International Journal of **Health Science**

RISK FACTORS FOR CARDIOVASCULAR DISEASE AMONG MEDICAL STUDENTS: A SYSTEMATIC REVIEW

Paloma de Lima Andrade
Universidade de Franca, Franca – Sp
http://lattes.cnpq.br/3446433736188770

Marina Carvalho de Oliveira
Universidade de Franca, Franca – Sp
http://lattes.cnpq.br/5220431171678731

Thanielle Souza Silva Brito
Universidade de Franca, Franca – Sp
http://lattes.cnpq.br/3403677915021723

Danubia de Sá-Caputo
Universidade do Estado do Rio de Janeiro
Rio Janeiro – RJ
http://lattes.cnpq.br/2124731935116117

Luiz Carlos de Abreu
Universidade Federal do Espírito Santo
Vitória – ES
http://lattes.cnpq.br/6796970691432850

Marcelo Ballaben Carloni
Universidade de Franca, Franca – SP
http://lattes.cnpq.br/5635754569291892

Sinesio Grace Duarte
Universidade de Franca, Franca – SP
http://lattes.cnpq.br/9622493605196572

Cynthia Antonia Kallás Bachur
Universidade de Franca, Franca – SP
http://lattes.cnpq.br/9109940201412543

José Alexandre Bachur
Universidade de Franca, Franca – SP
http://lattes.cnpq.br/9313688502495575

Abstract: Title: Risk factors for cardiovascular disease among medical students: a systematic review. **Introduction:** Heart disease and circulatory diseases are the leading cause of death in the world, and associated with this there are several factors that predispose to the risk of triggering such diseases, such as smoking, obesity, hypertension, diabetes and others. Thus, this study aims to contextualize this problem in the academic sphere, especially in the medical course. **Aim: To** evaluate cardiovascular risk factors in medical students, using the literature gathered. **Method:** Systematic review of cross-sectional studies, structured according to the PRISMA guidelines, developed from research questions, following the acronym PVO: How are the scientific foundations related to the prevalence of risk factors for cardiovascular disease in medical students. The Rayyan instrument was used to check eligibility, and the Critical Appraisal of Studies with Prevalence Data (ACEDP-JBI) tool and the GRADE (Grading of Recommendations Assessment, Development and Evaluation) system were used to assess the quality of the included studies. The results are shown in figures and tables. **Results:** This study used a total of 22 articles, and 13 were included in the review. Of the articles included, 77% were assessed as having a high level of evidence and 23% as having a moderate level of evidence, and the methodological quality classification of the included studies was 46.15% high quality and 53.84% moderate quality. **Discussion:** The results of the systematic review showed that many academics have some risk factors that can lead to cardiovascular disease, but that they also have knowledge on the subject and are not considered to be the main target, since such diseases are more relevant to people of older age. **Funding:** This study did not receive any funding.

Keywords: Risk factors, cardiovascular diseases and medical students.

INTRODUCTION

Over time, the impact of industrialization has led to many technological advances and modernization around the world, but it has also brought with it many habits that have become harmful to health, such as eating habits, in which many people give preference to services that offer fast service, variety of food, affordable prices, but little nutrition, as is the case with many fast food chains, which also favor the high consumption of processed and ultra-processed foods. Thus, it is clear that with modernity, in addition to the high prevalence of industrialized food consumption, a sedentary lifestyle has also become very prevalent, since the hectic routine, as seen in many big cities, ends up providing fewer moments of leisure and health care. As a result, bad habits have become risk factors that favor the appearance of many chronic diseases, especially cardiovascular diseases, which will be the focus of the discussion, and are conceptualized as covering diseases of the heart and blood vessels (PAHO, 2023).

According to the Pan American Health Organization, cardiovascular diseases (CVD) include coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism. And in the current context, these diseases have become the leading cause of death in the world, with around 17.9 million people dying from cardiovascular diseases in 2016, around three quarters of which were in underdeveloped countries (PAHO, 2023). This is an important fact, as it is in middle- and low-income countries that there is a greater consumption of low-nutrition and highly industrialized foods, leading to a greater predisposition to comorbidities and chronic diseases (Maciel, 2022).

As discussed, there are many risk factors for the development of cardiovascular diseases, and according to the Ministry of Health, among the most prominent are smoking, hypercholesterolemia (elevated low-density lipoprotein (LDL)), systemic arterial hypertension represented by a systolic blood pressure equal to or greater than 120 mmHg and a diastolic value equal to or greater than 90 mmHg, obesity that presents people with a BMI equal to or greater than 30 kg/m², diabetes mellitus, excess adipose tissue in the abdomen, a sedentary lifestyle, psychosocial stress, a diet low in fruit and vegetables, as well as males aged over 45 and females aged over 55 also being risk factors, and people with a history of premature coronary artery disease (first-degree men under 55 and women under 65) (MINISTÉRIO DA SAÚDE, 2006).

It is therefore clear that it is important to recognize these and related factors in academic settings, especially in the medical course, where it is very common for students to have a stressful routine, due to the high demand of the course, with few moments of leisure, and with neglected nutrition, being exposed to many industrialized foods, and also the high consumption of licit and illicit drugs, a fact that becomes very common in many universities (Santos et al., 2014). As a result, many people are psychologically unstable, with many cases of anxiety, stress and depression, all of which, added to the many others that university students are exposed to, can lead to and trigger cardiovascular diseases.

Therefore, given the importance of this topic and the grounds discussed, this systematic review study aims to evaluate the risk factors for cardiovascular diseases, especially for medical students, using the literature gathered on the subject.

METHOD

This article is a systematic review of cross-sectional studies on cardiovascular risk factors among medical students. Its development was based on the recommendations of the PRISMA tool (Principal Reporting Items for Systematic Reviews and Meta-analyses) (Moher et al., 2015), which is structured in the form of a checklist with 27 topics, helping to produce a quality systematic review.

As oriented, the construction of this literature review began with exploratory research questions, structured on the basis of the acronym P.V.O (Biruel et al., 2011), in which the P (composed of the problem situation) is the cardiovascular risk factors, the acronym V (research variables), such as the prevalence among medical students and the O (outcomes), arranged as follows: How are the scientific foundations related to the prevalence of risk factors for cardiovascular disease in medical students (Biruel et al., 2011).

Key words were taken from the research questions and used in scientific descriptors, including the DeCS Terms system (http://decs.bvs.br/) and the MeSH Database of the National Library of Medicine (https://www.ncbi.nlm.nih.gov/mesh/): 'risk factors', 'cardiovascular diseases' and 'medical students'. It was carried out on the Pubmed (Medline) database, with a filter applied to the last 10 years, covering articles published from 2014 to 2024.

In this way, the articles were previously evaluated in a paired manner, using the eligibility criteria for the inclusion and exclusion of scientific articles, and the tool used was the Rayyan tool developed by the QCRI - Quatar Computing Research Institute (2022) so that it brings together the literature, in a paired manner, in order to identify and eliminate duplicates and verify the eligibility of each document.

The articles included in this review are cross-sectional studies carried out on people, so that they were approved by the ethics

committee and had content that dealt with factors that contributed to an increased risk of cardiovascular disease or that caused harm to the health of medical students. And as an exclusion parameter, those that were not in line with the topic addressed or that did not address the selected audience, which in this case are medical students, were eliminated. The elements extracted from each stage of the article eligibility process were highlighted in the eligibility flowchart (Figure 1) and the analytical aspects were developed with a focus on the objective and outcome of each study, and their data is shown in Table 1.

For the included studies, a Critical Appraisal of Studies with Prevalence Data (ACEDP-JBI) tool was used, developed by the Joanna Briggs Institute (JBI), in order to assess the methodological quality of each article. It consists of nine questions, addressing various research development parameters and classifies each item as yes, no, uncertain or not applicable (JBI, 2014). The result extracted from the tool is shown in the Methodological Quality Assessment (Figure 2).

The systematic review also used the GRADE (Grading of Recommendations Assessment, Development and Evaluation) system, developed by a group of collaborative researchers, in order to verify the quality and strength of recommendation of each study (MS, 2014), and its results are shown in the Evaluation of the Levels of Evidence of Included Articles (Figure 3).

It is worth noting that for the development of the systematic review, all the tools used and the data collected were carried out in pairs between the participants of the study team under the supervision of the researcher in charge, with the aim of achieving group consensus. And in order to obtain a result of better agreement, the researchers were instructed and trained in advance on the tools, as guided by the literature (Donato et al., 2019).

RESULTS

According to the eligibility tools shown in figure 1, the studies collected and evaluated in the databases were 22 articles, all from MEDLINE/PubMed, none were excluded due to duplication, but 9 were excluded because they were considered to be different studies and/or unrelated to the objective of the topic, among these 3 studies had participants evaluated after the therapeutic intervention. And 9 studies were included, cross-sectional observational studies, as they were chosen because they met the objective of this study.

According to the analytical aspects, the objective and outcome of each study were evaluated, and it can be seen that among the objectives many evaluated similar aspects, all associated with the risk factors that students expose themselves to and their knowledge on the subject, and the outcome brought data that allows us to identify a better understanding of the risk factors at the most advanced stage of the course and highlighted some risk factors that increase the risk of triggering cardiovascular disease.

According to the assessment of methodological quality shown in figure 2, the studies examined showed that 46.15% had yes answers to all the items and were classified as being of high quality. Of the total, 53.84% answered no to one or more items, classifying them as studies of moderate quality. In addition, none of the studies had low methodological quality.

According to the evaluation of the levels of evidence of the articles included in figure 3, 10 studies were evaluated as high evidence articles, representing 77%, because they showed that new research would hardly change the reliability of the final result. And 3 studies, corresponding to 23%, were classified as moderate evidence, due to the possibility of having a significant impact on the reliability of the result and changing the final result with new research.

	Studies Identified in the Databases (DB)	
Identifica-tion	BD - 1 MEDLINE/PubMed n = 22 BD - 2 Web of Science n = 00 BD - 3 Scopus n = 00	

	Selected Studies	**Exclusion due to duplication**
Evaluation	n = 22	n = 00

	Evaluation Studies	**Exclusion of studies according to eligibility criteria**
Eligibility	n = 22	Different types of study and/or study unrelated to the objectives n = 9 Participants assessed after therapeutic intervention n = 3

	Included studies	Types of Studies Selected
Inclusion	n = 13	Cross-sectional observational studies n = 13

Figure 1. Eligibility Flowchart

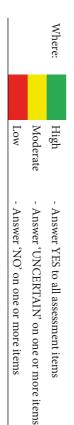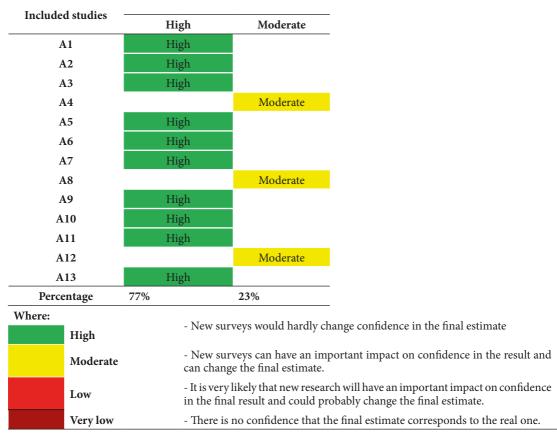|	Study objective(s)	Observed outcome(s)
A1	Classifying salt intake among medical students based on their knowledge, practices and attitudes	Most of the students knew that a diet high in salt could lead to various health problems. And they didn't know for sure whether the amount of salt in their meals was extremely high or not.
A2	To investigate whether nursing and medical students take care of their cardiovascular health and the risk factors that predispose them to this disease.	It is concluded that academics who take greater care of their cardiovascular health have a lower risk rate compared to those who do not take measures.
A3	To identify the occurrence of cardiovascular risk factors in medical students and compare the percentage of the result between the stages of the course, from the basic cycle to the internship. And also comparing with the same age group.	It was found that exposure to risk factors and established cardiovascular disease are lower in medical students when compared to the young adult population. In addition, medical training, especially during internship, favors greater health care, helping to prevent diseases, including the prevalence of CVD.
A4	To assess among doctors, final year medical students and patients what is known about the screening and management of pre-diabetes.	Knowledge among the people assessed about the management of pre-diabetics was poor.
A5	To identify risk factors among medical students, assessed by gender, overweight and obesity.	There was a higher occurrence of cardiovascular risk factors in males. And also in overweight and obese students. Compared to the average Slovakian population, young medical students had a lower frequency of risk factors.
A6	To evaluate the correlation of serum low-density lipoprotein and lipoprotein subfractions with other routine indices in medical students.	Medical students were more at risk of angiocardiopathy than young women. And medical students showed a high rate of abnormal serum lipoprotein.
A7	To highlight the risks of cardiovascular disease (CVD) among students of the medical profession (SMP) in India.	DRCV is increasing at an alarming rate among medical students in India.
A8	To classify medical students' knowledge and attitudes towards risk factors for cardiovascular disease, and to analyze the impact that medical training has on this prevention.	It showed that medical students in the more advanced cycle knew more about cardiovascular risk factors than the younger ones.
A9	To examine dietary habits among students at Wroclaw Medical University, associated with nutritional risk factors for cardiovascular diseases.	Most of the students have an inadequate diet, especially the men.
A10	To assess the understanding and prevalence of risk factors for cardiovascular disease among medical students at the University of Lower Silesia.	It found that many medical students had an insufficient level of knowledge about cardiovascular risk factors.
A11	To analyze the 30-year risk of cardiovascular disease among medical students, based on the Framingham Heart Study (FHS) scale.	The risk of cardiovascular disease in medical students was almost a quarter of the total.
A12	To examine the incidence of overweight and obese medical students associated with cardiovascular risk factors.	Among the students, there was a high rate of obesity, with a prevalence of CVRF.
A13	To verify the prevalence of risk factors for cardiovascular diseases among medical students aged between 18 and 25 in Egypt and Saudi Arabia.	Saudi medical students had a higher prevalence of premature coronary heart disease associated with obesity and family history. Egyptian students had a higher prevalence of hypertension.

Table 1. Analytical Aspects

Critical Evaluation of Studies with Prevalence Data - Joanna Briggs Institute	Studies Included in qualitative synthesis												
	AR1	AR2	AR3	AR4	AR5	AR6	AR7	AR8	AR9	AR10	AR11	AR12	AR13
1 Was the sampling frame adequate to address the target population?	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
2 Were the study participants appropriately sampled?	Green	Green	Green	Green	Green	Green	Green	Yellow	Yellow	Green	Green	Yellow	Yellow
3 Was the sample size adequate?	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
4 Have the subjects of the study and the setting been described in detail?	Green	Green	Green	Green	Green	Green	Green	Yellow	Yellow	Green	Green	Green	Green
5 Was the data analysis carried out with sufficient coverage of the sample?	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	Green
6 Were valid methods used to identify the condition?	Yellow	Green	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Green	Yellow	Yellow
7 Was the condition measured in a standard and reliable way for all participants?	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	Green
8 Was there appropriate statistical analysis?	Green	Green	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green
9 The response rate was adequate and, if not, the low response rate was managed	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Methodological Quality Classification	Moderate	High	High	High	High	Moderate	Moderate	Moderate	Moderate	High	High	Moderate	Moderate

Where:

Green	High - Answer YES to all assessment items
Yellow	Moderate - Answer 'UNCERTAIN' on one or more items
Red	Low - Answer 'NO' on one or more items

Figure 2. Methodological Quality Assessment

Included studies	High	Moderate
A1	High	
A2	High	
A3	High	
A4		Moderate
A5	High	
A6	High	
A7	High	
A8		Moderate
A9	High	
A10	High	
A11	High	
A12		Moderate
A13	High	
Percentage	77%	23%

Where:

	High	- New surveys would hardly change confidence in the final estimate
	Moderate	- New surveys can have an important impact on confidence in the result and can change the final estimate.
	Low	- It is very likely that new research will have an important impact on confidence in the final result and could probably change the final estimate.
	Very low	- There is no confidence that the final estimate corresponds to the real one.

Figure 3. Evaluation of the Levels of Evidence of the Included Articles

DISCUSSION

In this study, it was noted that many studies have shown that academic medical training influences greater knowledge of risk factors for cardiovascular disease, especially students who are in the more advanced stages of the course, as is the case with interns, but some studies have also shown limited knowledge on the part of students, especially in the early stages of the course, not knowing for sure what the risk factors are that can trigger the disease. And in studies that looked at their eating habits, many recognized that they had an inadequate diet, but didn't know for sure how much food would be harmful to their health.

As has been shown, male gender, smoking, overweight and obesity, diabetes and many others can be considered cardiovascular risk factors (PAHO, 2023). The studies showed that many male academics and those with a family history had a greater predisposition, as well as those who were also overweight and obese, with hypertension and diabetes, which is in line with current research.

Furthermore, it was also pointed out that even though some students have risk factors for developing cardiovascular disease, it is more common and more prevalent in older individuals in the same condition. This can be explained by the fact that many acute forms of cardiovascular disease take years to develop and occur later in life, due to the need to be exposed to risk factors for a long time. For example, strokes and heart attacks occur due to an acute episode caused by a blockage that makes it impossible for blood to pass through. This blockage is usually due to the accumulation of fat deposits, due to an inadequate diet, and associated with other risk factors, such as smoking and a sedentary lifestyle (PAHO, 2023), (MINISTÉRIO DA SAÚDE, 2006).

Thus, based on literary evidence, many cardiovascular diseases can be prevented with everyday attitudes, with healthy habits, such as eating a balanced diet, exercising regularly, giving up unhealthy addictions, such as smoking, and in this way many diseases of the heart and blood vessels can be avoided and consequently the incidence of deaths caused by these diseases can be reduced annually (PAHO, 2023). To this end, it is always important to have campaigns in the academic spheres of the medical course, to raise awareness that as well as learning to take care of other people's health, it is extremely important to take care of their own health, in order to promote quality of life and prevent health comorbidities.

FINAL CONSIDERATIONS

Considering the information and results extracted from this systematic review, we conclude that medical students are exposed to some risk factors for cardiovascular diseases, but are not potential targets when compared to the older population,

CONFLICTS OF INTEREST

The researchers of this systematic review declare that they have no conflicts of interest in relation to the topic covered in the study and the articles evaluated.

FUNDING SOURCES

The systematic review did not use any type of funding from any funding agency.

REFERENCES

BIRUEL, E. *et al*. Bibliotecário: Um Profissional a serviço da pesquisa. **Sistemas de informação, multiculturalidade e inclusão social**, Maceió, Alagoas, 2011

DONATO, H. *et al*. Revista científica da ordem dos médicos. **Etapas na Condução de uma Revisão Sistemática**, [*s. l.*], Março 2019. DOI https://doi.org/10.20344/amp.11923. Disponível em: http://www.actamedicaportuguesa.com/. Acesso em: 18 jun. 2024.

JBI - Joanna Briggs Institute *et al*. Avaliação Crítica de Estudos com dados de Prevalência (ACEDP-JBI). **Análise da qualidade metodológica de estudos de prevalência com a ferramenta do Joanna Briggs Institute (JBI)**, [*S. l.*], 6 jul. 2022. UFSC. Risco de viés em revisões sistemáticas: guia prático (cobe/ufsc), p. Cap.12.

MACIEL, A. J. Universidade de São Paulo - USP. **Estudo da USP mostra que população mais pobre consome mais alimentos industrializados**: Grupos com menor escolaridade possuem alimentação mais industrializada e com menor ingestão de hortaliças em comparação com as classes mais escolarizadas, [*s. l.*], 20 out. 2022. Disponível em: https://aun.webhostusp.sti.usp.br/index.php/2022/10/20/estudo-da-usp-mostra-que-populacao-mais-pobre-consome-mais-alimentos-industrializados/#:~:text=Grupos%20com%20menor%20escolaridade%20possuem,com%20as%20classes%20mais%20escolarizadas. Acesso em: 3 jun. 2024.

MINISTÉRIO DA SAÚDE. Cadernos de Atenção Básica. **Prevenção clínica de doença cardiovascular, cerebrovascular e renal crônica**, Brasília - DF, ed. 14°, p. 53, 2006.

MINISTÉRIO DA SAÚDE *et al*. Diretrizes metodológicas. **Sistema GRADE - manual de graduação da qualidade da evidência e a força de recomendação para tomada de decisão em saúde.**, Brasília - DF, 2014.

MOHER, D. *et al*. Sielo. **Principais itens para relatar Revisões sistemáticas e Meta-análises: A recomendação PRISMA**, [*s. l.*], Junho 2015. Disponível em: www.prisma-statement.org. Acesso em: 30 abr. 2024.

OPAS – Organização Pan-Americana da Saúde. **Doenças cardiovasculares,** 2023. Disponível em: https://www.paho.org/pt/topicos/doencas-cardiovasculares. Acesso em: 17 jul. 2024.

QCRI - Quatar Computing Research Institute *et al*. Rayyan. *In*: **Intelligent Systematic Review**. [*S. l.*], 2022. Disponível em: http://www.rayyan.ai. Acesso em: 10 jul. 2024.

SANTOS, A. K. G. V. *et al*. Simbiologias. **Qualidade de vida e alimentação de estudantes universitários que moram na região central de são paulo sem a presença dos pais ou responsáveis,** [*s. l.*], 2014.