1.

Pan American Health Organization. Elimination of mother-to-child transmission of HIV and syphilis in the Americas. Update 2016. Washington DC: PAHO; 2017 [citado 5 fev 2020]. Disponível em: http://iris.paho.org/xmlui/bitstream/handle/123456789/34072/9789275119556- eng.pdf.

PEDER, L. D.; MALIZAN, J. A.; MALIZAN, J. M.; NASCIMENTO, L. B. et.al.
Aspectos epidemiológicos da sífilis no sul do Brasil: cinco anos de experiência. 2017. EVS, Goiânia, v.46, 33-43, 2019.

Roehrs MP, Silveira SK, Gonçalves HH, Sguario RM. Sífilis materna no Sul do Brasil: epidemiologia e estratégias para melhorar. Femina. 2020;48(12):753- 9.

ROMPALO A. M.; JOESOEF M. R.; O'DONNELL J. A.; AUGENBRAUN M.;
BRADY W.; RADOLF, J. D., et.al. Clinical manifestation of early by HIV status and gender: resulto d the suphilis and HIV stud. Sex Transm Dis. 2001;28:158-65.

SANCHEZ, M. R. Syphilis. In> Fitzpatrick's Dermatology in general medicine.
6. ed. USA: McGraw Hill; 2003. p. 2163-88.

SARACENI, V.; LEAL, M. C. Avaliação da efetividade das campanas para eliminação da sífilis congênita na redução da morbimortalidade perinatal: Município do Rio de Janeiro, 1999-2000. Cad. Saúde Pública. 2003;19:1341- 9.

SARACENI, V.; DOMINGUES, R. M.S.M.; VELLOZO, V.; LAURIA, L. M.; DIAS, M. A. B.; RATTO K. M. N. et.al., Vigilância da sífilis na gravidez. Epidemiol Serv Saúde 2007; 16:103-11.

Silva, I. M. D.; Leal, E. M. M.; Pacheco, H. F., et al. Perfil epidemiológico da sífilis congênita. 2019. Rev enferm UFPE on line., Recife, 13(3):604-13, mar., 2019.

SINGH, A. E. ROMANOWSKI, B. Syphilis: reviwe with emphasis on clinical, epidemiologic and some biologic features. Clin. Microbiol Rev. 1999; 12:187- 209.

SOPER, D. E. Infecções genitourinárias e doenças sexualmente transmissíveis. In: BEREK, J. S.; NOVAK. Tradado de ginecologia. 14 Ed. Rio de Janeiro: Guanabara Koogan, 2008. Cap. 18. p.436-446.

SOUZA, S. S.; SILVA, Y. B.; SILVA, I. M. L.; OLIVEIRA, H. F. C., et.al. Aspectos clínico-epidemiológicos da sífilis gestacional no nordeste do Brasil. 2021. Revista Ciência Plural. 2022; 8(1): e22522.

TABISZ, L.; BOBATO, C. T.; CARVALHO, M. F. U.; TAKIMURA, M.; REDA, S.;

PUNDEK M. R. Z. Sífilis, uma doença reemergente. Ver. Med Res. 2012; 14(3): 165-72.

TANNOUS, L. S. D.; PANSIERA C. J.; RIBEIRO, M. P.; OLIVEIRA, M. S.;

CONTIERO, N. C. Comparação entre os índices de sífilis na gestação e sífilis congênita na regiaõ de Catanduva/SP. 2017 jul – dez.; 11(2); 187-192.

VERONESI, R.; FOCACCIA, R. Tratado de infectologia. 5ª ed. Atheneu, 2015.

CHAPTER 74

Impact of the pandemic of Covid-19: comparison of the epidemiological profile of the cuesta pole and Jurumirim valley

10.56238/rsfohsv1-074

Carolaine Sousa Novaes
Graduated in Nursing from the Vale do Jurumirim Educational Association- Eduvale de Avaré College, (SP).
E-mail: carolainenovaes200@live.com;
ORCID ID: 0000-0002-7237-8817

Elaine Cristina Navarro
Graduated in Biological Sciences from the State University of São Paulo Júlio de Mesquita Filho (FC/Unesp), Bauru (SP). PhD in Tropical Diseases from the State University of São Paulo Júlio de Mesquita Filho - (FMB/Unesp) - Botucatu (SP). Professor at The Eduvale de Avaré College - Avaré (SP) and Centro Paula Souza - Botucatu (SP).
E-mail: elainenavarro.bio@gmail.com
ORCID ID 0000-0001-6638-1713.

Vivienne do Val Rodrigues
Graduation in Mathematics from the Regional Educational Foundation of Avaré (SP). Master's degree in Mathematics from the Paulista State University "Júlio de Mesquita Filho" Instituti de Biosciences, Letters and Exact Sciences, São José do Rio Preto, by the Professional Master's Program in Mathematics in National Network (PROFMAT). Specialist in Mathematics and Statistics from the Federal University of Lavras (UFLA), Lavras (MG). Docente at The Eduvale College of Avare - Avaré (SP).
E-mail: vivienne_val@hotmail.com

Ednaldo Alexandre Zandoná
Graduated in Medical Physics from the State University Paulista Júlio de Mesquita Filho (IBB/Unesp), Botucatu (SP). Master and PhD in Applied General Biology from the State University of São Paulo Júlio de Mesquita Filho - (IBB/Unesp) - Botucatu (SP). Lecturer at Eduvale de Avaré College - Avaré
alex.zandona@gmail.com
ORCID ID .0000000343899004

Larissa Matias Lopes
Graduated in Nursing from the Vale do Jurumirim Educational Association - Eduvale de Avaré College (SP).
E-mail: larissa.lopes@ead.eduvaleavare.com.br
ORCID ID: 0000-0002-7336-6690

Carlos Cesar Marques Colella
Graduating in Nursing from the Jurumirim Valley Educational Association - Eduvale de Avaré College (SP). Nursing Intern of the Municipal Health Department of Avaré (SP).
Email: carlos.collela@avare.sp.gov.br
ID: 0000-0002-7336-6690

Maria Thereza Ward de Santi Melo
Graduated in Nursing from the Jurumirim Valley Educational Association - Eduvale de Avaré College (SP).
Email: ORCID mah-ward@hotmail.com ID 0000-0002-4512-837X

Catarina Osue Ide Silva
Graduated in Nursing from the Jurumirim Valley Educational Association - Eduvale de Avaré College (SP).
Email: idesilva.catarina@gmail.com
ID: 0000-0002-7153-5366

ABSTRACT
Coronaviruses (CoV) are a family of RNA viruses that cause different degrees of respiratory diseases in humans, among them COVID-19, caused by SARS-CoV-2. After the first infection in China there was exponential growth reaching all countries, and who (World Health Organization) defined it as a public health emergency pandemic of international importance (ESPII) for presenting high rates of infection and mortality. The contagion of the disease occurs through the elimination of droplets and aerosols and may lead to complications causing severe acute respiratory syndrome, affecting individuals of all however, studies indicate that the main risk factors are associated with age, viral load and chronic comorbidities. Thus, it is worth mentioning that Epidemiological Surveillance plays an important role in monitoring, evolution and providing data to managers to take measures to contain viral propagation. Therefore, this research project was developed with the objective of conducting a comparative analysis of the epidemiological data of COVID-19 ofthe municipalities belonging to the Commission Regional Intermanagers (CIR) of the Cuesta Pole and the Jurumirim Valley. The type of research was defined through a cross-sectional study with descriptive and quantitative analytical approach on the progression of emiological epiddata, which were obtained from the State Data Analysis System Foundation (Seade) and the Epidemiological Surveillance Service from January 2020 to January 2022.
Keywords: Coronavirus. Epidemiology. Mortality. Pandemic. Chronic Comorbidities.

1 INTRODUCTION

In December 2019 the World Health Organization (WHO) was alerted to several cases of pneumonia in wuhan city (China) and the following month Chinese authorities said it was a new strainof onavirus color identified in humans. In January 2020 the WHO stated that there was an outbreak of COVID-19 and on March 11 of the same year declared that there was a pandemic of COVID-19 (CAVALCANTE et al., 2020).

The SARS-CoV-2 virus popularly known as coronavirus is an etiological agent with high contagion capacity, which occurs through the elimination of droplets and aerosols and can cause everything from an asymptomatic infection to a severe acute respiratory syndrome (ARAÚJO et al., 2020).

Coronavirus, because it belongs to the class of viruses with RNA genome, has as characteristic high power of mutations and consequently dissemination and viral transmission of various strains, as viruses evolve they can undergo change becoming more resistantand causing an increase in the capacity of their transmissibility, virulence and pathogenicity (MEDINA et al., 2021). Among the variants that caused the most concerns in Brazil were the following strains: Beta, Alfa, Gama, Delta and Ômicron (INSTITUTO BUTANTAN, 2021).

Since the first appearance of the COVID-19 virus, there has been the appearance of numerous genetic strains that circulated globally, among which we have a chronological sequence of the appearance of the variants, and initially the Alpha variant was detected in September 2020 , the following month, two new mutations were discovered being Beta in South Africa, and Delta in India and in December of the same year, Brazil identified Gama. Finally, the following year in 2021, Ômicron was identified in several countries in November (MCLEAN et al., 2022).

As the coronavirus undergoes the mutation process, there are differences betweenthe cystic characteristics of expressiveness in the course of infection, that is, the alpha lineage can cause increased severity, besides being associated with increased mortality when compared to other strains. In addition, it has an increased capacity to invade host cells, because, through their mutations, it caused the Spike protein to have greater affinity with ECA-2 (angiotensin-to-converter enzyme 2) facilitating its viral replication process (ALEEM, A; et al.; 2022).

A study conducted with data from the Influenza Epidemiological Surveillance Information System (SIVEP-Gripe) in four Brazilian capitals showed that the gamma variant spread uncontrolled reaching the population, being, Manaus the most affected mainly because it was experiencing difficulties in oxygen supply which was vital for treatment COVID-19 (ORELLANA, et al., 2021).

Although widely disseminated by respected health agencies such as the WHO (Mu ndial Health Organization), the best forms of contagion containment are non-pharmacological means such as social distancing, correct use of mask and constant washing of hands and/or use of alcohol gel, however, there are evident flaws in the non-compliance with protection measures, favoring viral dissemination and the

possibility of the appearance of new variants (GARCIA; LEILA POSENATO; DUARTE; ELISETE, 2020).

As an additional measure in the prevention of COVID-19, the vaccine was made available, and the first person to be vaccinated in the world was from the UK in December 2020. After the authorization of ANVISA (National Health Surveillance Agency) vaccination of emergency use was initiated for Brazilians with prioritization of health professionals and the elderly in January 2021. The fast vaccine development occurred due to worldwide mobilization to create an effective and efficient immunizer to combat the pandemic.

With several studies and studies there was the approval of more immunizations from different laboratories providing an increase in the supply of vaccines throughout the country. The health campaigns provided by the PNI (National Immunization Program) associated with the use of wide dissemination by various media about the importance of vaccination represent promising advances in pandemic control (MINISTÉRIO DA SAÚDE, 2021).

In view of this scenario, it is worth mentioning that the early identification of risk factors is considered an indicator for disease progression. According to the scientific community, the new coronavirus can affect all individuals of any age group, however, there is a greater vulnerability of some groups considered at risk in the population to which it presents a profile more susceptible to the involvement of the severe phase of the disease, among them are the elderly and those with chronic diseases (FIOCRUZ, 2020).

After the arrival of the COVID-19 pandemic, countries around the world have adopted measures to limit the spread of the virus and minimize severe effects of the disease mainly through social isolation (BEZERRA; ANSELMO CÉSAR VASCONCELOS et al., 2020). Prevention measures have become a major challenge for the health system and society as a whole, on the one hand health authorities sought to reduce the impact of the new coronavirus through rigorous measures including from encouraging hand hygiene, the mandatory use of a mask to the bl community lockdown. And, on the other hand, the need to raise awareness among the population to adopt a new lifestyle in the social, cultural and economic spheres (AQUINO; ESTELA et al., 2020).

With a high rate of transmissibility, when the pandemic atingia peaks of notifications and deaths and there were no specific drugs for treatment, the only form of effective and available intervention for the control of the pandemic was associated with public health measures such as isolation, social distancing and surveillance of cases, with the objective of reducing contagion and preventing death. (SHEN, et al., 2020).

Brazil has a large population that is distributed in a non-homogeneous way throughout the territory, with differences and local, cultural, social and geographical characteristics, factors that can influence in the aveto of interventions not that should be taken into account in the strategies of response to the epidemic, since there are also social inequalities in access to health services (CAVALCANTE, 2020).

Despite the various information released by health agencies, there was a bombardment of news propagated without scientificcriteria considered as one of the factors that influenced the evolution of the pandemic in Brazil, "the information not found". The non-alignment between health agencies and representatives of the executive branch and the dissemination of "Fake News" had a directinfluence on the progression of the pandemic , which contributes to the discredit of science and health institutions (GALHARDI, C. P et al., 2020).

In addition, in Brazil, social inequality and a high informal work rate contributed to the non-compliance with basic rules to control the spread of the virus, such as social distancing and regular and correct use of masks (DEMENECH; MIRANDA et. Al.; 2020).

Thus, in order to cope with the coronavirus, it is necessary to recognize the role of science in taking actions, in order to preserve life, in which public policies and government strategies must act in a symbolic way with the purpose of containing the virus responsible for causing one of the greatest sanitary and economic crises in history.

The aim of this study was to perform a descriptive and comparative analysis of the epidemiological profile and the evolution of cases of infection, obitos and pre-existing diseases, according to the demographic variables of the Regional Intergesterores Commission of the Cuesta Pole and the Jurumirim Valley in the interior of São Paulo.

2 METHODOLOGY

This is a cross-sectional study with a descriptive and quantitative analytical approach on the evolution of epidemiological data from the Regional Intermanagers Commission (CIR) of the Cuesta Pole and the Jurumirim Valley, obtained from the State Data Analysis System Foundation (SEADE) and the Service Epidemyological SurveillanceA.

The research was carried out in three stages of data collection, and initially extracted from the SEADE, whose information is in the public domain, made available by epidemiological bulletins , updated daily, provided by the Center for Epidemiological Surveillance (CVE) and the Coordination of Disease Control (CCD) and the Secretary of State for Health (SES). This research used aggregated data, and it was not possible to identify the individual subject of the research. Subsequently, the data obtained were organized in a proportion of 100,000 inhabitants, however, for statistical purposes the data were converted according to thenumber of inhabitants of each city, according to the 2010 CENSUS and finally, the program used for statistical tests was JAMOVI.

For inclusion criteria, only 13 cities of cir Polo Cuesta (Anhembi, Areiópolis, Bofete, Botucatu, Conchas, Itatinga, Laranjal Paulista, Pardinho, Pereiras, Porangaba, Pratânia, São Manuel and Torre de Pedra) and 17 cities in the Jurumirm Valley (Águas de Santa Bárbara, Arandu, Avaré, Barão de Antonina, Cerqueira César, Coronel Macedo, Fartura, Iaras, Itaí, Itaporanga, Manduri, Paranapanema, Piraju, Sarutaiá, Taguaí, Taquarituba and Tejupá).

The cities mentioned went through the analysis in the question of notifications regarding the variables: gender (male or female), age group (>9, 10 – 19, 20 – 29, 30 – 39, 40 – 49, 50 – 59, 60 – 69, 70 – 79, 80 – 89 and ≥90 years), preexisting diseases (Asthma, Heart Disease, Diabetes, Liver Disease, Hematological Disease, Neurological Disease, Kidney Disease, Immunodepression, Obesity, Puerperal and Down Syndrome) infection and death by band lethality by age group and pre-existing diseases, infection and deaths from pre-existing underlying disease.

The numbers obtained from infections and deaths considered wereonly those that presented positive test results for Covid-19 (RT-PCR, rapid tests or other epidemiological laboratory and clinical methods) in the period of January 2020 to 17 January 2022. The incidence of confirmed cases was calculated per 100,000 inhabitants.

The literature review was conducted at PubMed (National Library of Medicine of the United States) and SciELO (Scientific Electronic Library Online). The bases for the consolidation of the work were structured by the search for descriptors "COVID-19", "pandemic", "virus" "epidemiology", "risk factors", "non-pharmacological strategies" and "Fake News".

The study's main study is to integrate issues that address the epidemiology of the SARS-COV-2 virus, which has as a characteristic high contagion rate as transmission through the elimination of droplets and aerosols, characterizing a global-scale pandemic with overload of health systems, making care of the infected more precarious, consequently reflecting the increase in deaths.

Thus, we sought to quantify the number of reports of deaths and infections in the period mentioned, identifying the main risk factors associated with the involvement of the pathology in individuals, since even at the beginning of the pandemic there was no specific pharmacological treatment, and preventive measures were used to contagion to cope with the pandemic and the delay in the number of cases, however, with the progress of research was approved in 2022 by ANVISA (National Health Surveillance Agency) the use of medications to treat patients in the severe phase of coronavirus infection.

3 DATA ANALYSIS METHODOLOGY

Data analysis will be performed in the JAMOVI statistical software, 2.3.16 through descriptive statistics. They were used to evaluate the number of confirmed cases, incidence and lethality, so that quantitative numerical variables were presented by median (when there was no normal distribution) and the normality test used was p Shapiro-Wilk with significance value less than <0.05. For statistical analysis of the number of deaths, the Parametric Test of repeated measurements was used in a paired way by Friedman, and to perform multiple comparisons of deaths annually, the ANOVA of repeated , non-parametric (durbin-conover) measurements was used.

4 RESULTS AND DISCUSSION

More than 326 million cases of covid-19 have been confirmed worldwide by January 2022. In Brazil, more than 23 million infections have been reported, with more than 4 million in the state of São Paulo alone, the most populous in the country. According to the ESON, between January 2020 and January 17 , 2022, 36,441 cases of COVID-19 and 42,576 cases were reported in the Jurumirim Valley and 42,576 cases. However, Polo Cuesta was able to cover greater coverage in the testing of COVID-19, 210,216 against 114,833 tests of the Jurumirim Valley based on the Jurumirim Valley Intelligent Monitoring (SIMI-SP). It is noteworthy that the largest municipality in Polo Cuesta has a teaching hospital, the Hospital das Clínicas of the Botucatu-UNESP Medical School, which serves both the municipalities of the Polo Cuesta as well as the municipalities of the Jurumirim Valley.

Another comparison can be made between the two cities with the highest number of inhabitants, that is, 134,330 tests were performed between 2020 and 2021 in Botucatu and 34,901 tests in Avaré, this shows a broad test of the Botucatuense population and, perhaps, many Avareenses may have presented the infection, but for not having done the test was not reported to the epidemiology service, and may generate possible underreporting in relation to the number of cases in Avaré.

During the smoothed anaperiod it was possible to observe that in the Jurumirim Valley the median was lower in 2020, with a value of 39.0 already in 2021 reached 194 we can say that between the years mentioned there were significant statistical differences since the value of p Shapiro-Wilk was <001. This shows that from the beginning of the pandemic to the peak in relation to the median of 2021, there was an increase in the number of confirmed cases.

The Jurumirim Valley is composed of 17 cities, to which Avaré leads among the period evaluated withthe largest number of confirmed cases, with 1068 in 2020, 9196 in 2021 and 10077 to January 17, 2022. However, the cities with the lowest number of confirmed were Baron antonina in 2020 and Sarutaiá in 2021 and 2022, as shown in table 1.

Table 1. Number of cases confirmed by COVID-19, in the period up to January 17 , 2022, in the Jurumirim Valley, São Paulo, Brazil.

Vale do Jurumirim	2020	2021	2022
Águas de S. Barbara	48	531	607
Arandu	69	594	657
Avaré	1288	11088	12151
Barão de Antonina	25	470	519
Cerqueira Caesar	322	2095	2218
Cornonel Macedo	48	577	663
Fartura	438	2054	2343
Iaras	76	282	287

Itaí	218	2900	3054
Itaporanga	268	1331	1934
Manduri	200	900	991
Paranapanema	338	2017	2147
Pirajú	435	1917	2121
Sarutaiá	64	126	127
Taguaí	559	2440	2636
Taquarituba	611	3637	3843
Tejupá	50	142	143
Total	**5057**	**33101**	**36441**

Source: Data extracted from the State Data Analysis System Foundation (SEADE) 2020, 2021 and 2022. Data expressed in a population of 100,000 inhabitants.

The Cuesta Pole is composed of 13 cities, to which Botucatu leads among the period evaluated with the highest number of confirmed cases, 4051 in 2020, 17460 in 2021 and 19909 until January 17, 2022. However, the cities with the lowest number of confirmed were Pedra Tower in 2020, 2021 and until January 2022, as shown in table 2.

Table 2. Number of cases confirmed by COVID-19, in the period up to January 17, 2022, at Polo Cuesta, São Paulo, Brazil.

Polo Cuesta	2020	2021	2022
Anhembi	33	292	362
Areiópolis	182	1334	1419
Bofete	181	887	995
Botucatu	4051	17460	19909
Conchas	497	2237	2590
Itatinga	376	2747	2893
Laranjal Paulista	1047	4252	4671
Pardinho	265	749	809
Pereiras	263	1116	1182
Porangaba	73	866	943
Pratânia	67	837	902
São Manuel	634	5321	5714
Torre de Pedra	25	154	187

Total	**7694**	**38252**	**42576**

Source: Data extracted from the State Data Analysis System Foundation (SEADE) 2020, 2021 and 2022. Data expressed in a population of 100,000 inhabitants.

In the two regions studied, it was observed that in 2020 both presented a lower number of confirmed diagnoses of individuals with positive test for covid-19, and in 2021 there was a marked growth. And when statistically comparing the median of the regions, it is observed that in 2020 the Cuesta Pole had a median of 18.0 and in 2021 85.3.

In early 2020, tests were still scarce and most were sent to the Adolpho Lutz institute, in the same year they began to provide rapid tests and testing was expanded. In 2020, the most common was to test IgM and IgG antibodies of people with flu-like symptoms, and therewas no rt-PCR test considered the gold standard. However, the municipality of Botucatu with the Municipal Health Department carried out testing on all people flu-like symptoms and the same did not occur in Avaré.

According to ESED data until January 2022, Brazil accounted for 621,099 deaths, and in the state of São Paulo, 155,729 had been reported, corresponding to 25.07% of deaths. And as a demonstration of the severity of the pandemic worldwide until January 17, 2022, it wasreported that 5,535,426 deaths.

Regarding deaths according to the ESED between January 2020 and January 17, 2022, 1,906 deaths were reported in the Jurumirim Valley and at Cuesta Pole 1,790, i.e., the Jurumirim Valley had 6.08% more deaths. According to the Ministry of Health, the first death by COVID-19 in Brazil occurred in the state of São Paulo on March 17 , 2020, while in Avaré the first notification ofinfection occurred only in April and, after 10 days, there was a confirmation of the first death.

The fact that Botucatu participated in the study of the effectiveness of the Oxford/Astrazeneca vaccine allowed the entire population, of all age groups, to be vaccinated before the other cities in the country, and this certainly contributed to the reduction in the number of deaths. In addition, unesp undergraduate students were immunized on the Botucatu campus, to whom these individuals employ a significant portion of the population, immunized early.

In the effectiveness study developed by Clemens, et al. (2022) were previously immunized with the first dose 77,683, reaching vaccination coverage of 84.2% and 74,051 received the second dose, equivalent to 80.2% of vaccination coverage. The safety and effectiveness of the ChadOx1-nCoV19 vaccine, used during the campaign in Botucatu, was evaluated. Within a period of 42 days, the possible non-severe side events of the vaccine were investigated, to which pain at the site of application was evident; malaise and fatigue; or incorrect administration of the immunizer. In addition, among the 18 adverse events after vaccination (EAPV), houv andonly the increased risk for Bel's Palsy, eight cases were reported.

Table 3. Comparations of deaths confirmed by COVID-19, between January 1, 2020 and January 17, 2022, in the Jurumirim Valley and at Polo Cuesta, São Paulo, Brazil.

JURUMIRIM VALLEY	**CUESTA** POLO
2020 - 84 DEATHS	2020 - 120
2021 - 857 DEATHS	2021 - 790
2022 - 965 DEATHS	2022 - 880

Source: State Data Analysis System Foundation (SEADE) 2020, 2021 and 2022. Data expressed in a population of 100,000 inhabitants.

Regarding deaths between the Jurumirim Valley and the Cuesta Pole in the years of study, it was analyzed that there were significant differences, that is, at the beginning of the pandemic the Cuesta Pole had a median of 19.1 and in the Jurumirim Valley 16.1 in one with between 2020 and 2021.

Table 4. Multiple comparations of deaths confirmed by COVID-19, between January 1, 2020 and January 17, 2022, in the Jurumirim Valley and the Cuesta Pole, São Paulo, Brazil.

VALE DO JUUUMIRIM	**STATISTICS**	**P**
Deaths 2020 - Deaths 2021	16.1	<. 001
Deaths 2020 - Deaths 2022	28.4	<. 001
Deaths 2021- Deaths 2022	12.2	<. 001
POLO CUESTA	**Statistics**	**P**
Deaths 2020- Deaths 2021	19.1	<. 001
Deaths 2020 - Deaths 2022	36.1	<. 001
Deaths 2021 - Deaths 2022	17. 0	<. 001

Source: State Data Analysis System Foundation (SEADE) 2020, 2021 and 2022.

Among the patients who evolved to death it was possible to make an association with a pre-existing disease, and studies indicate that having a basic pathology increases the chance of deterioration of health, and the worse clinical complications after infection of the new coronavirus (GALVÃO AND RONCALLI, 2020).

According to the data obtained, the main diseases that influenced the number of deaths due to underlying pathology, were: heart disease, diabetes, neurological disease and obesity, however, individuals with heart disease are more susceptible to death , with the disease being the most impacted in the regions studied.

In a study conducted with 700 patients with COVID-19, confirmed between March and May 2020 at the University of Pennsylvania Hospital, it noted that patients at higher risk of needing Intensive Care (ICU) care are carriersof comorbidities, and during hospitalization there is a higher chance of having cardiac arrest and arrhythmias, those who already had previous heart diseases and that the outcome was more associated with comorbidity than covid-19 infection itself (BHATHA et al.; 2020).

The impact of comorbidity due to cardiovascular diseases was studied by GOMES, et al. (2022) who analyzed the effect of cardiovascular diseases on coronavirus infection and showed that, during the course of COVID-19 infection there was an increase in troponin, i.e ., protein that participates physiologically in cardiac contractility. However, the increase in troponin was present in the vast majority of the clinical picture of patients who died. Another relevant factor was systemic inflammation, the exacerbating increase of pro-inflammatory cytokines and injury to cardiac muscle fibers, cardiomyocytes.

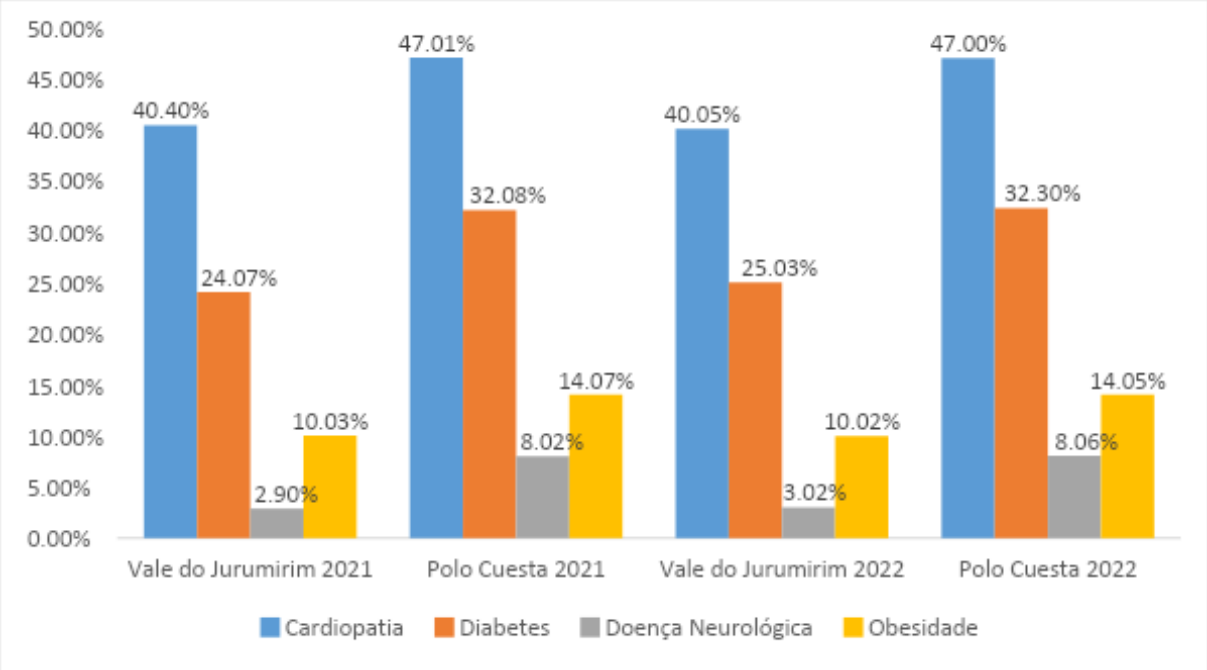
Several studies indicate that individuals with type 2 diabetes are associated with theinvolvement of severity and mortality, leading to unfavorable outcomes mainly in the immune system, affecting the number of CD4+ T cells, CD8+ T cells and Natural Killer cells. Since these important defenses in pathogenic combat, in addition,the same viral infection has the potential to increase pro-inflammatory cytokines, especially in patients with diabete (HAN et al., 2021).

According to the repository of data made available through NHS England, NHS Improvement in England and through the National Diabetes Audit (NDA), it assessed that people with diabetes are more at risk of evolving to death, since of the 61,414,470 individuals who were registered in a clinic 263,830 had diabet and type1 and 2,864,670 had type 2 diabetes comorbidity as comorbidity. During the period evaluated there were 23,698 deaths, one third of which were in people with diabee 31.4% with 7,434 during the period from March 1 to May 11, 2020 (BARRON et al.; 2020).

VAS, et al. (2020), from the Department of Diabetes, King's College NHS Foundation Trust, conducted a literature review on the interaction of diabetes with COVID-19, and analyzed that this pathology was one of the main pathophysiological comorbidities causing harm in the course of infection by the coranavirus, because they have up to three times more, the risk of evolution to death, due to the higher prevalence in cases of hospitalizations, when it comes to this type of disease, in addition tothe higher incidence of icu admissions (Intensive Care Unit). Thus, the main accepted hypothesis is associated with insulin resistance, which occurs due to a neuroendocrine response, causing hyperglycemia and hindering recovery and may evolve to more serious complications such as stroke (stroke Cerebral).

According to the research data, it is possible to observe that when performing a comparison in 2021, in both regions, we can conclude that there was a higher percentage of the diseases associated with comorbidity of neurological disease in the Cuesta Pole with 8.02% while in the Jurumirim Valley in the same year it was 2.90%, as shows in graph 1.

Graph 1. Multiple comparations of deaths confirmed by COVID-19, between 2021 and 2022 , in the Cuesta Pole and jurumirim valley.



Source: State Data Analysis System Foundation (SEADE), 2021 and 2022. Death rate expressed in preexisting diseases per 100,000 inhabitants.

According to the American Academy of Neurology, the SARS-COV-2 virus is considered a risk factor for individuals with neurological impairment, causing an increase in hospital stay and worse outcomes of the condition in its prognosis. As well as, it can trigger neurological events in patients without previous neurological diseases, causing complications such as: ischemicstroke co, seizures or encephalopathy, during the course of his disease, especially in male elderly.

As a justification we can associate that the triggering of the infectious process occurs after the union of the Spike protein of the virus to the Angiotensin Converter Enzyme 2 (ECA2), which is present in greater abundance in the lungs and heart. However, the receptor of this enzyme can be found in several organs, including the nervous system that linked to neuroinflammation with the sudden and expressive release of cytokines causes worsening, and consequently can lead to death (THAKUR, et al.; 2022).

In 2020, a study was conducted with confirmed clinical cases of SARS-COV-2 in the Department of Neurology of the Central Military Hospital in Bogotá, Colombia, and it was possible to observe that covid-19 also affects the SNP (Peripheral Nervous System) causing in the patients neuropathies and radiculoneuropathies leading to permanent sequelae (LANCHEROS PINEDA, et.; 2021).

In Wuhan, China, in three Union Centers, Huazhon University of Science and Technology Hospital, 214 patients were evaluated with coronavirus infection and of these, 41.1% evolved to severe infections. Of the total, of the patients evaluated, 36.4% presented nerological manifestations, mainly, ofacute cerebrovascular diseases, impaired awareness and skeletal muscle injury. In view of this, the COVID-19

virus, in addition to affecting the respiratory system, and the nervous system and mainly affects the elderly, males, who presented comorbidities in higher prevalence of hypertension. (MAO, et al.; 2020).

Systemic arterial hypertension (SAH) affects about 1 billion people worldwide, and causes health damage. During the pandemic period it was found that patients with SAH were nine times more likely to go to individuals, without pre-pathopathiccomorbidities. As published in the Infectious Diseases Information System, in China the majority of deaths occurred in the elderly, aged (≥ 60) who have SAH, cardiovascular diseases and diabete (FERREIRA et al.; 2020).

The immune system is the first line of defense of the body, and plays an important role in eliminating the virus. However, its immune response should maintain a certain balance, as immunological dysregulation associated with an exacerbated storm of pro-inflammatory cytokines is characteristic of patients who progress to poor prognosis of the disease and may have affected organs and tissues. Therefore, strategies involving immunomodulation may play an important role in disease control (SORDI, et al.; 2020).

Adipose tissue is an endocrine organ that performs the synthesis of hormones, adipokines and cytokines, besides being the energy reserve of the body. However, obesity contributes to the severity of COVID-19 infection, since the inflamatory process is relatively increased when compared to individuals with eutrophic weight. Another important factor is the decrease in innate and acquired immune response, with decreased phagocytic action and finally, due to the accumulation of fat in the thoracic cavity and abdominal region, there is a respiratory impairment because there is a certain restriction of the diaphragm muscle in the contraction and relaxation that is extremely essential for the breathing process. Together , these factors demonstrate how harmful the fact of obesity becomes in individuals who have become infected with SARS-COV-2 (LOPES, FURIERI & ALONSO-VALE, 2021).

According to data from 2010 and 2021 obtained from VIGITEL (Surveillance System for Risk and Protective Factors for Chronic Diseasesby Telephone Survey), the percentage of adults (≥18 years) overweight (BMI ≥ 25/M²), in 2010, in the capital of São Paulo, was 48.91% already, in 2021, the overall records increased to 57.42%. In the age, the most affected with the obese from among the capitals of the Brazilian states and the Federal District were individuals aged 65 years or older, with 60.72% in 2021.

According to Nogueira et al., (2021) about 49% of the population has one or more NCD diseases (chronic diseases not transmissible) that mainly affects the elderly aged 60 years or corresponding to (72%) of those affected with the chronic disease already, in individuals aged 18 to 24 years, the incidence is lower.

As far as gender is considered, men are more susceptible to viral infection compared to females, and this probably occurs due to differences in innate immune responses and adaptive measures between the sexes, in which women have more effective responses in combating the virus (NG et al.; 2020).

In 2020, a study conducted in the Netherlands, extracted from the national surveillance database, an amosta of 29,539 individuals was evaluated, of which 49.5% were male and 11,277 evolved to hospitalization, but among all reported cases, mortality among males was 22.9% and18.3% for females.

This study showed a discrepancy between sex mortality in the Dutch population, regardless of age factor and previous diseases (NIESSEN et al.; 2022).

According to the Epidemiological Bulletin available in the SEADE database, the lethality rate (3.5) and mortality rate (333.8) in the state of São Paulo was considered higher than the national average, to which mortality (2.7) and (291.2) of mortality accounted for 17 January 2022. Regarding mortality, incidence and lethality, the Jurumirim Valley presented higher numbers in relation to the Cuesta Pole, presenting significant differences between them in 2021, as shown in the table Five, five of them.

Table 5. Descriptive statistics of mortality , incidence and lethality by COVID-19, in the period included, in 2021, in the Jurumirim Valley and in the Cuesta Pole, São Paulo, Brazil.

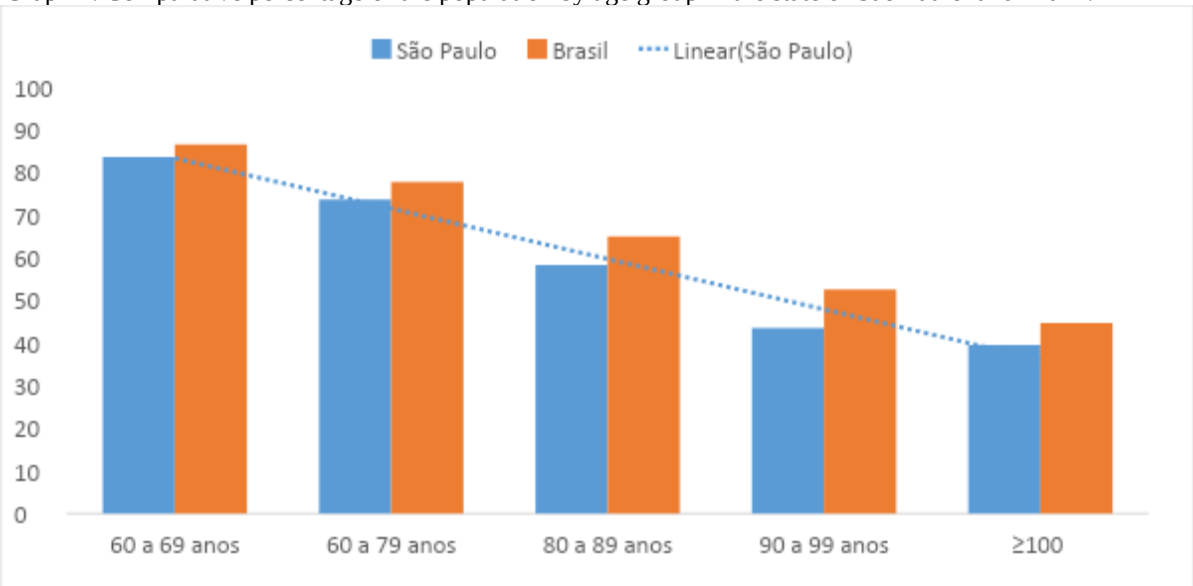
	2021
JURUMIRIM VALLEY (Number of cities evaluated)	17
Median Mortality †	29.7
Median Incidence *	1278
Median Lethality §	0.368
POLO CUESTA (Number of cities evaluated)	13
Median Mortality †	18.9
Median Incidence *	960
Median Lethality §	0, 0. 182

* Incidence rate expressed in number of confirmed cases abused according to number of inhabitants, from cand nso 2010.
† Taxa de mortalidade expressa em número de obitos a bsoltos dand corof com nº de habitantes, do candnso 2010.
§ Lethality expressed in percentage points.

As a justification we can highlight the presence of the Faculty of Medicine, in the municipality of Botucatu, in the Cuesta Pole and the mass testing and vaccination project had a great impact on the differences in the numbers of mortality, lethality and incidence observed in the two regions.

It is also necessary to consider thatthe state of São Paulo is the most populous in the country, with 42,262,199 people based on the last census of 2010 (IBGE), and managed to perform a wide test with 26,697,312. These factors justify the high lethality and mortality rate, because it is among the states with the highest proportion of elderly, with about 11.6% aged ≥ 60 years according to the (EASD), which coincidentally are the most affected in the pandemic, as chart 2 shows.

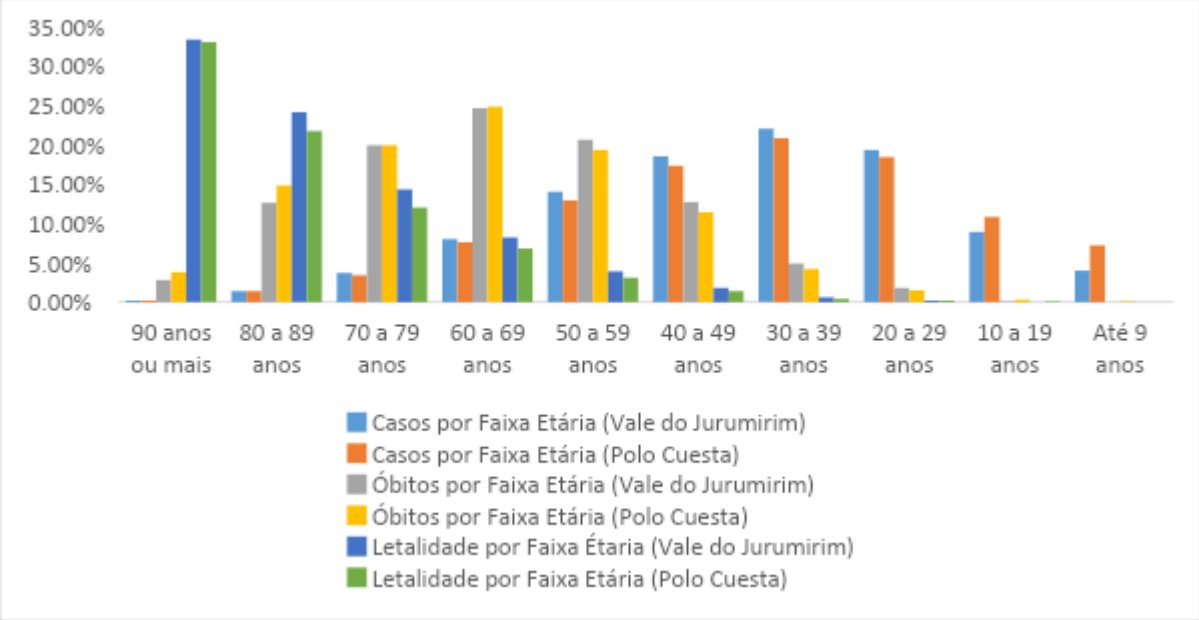
Graph 2. Comparative percentage of the population by age group in the state of São Paulo and Brazil.



Source: IBGE. 2010 Demographic Census (preliminary results). State DataAnalysis System Foundation (SEADE).

When comcommencing age groups and infections in the Jurumirim Valley and the Cuesta Pole, young people and young adults (20 to 49 years old) represent the majority of those infected, while the elderly represent the group with the lower infection rate. On the other hand, deaths become pronounced in individuals between 50 and 79 years, and the lethality rate between (70 to ≥ 90) this means that the concentration of the infection rate is predominant among young people and adults, however, the highest rate of deaths and lethality occurs among the elderly, particularly between the age of 60 to 69 years old.

Graph 3. Multiple case, death and lethality compared to confirmed age group until January 17, 2022, in the Jurumirim Valley and Cuesta Pole, São Paulo, Brazil.



Source: State Data Analysis System Foundation (SEADE) until January 17 , 2022.Rate of cases, deaths and age group expressed per 100,000 inhabitants.

The Jurumirim Valley received 567,481 doses of vaccine against COVID-19, and Avaré 174,924 was the city that applied the highest number of immunizers, followed by Pirajú 56,577. Of the total doses of the vaccines applied, 257,661 were allocated to the first dose, while 245,823 for the second dose, and still 99,475 the third dose and 6,978 single dose, this indicates that the vast majority received the first dose, but did not complete the vaccination schedule.

Graph 4. Number of doses of covid-19 vaccine received by January 17, 2022, in the Jurumirim Valley, São Paulo, Brazil.



Source: State Data Analysis System Foundation (SEADE) until January 17, 2022. Vaccination rate expressed per 100,000 inhabitants.

It is noteworthy that initially immunization was of emergency use with prioritization to health professionals and the elderly in January 2021, but with several studies there was the approval and release

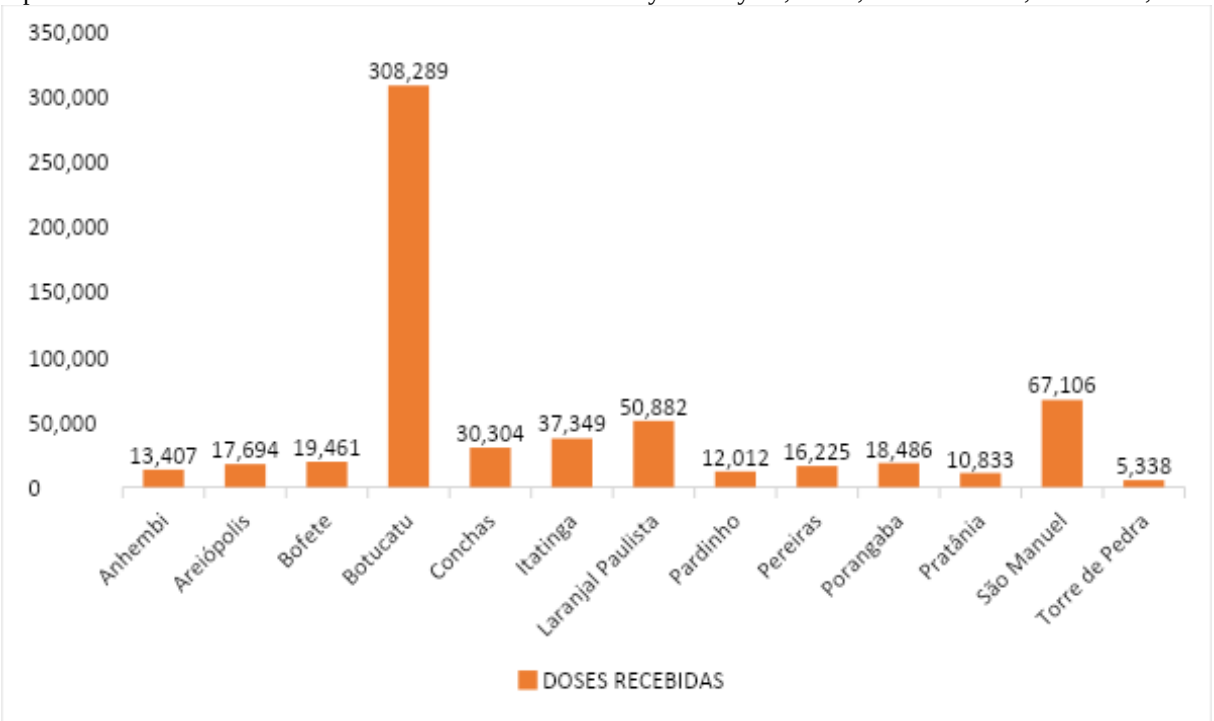
of other immunizations, increasing the supply of vaccines throughout the country through the PNI (National Immunization Program).

The Ministry of Health provided coronavac vaccines (Sinovac Biotech), ChAdOx1 (AstraZeneca), Ad26.COV2 vaccines through the PNI. S (Janssen) and BNT162b2 (Pfizer-BioNTech). In a statement, when evaluating the efficacy of the vaccine, it was possible to identify a decrease in the notificationsof patients who were progressing to severe status, with a sharp decrease mainly among the elderly, however, the protection of the immunization increased gradually among individuals who received exchange of vaccines, i.e., received the first dose of CoronaVac associated with a booster dose with Pfizer-BioNTech (CERQUEIRA, et al.; 2022).

On May 16, 2021, a mass vaccination campaign began in Botucatu, distributed to the target population aged 18 to 60 years, applying a dose of ChadOx1-nCoV19 and after the 12th week interval the second dose in August 2021 (CLEMENS, et al.; 2022).

Polo Cuesta received 1,174,867 doses of vaccine against COVID-19, and Botucatu 308,289 was the city that applied the highest number of immunizers, followed by São Manuel 67,106. Of the total doses of the vaccines applied, 531,086 were allocated to the first dose, while (507,184) forthe second dose, and also (248,841) the third dose and 11,131 single dose, as shown in graph 5.

Graph 5. Number of doses of covid-19 vaccine received by January 17, 2022, at Polo Cuesta, São Paulo, Brazil.



Source: State Data Analysis System Foundation (SEADE) until January 17 , 2022.Vaccination rate expressed per 100,000 inhabitants.

5 FINAL CONSIDERATIONS

It is notorious that the coronavirus spread around the world in a short period of time and left the health system collapsing, since at the beginning of the pandemic it was still a pathology that had recently been discovered and there was no specific treatment. Due to the lack of control mechanisms and the lack of infrastructure of most hospitals around the world the virus spread was able to cause thousands of deaths.

The non-pharmacological means recommended for reducing viral propagation were extremely important, however, it is perceived that there was d compliancein social isolation, which impacts on the different types of mutations suffered. In the present study it was possible to observe the impact of science in the control of a pandemic, because it was evident that the reduction of severe forms and the need for icu admissions that was observed in the population of Botucatu, in the Cuesta Pole, is directly linked to the research project that involved the effectof the vaccine. In addition to vaccination, the project included testing all individuals with flu-like syndrome and genotyping of those who tested positive for COVID-19. Thus, the greater number of cases reported in the Cuesta Pole in comp arationwith the Jurumirim Valley is probably related to the number of available tests and not the greater circulation of the virus.

During the analysis of the public data disclosed it was possible to draw a profile of the individuals most susceptible to death. As in other studies published in different regions it was also observed that advanced age, presence of comorbidities mainly chronicheart disease with the presence of elevated troponin, diabetes, obesity, hypertension and diseases neurological diseases are aggravating to develop the clinical stage of Acute Respiratory Syndrome with evolution to death.

REFERENCES

AQUINO, Estela M. L. et al. Medidas de Distanciamento Social no Controle da Pandemia de COVID-19: Potenciais Impactos e Desafios no Brasil. Ciência & Saúde Coletiva [online]. v. 25. Disponível em: <https://doi.org/10.1590/1413- 81232020256.1.10502020>. Acesso em: 15 de março. 2022.

ALLEM, A; AKABAR, Samad; SLEMKER, AK. Merging Variants of SARS-CoV-2 And Novel Therapeutics Against Coronavirus (COVID-19). Disponível em Variantes emergentes de SARSCoV-2 e Novas Terapêuticas Contra Coronavírus (COVID-19) - StatPearls - Estante NCBI (nih.gov).

ARAUJO, L. F. S., Strina, A., Grassi, M. F. R. G., & Teixeira, M. G. (2020). Aspectos Clínicos e Terapêuticos da Infecção da COVID-19. Universidade Federal da Bahia/Fundação Oswaldo Cruz.

BARRON E, Bakhai C, Kar P, Weaver A, Bradley D, Ismail H, Knighton P, Holman N, Khunti K, Sattar N, Wareham NJ, Young B, Valabhji J. Associations of Type 1 and Type 2 Diabetes With COVID-19-Related Mortality in England: a Whole-Population Study. Lancet Diabetes Endocrinol. 2020 Oct;8(10):813-822. doi: 10.1016/S2213- 8587(20)30272-2. Epub 2020 Aug 13. PMID: 32798472; PMCID: PMC7426088.

BEZERRA, Anselmo César Vasconcelos et al. Fatores Associados ao Comportamento da População Durante o Isolamento Social na Pandemia de COVID-19. Ciência & SaúdeColetiva [online]. 2020, v. 25. Disponíve em: https://doi.org/10.1590/1413-81232020256.1.10792020. Acesso em: 16 de março, 2022.

BOLSONI, L. A., Furieri, L. B. & Alonso-Vale, M. I. C. (2021). Obesidade e a Covid-19: Uma Reflexão Sobre a Relação Entre as Pandemias. Revista Gaúcha de Enfermagem, 42.

BRASIL. Ministério da Saúde. Barcitinibe: Aprovado o Primeiro Medicamento Para Tratamento da Covid-19 no SUS. Brasília, 2022.

BRASIL. Fundação Oswaldo Cruz, Instituto de Comunicação e Informação Científica e Tecnologia em Saúde. Covid-19 e Fatores de Risco: Conheça Fontes de Informação Sobre Doenças Crônicas e Saúde dos Idosos. 2020. Disponível em: https://www.icict.fiocruz.br/. Acesso em: 11 mar. 2022.

BRASIL. Ministério da Saúde. Guia Orientador Para o Enfretamento da Pandemia Covid-19 na Rede de Atenção à Saúde 4ª Edição. Brasília, 2021.

CAVALCANTE, João Roberto et al. COVID-19 no Brasil: Evolução da Epidemia Até a Semana Epidemiológica 20 de 2020. Epidemiol. Serv. Saúde, Brasília, v. 29, n. 4, set. 2020.

CERQUEIRA S, T., Katikireddi, SV, de Araújo Oliveira, V. et al. Efetividade da Vacina de CoronaVac Heterólogo mais BNT162b2 no Brasil. Nat Med 28 , 838- 843 (2022). https://doi.org/10.1038/s41591-022-01701-w.

CLEMENS SAC, Fortaleza CMCB, Crowe M, Pollard A, Tasca KI, Grotto RMT, Martins MR, Spadaro AG, Barretti P, Verstraeten T, Clemens R. Safety of the Fiocruz ChAdOx COVID-19 Vaccine Used in a Mass Vaccination Campaign in Botucatu, Brazil. Vaccine. 2022 Aug 22:S0264-410X(22)01010-6. doi: 10.1016/j.vaccine.2022.08.026.
Epub ahead of print. PMID: 36055876; PMCID: PMC9393160.

DEMENECH, Lauro Miranda et al. Desigualdade Econômica e Risco de Infecção e Morte por COVID-19 no Brasil. Revista Brasileira de Epidemiologia [online]. 2020, v. 23.Disponível em: <https://doi.org/10.1590/1980-549720200095>. Acesso em: 15 de maio, 2022.

FERREIRA SPA, Simões LPS, Lima RN. O Impacto da Hipertensão em Pacientes com COVID-19. Rev Bras Interdiscip Saúde - ReBIS. 2022; 4(1):14-20.

GARCIA, Leila Posenato; DUARTE, Elisete. Intervenções Não Farmacológicas Para o Enfrentamento à Epidemia da COVID-19 no Brasil. Epidemiol. Serv. Saúde, Brasília v.29, n. 2, maio 2020. Disponível em: http://dx.doi.org/10.5123/s1679- 49742020000200009. Acesso em15 de maio, 2022.

GALHARDI, Cláudia Pereira; FREIRE, Neyson Pinheiro; MINAYO, Maria Cecília de Souza; FAGUNDES, Maria Clara Marques. Fato ou Fake? Uma análise da desinformação frente à pandemia da Covid-19 no Brasil. Ciência & Saúde Coletiva, [S.L.], v. 25, n. 2, p. 4201-4210, out. 2020. FapUNIFESP (SciELO). http://dx.doi.org/10.1590/1413-812320202510.2.28922020.

GOMES, Bruno Ferraz de Oliveira et al. Impacto do Alto Risco Cardiovascular na Mortalidade Hospitalar em Pacientes Internados em Terapia Intensiva por COVID-
19. Arquivos Brasileiros de Cardiologia [online]. 2022, v. 118, n. 5 [Acessado 26 Outubro 2022] , pp. 927-934. Disponível em: <https://doi.org/10.36660/abc.20210349>. Epub 13 Maio 2022. ISSN 1678-4170. https://doi.org/10.36660/abc.20210349.

INSTITUTO BUTANTAN. OMS Reclassifica Gravidade e Altera o Grupo de Variantes do SARS-CoV-2. São Paulo, 2021. Disponível em: https://butantan.gov.br/. Acesso em: 25 mar. 2022.

LANCHEROS PINEDA, Lina María et al. Manifestaciones Neurológicas por COVID-
19. Reporte de casos en Hospital Militar Central Bogotá, Colombia, y revisión de la literatura. Rev. Fac.med, Bogotá, v.29, n.1, p. 57-76, june 2021. Available from http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0121525620210001000057& Ing=en&nrm=iso.Acesso em 26 de Out.2022. Epub Dec 31,2021. https://doi.org/10.18359/rmed.5144.

MAO L, Jin H, Wang M, Hu Y, Chen S, He Q, Chang J, Hong C, Zhou Y, Wang D, Miao X, Li Y, Hu B. Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. JAMA Neurol. 2020 Jun 1;77(6):683-690. doi: 10.1001/jamaneurol.2020.1127. PMID: 32275288; PMCID: PMC7149362.

MCLEAN G, Kamil J, Lee B, Moore P, Schulz TF, Muik A, Sahin U, Türeci Ö, Pather S. The Impact of Evolving SARS-CoV-2 Mutations and Variants on COVID-19 Vaccines. mBio. 2022 Apr 26;13(2):e0297921. doi: 10.1128/mbio.02979-21. Epub 2022 Mar 30. PMID: 35352979; PMCID: PMC9040821.

NIESSEN A, Teirlinck AC, McDonald SA, van der Hoek W, van Gageldonk-Lafeber R; RIVM COVID-19 epidemiology, surveillance group, Knol MJ. Sex Differences in COVID-
19 Mortality in the Netherlands. Infection. 2022 Jun;50(3):709-717. doi: 10.1007/s15010-021-01744-0. Epub 2022 Feb 9. PMID: 35138581; PMCID: PMC9151564.

NG, J., Bakrania, K., Russell, R., & Falkous, C. (2020). Covid-19 Mortality Rates by Age And Gender: Why is The Disease Killing More Men Than Women. RGA.

NOGUEIRA, et al. Perfil Epidemiológico da Pandemia de COVID-19 e Características do Agente Etiológico: REVISÃO. Rio de Janeiro: Pubvet, v. 15, n. 6, 11 jun. 2021. Disponível em: https://doi.org/10.31533/pubvet.v15n03a845.1-11. Acesso em: 23 mar. 2022.

ORELLANA, Jesem Douglas Yamall, Marrero, Lihsieh e Horta, Bernardo Lessa. Letalidade Hospitalar por COVID-19 em Quatro Capitais Brasileiras e sua Possível Relação Temporal com a Variante Gama, 2020-2021. Epidemiologia e Serviços de Saúde [online]. 2021, v. 30, n. 4 [Acessado 27 Outubro 2022] , e2021709. Disponível em:
<https://doi.org/10.1590/S1679-49742021000400024>. Epub 29 Nov 2021. ISSN 2237-9622. https://doi.org/10.1590/S1679-49742021000400024.

SHEN, Z., Xiao, Y., Kang, L., Ma, W., Shi, L., Zhang, L., Zhou, Z., Yang, J., Zhong, J., & Yang, D. (2020). Genomic Diversity of Severe Acute Respiratory Syndrome– Coronavirus 2 in Patients With Coronavirus Disease 2019. Clinical Infectious Diseases, 71(15), 713–720. https://doi.org/10.1093/infdis/jiaa229.

SORDI, Luiz Henrique Silva de; MAGALHÃES, Isabela Sales Oliveira; CASSELHAS, Daniela Abreu; ANDRADE, Mariléia Chaves. O Papel da Imunidade Inata na COVID-19. Revista Ciências em Saúde, [S.L.], v. 10, n. 3, p. 5-8, 2 jul. 2020. Revista Ciencias em Saude. http://dx.doi.org/10.21876/rcshci.v10i3.997.

SOUZA, Alex Sandro Rolland et al. General Aspects of The COVID-19 Pandemic. Revista Brasileira de Saúde Materno Infantil [online]. 2021, v. 21, n. Suppl 1 [Acessado 22 Março 2022]
, pp. 29-45.

THAKUR, T. Kiran et al. Risk Factors for New Neurologic Diagnoses in Hospitalized Patients With COVID-19. Neurol Clin Pract agosto de 2022, 12 (4) e66- e74; DOI: 10.1212/CPJ.000000000020000.

VAS, Prashanth, et al. Diabetes, Obesity and COVID-19: A Complex Interplay. Diabetes, obes, Metab. 2020; 22: 1892-1896.

CHAPTER 75

Human anatomy: speech-language pathology students' preferences and perspectives

10.56238/rsfohsv1-075

Ana Lúcia Basilio Carneiro
Federal University of Paraíba, João Pessoa, Brazil
E-mail: analucarneiro@gmail.com

Semírames Cartonilho de Sousa Ramos
Federal University of Paraíba, João Pessoa, Brazil
E-mail: semiramesramosmoga@gmail.com

Lindair Alves da Silva
Hospital de Emergência e Trauma Senador Humberto Lucena, João Pessoa, Brazil
E-mail: alveslindair@gmail.com

Lincoln Basilio Alves
Deméter Research, São Paulo, Brazil
E-mail: lincolnbasilio1@gmail.com

ABSTRACT
Teaching practices at the university and the curricular component of Human Anatomy, in recent decades, have shared a significant process of change. The research aims to describe the profile and teaching preferences of Speech Therapy students enrolled in the Functional Neuroanatomy curricular component, offered at the Health Sciences Center of the Federal University of Paraíba, João Pessoa, Brazil. The study was observational and cross-sectional in nature with serial collection in the same population. Data collection took place between July 2014 and April 2018. Most of the 53 respondents were female, aged between 18 and 28 years, mean age of 20.4±2.2 years. In the students' opinion, learning anatomy disciplines involved a lot of effort (65.4%) and the majority (71.7%) consider the cadaver necessary in the study of anatomy, but would not donate their body for teaching or research. Students use the main personal protective equipment, lab coat, mask and gloves, but many complaints of headache, nasal irritation and tearing were observed. Thus, making a local diagnosis and identifying preferences, demands and difficulties is essential for decision-making and planning of institutional and teaching actions that can qualify the teaching-learning process, which will imply the qualification of the future professional practice of these students.

Keywords: Corpse. Body donation. Formalin. Anatomy Laboratory.

1 INTRODUCTION

Teaching practices at the university and the Human Anatomy curricular component, in recent decades, share a significant process of change with the expansion and democratization of access to Higher Education and Information and Communication Technologies (ICTs). This movement resulted in growth in the number of Higher Education Institutions (HEIs), courses, undergraduate and graduate courses, vacancies and the academic community. It also changed the educational conception, as well as the resources and teaching methods1-5.

The university's new social, cultural and technological scenario has changed the profile of students, today more heterogeneous and with new challenges and needs. Considering the public policies of expansion and inclusion and this number of new students, it is necessary to know their profile in order to welcome, assist in management, provide better adaptation and permanence, improve the quality of training and ensure personal and academic success1,6 .

There are few publications that discuss the profile, health status, preferences and intentions of these academics. Considering this scarcity and the need to guide this issue in the academic-scientific

environment, we raise the following question: how to welcome and articulate the offer of activities and services to this heterogeneous public, what are their expectations, preferences, skills and difficulties?

Thus, this research, of an observational nature, aims to describe the profile and didactic preferences of Speech Therapy students enrolled in the Functional Neuroanatomy curricular component, offered at the Health Sciences Center (CCS) of the Federal University of Paraíba, João Pessoa, Brazil .

Theoretical Bases of Human Anatomy and Neuroanatomy

Anatomy is the science that deals with the form, architecture and structure of beings that live and have lived, it is the foundation of the biomedical area, it is the study of life for life, being considered the oldest group of knowledge related to health. For the American Association for Anatomy: Anatomy is the study of the structure of living things – animal, human, plant – from microscopic cells and molecules to whole organisms as large as whales7.

Neuroanatomy is a branch of Human Anatomy that studies the macro and microscopic structures of the nervous system (SN).

Human Anatomy, as a curricular component, constitutes the basis for the training of health professionals, enabling them to (re)know, locate and describe the structures of the human body and, subsequently, know how to relate them to Physiology and Pathology to offer a correct diagnosis, treatment and prognosis10,11. For this, several methods and resources are applied, one of them is the human cadaver, considered the oldest and most traditional way of teaching and learning Anatomy and, indispensable in the practical class of Human Anatomy. Despite this, today it is an increasingly scarce resource11,12.

The curricular structure of the UFPB Speech Therapy course contains three curricular components of Anatomy, one in the first period, Applied Anatomy to Speech Therapy I, and two in the second, Applied Anatomy to Speech Therapy II and Functional Neuroanatomy. In these disciplines, classes and practical assessments are irreplaceable and indispensable in the teaching-learning process, being essential for achieving a deep focus, which requires time, effort, personal involvement and encouragement13. Thus, cadavers and anatomical models allow three-dimensional visualization and consolidation of knowledge of the anatomical structures of the human body.

In this perspective, the Anatomy/Neuroanatomy monitoring projects play an important role, since they function as pedagogical support offered to students interested in deepening or revising content and solving difficulties. It seeks to present basic concepts, in addition to developing skills and practical skills that arouse interest in teaching, as class time is limited and does not allow the repetition of the content covered as many times as necessary14, and for this reason these projects are encouraged by teachers .

We can say that the teaching-learning process of Human Anatomy has undergone structural changes to accompany the didactic-pedagogical evolution related to several factors, such as advances in ICTs, difficulty in obtaining cadavers for dissection, due to the legislation in force, increased the number of students in the disciplines, reduced workload and the inclusive process, with students with different abilities and special needs. This means that, if, on the one hand, the changes facilitated the study of Anatomy, as is

the case with ICTs, on the other hand, they make the teaching and learning process of Anatomy more difficult. 4,15.

2 METHODOLOGY

The study was observational and cross-sectional in nature with serial collection in the same population. Recruitment was carried out in the Morphology department of the Health Sciences Center (CCS) at UFPB, with the target audience being students of the Speech Therapy course enrolled in the discipline of Functional Neuroanatomy.

The project was approved by the Research Ethics Committee (CEP) of the CCS/UFPB in June 2014, opinion n° 710.630, CAAE 27394614.1.0000.5188. Volunteers were informed about the research objectives and the anonymity of the questionnaire, signing a Free and Informed Consent Form (TCLE) when they chose to participate. Data collection took place between July 2014 and April 2018. Data were stored and analyzed in the EPIINFO program version 6.0.

As for the data collection instruments, 53 questionnaires were applied in the last four years, this corresponds to 27.04% of active students in the course. Most respondents were female, aged between 18 and 28 years, mean age of 20.4±2.2 years.

3 RESULTS AND DISCUSSION

In general, it is observed that Human Anatomy arouses great interest among academics in the health area, but I am also afraid, due to the peculiarities of learning, which involves the corpse and its representations and the anatomical terminology with its meanings and associations. Promoting this learning requires efficient mediation by the teacher, the use of significant strategies and resources and a predisposition to learn on the part of the learner, these principles being important for the development of meaningful learning4.

Taking as reference the investigative question and the objective of the study, the data collected revealed participants from the Northeast (92.5%), from Paraíba, single without children, Christians and who live with their parents (56.6%). See Table 1 and Figure 1 for the socioeconomic and demographic profile of the participants. These results corroborate the profile of undergraduate students from other institutions12,16,17.

Table 1. Distribution of speech therapy students (2014-2018), according to socioeconomic, demographic and academic variables. João Pessoa-PB, Brazil (N=53).

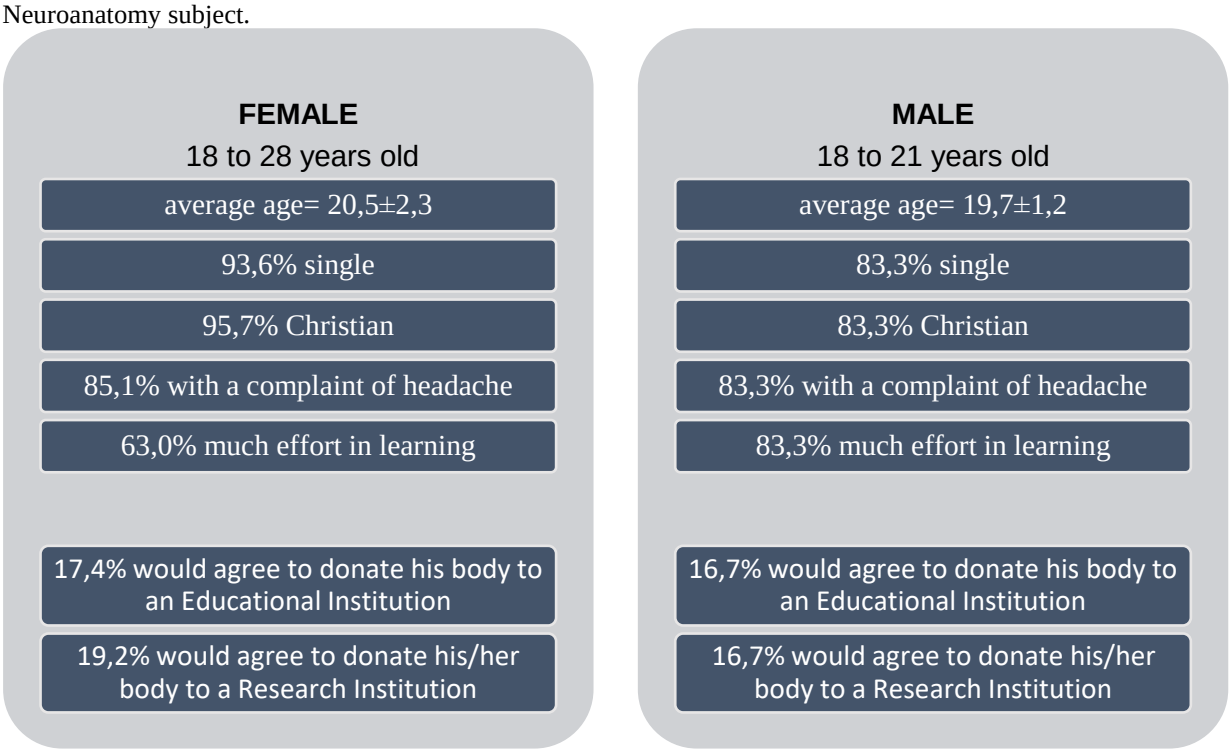
VARIÁVEIS	NÍVEIS	n	(%)
Gender	**Female**	**47**	**88,7**
	Male	06	11,3
Color/race/ethnicity	**Mixed race**	23	43,4
	White/caucasian	22	41,5
	Black	07	13,2
	Asian/Yellow	01	1,9
Education	**High School Complete**	**51**	**96,2**

	Higher Education Incomplete		
	College degree complete	02	3,8
School Origin	Private School	31	58,5
	Public School	21	39,6
	Mostly in public school	01	1,9
Marital Status	**Single**	**49**	**92,5**
	Married	02	3,8
	Others	02	3,8
Religious Preferences	**Catholic**	**39**	**73,6**
	Gospel	11	20,8
	No religion	03	5,7
Origin State	**Paraíba (PB)**	**38**	**71,7**
	Pernambuco	08	15,1
	BA, RN, SP, PR	05	9,4
	Not Answered	02	3,8
Monthly family income	**Less than 5 salaries**	**29**	**81,1**
	Between 5 and 10 salaries	08	15,1
	Between 10 and 30 salaries	02	3,8
Alcoholic beverage consumption	No	31	58,5
	Yes	19	35,8
	Tried it once	03	5,7
Smoking	**No**	**52**	**98,1**
	Yes	01	1,9

BA = Bahia; RN = Rio Grande do Norte; SP = São Paulo; PR = Paraná.

As for income, few students came from high-income families (more than 10 minimum wages) (Table 1), data similar to those presented in other studies3,18. We observed that only 3.8% of the interviewees declared they received a family grant, and 100% did not receive, at the time of the interview, grants from institutional programs (extension, scientific initiation and monitoring).

Figure 1. Student profile (2014-2018), headache complaints, and issues related to teaching and learning of the Anatomy and Neuroanatomy subject.



As for aspects related to health, most consider their health to be good (54.7%) or very good (34.0%). Despite the positive self-perception of health, many students reported headache (84.9%) and different respiratory disorders, such as: allergy (35.8%), sinusitis (34.0%), allergic rhinitis (24.5%), asthma (3.8%) and lung diseases (1.9%). Psychiatric (7.5%) and cardiovascular (3.8%) diseases were also reported. Research carried out in this population in 2018-2019 found a prevalence of 13.5% of self-reported psychiatric treatment and 23.7% of suicidal ideas, apparently pain and mental suffering accompanies the academic journey of these young people19.

3 ANATOMY TEACHING: LEARNING AND CLASSES IN THE HUMAN ANATOMY LABORATORY

The main function of the Anatomy laboratory is to promote practical knowledge of Anatomy, allowing students to have contact with the cadaver and its structures/organs and with synthetic models for a better understanding in this area of knowledge. The environment must also motivate and stimulate students through different resources to build meaningful learning.

In the participants' opinion, learning anatomy disciplines involved a lot of effort (65.4%). In addition, 45.3% of students stated that they usually bring new references if the subject in question is of interest to them, 37.7% declared that they usually seek new references on subjects to share with colleagues and professors, while 17% of academics they only stick to what the teacher and colleagues approach.

Most participants believe that studies in synthetic and **animal models** do not portray human anatomy well and, therefore, the majority (71.7%) **consider the cadaver necessary** in the study of anatomy. This preference is reported in other studies12,20. However, when asked about donating their bodies for teaching and research purposes, most students would not donate their bodies to an educational institution (53.8%) or research (54.7%).

In the Anatomy laboratory, the cadaver represents the opportunity for deeper and more meaningful knowledge. However, today, the donation of corpses to educational institutions does not meet the demand for training in Higher Education. The solution found by several countries and some Brazilian states was to encourage body donation. For the Brazilian Society of Anatomy, the benefits of donating bodies for teaching and research are 21:

> Contribute to better technical training of health professionals;
> Collaborate for the humanistic formation of students;
> Allow the development of new surgical techniques that may be more efficient and less invasive;
> Enable the study and knowledge of existing anatomical variations in individuals;
> Help in the development of medical-scientific research that, in the future, may benefit all of humanity, including future generations of your family.

3.1 ETHICAL, LEGAL AND BIOSAFETY ISSUES

Access to and permanence in any laboratory presupposes knowledge of the ethical and biosafety issues involved in this complex environment. In this context, students were asked about their knowledge of

Law 8501 of 1992, which provides for the use of unclaimed cadavers for study or research purposes. Of the sample, 32.1% were unaware of the law, 9.6% had heard of it, but had never read it; while 28.3% knew partially.

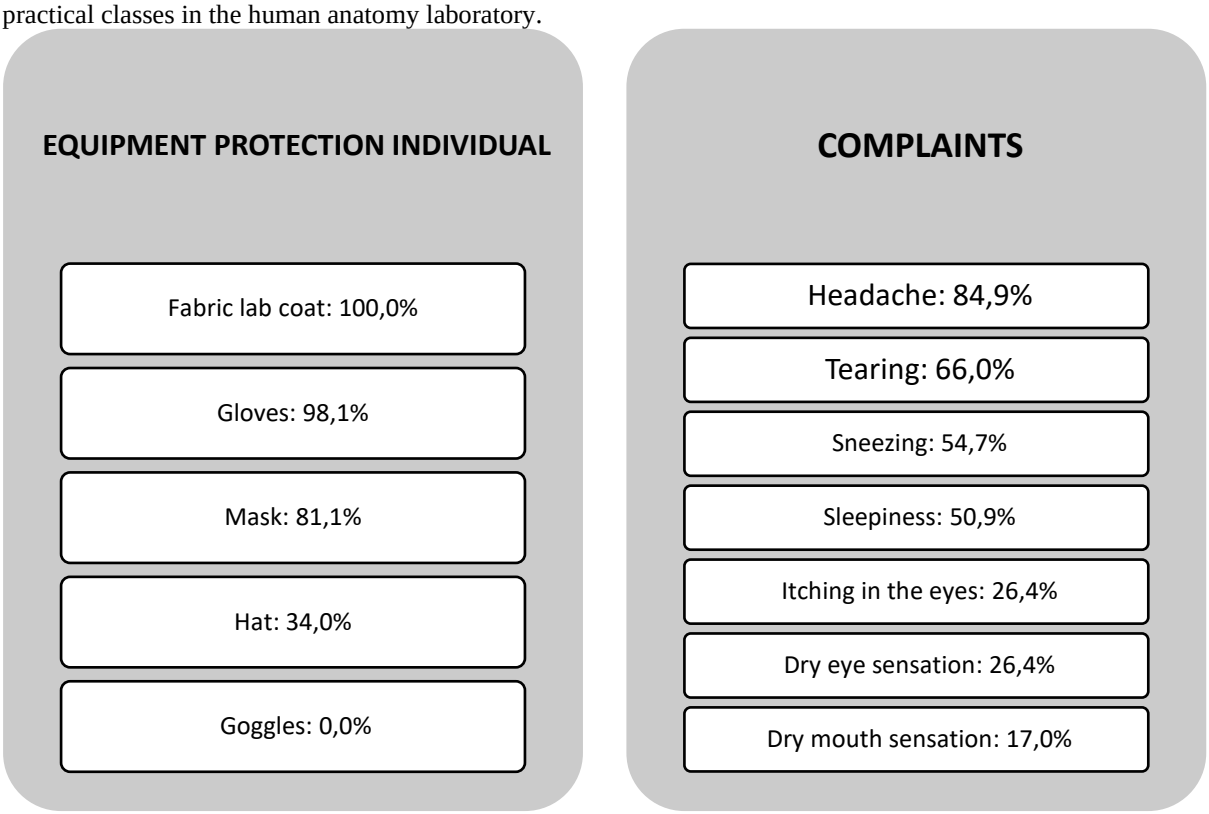
3.2 CONDITIONS OF HUMAN ANATOMY LABORATORIES

The conditions of the anatomy laboratories were considered ideal for studying by 11.3% of the students. However, thermal discomfort (96.1%) (Table 2) and complaints arising from the use of formaldehyde during practical activities may explain part of the dissatisfaction with the conditions of the environment for practical activities (79.3%).

Table 2. Words used to describe the temperature in the UFPB anatomy laboratories during practical classes.

Laboratory Temperature	n	%
Negative feedback		
Very Hot	30	58,82
Hot	5	9,80
Terrible	4	7,84
Not very comfortable	2	3,92
Awful	2	3,92
Regular	1	1,96
Uncomfortable	1	1,96
Higher	1	1,96
Horrible	1	1,96
Inadequate	1	1,96
Bad	1	1,96
Positive feedback		
Great	1	1,96
Good	1	1,96
Total	51	100,00

Figure 2. Use of Personal Protective Equipment (PPE) among students and complaints related to the use of formaldehyde in practical classes in the human anatomy laboratory.



The ocular complaints of the participants may be a response to formaldehyde and, possibly, would be avoided with the use of protective glasses. However, considering the temperature of the region and the laboratory and the mandatory use of other personal protective equipment, the thermal sensation and discomfort would certainly be greater.

Table 3. Complaints related to the possible toxic effects of formaldehyde.

SIGNS AND SYMPTOMS	n	%
1. Headache	**45**	**84,9**
2. Nasal irritation	**37**	**69,8**
3. Tearing	**35**	**66,0**
4. Itching in the eyes	**33**	**62,3**
5. Irritability	**30**	**56,6**
6. Sleepiness	**27**	**50,9**
7. Tiredness	25	47,2
8. Sneezing	23	43,4
9. Dry cough	21	39,6
10. Throat irritation	21	39,6
11. Nasal itching	19	35,9
12. Rinorreia/runny nose	19	35,9
13. Nasal obstruction	16	30,2
14. Dry eye sensation	14	26,4
15. Itchy eyes	14	26,4
16. Nausea	14	26,4
17. Dry mouth	9	17,0
18. Menstrual irregularity	9	17,0
19. Chest tightness	5	9,4
20. Vomiting	1	1,9

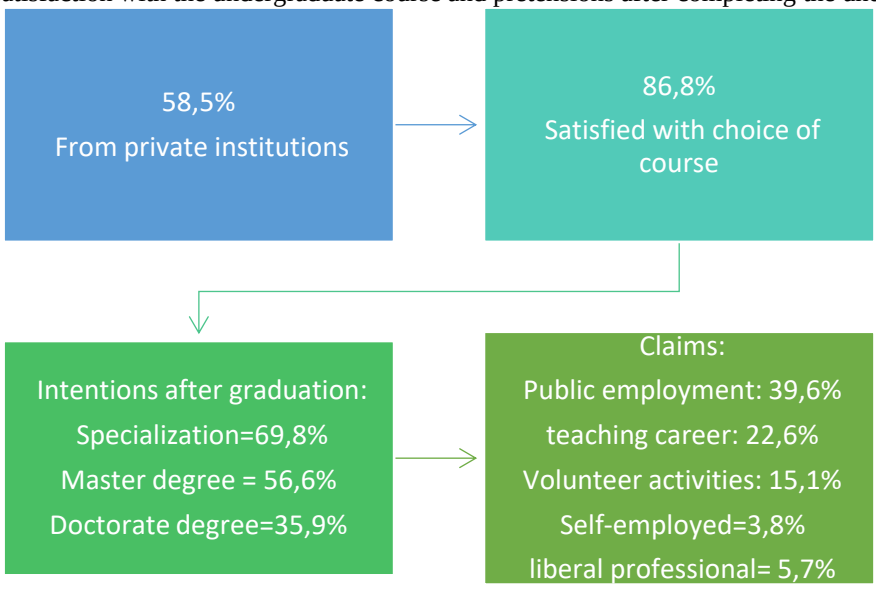
The toxicity of formaldehyde has been extensively studied and its use in the conservation of cases has been questioned22. It is known to be irritating to the eyes and ear system. The literature also reports its effects on the cardiovascular, gastrointestinal, nervous and integumentary systems23-27. Formaldehyde is among the occupational agents of occupational rhinitis, occupational sinusitis and occupational smell alterations28. Other studies show that formaldehyde in the anatomy laboratory affects the upper respiratory tract and eyes more 29,30.

Students' exposure to formaldehyde is transient, unlike technicians, teachers and researchers. Better monitoring and control of occupational risks involved in activities involving the construction of the teaching-learning process of Human Anatomy in teaching institutions is necessary.

3.3 SCHOOL BACKGROUND AND FUTURE PERSPECTIVES

As for school background, the majority attended high school in private educational institutions (58.5%) and attended pre-university entrance exams (66.1%). Questioned about the choice of graduation course, most considered themselves satisfied (86.8%), only 13.2% showed dissatisfaction. Regarding professional choice, 28.3% are undecided and 11.3% would like to take another course. Upon completion of higher education, most participants plan to pursue postgraduate studies and think about joining the public sector and a teaching career (Figure 3).

Figure 3 . Origin, satisfaction with the undergraduate course and pretensions after completing the undergraduate course.



The perspectives for the future of speech therapy students include postgraduate studies, especially specialization (69.8%) and work in the public sector and in the teaching career (Figure 3).

4 CONCLUSIONS

The cadaver was the preferred material resource among the students, considered indispensable, while the didactic models and the study on animals, according to the participants, do not portray the human anatomy well. Despite awareness of the cadaver's contribution to science, most would not agree to donate their bodies for study and research. In this way, making a local diagnosis and identifying the preferences, demands and difficulties of a heterogeneous and dynamic group is essential for decision-making and planning of institutional and teaching actions that can qualify the teaching-learning process, which will imply in the qualification of the future professional practice of these students. It allows us to reflect on the training scenario of professionals who work in a knowledge society31.

REFERENCES

1. Mancebo D, Araujo Do Vale A, Barbosa Martins T. Políticas de expansão da educação superior no Brasil 1995-2010. Revista Brasileira de Educação 2015;20(60).

2. Fornaziero CC, Gil CRR. Novas tecnologias aplicadas ao ensino da anatomia humana. Revista Brasileira de Educação Médica 2003;27(2):141-146.

3. Ristoff D. O novo perfil do campus brasileiro: uma análise do perfil socioeconômico do estudante de graduação. Avaliação: Revista da Avaliação da Educação Superior 2014;19(3).

4. de Sá GFMA. O ensino-aprendizagem da anatomia humana: avaliação do desempenho dos alunos após a utilização de mapas conceituais como uma estratégia pedagógica. Ciência & Educação (Bauru) 2018;24(1):95-110.

5. Soares Neto J, Santos MJCD, Cerqueira GS, Souza EPD. A Sequência Fedathi e o uso de tecnologias digitais 3D como recursos metodológicos para o ensino de anatomia humana: uma revisão integrativa. Research, Society and Development 2020;9(10):e3559108141.

6. Talamoni ACB. No anfiteatro da anatomia: o cadáver e a morte. Coleção PROPG Digital (UNESP) 2012.

7. Anatomy AAf. What is Anatomy? <https://www.anatomy.org/AAA/AAA/About-AAA/What-Is-Anatomy/What-Is-Anatomy.aspx?hkey=9c4abc68-325d-403a-8ef4-310a9a25fb07>. Accessed 2022.

8. de Souza SC. Anatomia: aspectos históricos e evolução. Revista de Ciências Médicas e Biológicas 2011;10(1):3-6.

9. Carneiro ALB. Fundamentos de Anatomia. Coleção Educação Física EaD. Manaus: Edua; 2009.

10. Tavano PT, Oliveira MCd. Surgimento e desenvolvimento da ciência anatômica. 2008.

11. Marsola TRPS. Doação voluntária de corpos para estudo anatômico. 2013.

12. da CostaI GBF, da CostaI GBF, LinsI CCdSA. O cadáver no ensino da anatomia humana: uma visão metodológica e bioética. Revista Brasileira de Educação Médica 2012;36(3):369-373.

13. García-Hernández F. Evaluación del aprendizaje práctico de la anatomía humana para odontología en la Universidad de Antofagasta, Chile. International Journal of Morphology 2003;21(1):43-47.

14. Haag GS, Kolling V, Silva E, Melo SCB, Pinheiro M. Contribuicoes da Monitoria no Processo Ensino-aprendizagem em Enfermagem. REBEn 2008:215-220.

15. Mallmann LA, Franco AM, da Cunha KS. Projeto Piloto: O Blog como Objeto de Aprendizagem da Disciplina de Anatomia Odontológica.

16. Latreille AC, Sobrinho SM, Warmling AMF, Ribeiro DM, Amante CJ. Perfil socioeconômico dos graduandos em Odontologia da Universidade Federal de Santa Catarina. Revista da ABENO 2015;15(1):86-96.

17. Neto FRGX, Muniz CFF, Dias LJLF, Júnior FD, da Silva MAM, Oliveira EN. Perfil sociodemográfico dos estudantes de Enfermagem da Universidade Estadual Vale do Acaraú (UVA). Enfermagem em Foco 2017;8(3).

18. Nardelli GG, Gaudenci EM, Garcia BB, Carleto CT, Gontijo LM, Pedrosa LAK. Perfil dos alunos ingressantes dos cursos da área da saúde de uma universidade federal. Revista de Enfermagem e Atenção à Saúde 2013;2(01).

19. Alves LB, Carneiro ALB, Ramos SCdS, Melo MNAd, Silva LAd. Perceptions, Physical and Psycho-Emotional Complaints Among Students: a cross-sectional study before the pandemic. International Journal of Health Science. Volume 2. https://www.atenaeditora.com.br/post-artigo/650452022. p 1-14.

20. Simionato A, Souza SRGD, Hermes TDA, Macedo AB. DESAFIOS NA UTILIZAÇÃO DE MODELOS ANATÔMICOS NAS AULAS PRÁTICAS DE ANATOMIA. Arquivos do Museu Dinâmico Interdisciplinar 2019;23(3):1-9.

21. SBA. Benefícios da doação de corpos para fins de ensino e pesquisa. <https://www.sbanatomia.org.br/recursos/doacao-de-corpos>. Accessed 2022.

22. da Luz Veronez DA, Farias ELP, de Fraga R, Freitas RSd, Petersen ML, de Paula Silveira JR. POTENCIAL DE RISCO PARA A SAÚDE OCUPACIONAL DE DOCENTES, PESQUISADORES E TÉCNICOS DE ANATOMIA EXPOSTOS AO FORMALDEÍDO. InterfacEHS 2010;5(2).

23. Arcia OJM. Contribución al estudio de los efectos tóxicos del formaldehido. Mérida1990.

24. Pereira EA, Cardoso AA, Dasgupta PK. Gota suspensa para avaliação de aldeído total no ar interno e externo do ambiente. Química Nova 2001.

25. Council's Dutch Expert Committee on Occupational Standards (DECOS). Formaldehyde; Health-based recommended occupational exposure limit. Health Council of the Netherlands: Health Council of the Netherlands; 2003.

26. Collins JJ. Formaldehyde exposure and leukaemia. Occup Environ Med 2004:875-876.

27. Vaughan T, Stewart PA, Teschke K, Lynch CF, Swanson GM, Lyon JL, Berwick M. Occupational exposure to formaldehyde and wood dust nasopharyngeal carcinoma. Occup Environ Med 2008:376-384.

28. Bagatin E, Costa EA. Doenças das vias aéreas superiores. J Bras Pneumol 2006:S17-S26.

29. Silva ACS. Avaliação da Toxicidade do Formaldeído em Voluntários no Laboratório de Anatomia da UFAM. Manaus2009.

30. Onyije FM, Avwioro OG. Excruciating effects of formaldehyde exposure to students in. The International Journal of Occupational and Environmental Medicine 2012;3:92-95.

31. Masetto MT. Formação pedagógica dos docentes do ensino superior. Revista Brasileira de Docência, Ensino e Pesquisa em Administração 2009;1(2):04-25.

CHAPTER 76

Characterization of chitosana films produced with incorporation of anacardium microcarpum ducke extract

https://doi.org/10.56238/10.56238/rsfohsv1-076

Ronaldo Coelho Pereira
Degree in Physics from the Federal Institute of Piauí – IFPI/Campus Picos
Federal Institute of Piauí - IFPI
Avenida Pedro Marques de Medeiros, S/N, Bairro: Pantanal, Picos - PI, Brasil
E-mail: ronaldo.coelho@ifpi.com.br

Maura Vieira dos Santos Sousa
Master's student in Materials Science and Engineering at the Graduate Program in
Materials Science and Engineering - PPCEM
Federal University of Paraíba – UFPB
Cidade Universitária, s/n, Conj. Pres. Castelo Branco III, João – Pessoa, PB, Brasil
E-mail: mauraallabbiomat@gmail.com

Marina de Oliveira Cardoso Macêdo
PhD in Materials Science and Engineering from the Federal University of Rio Grande do Norte.
Federal Institute of Piauí - PPGEM/IFPI
Avenida Pedro Marques de Medeiros, S/N, Bairro: Pantanal, Picos - PI, Brasil
E-mail: marinaocmacedo@gmail.com

Vicente Galber Freitas Viana
PhD in Sciences (Applied Physics) from the Institute of Physics of São Carlos/USP
Federal Institute of Piauí - PPGEM/IFPI
Rua Álvaro Mendes, N 94, centro (Sul), Teresina – PI, Brasil
E-mail: galber@ifpi.edu.br

Haroldo Reis Alves de Macêdo
PhD in Materials Science and Engineering from the Federal University of Rio Grande do Norte.
Federal Institute of Piauí - Campus Picos and PPGEM/IFPI
Avenida Pedro Marques de Medeiros, S/N, bairro Pantanal, Picos - PI, Brasil
E-mail: haroldoram@ifpi.edu.br

ABSTRACT
Chitosan is a polysaccharide derived from the chitin deacetylation process with wide versatility of applications in different areas such as agriculture, tissue engineering, pharmaceutical, food industry, dentistry, among others. Tissue engineering is one of the prominent areas in research involving chitosan, due to its properties such as low toxicity, bioactivity and biocompatibility. Several studies have associated chitosan with other biomaterials that have favorable biological effects to the healing process seeking the production of films with potential for biomedical application., from this perspective, this work aimed at the production and physicochemical characterization of chitosan films with the incorporation of Anacardium microcarpum Ducke extract, ("cajuí"), aiming at the production of a biomaterial for biomedical applications. Analysis of films by the techniques of: optical microscopy; contact angle; superficial tension; thermogravimetric analysis (TGA) and water absorption showed changes in the surface properties of the films that received extract, respectively, these showed higher heterogeneity, increased hydrophilic character, and greater degradation in aqueous medium than pure films.

Keywords: Films, Chitosan, Extract, Anacardium microcarpum Ducke.

1 INTRODUCTION

Polymers are defined as macromolecules with a long chain and/or high molecular weight. Polymer chains are made up of smaller units called monomers, if made up of a single type of monomer they are called homopolymer, if made up of two or more copolymers (BEZERRA, 2011). Polymers can still be divided into two large groups: synthetic and natural.

The modern lifestyle has synthetic polymers as one of its pillars, which are strongly incorporated into people's daily lives, constituting countless products sold on a large scale, such as household utensils, clothing, automobiles, packaging, among other countless products. Biopolymers are considered the basis of life, including proteins, nucleic acids and polysaccharides. The latter can play an energetic role in living

beings such as starch and glycogen or a structuring function such as cellulose and chitin. (FELIPE et al., 2017; DUMITRIU, 2004).

Among the biopolymers, chitosan, a polysaccharide derived from the chitin deacetylation process, is recognized as a biomaterial of great interest for having its origin in the reuse of a natural resource, being a functional biomaterial and having a high potential for application in several areas (OLIVEIRA, 2011). In the literature, one can find works of its application in areas such as: agriculture, pharmaceuticals, dentistry, food industry, tissue engineering, bioremediation and treatment of effluents (FELIPE, 2017).

Tissue engineering is one of the areas highlighted in research involving chitosan, this is due to the properties of this biomaterial such as: being biodegradable, biocompatible, having the ability to accelerate cell proliferation, having very low toxicity and even, in some cases, presenting antimicrobial and antifungal activity (ROLIM, 2018; FELIPE, 2017). Among the applications in tissue engineering are the development of membranes/films/blends containing chitosans for use as dressings with the potential to improve the healing process.

Several works have associated chitosan with other biomaterials that have biological effects favorable to the healing process, seeking the production of films with greater potential for biomedical application. The incorporation of plant extracts of certain species is one of the researched alternatives, some examples are the incorporation: of Barbatimão hydroethanolic extract (BARRAL, 2014), crude alcoholic extract of Cissus verticillata (L.) Nicolson & C.E. Jarvis (SOUZA NETO et al., 2019), Jacquez grape extract (ALMEIDA, 2017), grape seed extract (SOGUT and SEYDIM 2018), methanolic extract of Euphorbia umbellata (LEMES, 2016), extract of Chenopodium ambrosioides (ANJOS , 2017), leaf extract of Combretum duarteanum Cambess (SOUSA, 2017), among others.

In this perspective, this work aimed at the production and physicochemical characterization of chitosan films with the incorporation of Anacardium Microcarpum Ducke (cashew fruit) extract, a species with phytochemical composition and morphology similar to cashew, aiming at the production of a biomaterial for biomedical applications . The choice for the species in question was due to its strong regional presence and the existence of research that proves the positive biological effects of the species Anacardium occidentale, cashew, in the healing process.

Anacardium microcarpum Ducke has a wide distribution and variety in the Northeast, having nutritional value for animals and communities in the cerrado, in addition to being important in folk medicine where the plant is used to treat inflammation in the mouth and throat, diarrhea, and used to heal wounds. It is sometimes considered as a morphotype of Anarcadium occidentale, cashew, although they are popularly treated as distinct, mainly due to the large difference in size of the fruit-pseudofruit set between them.

Studies analyzing the extracts of the two species show that their phytochemical compositions are similar, with several phenolic compounds, flavonoids, tannins, triterpenes, saponins, and essential oils being found in both (BAPTISTA, 2018). These bioactive compounds are associated with their antioxidant, anti-inflammatory and microbicidal effects. Baptista (2016), analyzing the two extracts, concluded that the

concentrations of total phenolics and flavonoids in cashew leaves were different in relation to cashew fruit, but they were observed to have similar in vitro antioxidant and antimicrobial capacity.

Formulations based on Anarcadium occidentale have shown positive effects in works evaluating their effects on the healing process, for example, on the healing process in rats submitted to ulcerative colitis PEDRO (2015) and ALMEIDA (2016), in mice when: evaluating the bioprospection of Anacardium occidentale as an anti-Leishmania and healing product SILVA (2016), associated effect between the gel based on cashew tree bark and therapeutic ultrasound on the healing process of cutaneous wounds FURTADO (2019), in cutaneous lesions where it was evaluated antioxidant, anti-inflammatory and healing activities of cashew nuts VASCONCELOS (2011). Thus, the extract of Anacardium microcarpum Ducke presents itself as an input of interest for the evaluation of its association in the production of chitosan films for biomedical purposes.

2 MATERIALS AND METHODS

This work was divided into three parts. The first was the preparation of the carcass extract of Anacardium microcarpum Ducke by a process of maceration in hydroethanolic solution. The second consisted in the production of chitosan films by the solvent evaporation method. The third consisted of the physical-chemical characterization of these films.

2.1 EXTRACT PREPARATION

The barks of Anacardium microcarpum Ducke were collected in the stem region of trees belonging to native vegetation in the municipality of Ipiranga do Piauí - PI at coordinates (-6.806, -41.861) and (-6.795, -41871) on 02/24/ 2019. Then, they were taken to the Laboratory of Research in Biomaterials of the IFPI - Campus Picos (LaBioMat), then washed and placed to dry for 5 days in an oven at 50 °C, later they were ground in a manual mill obtaining the peels in dust.

The hydroalcoholic extract was obtained by adding 100g of powder to one liter of hydroethanolic solution (30:70, water: ethyl alcohol) and leaving the mixture in maceration by solvent for one week in a closed container protected from light. After that, the mixture was filtered three times, the first time through a nylon mesh filter and the last two times through qualitative filter paper (14 µm) using a vacuum pump.

2.2 PREPARATION OF CHITOSAN FILMS

The chitosan used to produce the films was purchased from Polymar Ltda, Fortaleza, Brazil, with the following characteristics: degree of deacetylation of 85%, pH equal to 8.4 and density equal to 1.805 g/L.

The initial process for the preparation was to dissolve chitosan powder at a concentration of 2% (w/v) in a 2% (v/v) acetic acid solution with constant stirring for 24 hours for the effective dissolution of

chitosan. Then, the solution was subjected to two filtrations to eliminate impurities, the first through a filter with a nylon screen and the second through a Mille Millipore® filter (41µm).

Two types of films were produced: pure chitosan films (MQP) and films with extract incorporation (MQE5%, MQE10%, MQE20%). For the second case, after obtaining the chitosan solution described above, the extract was added to it in proportions of 5%, 10% and 20% (v/v) and the mixture was again placed under constant agitation for 24 hours.

After that, the chitosan and chitosan solutions with extract were distributed in Petri dishes, 30 ml each, and placed in an oven for 24 hours at a temperature of 50ºC for solvent evaporation. Subsequently, the formed films were neutralized with a 5% NaOH solution (w/v), which were then washed abundantly with distilled water to remove NaOH residues. Finally, they were accommodated for drying for a period of 24 hours at room temperature.

2.3 PHYSICAL-CHEMICAL CHARACTERIZATIONS

The physical-chemical characterization of the films produced was carried out using optical microscopy, contact angle, surface tension, thermogravimetric analysis (TGA) and water absorption techniques.

2.3.1 Water absorption test

This test evaluated the amount of water absorbed by the films at different time intervals and the amount of mass lost, degradation, after the final immersion time. The MQP, MQE5%, MQE10% and MQE20% films were initially weighed on an analytical balance with four decimal places (initial dry weight) and then immersed in 350 ml of distilled water, each, for 72 hours at an ambient temperature of 32°C. Weight gain was monitored by weighing every 1h in the first 8h. Before each weighing, the films were dried with a paper towel to retain excess water.

After the eight initial weighings, the films were weighed after 24 h, 48 h and 72 h of immersion. After the last wet weight, the films were placed in an oven at 50 °C for 24 h to remove moisture and then the final dry weight was carried out. The analysis was performed in triplicate by calculating the arithmetic mean of mass gain in each situation. Gain was calculated by equation 1 and mass loss after 72 h by equation 2, where m_u= wet mass, m_c= dry mass and m_f=final dry mass.

$$G(\%) = \frac{m_u - m_c}{m_c} \cdot 100 \qquad \text{Eq. (1)}$$

$$P(\%) = \frac{m_c - m_f}{m_c}$$

2.3.2 Contact angle

The method used was the sessile drop performed in a goniometer produced by the Laboratory of Research in Biomaterials of the IFPI - Campus Picos. Three liquids were used to carry out the technique: water, formamide and glycerin. Samples of each type of film produced were detached, pieces of approximately 3〖cm〗^2, which were fixed one by one on the flat base of the goniometer, then 20 µL of each liquid was dripped separately onto the surface of each sample, first the analysis was performed with water in all samples followed by formamide and glycerin. This procedure was filmed and monitored on a computer using the Windows Movie Maker program.

Then, through clippings in the frames using Movie Maker, a sequence of images of the behavior of the drop in relation to the surface was obtained, respectively, images at the instants 0 s, 10 s, 20 s, 30 s, 40 s, 50 s and 60 s of falling and stabilizing. The images were analyzed using the Surftens demo program, where the contact angle of the base of the drop with the surface of the film was measured. The measurement consisted of making 5 marks on the drop, generating a circle and consequently its tangent whose angle the program provided. The marking procedure was performed 7 times on each image, eliminating the largest and smallest angles, with the contact angle on each image being the average of the 5 angles of the drop markings. The process was carried out for each liquid, in each type of film and at different times.

2.3.3 Surface Energy (Surface Tension)

The theory of Fowkes (1968) allows the determination of the surface energy of solids through the measurement of the contact angle between different liquids, of known surface tension, with the surface of the solid. Fowkes suggests that the surface free energy should be considered as a sum of the intermolecular forces themselves, that is, the polar (γ^P) and nonpolar (γ^D) component, also called forces or surface cohesion or dispersion factor. (FOWKES, 1968 apud CARNEIRO, 2001). The calculation is performed using Eq. (3).

$$\left[\frac{1+\cos\theta}{2}\right]\cdot\left(\frac{\gamma_L}{\sqrt[2]{\gamma_L^D}}\right)=\sqrt[2]{\gamma_S^P}\cdot\sqrt{\frac{\gamma_L^P}{\gamma_L^D}+\sqrt[2]{\gamma_S^D}} \qquad \text{Eq.}$$

Where γ_L, γ_L^D, γ_L^P, γ_S^D, γ_S^P and Θ are, respectively, the total surface tension of the liquid-air, dispersive coordinate of the surface tension of the liquid, polar coordinate of the surface tension of the liquid, coordinate dispersive surface tension of the analyzed solid, polar coordinate of the surface tension of the solid under study and contact angle for the liquid. The values of γ^P and γ^D for the liquids used are shown in table 1.

Table 1 – Surface energy of the liquids used.

Líquidos	$\gamma_l(mJ/m^2)$	$\gamma_l^p(mJ/m^2)$	$\gamma_l^d(mJ/m^2)$
Água	72,8	51,0	21,8
Formamida	58,2	18,7	39,5
Glicerol	63,4	26,2	37,2

Source: Macedo, 2013.

2.3.4 Thermogravimetric Analysis (TGA)

TGA is a thermal analysis technique that uses a temperature-controlled program to analyze the change in mass of a substance as a function of time or temperature. From it it is possible to analyze the thermal stability of materials and their stages of decomposition. The results of this technique, in general, are presented in the form of graphs where the abscissa axis corresponds to the temperature (or time) values and the ordinate axis corresponds to the percentage of mass lost or gained (FENANDES, 2009; ROSENDO, 2016). The First Derivative of the Thermogravimetric Curve (DTG) is a mathematical treatment of the TGA curve where curves are obtained marked by the presence of peaks that delimit areas proportional to the changes in mass suffered by the samples. heating process.

The thermogravimetric analysis of the films was carried out at the Laboratory of Thermal Analysis of the PPGEM - IFPI on the Campus Teresina Central, for which a Shimadzu equipment, model TGA-51H, and samples of approximately 12 mg of the material were used. following conditions: temperature range from 25 °C to 1000 °C, heating rate 10 °C· 〖min〗^(-1) and nitrogen atmosphere at 50 ml· 〖min〗^(-1).

2.3.5 Optical microscopy

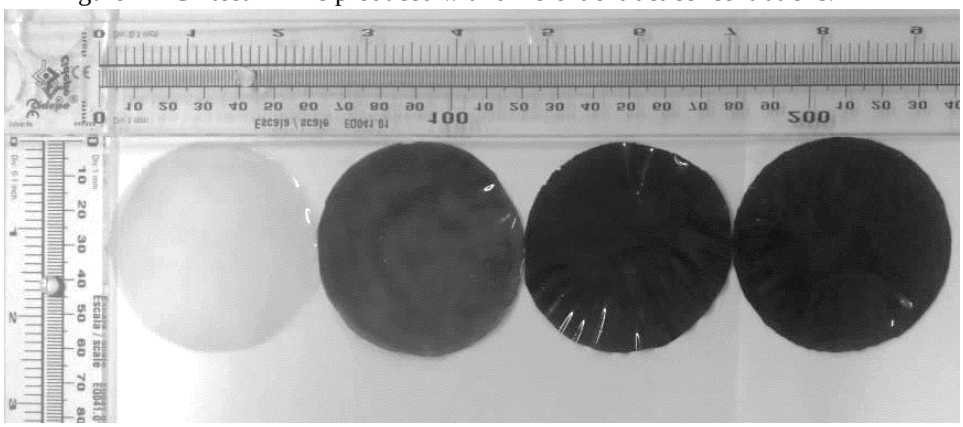
The surfaces of the films of each proportion were analyzed at 50 times magnification through the Metallographic Microscope Trinocular Plain Normal - model TNM-08T-PL belonging to the laboratory of biomaterials of the IFPI - Campus Picos. The analysis consisted of capturing 5 images of different parts of the sample, identifying changes in their surfaces and establishing comparisons between the compositions of the films.

3 RESULTS AND DISCUSSION

3.1 THE FILMS PRODUCED

The films obtained were circular in shape, with an average radius of 65 mm and thickness of 11 μm (figure 1). The pure films with the naked eye and placed against the light presented a homogeneous and transparent appearance, whereas the films with extract presented a red or close to brown color, with the hue intensifying with an increase in the amount of extract, presenting a less homogeneous appearance than the film. pure where regions with higher concentration of extract could be identified.

Figure 1 – Chitosan films produced with different extract concentrations.

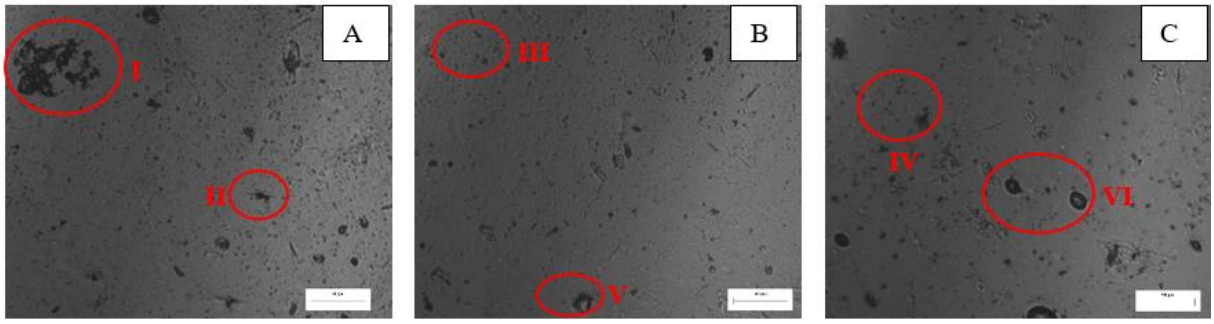


Source: Author's.

3.2 OPTICAL MICROSCOPY

In the analysis of the optical microscopy images, it was observed that the surfaces of the films were compact. It was found that MQP was the film with the greatest homogeneity. In the MQP5% one can identify regions with portions of extract suspended in the matrix dispersed throughout the film and with different dimensions (markings I and II) in addition to some air bubbles. In the MQE10% and MQE20% films, it was not possible to identify regions of extract concentration with large dimensions, only small dots (markings III and IV), this is most likely due to the dark color of the films, not allowing light to penetrate much inside. and reflection occurred only superficially and to a lesser extent. An even greater amount of bubbles was observed in films with a higher proportion of extract (markings V and VI), as seen in figure 2.

Figure 2 – Microscopy on a 50 µm scale of A) MQE5%, B) MQE10% and C) MQE20%

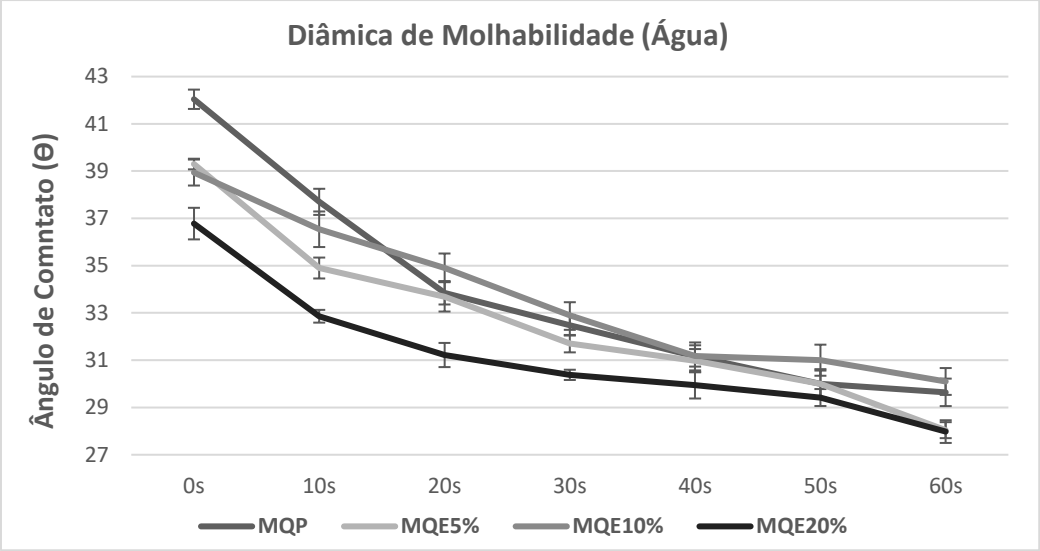


Source: Author's.

3.3 WETTABILITY

All films showed a hydrophilic character, ie contact angle θ between 0° and 90°, films with extract incorporation showed a lower contact angle and therefore a higher degree of hydrophilicity. Figure 3 shows the drop accommodation dynamics on the surfaces. The maximum and minimum contact angles for each film respectively: MQP (42,04°; 29,64°), MQE5% (39,30°; 28,04), MQE10% (38,94°,30,10) e MQE20% (36,78; 27,98).

Figure 3 - Graph of the wettability dynamics for the films produced



Source: Author's.

An increasing tendency of surface affinity with water can be observed as the amount of extract in the films increases. According to (MACEDO et al, 2011; TSAI and WANG, 2008) the natural hydrophilicity of chitosan is associated with the presence of hydroxyl groups (OH) and aminos (NH_2).

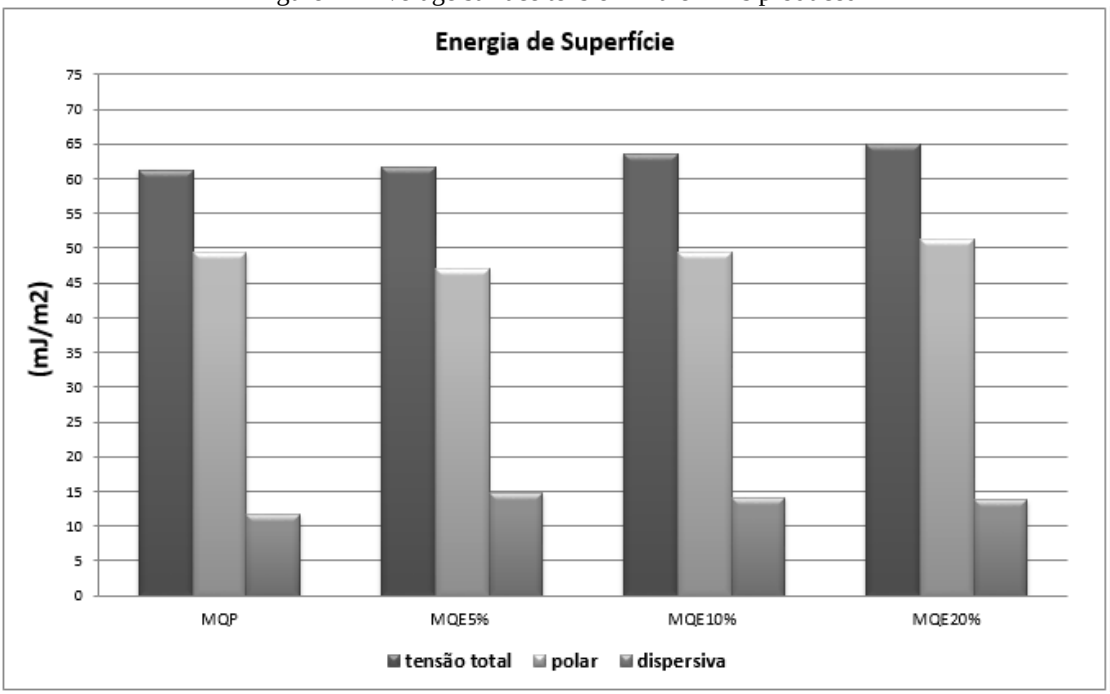
The increasing hydrophilicity in the films with extract indicates the increase of polar groups in their compositions. These polar components can be explained by the incorporation of phenolic groups present in the extract of Anacardium microcaptum Ducke. As shown in phytochemical analyzes in several works among them (BAPTISTA, 2018; SILVA and ALMEIDA, 2013; BARBOSA FILHO et al, 2013; CHAVES 2010*) the extracts of Anacardium occidentale and Anacardium microcarpum Ducke are rich in phenolic compounds.*

3.4 SURFACE ENERGY

Surface energy is a relevant feature in the study of biomaterials because it is associated with the ability of other substances to interact/adhere to the surface of the material. It is known that surface energy strongly affects biological interactions, such as adhesion, proliferation and cell morphology (PONSONNET et. al., 2003 apud MACÊDO, 2012).

Materials with high surface free energy adsorb macromolecules more easily, develop a greater number of favorable sites for binding to occur and form favorable layers for cell binding (BAIER and MEYER, 1988 apud COUTINHO and ELIAS, 2009). The polar component in these materials is an important factor, since the adsorption of proteins related to cell adhesion, such as fibrins, occurs preferentially on the surfaces of materials with high polar energy (SOUSA, 2017). Figure 4 shows the surface energy values for the films produced.

Figure 4 - Average surface tension in the films produced



Source: Author's.

It can be observed that there was a predominance of the polar coordinate in all films to the detriment of the dispersive one and that the total surface energy of the films with extract was higher than the pure film. This increase indicates chemical changes on the surfaces of the films, probably due to the presence of phenolic groups in the extract, as mentioned above, and may also have contributions from physical changes such as changes in surface roughness.

MQP has a polar component greater than MQE5% and MQE10%, this behavior is most likely associated with the chemical interaction of the polar groups of the extract with those of chitosan, resulting in less polar groups available on these surfaces to interact with water compared to MQP, Sousa (2017) in his work characterizing chitosan films with extract also assumes this hypothesis for the surface energy behavior in his analysis. As the extract is incorporated into the films, the polar component of the surface energy increases, indicating greater availability of free polar groups in the extract to interact with water.

3.5 THERMOGRAVIMETRIC ANALYSIS (TGA)

The samples showed a characteristic initial event of thermal degradation, event 1, which can be attributed to the release of water molecules, solvents or low molar mass molecules from the material. The proportional relationship observed between a greater amount of extract and a greater loss of mass in this decomposition phase is due to the increase in increasing proportions of extract in the films, therefore, the greater the proportion of extract present in the film, the greater the residual fraction of solvents dispersed in the film matrix and consequently greater mass loss in this phase with the breakdown of these solvents (table 2).

Table 2 – Events of thermal degradation of chitosan films.

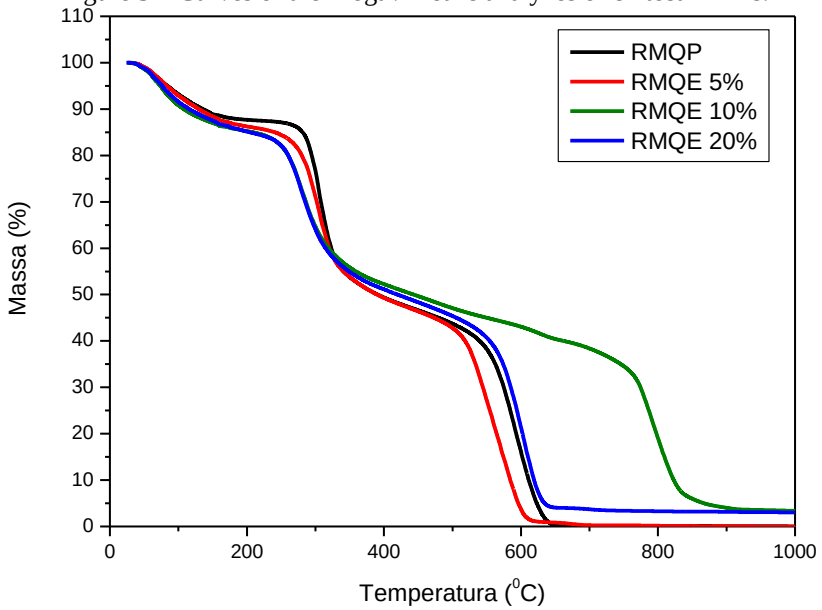
	Event 1		*Event 2*		*Event 3*		*Event 4*	
SAMPLES	IT	PM%	IT	PM%	IT	PM%	IT	PM%
RMQP	24 – 225	12,53	225 – 435	40,22	435 – 680	47,25	-	-
RMQE 5%	26 – 201	13,84	201 – 430	38,73	430 – 643	46,77	643 – 721	0,64
RMQE 10%	25 – 188	14,47	188 – 428	34,83	428 – 664	10,85	664 – 923	36.28
RMQE 20%	22 – 205	15,09	205 – 423	35,12	423 – 664	45,82	664 – 760	0,63

* IT – Temperature Interval (ºC); PM% - Mass Loss %

Source: Author's.

The TGA curves presented in Figure 5 indicate the occurrence of four main degradation events in the films with extract incorporation, while the MQP presented only three events. The second degradation event of the material, event 2, occurred in the average temperature range of 205-429 and it can be attributed to the beginning of the polymeric degradation of chitosan through dehydration of the saccharidic rings, depolymerization and decomposition of the acetylated and deacetylated groups of the monomers of chitosan (TRINDADE NETO et al, 2003; LEMES, 2016). In films with extract incorporation, this mass loss is possibly also associated with the degradation of phytoconstituents such as secondary metabolites present in the extract, as pointed out by Anjos (2017) and Sousa (2017) in the results of the thermal analysis tests of their works addressing the incorporation of plant extracts on chitosan membranes.

Figure 5 – Curves of thermogavimetric analyzes of chitosan films.

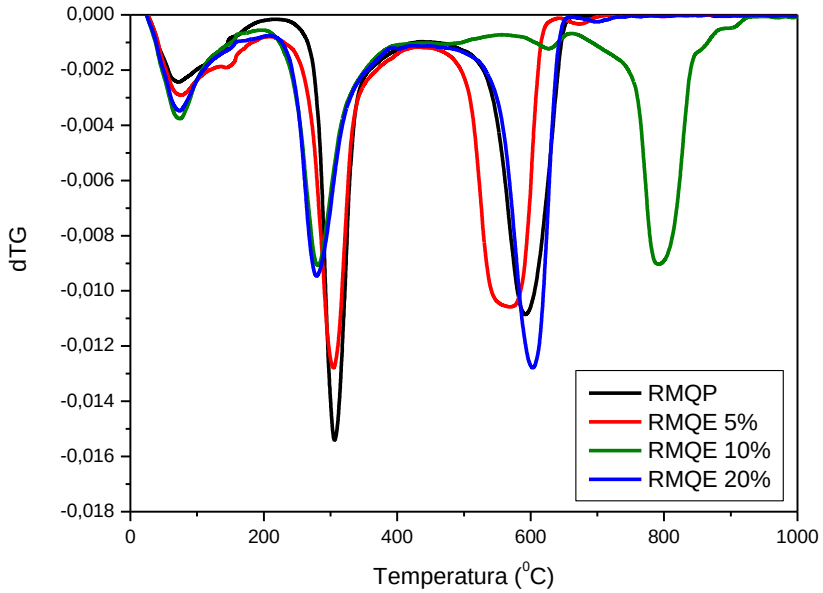


Source: Author's.

The dTGA curves of the chitosan films with 10% extract incorporation, MQE10%, present an anomalous behavior from 400 ºC when compared with the curves for the other films, that is, the degradation processes above this temperature are different from the ones too much, thus indicating the degradation of some different substance or in proportion far above that present in the other samples. As it is an intermediate proportion between MQE5% and MQE10%, which show results that are in agreement with each other, and considering that this sample showed a significant degradation event 4 with a peak at approximately 800 ºC,

the anomalous result of MQE10% is most likely associated with presence of some impurity in this sample, possibly some mineral that may have been added to the film in one of its production and/or handling stages, as seen in figure 6.

Figure 6 – Curves of derivatives of thermogravimetric analyzes for chitosan films.



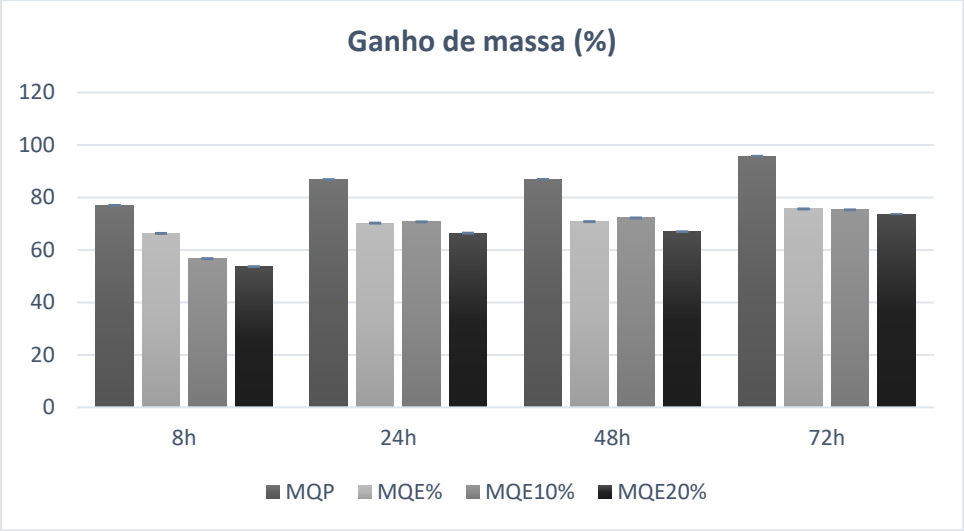
Source: Author's.

The highest degradation of the material, except for the MQE10% of the analysis, occurs in the third degradation phase (event 3) in the average temperature range of 429-662°C with an average mass loss of 46.61%. This loss is related to the effective degradation of chitosan with the depolymerization and decomposition of the polysaccharide structure and the degradation of flavonoids, triterpenes, saponins, tannins, and other phytoconstituents present in the extract (SOUSA, 2017). The films with MQE5%, MQE10% and MQE20% extract incorporation showed final residues of respectively 0.02%, 3.57% and 3.34% certainly associated with the presence of salts in the composition of the biological material base of the extract, the MQP did not show residues at the end of the test.

3.6 WATER ABSORPTION TEST

Na figura 7 são apresentados os valores obtidos para a absorção de água ao longo do tempo em relação ao peso seco inicial. A MQP apresentou maior taxa de absorção e um padrão constante de ganho de massa em relação os filmes com extrato (MQE5%, MQE10% e MQE20%). Essas por sua vez presentaram crescimentos muito pequenos a partir da 24h em relação ao ganho de massa e valores praticamente iguais entre as três.

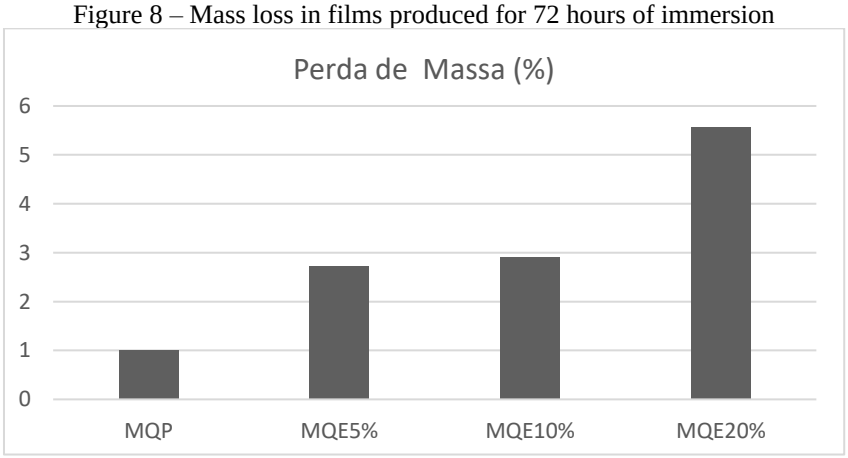
Figure 7 - Graph of mass gain in percentage for the films produced



Source: Author's.

The greater absorption, mass gain, in the MQP in relation to the other films may be associated with a small increase in the dispersive component in the films with extracts and the chemical interaction of the polar groups of the extract with those of chitosan, implying a lower availability of interaction with water along the fiber layers making swelling difficult compared to MQP. Another factor that may have contributed to this behavior was that the films with extract showed a high mass loss (figure 8) in relation to the MPQ, thus being able to infer the mass gain over time in the analysis.

Figure 8 – Mass loss in films produced for 72 hours of immersion



Source: Author's.

Films with extract incorporation showed greater mass loss compared to MPQ, which indicates that the extract facilitated matrix degradation, that is, the disaggregation of parts of its structure. This loss can be attributed to the dissolution in water of portions of the extract that are not chemically incorporated into chitosan, facilitating the detachment of pieces from the matrix.

4 CONCLUSIONS

It was possible to obtain films from the incorporation of different proportions of extracts to the chitosan solution (5%, 10% and 20%) and it was verified that the films with extract presented alterations in their physical-chemical characteristics of heterogeneity, hydrophilicity, surface energy, absorption and degradation in water, when compared to pure films. The increase in hydrophilicity and surface energy in films with extract, with a predominance of the polar component, indicates a positive point for a curative biomaterial, since these characteristics are associated with cell adhesion and proliferation. Less water absorption and greater degradation of films with extract, especially in the 20% proportion, are negative points that can compromise the functionality of the biomaterial in terms of its ability to absorb body fluids and its resistance.

The characterizations made in the work indicate that chitosan films with the incorporation of Anacardium microcarpum Ducke extract have physicochemical characteristics compatible with the possibility of use as a curative biomaterial, establishing 205 ºC as the maximum temperature limit at which the biomaterial can be be exposed in possible sterilization processes, since the TGA test signals the thermal degradation of chitosan and the constituents of the extract from this average temperature value. However, an effective assessment of this biomaterial as to whether or not it is suitable for use as a dressing depends on further work that investigates the appropriate proportions to improve the stability of the biomaterial, expanding the number and types of characterization tests and carrying out biological tests for evaluate the healing potential and toxicity of the films produced.

ACKNOWLEDGMENT

To the Biomaterials Research Laboratory of the IFPI - Campus Picos (LaBioMat) and to the PIBIC-IFPI.

REFERENCES

1. ALMEIDA, E. G**. Estudo morfológico do cólon de ratos tratados com o extrato de *Anacardium occidentale* L. em um modelo de colite ulcerativa.** Monografia, Universidade Federal do Rio Grande do Norte, Centro de Biociências, Curso de Ciências Biológicas, Natal-RN, 2016.

2. ANJOS, F. F. **Preparo e caracterização de membranas de quitosana com incorporação do extrato hidroalcoólico liofilizado do *Chenopodium ambrosioides* para aplicação como biomaterial.** Dissertação (Mestrado em Engenharia de Materiais) - Instituto Federal de Educação, Ciência e Tecnologia do Piauí, Programa de Pós-graduação em Engenharia de Materiais, Teresina, 2017.

3. BAPTISTA, A. B. **Extrato de folhas de caju (*Anacardium occidentale l.*) e de cajuí (*Anacardium microcarpum D.*): prospecção fitoquímica, atividade antioxidante, antimicrobiana e anti-inflamatória, in vitro e in vivo.** Tese (Doutorado), Universidade Federal de Viçosa, Programa de Pós-graduação em Ciência da Nutrição, Viçosa – MG, 2018.

4. BARBOSA FILHO, V. M., et al. **Phytochemical constituents, antioxidant activity, cytotoxicity and osmotic fragility effects of Caju (*Anacardium microcarpum*)**. Industrial Crops and Products, v. 55, p. 280-288, 2014.

5. BARRAL, S.M. **O uso do extrato hidroalcoólico de barbatimão associado ao filme de quitosana para a cicatrização de feridas cutâneas complexas em ratas**. Tese (Doutorado em Ciências Aplicadas à Cirurgia e à Oftalmologia) - Universidade Federal de Minas Gerais, Faculdade de Medicina, Belo Horizonte, 2013.

6. BEZERRA, A. M. **Síntese e avaliações físico-química e biológicas de derivados de quitosana de alta e baixa massa molecular**. Dissertação (Mestrado em Tecnologia Bioquímica-Farmacêutica) – Universidade de São Paulo, Faculdade de Ciências Farmacêuticas, São Paulo, 2011.

7. BEZERRA, A. M. **Síntese e avaliações físico-química e biológicas de derivados de quitosana de alta e baixa massa molecular**. Dissertação (Mestrado em Tecnologia Bioquímica-Farmacêutica) – Universidade de São Paulo, Faculdade de Ciências Farmacêuticas, São Paulo, 2011.

8. CARNEIRO, M. P. **Caracterização das propriedades de superfície de filmes polipropileno tratados com descarga corona**. Dissertação (Mestrado em Engenharia Química) – Universidade Estadual de Campinas, Faculdade de Engenharia Química, Campinas-SP, 2001.

9. CHAVES, M.H. **Fenóis totais, atividade antioxidante e constituintes químicos de extratos de *Anacardium occidentale* L., *Anacardiaceae***. Revista Brasileira de Farmacognosia, v. 1, n. 20, p. 106-112, 2010.

10. COUTINHO, M.P.; ELIAS, C.N. **Rugosidade e molhabilidade do titânio usado em implantes dentários com superfícies tratadas**. Revista brasileira de odontologia, v. 66, n. 2, p.234-8, 2009.

11. DUMITRIU, S. **Polysaccharides: Structural Diversity and Functional Versatility**. 2° Ed. Nova York: CRC Press, 2004. 1224 p.

12. FELIPE, L. O. et. al. **Quitosana: da química básica à bioengenharia. Química Nova na escola**. v. 39, n. 4, p. 312-320, 2017.

13. FERNANDES, L.L. **Produção e caracterização de membranas de quitosana e quitosana com sulfato de condroitina para aplicações biomédicas.** Monografia (Bacharelado em Engenharia de

Materiais) – Universidade Federal do Rio de Janeiro, Departamento de Engenharia metalúrgica e de Materiais, Rio de Janeiro-RJ, 2009.

14. FURTADO, R. A. A., et al. **Ação do gel *Anacardium Occidentale* L. associado ao ultrassom terapêutico no processo de cicatrização em camundongos.** Revista Saúde, v. 45, n. 2, Santa Maria-RS, 2019.

15. LEMES, B. M. **Membranas de quitosana contendo fração metanólica de *Euphorbia umbellata* (PAX) BRUYNS (EUPHORBIACEAE): desenvolvimento, caracterização e avalização**. Dissertação (Mestrado em Ciências Farmacêuticas) - Universidade Estadual de Ponta Grossa, Setor de Ciências Biológicas e da Saúde, Ponta Grossa-PR, 2016.

16. MACÊDO, H. R. A. **Tratamento térmico do titânio e suas consequências sobre as propriedades físico-química e de Biocompatibilidade**. Tese (Doutorado em Ciências e Engenharia dos materiais) – Universidade Federal do Rio Grande do Norte, Centro de Ciências Exatas e da Terra, Natal-RN, 2012.

17. MACÊDO, M.O.C, **Efeito do Tratamento por Plasma na Proliferação de Fibroblastos e Esterilização de Membranas de Quitosana**. 2013. Tese (Doutorado em Ciências e Engenharia de Materiais) – Universidade Federal do Rio Grande do Norte, Natal, 2013.

18. MACÊDO, M.O.C. et al. **O uso do plasma de nitrogênio para modificação superficial em membranas de quitosana**. Revista Brasileira de Inovação Tecnológica em Saúde, v.1, n. 2, 2011.

19. OLIVEIRA, M. **O biopolímero quitosana, modificado quimicamente ou reticulado com metais, em forma de pó ou esfera, aplicado no estudo termoquímico da 81 interação com cobre e aminas alifáticas**. Tese (Doutorado em Ciências) – Universidade Estadual de Campinas, Instituto de Química, Campinas, 2011.

20. PEDRO, V. **Avaliação do efeito do extrato hidroalcoólico das folhas de *Anacardium occidentale* L. em ratos submetidos à colite ulcerativa.** Tese, Universidade Federal do Rio Grande do Norte, Centro de Ciências Biomédicas, Natal-RN, 2015.

21. ROLIM, A. E. H., et al. **Arcabouços de quitosana - propriedades físico-químicas e biológicas para o reparo ósseo.** Revista Virtual de Química, v. 10, n. 2, p. 211-228, 2018.

22. ROSENDO, R. A. **Desenvolvimento e Caracterização de Scaffolds de Quitosana /Cissus verticillata (L.) Nicolson & C.E. Jarvis**. Tese (Doutorado em Ciência e Engenharia de Materiais) – Universidade Federal de Campina Grande, Centro de Ciências e Tecnologia, Campina Grande-PB, 2016.

23. SILVA, A. E. S. e ALMEIDA, S. S. M. S. **Análise fitoquímica das cascas do caule do cajueiro (*Anacardium occidentale* L. – *Anacardiaceae*)**. Estação Científica (UNIFAP), v. 3, n. 2, p. 81-88, jul.-dez. 2013, Macapá.

24. SILVA, L. A. C. **Bioprospecção de *Anacardium occidentale* como produto anti-Leishmania e cicatrizante.** Tese (Doutorado em Biotecnologia), Programa de Pós-graduação da Rede Nordeste de Biotecnologia – RENOBIO, São Luís – MA, 2016.

25. SOGUT, E.; SEYDIM, A. C. **Development of Chitosan and Polycaprolactone based active bilayer films enhanced with nanocellulose and grape seed extract**. Carbohydrate Polymers. v. 195, p. 180-188. 2018.

26. SOUSA, F. M. S. **Preparo e caracterização de membranas de quitosana com extratos foliares de *combretum duarteanum cambess* para aplicações biológicas.** Dissertação (Mestrado em Engenharia

de Materiais) - Instituto Federal de Educação, Ciência e Tecnologia do Piauí, Programa de Pós-graduação em Engenharia de Materiais, Teresina, 2017.
27. SOUZA NETO, A. A., et al. **Desenvolvimento e caracterização de membranas de quitosana / *Cissus verticillata* (L.) Nicolson & C.E. Jarvis.** Revista matéria, v. 24, n. 03, 2019.

28. TRINDADE NETO, C.G. et al. **Permeação de fármacos através de membranas de quitosana modificadas com poli (óxido de etileno)**. In: 7º Congresso Brasileiro de Polímeros, Belo Horizonte, MG, Brasil, 2003.

29. TSAI, H. S. e WANG, Y. Z. **Properties of hydrophilic chitosan network membranes by introducing binary crosslink agentes**. Polymer Bulletin, v. 60, pp. 103-113, 2008.

VASCONCELOS, L. S. **Atividades antioxidante, anti-inflamatória e cicatrizante do caju (*Anacardium occidentale l.*).** Dissertação (Mestrado em Bioquímica) – Universidade Federal do Ceará, Centro de Ciências, Fortaleza-CE, 2011.

CHAPTER 77

Pregnant nursing professionals in the context of the covid-19 pandemic: an experience report

https://doi.org/10.56238/10.56238/rsfohsv1-077

Nataniele de Albuquerque
Nurse Specialist in Oncology/Public Health Institution: University Hospital Professor Alberto Antunes - HUPAA/UFAL
E-mail: monitoria_pe@yahoo.com.br

Thaísa Mirella da Silva
Nurse Specialist in Oncology Institution: University Hospital Professor Alberto Antunes- HUPAA/UFAL
E-mail:thaisa.mirella@ebserh.gov.br

Suzana Maria de Oliveira Costa Meneses
Nurse Specialist in Oncological Nursing Institution: University Hospital Professor Alberto AntunesHUPAA/UFAL
E-mail: suzaninha_costa@hotmail.com

Sâmela Maria de Oliveira Silva
Nurse Master in Oncology and Hematology Institution: University Hospital Professor Alberto Antunes - HUPAA/UFAL
E-mail: samela.silva@ebserh.gov.br

Clebiana Alves e silva Diniz
Nurse Master's student in gerontology Institution: University Hospital Professor Alberto Antunes- HUPAA/UFAL
E-mail:clebiana31@gmail.com

Tainan de Andrade Rocha
Nurse Specialization: Urgency and Emergency and ICU Institution: University Hospital Professor Alberto Antunes- HUPAA/UFAL
E-mail: tainan_and_rocha@hotmail.com

Julia Maria Pacheco Lins Magalhães
Nurse Master's in Health Research Institution: University Hospital Professor Alberto Antunes - HUPAA/UFAL
E-mail: juliapachecolins@hotmail.com

Poliana Silva de Brito
Nurse Specialist in Oncology/Public Health Institution: Hospital das Clínicas de Pernambuco- UFPE
E-mail: polianasb@hotmail.com

Manuelle de Araújo Holanda
Master in Hebiatrics Institution: Hospital das Clínicas de Pernambuco - UFPE
E-mail: manuelleholanda@hotmail.com

Eliane dos Santos Nunes
Nurse Specialist in Management and Health Services Institution: Hospital das Clínicas de Pernambuco- UFPE
E-mail: elianesantosnunes@hotmail.com

ABSTRACT
The emergence of the Covid-19 pandemic has multiplied fears and uncertainties among pregnant women, especially among nurses who experienced pregnancy and the puerperium during the pandemic, due to the greater vulnerability resulting from the specifics of work. Objective: To report the experience of nurses from the Oncology Unit of the HUPAA, pregnant women in the context of the COVID-19 pandemic. Method: This is a descriptive, exploratory, experience report type study. Results: Technological innovation, through remote work, provided a beneficial experience for pregnant nurses, as it allowed them to protect and protect this group, ensuring greater safety for the mother-child binomial.

Keywords: COVID-19; pregnant women; nursing; telecommuting.

1 INTRODUCTION

In December 2019, an outbreak caused by a new coronavirus began in Wuhan in China and spread rapidly. On January 9, 2020, the new Coronavirus was identified, known scientifically as Severe Acute Respiratory Syndrome-Coronavirus or Severe Acute Respiratory Syndrome-Coronavirus (SARS-CoV-2) in English. It is the microorganism that causes the human infection called COVID-19 (MASCARENHAS *et al*., 2020).

The new coronavirus, SARS-COV-2, etiological agent of COVID-19 caused a pandemic in the world population with numerous health repercussions, especially in the most vulnerable such as pregnant

women, the elderly and those with comorbidities. (ALFARAJ, AL-TAWFIQ and MEMISH, 2019). Later, health professionals, pregnant and postpartum women and newborns were also inserted in the risk group (RONDELLI *et al.* , 2020).

Pregnancy is a physiological phenomenon consisting of several physical, psychological and socioeconomic changes, but should be seen by pregnant women and health professionals as part of a healthy life experience (BRASIL, 2013). Any event that can interfere for the promotion of health in pregnant women deserves timely and timely attention and assistance in order to avoid damage and maternal-fetal deaths (OLIVEIRA *et al*., 2021).

Some physiological changes during pregnancy, such as reduced residual volumes, elevation of the diaphragm, and change in immunity, characterized by stimulation of the innate immune system and suppression of the adaptive immune system (only in the TH1 pole), generate greater vulnerability in this set of women (ALZAMORA *et al.*, 2020).

Pregnant women may be at risk of severe illness, morbidity or mortality when compared to the general population. As reported in cases of other coronavirus-associated infections: severe acute respiratory syndrome (SARS- CoV), Middle East respiratory syndrome coronavirus (MERSCoV), and other respiratory viral infections, including H1N1 influenza, during pregnancy (KASANO, DÍAZ, & SANTIBÁÑEZ, 2020). This public, during infections caused by SARS-CoV, H1N1 influenza, and MERSCoV viruses, which occurred in 2002, 2009, and 2012, respectively, presented various complications, such as fever, cough, and dyspnea (ALFARAJ, AL-TAWFIQ, and MEMISH, 2019).

The Normative Instruction no. 21/2020 of the Ministry of Economy, a generalized conduct indicator in public service, established on March 16, 2020 the remote work for pregnant and lactating public servants and employees while the state of public health emergency of international importance due to the coronavirus (Covid-19) persists (BRASIL, 2020).

Thus, the Hospital Universitário Professor Alberto Antunes (HUPAA), as a public federal health care institution, following such recommendations, has removed its employees from the so-called risk group, i.e., people who have a greater predisposition to fatal outcomes if affected by COVID, such as immunosuppressed workers, those with chronic diseases, pregnant women, and nursing mothers, to perform remote work.

Remote work is an innovation in the nursing work process expanding the perspectives of care and ensuring the safety of professionals in risk groups (SCARCELLA and LAGO, 2020). Carvalho and Fincato (2018) point out that telework can be considered as a current phenomenon in the scenario of major lasting political, economic and social transformations, as it permeates determining factors of change, such as: flexibility, Information and Communication Technology (ICT) and sustainability.

Given the above, the present study aims to describe the experience of nurses at the Oncology Unit of HUPAA pregnant women in the context of the pandemic due to COVID-19.

2 DEVELOPMENT

2.1 METHODOLOGY

This is a descriptive, exploratory study, of the experience report type, described by nurses of the chemotherapy sector of the Oncology Unit of the HUPAA.

2.2 EXPERIENCE REPORT

Pregnancy is a phase of many expectations and uncertainties for most women (FAGUNDES *et al.* , 2020). Some pregnant nurses at HUPAA reported concern about being infected by coronavirus and developing severe forms of the disease, as well as fear of having fetal complications.

Before the beginning of the pandemic, when the problem was still confined to mainland China, some publications said there was no "reliable evidence" that the virus could be transmitted **(**CHEN *et al.* , 2020). An example of this "scientific instability" refers to the possibility of vertical transmission, that is, from the woman to the fetus/baby during pregnancy or at delivery (SILVA, RUSSO and NUCCI and, 2021).

The HUPAA following governmental recommendations, in order to favor social isolation and avoid the exposure of this group in the hospital environment, removed its employees from the so-called risk groups, to telecommute, among them pregnant and lactating women with children up to 1 year of age. In the year 2021, there was an average of 30 pregnant/lactating employees on leave per month. This year, the HUPAA Oncology Unit had a total of 3 pregnant and 2 lactating collaborators away from on-site activities. A new challenge then arises for nursing, remote work.

In this context, the pregnant nurses started working at a distance. Among the activities developed, one can cite: Conducting scales of the chemotherapy nursing team of the Oncology Unit, conducting training and updating of the teams through video classes, preparation of scales of distribution of weekly activities, monitoring of EBSERH processes in the Electronic Information System (SEI), preparation of standard operating protocols of the Oncology Unit, among others.

3 FINAL CONSIDERATIONS

The Covid-19 pandemic, being a recent disease, multiplied the doubts and anguish among health professionals, especially nurses, technicians, and nursing assistants who experienced pregnancy and puerperium during the pandemic, due to the greater vulnerability resulting from the specifics of the job. Pregnant women have particularities, mainly related to their physiological and immunological changes. In addition, the need to protect the fetus represents a greater responsibility in relation to this group.

However, we emphasize that the technological innovation, through the remote work performed by the pregnant nurses during the pandemic, provided a beneficial experience, because it allowed to protect and safeguard this group, ensuring greater safety to the mother-child binomial.

REFERENCES

ALFARAJ S.H., AL-TAWFIQ J.A., MEMISH Z.A**.** Infecção por coronavírus da síndrome respiratória do Oriente Médio (MERS-CoV) durante a gravidez: relato de dois casos e revisão da literatura**. Revista de microbiologia, Imunologia e Infecção,** vol 52, Ed.3, pág. 501-503. 2019. DOI: https://doi.org/10.1016/j.jmii.2018.04.005. Disponível em: https://www.sciencedirect.com/science/article/pii/S168411821830152X?via%3Dihub**.** Acesso em: 28/10/2022.

ALZAMORA, M.C. *et al.* Severe COVID-19 during Pregnancy and Possible Vertical Transmission. **American Journal of Perinatology** Vol. 37 No. 8/2020. DOI:10.1055/s-0040-1710050. Disponível em: https://www.thieme connect.de/products/ejournals/abstract/10.1055/s-0040-1710050**.** Acesso em: 25/10/2022.

BRASIL Ministério da Saúde. Cadernos de Atenção Básica: Atenção ao pré-natal de baixo risco. Serie 32. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. – Brasília : **Editora do Ministério da Saúde,** 2012.

BRASIL. Instrução Normativa nº19 de 12 de março de 2020. **Diário Oficial da União**, Seção1, p. 13-14. 2020. Disponível em: http://www.in.gov.br/autenticidade.html, pelo código 05152020031300013. Acesso em: 22/10/2022.

CARVALHO, G. B. J.; FINCATO, D. P. A implantação do trabalho remoto no âmbito da Procuradoria Geral Federal. **Revista da AGU**, Brasília, v. 17, n. 3, p. 129-148, jul./set.2018. Disponível em: https://www.academia.edu/37524148/A_IMPLANTA%C3%87%C3%83O_DO_TRABALHO_REMOTO_NO_%C3%82MBITO_DA_PROCURADORIA_GERAL_FEDERAL . Acesso em: 10/10/2022.

CHEN H.C., *et al.* Características clínicas e potencial de transmissão vertical intrauterina da infecção por COVID-19 em nove gestantes: uma revisão retrospectiva de prontuários. **The Lancet**, Vol 395 March 7, 2020. DOI: https://doi.org/10.1016/ S0140-6736(20)30360-3. Disponível em: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30360-3/fulltext#seccestitle80**.** Acesso em: 19/10/2022.

FAGUNDES M.C.M. *et al.* Anseios das profissionais de enfermagem gestantes frente à pandemia de COVID-19. **Revista Enferm. Foco** 2020; 11 (Esp. 2): 109-113. Disponível em: http://biblioteca.cofen.gov.br/wp-content/uploads/2021/02/anseios-profissionais-enfermagem-gestantes-pandemia-covid-19.pdf. Acesso em: 27/10/2022.

KASANO J.P.M., DÍAZ I.S., SANTIBÁÑEZ L.M. Recomendaciones em gestantes durante la pandemia COVID-19. **Rev. Peru Investig Matern Perinat** 2020; 9(1): 59-62. DOI: https://doi.org/10.33421/inmp.2020191. Disponível em: https://investigacionmaternoperinatal.inmp.gob.pe/index.php/rpinmp/article/view/191. Acesso em: 28/10/2022.

MASCARENHAS V.H.A. *et al.* COVID-19 e a produção de conhecimento sobre as recomendações na gravidez: revisão de escopo. **Rev. Latino-Am. Enfermagem**. 2020;28:e3348. DOI: http://dx.doi.org/10.1590/1518-8345.4523.3348. Disponível em: https://www.scielo.br/j/rlae/a/WBFTkqSGYsKcqyzYfk9NVBj/?lang=en. Acesso em: 28/10/2022.

SCARCELLA M.F.S., LAGO P.N. Atuação da enfermagem em trabalho remoto no contexto da pandemia COVID-19. **Revista Nursing,** 2020; 23 (267): 4514-4517. DOI: https://doi.org/10.36489/nursing.2020v23i267p4514-4521. Disponível em:

https://www.revistas.mpmcomunicacao.com.br/index.php/revistanursing/article/view/831. Acesso em: 21/10/2022.

SILVA F.L., RUSSO J., NUCCI M. Gravidez, parto e puerpério na pandemia: os múltiplos sentidos do risco. **Horiz. antropol.,** Porto Alegre, ano 27, n. 59, p. 245-265, jan./abr**.** 2021. DOI: https://doi.org/10.1590/S0104-71832021000100013 . Disponível em: https://www.scielo.br/j/ha/a/mthgtDG3P5JxbT9fGhnf4Rz/?lang=pt. Acesso em: 18/10/2022**.**

OLIVEIRA F.P. *et al.* Assistência à saúde de gestantes no contexto da pandemia do COVID-19. **Rev Interdisciplinar**. v. 13, n.2021; 1843. Disponível em: https://dialnet.unirioja.es/servlet/articulo?codigo=7973392. Acesso em: 23/10/2022.

RONDELLI G.P.H. *et al*. Assistência às gestante e recém-nascidos no contexto da infecção COVID-19: Uma revisão sistemática. **Revista Desafios,** v7. 2020. DOI: **https://doi.org/10.20873/uftsuple2020-8943.** Disponível em: **https://sistemas.uft.edu.br/periodicos/index.php/desafios/article/view/8943/16730.** Acesso em: 27/10/2022.

KASANO J.P.M., DÍAZ I.S., SANTIBÁÑEZ L.M. Recomendaciones en gestantes durante la pandemia COVID-19. **Rev. Peru Investig Matern Perinat** 2020; 9(1): 59-62. DOI: https://doi.org/10.33421/inmp.2020191. Available at: https://investigacionmaternoperinatal.inmp.gob.pe/index.php/rpinmp/article/view/191. Accessed on: 28/10/2022.

MASCARENHAS V.H.A. et *al.* COVID-19 and the production of knowledge about recommendations in pregnancy: scoping review. **Rev. Latino-Am. Nursing**. 2020;28:e3348. DOI: http://dx.doi.org/10.1590/1518-8345.4523.3348. Available at: https://www.scielo.br/j/rlae/a/WBFTkqSGYsKcqyzYfk9NVBj/?lang=en. Accessed on: 28/10/2022.

SCARCELLA M.F.S., LAGO P.N. Nursing performance in remote work in the context of the COVID-19 pandemic. **Nursing Journal,** 2020; 23 (267): 4514-4517. DOI: https://doi.org/10.36489/nursing.2020v23i267p4514-4521. Available at: https://www.revistas.mpmcomunicacao.com.br/index.php/revistanursing/article/view/831. Accessed on: 21/10/2022.

SILVA F.L., RUSSO J., NUCCI M. Pregnancy, childbirth and puerperium in the pandemic: the multiple meanings of risk. **Horiz. antropol.,** Porto Alegre, ano 27, n. 59, p. 245-265, jan./apr**.** 2021. DOI: https://doi.org/10.1590/S0104-71832021000100013 . Available at: https://www.scielo.br/j/ha/a/mthgtDG3P5JxbT9fGhnf4Rz/?lang=pt. Accessed on: 18/10/2022**.**

OLIVEIRA F.P. *et al.* Health care for pregnant women in the context of the COVID-19 pandemic. **Rev Interdisciplinar**. v. 13, n.2021; 1843. Available at: https://dialnet.unirioja.es/servlet/articulo?codigo=7973392. Accessed on: 23/10/2022.

RONDELLI G.P.H. *et al*. Care of pregnant women and newborns in the context of COVID-19 infection: A systematic review. **Challenges Journal,** v7. 2020. DOI: **https://doi.org/10.20873/uftsuple2020-8943.** Available at: **https://sistemas.uft.edu.br/periodicos/index.php/desafios/article/view/8943/16730.** Accessed on: 27/10/2022.

CHAPTER 78

Hypertensive crisis in hospital urgency and emergency care: How to care?

https://doi.org/10.56238/10.56238/rsfohsv1-078

Clebiana Alves e silva Diniz
Enfermeira Mestranda em gerontologia. Instituição: Hospital Universitário Professor Alberto Antunes - HUPAA/UFAL
E-mail:clebiana31@gmail.com

Tainan de Andrade Rocha
Enfermeira Especialização: Urgência e emergência e UTI.
Instituição: Faculdade do Médio Parnaíba - FAMEP
E-mail: tainan_and_rocha@hotmail.com

Julia Maria Pacheco Lins Magalhães
Enfermeira Mestrado Pesquisa em Saúde. Instituição: Hospital Universitário Professor Alberto Antunes - HUPAA/UFAL
E-mail: juliapachecolins@hotmail.com

Natanielle de Albuquerque
Enfermeira Especialista em Oncologia/ Saúde Pública.
Instituição: Hospital Universitário Professor Alberto Antunes - HUPAA/UFAL
E-mail: monitoria_pe@yahoo.com.br

Sâmela Maria de Oliveira Silva
Enfermeira Mestrado em Oncologia e Hematologia.
Instituição: Hospital Universitário Professor Alberto Antunes - HUPAA/UFAL
E-mail: samela.silva@ebserh.gov.br

Poliana Silva de Brito
Enfermeira Especialista em Oncologia/ Saúde Pública.
Instituição: Hospital das Clínicas de Pernambuco- UFPE
E-mail: polianasb@hotmail.com

Suzana Maria de Oliveira Costa Meneses
Enfermeira Especialista em Enfermagem oncológica.
Instituição: Hospital Universitário Professor Alberto Antunes- HUPAA/UFAL
E-mail: suzaninha_costa@hotmail.com

Thaísa Mirella da Silva
Enfermeira Especialista em Oncologia Instituição: Hospital Universitário Professor Alberto Antunes- HUPAA/UFAL
E-mail: thaisa.mirella@ebserh.gov.br

Eliane dos Santos Nunes
Enfermeiro Especialista em Gestão e Serviços de Saúde.
Instituição: Hospital das Clínicas de Pernambuco- UFPE
E-mail: elianesantosnunes@hotmail.com

Manuelle de Araújo Holanda
Enfermeira Especialista em Hematologia/ Hemoterapia.
Instituição: Hospital das Clínicas de Pernambuco - UFPE
E-mail: manuelleholanda@hotmail.com

ABSTRACT
The hypertensive crisis is one of the complications of arterial hypertension, characterized by a sudden increase in blood pressure, with the possibility of damage to target organs, which increases the risk of death. This article aimed to analyze the care provided to hypertensive crisis in urgent and emergency care through scientific production. This is a bibliographic review. The selection of works for this review was based on a bibliographical research carried out in scientific production indexes (BIREME, LILACS, SCIELLO) with the descriptors hypertensive crisis, urgent and emergency care in hypertensive crisis, full scientific articles and published abstracts were chosen. This study focused on the hypertensive crisis, showing the importance of emergency care, the risk factors associated with the crisis, the common characteristics and the clinical conditions presented. It then becomes necessary to disseminate guidelines for the care of hypertensive crises, thus providing better quality care, without complications and unnecessary expenses.

Keywords: Hypertensive Crisis, hypertensive emergency, hypertensive urgency.

1 INTRODUCTION

Hypertensive crisis is one of the complications of arterial hypertension, characterized by an abrupt, inappropriate, intense, and symptomatic increase in blood pressure, which may cause damage to target organs (brain, heart, kidneys, and arteries), thus increasing the risk of death. In a hypertensive crisis, what commonly occurs is an elevation of the diastolic blood pressure of 120mmHg on average. However, in

specific cases, such as acute glomerulopathies and toxemia gravidarum, an increase in diastolic blood pressure of around 100 to 110 mmHg may occur (MARTIN *et al.*, 2004).

Arterial Hypertension (AH), in turn, is the multifactorial dysfunction characterized by sustained elevation of pressure levels greater than or equal to 140/90 millimeters of mercury (mmHg). It is often associated with metabolic disorders, functional and/or structural alterations of target organs (MARCIANO, 2021). AH constitutes an important risk factor for coronary heart disease and ischemic and hemorrhagic stroke. One of the global goals for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030 (WHO, 2021).

According to the Brazilian Guidelines on Hypertension, hypertensive crisis is characterized by a sudden increase in blood pressure (BP) usually associated with symptomatic manifestations, and can be divided into hypertensive emergency (HE) and hypertensive urgency (HU) (BARROSO *et al.*, 2021). The emergency occurs when there is target organ damage and imminent risk of death which requires a rapid reduction of blood pressure in a matter of minutes, whereas in hypertensive urgency there is no immediate risk of death and then a gradual decrease of pressure may occur in a matter of hours (MARTIN *et al*, 2004).

As it is characterized as urgent/emergency care, treatment has the main objective of avoiding damage to target organs due to the progression of the complication, minimizing the risk of consequences to the body and even death. Moreover, the choice of drug therapy depends on the underlying causes of the crisis, cardiovascular risk, and associated comorbidities (MALOBERTI *et al.*, 2018).

According to Guedes *et al.*, (2005), with the elevation of blood pressure, signs and symptoms such as severe headache, feeling unwell, anxiety, agitation, dizziness, chest pain, coughing, shortness of breath, visual changes, and vasospasms appear.

For Feitosa-Filho *et al.* (2008), among all visits to the emergency room, 3% of them are due to an imminent increase in blood pressure. Among these cases, it is estimated that 1 to 2% are hypertensive people who presented a set of signs and symptoms together with an unexpected elevation in blood pressure (BP) that resulted in emergency care.

Thus, the number of cases of hypertension has suffered a decline since 1940. Because until then, hypertension was not considered a pathology that could trigger major complications, on the contrary, it was seen as a component of the circulation, responsible for forcing the blood through the sclerotic arteries to the various tissues. In 1940, the adoption of drug therapy for patients with hypertension began, reducing morbidity and mortality (FRANCO, 2002).

Currently, systemic arterial hypertension (SAH) has been affecting about 15 to 20% of the Brazilian population, being classified as one of the cardiovascular risk factors. Although there is a variety of therapeutic measures for the chronic treatment of the disease, the rates of adequate control of SAH are lower than expected, with a high demand for urgent and emergency care of patients suffering from hypertensive crisis (MONTEIRO JÚNIOR *et al.*, 2008).

Within this perspective, the present study is justified by the fact that in the first contact with the emergency team, in triage, the classification of care occurs, according to need and severity. If an error occurs at this moment, the whole subsequent process will be compromised. The study aimed to analyze the care provided to hypertensive crisis in urgent and emergency care through scientific production previously published.

2 METHODOLOGICAL PROCEDURES

The study was a literature review, which according to Cerco and Bervian (1983) aims to gather, analyze and discuss information from documents already published, aiming to theoretically substantiate a particular theme. The selection of articles was based on bibliographic research carried out in the Virtual Health Library database (BIREME, LILACS, SCIELLO) with the descriptors hypertensive crisis, hypertensive pseudocrisis, urgency and emergency care. The articles chosen were: full scientific articles and published abstracts. Data collection was carried out in two moments: the first moment occurred on June 20th, 2010, in which articles and materials about methodology and hypertensive crisis were selected. The texts were the basis for the construction of the Introduction and Methodology of this article. The second moment was in January 2011, when the Results and Discussion were built using articles that approach the health team's assistance in the care of hypertensive crisis. Other literature was also used to complete the theme, which was not available in the Virtual Health Library.

3 RESULTS AND DISCUSSION

Among the articles found and chosen for the development of the study, some of them were published in the Brazilian Journal of Cardiology, and all were authored by cardiologists, nephrologists, nurses and nursing students. It is observed that these are recent studies, considering that the period of publication was between 2001 and 2009. The hypertensive crisis may be classified into two distinct clinical pictures, the first in a mild or moderate form, presenting symptoms such as dizziness, headache and tinnitus, without target organ damage, this picture of hypertensive crisis is called hypertensive urgency (IV BRAZILIAN GUIDELINES ON HYPERTENSION, 2004). The second clinical form, occurring the possibility of target organ damage, the symptoms are more intense, and dyspnea, chest pain, coma and even death may occur, thus having a hypertensive emergency. Thus, the emergency specialist or the nursing professional must differentiate between these two conditions to decide what is the best conduct in the situation (FEITOSA-FILHO ET al, 2008).

Feitosa-Filho et al. (2007), when evaluating the characteristics of patients arriving at the Emergency Unit, concluded that most of them were young, male, smokers, and constant alcohol consumption, and that 1/3 had no prior history of hypertension.

Blood pressure modification can appear with the inappropriate elevation of circulatory levels of substances responsible for vasocontriction of the arteries (norepinephrine, angiotensin, or the vasopressin)

that leads to increased systemic vascular resistance. As a result, shear forces trigger endothelial damage followed by fibrin and platelet damage. In cases of patients with chronic hypertension this process triggers milder changes, since, due to the chronicity of the disease, the vascular system has undergone changes such as remodeling or hypertrophy, which expands the limit of self-regulation of blood circulation and allows the adequacy of target organs to high pressure levels (GUASQUES; ROLANDI; CESARINO, 2008).

According to Franco (2002) the clinical manifestations of the hypertensive crisis are quite non-specific: headache, nausea and vomiting, dizziness, shivering, along with the increase in pressure, which will vary from case to case. The blood pressure level does not necessarily need to be very high to characterize a hypertensive emergency. A blood pressure of 160/100 mmHg in an adolescent with glomerulonephritis may develop hypertensive encephalopathy, or also with this same pressure level a pregnant woman with edema and proteinuria may have a seizure due to eclampsia, both pathologies classified as hypertensive emergency. Many times, even with a very high blood pressure level, it is not characterized as a hypertensive emergency, as is the case of an asymptomatic elderly person with no risk of target organ damage. For this reason, the approach to the patient's clinical conditions requires a precise assessment; the anamnesis consists of gathering the necessary information to characterize the crisis and outline the indicated treatment (GUASQUES; ROLANDI; CESARINO, 2008).

However, the indispensable topics in the anamnesis are current symptoms, preexistence of hypertension and hypertensive crises, neurological manifestations, symptoms of renal impairment and medications and drugs in use (PRAXEDES et al., 2001). The physical examination is done to obtain data on the clinical picture, being guided to verify damage in target organs, using the technique of pulse palpation in the limbs, heart and lung auscultation to check for murmurs, gallops and congestion. The fundus of the eye examination is essential in cases of suspected hypertensive crisis (FEITOSA-FILHO et al., 2008).

For Franco (2002) the fundus of the eye exam looks for visible alterations and does not require the use of vasodilator eye drops, since they may cause glaucoma crisis, if the person has this pathology, or even cause alterations that will make the neurological analysis of the patient difficult. The complementary exams are of utmost importance for the evaluation of the hypertensive picture and for the identification of the affected organs. The urine test will determine the existence of proteinuria and hematuria, the chest X-ray will investigate the cardiac area and possible pulmonary congestion, and the electrocardiogram will show some hypertrophy overload, arrhythmias, and conduction disturbances. These exams will be classified according to the analysis performed in the anamnesis and physical examination (PRAXEDES et al., 2001). After the classification of the case in hypertensive urgency or emergency, the specific complementary exams for each pathology are performed. The treatment must be initiated, evaluating the time of duration, tracing goals and establishing the intensity of the pressure to be reached (GUASQUES et al, 2008; PRAXEDES et al, 2001).

Within this perspective, Martin et al. (2004) carried out a retrospective study in the emergency department of a university hospital, analyzing the medical records of patients seen. The patients with

hypertensive crisis totaled 452, representing 5% of all clinical surgical care, among them 273 of urgency and 179 of hypertensive emergency. The identified risk factors related to hypertensive crisis were smoking and diabetes mellitus.

Pseudo hypertensive crisis constantly occurs in emergency care. What differentiates these patients is that despite the alteration in blood pressure levels, when evaluated with complementary exams there is no evidence of rapid target organ damage, nor imminent risk of life. These patients commonly have a past history of hypertension, but are defaulting on treatment for disease control, which leads to increased blood pressure. What may also lead to transient elevation of blood pressure and the occurrence of these pseudocrises are factors such as: some emotional event, pain, or discomfort such as migraine, dizziness, headaches, and panic syndrome manifestations (PRAXEDES et al., 2001).

Thus, when performing a study on the prevalence of pseudocrisis, Sobrinho et al. (2007) compared data from public and private hospitals and concluded that among the 110 patients studied, 48% had pseudocrisis, most of them from the private service (59%). Among the hospitals, the frequency of misdiagnoses regarding hypertensive crisis is similar, around 94% in the public service and 95% in the private service. Innovations in pharmacological therapies for arterial hypertension make acute blood pressure reductions possible, but the need to reduce pressure without compromising blood perfusion to target organs must be taken into consideration (FRANCO, 2002).

Thus, Guasques, Rolandi, and Cesarino (2008) and Praxedes et al. *(*2001) state that the mean arterial pressure should be reduced by no more than 25% compared to previous levels. A safe and practical way of reducing the pressure is not to immediately reduce the diastolic pressure to levels below 100 mmHg. The treatment must be continuously monitored, given the possibilities of complications such as cerebral or coronary hypoflow, and at any sign of complications a re-evaluation of the doses and drugs used is necessary. The classification of the case in hypertensive urgency, hypertensive emergency, and hypertensive pseudocrisis is of paramount importance for the choice of drug therapy. Monteiro Júnior et al. (2008) in a study carried out in an emergency room found that the medical conduct regarding the choice of adequate therapy according to the classification of cases was correct in 42% of the cases, being inadequate in more than half of the attendances. The hypertensive crisis is part of the routine of clinical emergency centers, so that the whole team must be trained in the correct identification of the condition presented to deal with these cases, this is not a problem of exclusive responsibility of the specialist in the area, but of the entire health team. It can be differentiated if it is an emergency or a hypertensive urgency, through a careful clinical history, objective and rigorous examination that includes neurological examination with fundoscopy performed by the specialist, palpation of peripheral pulses and performance of adequate complementary diagnostic tests, because the strategy and therapeutic approach depend on it.

The hypertensive crisis presents controversies related mainly to the correct diagnosis, the differentiation of emergency and urgency, the difficulties of evaluation and the choice of the appropriate therapy. This fact assumes greater importance when considering that the proper diagnosis and treatment

prevent serious injuries resulting from this medical condition. Therefore, the evaluation and diagnosis of CH should be performed in a targeted and objective manner (FRANCO, 2002).

The approach of the patient with hypertensive crisis requires a clinical and complementary evaluation performed in an appropriate place in clinical and hospital emergency centers. Next, we present ten sequential steps to approach the patient with hypertensive crisis, in such a way that the clinical and complementary investigation obtains the necessary information for diagnosis and establishment of the best treatment strategy (FRANCO, 2002).

The Hypertensive Crisis can be divided into hypertensive emergency and urgency, and is characterized by a marked elevation in blood pressure (BP) leading to or associated with impairment and rapid deterioration of target organ function and immediate risk of life. It is a condition that requires a rapid and gradual reduction in blood pressure levels, the time being measured in minutes to a few hours. It usually requires parenteral drug use and observation in the intensive care unit (VARON J & MARIK PE, 2000). Hypertensive urgency is characterized by rapid elevations in blood pressure, but without evidence of target-organ damage and without imminent life-threatening effects, allowing a slower reduction in BP levels over a period of 24 to 48 hours, usually using oral medications. An important fact of frequent occurrence in the treatment of hypertensive crisis is the so-called pseudocrisis (OLIVEIRA, 2008).

The increase in BP causes huge concern for physicians who provide care in primary care services or hospital emergency rooms, leading them to treat patients with pseudocrisis more aggressively, a fact verified by (Monteiro Júnior, et al. 2008) when they showed that 64.5% of hypertensive patients, characterized as having pseudocrisis, were seen in an emergency unit and inappropriately treated as hypertensive crisis (HC). In these patients, regardless of pressure levels, there is no evidence of acute target organ damage or immediate risk of life, when the patient is evaluated with the usual resources, mainly based on clinical history and physical exam, besides basic complementary exams (LESSA, 2001).

Thus, they are generally treated or untreated hypertensive patients, referred to the hospital emergency department for presenting very high BP measurements and who are oligosymptomatic or asymptomatic, therefore, carriers of uncomplicated and uncontrolled severe chronic hypertension. It must be emphasized, in these cases, that a reorientation and a re-evaluation by the physician are necessary. Another group of hypertensive patients may present transient elevation of the blood pressure before some emotional event, pain, or discomfort, such as migraine, rotational dizziness, vascular headaches of musculoskeletal origin and manifestations of panic syndrome, also characterizing a pseudo hypertensive crisis (TAVARES; KOHLMANN JUNIOR, 2001).

Thus, the diagnosis must be made based on the clinical and complementary investigation defined in the approach to CH, using the defined criteria that differentiate urgency from hypertensive emergency. The BP control in hypertensive urgency must be done in a longer period of time (24 to 48 hours). Therapy may be instituted after a period of about 2 hours of clinical observation in a calm, low-light environment, a condition that helps rule out situations of pseudo hypertensive crisis that may be resolved only with rest

and sometimes with the use of analgesics or tranquilizers. These measures may reduce the BP without the need for antihypertensives (TAVARES; KOHLMANN JUNIOR, 2001).

4 CONCLUSION

Within this context it was noted that hypertensive crisis has been increasingly frequent in the emergency department. Although there is already a national program for treatment of hypertension, most of the authors studied stated that these are the cases that most seek the emergency unit, since the treatment is not correctly adhered to. According to what was seen, it is clear the importance of the health professional who works in the urgency and emergency sector to guide people to adhere to the treatment of hypertension, since people who come to this sector presenting a hypertensive crisis need to be aware and act correctly, otherwise they will seek care again. It was also observed that the hypertensive crisis care is often neglected, because there is no consensus among health professionals regarding the differentiation of when it is a hypertensive urgency or emergency, so that the treatment is chosen appropriately. Thus, professionals working in primary care should create strategies aimed at the promotion, protection, and maintenance of the health of hypertensive people to prevent blood pressure changes. The articles showed that the publications are recent and thus reinforces the need for further studies that aim to disseminate the guidelines for the care of hypertensive crisis, thus providing a better quality care, without complications and unnecessary expenses.

REFERENCES

BARROSO, W.K.S. et al. Diretrizes Brasileiras de Hipertensão Arterial. **Arq. Bras. Cardiol**. v.116, n.3, p. 516-658, 2021. Disponível em: <https://abccardiol.org/wp-content/uploads/articles_xml/0066-782X-abc-116-03-0516/0066-782X-abc-116-03-0516.x55156.pdf>. Acesso em: 06 de dez. 2022.

CERVO, A. L.; BERVIAN, P. A. **Metodologia científica***:* para uso dos estudantes universitários. São Paulo: McGraw-hill do Brasil, 1983.

FEITOSA-FILHO, G. S. et al. Emergências hipertensivas. **Rev. Bras. Ter. Intensiva**, São Paulo, v.20, n.3, p. 305-12, 2008. Disponível em: <http://www.scielo.br/pdf/rbti/v20n3/v20n3a14.pdf>. Acesso em: 16 maio. 2010.

FRANCO, R. J. S. Crise hipertensiva: definição, epidemiologia e abordagem diagnóstica. **Rev Bras Hipertens**. São Paulo, v.9, n.4, out/dez, p.45, 2002. Disponível em: < http://departamentos .cardiol.br/dha/revista/4/ crises.pdf>. Acesso em: 16 mar. 2011.

GASQUES, J. C. P.;ROLAND, D. M S.; CESARINO, C. B. Caracterização da crise hipertensiva em pacientes de grupo de hipertensão de um ambulatório-escola. **Rev. Enferm**. UERJ. V.16, n.1, p. 46-50, jan.-mar, 2008. Disponível em: <http://www.portalbvsenf.eerp.usp.br/pdf/reuerj /v16n1/v16n1a07.pdf>. Acesso em: 25 de mar. 2009.

GUEDES N. G. et al. Crises hipertensivas em portadores de hipertensão arterial em tratamento ambulatorial. **Rev. Esc. Enferm**. v.39, n.2, p.181-8, 2005.

IV BRAZILIAN GUIDELINES ON HYPERTENSION. **Arq Bras Cardiol 82:** 16-19, 2004. Disponível em: http://www.fmrp.usp.br/revista/2003/36n2e4/18urgencias_emergencias_hipertensivas.pdf acesso em: 23 mai. 2011.

MALOBERTI, A. et al. Therapeutic Approach to Hypertension Urgencies and Emergencies in the Emergency Room. **High Blood Press Cardiovasc Prev**. v. 25, n. 2, p. 177 -189, 2018.

MARCIANO, M. V. F. et al. O papel da equipe de enfermagem frente a crise hipertensiva**. Brazilian Journal of Surgery and Clinical Research –BJSCR**, v.33, n.3, p.87-93, fev. 2021.

MARTIN, J. F. V. et al. Perfil de crise hipertensiva: **prevalência e apresentação clínica**. *Arq. Bras. Cardiol*, v.83, n.2, p.125-30, 2004.

MONTEIRO JÚNIOR, F. C. et al. Prevalência de verdadeiras crises hipertensivas e adequação da conduta médica em pacientes atendidos em um pronto-socorro geral com pressão arterial elevada. ***Arq. Bras. Cardiol.,*** v.90, n.4. São Paulo, abr. 2008.Disponível em: http://www.scielo.br/pdf/abc/v90n4/v90n4a06.pdf>. Acesso em: 16 mar. 2009

OLIVEIRA M. G. et al Análise da prescrição de captopril em pacientes hospitalizados. **Arq. Bras. Cardiol**., v.91, n.6, São Paulo, p.415-17, dez. 2008. Disponível em: < http://www.scielo.br/pdf/abc/v91n6/a09v91n6.pdf>. Acesso em: 23 mar. 2009.

OMS. **Prevalência da hipertensão**. Genebra: OMS, 2021. Disponível em: https://www.who.int/news-room/fact-sheets/detail/hypertension. Acesso em: 06 dez. 2022.

PRAXEDES J. N. et. al Encontro multicêntrico sobre crises hipertensivas – relatório e recomendações. **J. Bras. Nefrol**., v.23, p.1-23, 2001. Disponível em: <http://www.jbn.org.br/23-1/23S3.pdf>. Acesso em 16 mar. 2009.

SOBRINHO S. et. al Ocorrência e preditores clínicos de pseudocrise hipertensiva no atendimento de emergência. **Arq Bras. Cardiol**., v. 88, n.5, p. 579-84 2007.

TAVARES, A. ; KOHLMANN JUNIOR, O. Tratamento da crise hipertensiva / Treatment of hypertensive crises. **Rev. bras. hipertens**; 5(2): 120-5 abr.-jun. 2001. Disponível em:<http://bases.bireme.br/cgibin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&src=google&base=LILACS&lang=p&nextAction=lnk&exprSearch=260485&indexSearch=ID>. Acesso em: 19 jun. 2010.

VARON J & MARIK PE. The diagnosis and management of hypertensive crisis. **Chest 118**:14-27, 2000. Disponível em: http://www.fmrp.usp.br/revista/2003/36n2e4/18urgencias_emergencias_hipertensivas.pdf acesso em: 23 mai. 2011.

CHAPTER 79

Analysis of Drug Interactions in Patients With Heart Disease : An Experience Report

https://doi.org/10.56238/10.56238/rsfohsv1-079

Pedro de Almeida Rischard Poletto
Medical course academic.
E-mail: polettomed@gmail.com

Rafaela Bernardo Alaite
Medical course academic.
E-mail: rafaalaite@uni9.edu.br

Laura Alves Estevo
Medical course academic.
E-mail: lauraestevo@uni9.edu.br

Luiz Minuzo
Professor of the medical course.
E-mail:dr.minuzzo@uol.com.br

Luciana Vismari
Professor of the medical course.
E-mail: luvismari@gmail.com

Keywords: Interaction, Omeprazole, Clopidogrel.

1 INTRODUCTION

Cardiopathic patients routinely use multiple medications. This polypharmacy, although an important strategy for the control of comorbidities, can lead to numerous drug interactions, in addition to results of altered magnitude and specificity[1]. These interactions can be beneficial and expected, increasing treatment effectiveness, but they can also be undesirable, causing the opposite effect to the desired one[2].

2 OBJECTIVE

To report the experience of caring for a cardiac patient admitted to a public hospital with a complaint of anginal pain, focusing on discussing the possible impact of drug interactions on the ischemic presentation.

3 CASE REPORT

Male patient, 58 years old, with a history of three acute myocardial infarctions between 2009 and 2018, diabetic with glycated hemoglobin of 11.2%, (reference value (RV) <5.7%), dyslipidemic with LDL of 188 mg/dL (RV < 50 mg/dL), hypertensive, former smoker 62 years/pack, former severe alcoholic, reported anginal pain of intensity 10/10 on effort. Medications in use: omeprazole 20 mg, ASA 100 mg, carvedilol 25 mg, clopidogrel 75 mg, enalapril 5 mg, spironolactone 25 mg, metformin 850 mg, gliclazide 60 mg, atorvastatin 40 mg, dipyrone 500 mg. The Drugs.com database analysis of the drugs detected fourteen interactions: three (22%) mild, nine (64%) moderate, and two (14%) severe. Gliclazide is not included in the database used. Among the serious interactions is the association between spironolactone and enalapril, which can lead to hyperkalemia (not observed in the patient's tests). The co-administration of omeprazole and clopidogrel is associated with a decrease in the effect of the platelet antiaggregant, although no test to check platelet activity has been performed.

4 FINAL CONSIDERATIONS

The analysis suggests that the omeprazole-clopidogrel interaction may have culminated in decreased effectiveness of antiaggregant therapy. This fact was added to uncontrolled diabetes and dyslipidemia, increasing the risk of a new ischemic event. Therefore, a careful evaluation of the prescriptions is necessary in order to detect possible interactions, avoiding the risks of these interactions to be added to those of other comorbidities, ensuring the effectiveness of the instituted therapy.

REFERENCES

1- Jain S, Jain P, Sharma K, Saraswat, P. A Prospective Analysis of Drug Interactions in Patients of Intensive Cardiac Care Unit. *J Clin Diagn Res*. 2017 Mar 1;11(3): FC01–FC04.

2- Bundhun, PK, Teeluck, AT, Bhurtu, A, Huang,W-Q. Is the concomitant use of clopidogrel and Proton Pump Inhibitors still associated with increased adverse cardiovascular outcomes following coronary angioplasty?: a systematic review and meta-analysis of recently published studies (2012 – 2016). *BMC Cardiovasc Disord, 2017 Jan 5;* 17, 3.

3- Nag,K. Arvind, Umesh, M, Churi, S. Assessment of drug-drug interactions in hospitalised patients in India. Asian Journal of Pharmaceutical and Clinical Research, 2011 September; 4, 62-65.