



FACTORS ASSOCIATED WITH HIGH CARDIOVASCULAR RISK ACCORDING TO FRAMINGHAM SCORE: INTEGRATIVE REVIEW

Renata Soares Passinho**

Renan Sallazar Ferreira Pereira**

Adriano Marçal Pimenta***

ABSTRACT

Objective: to investigate in the scientific literature the factors associated with high cardiovascular risk of 10 and 30 years. **Method:** an integrative review of the literature conducted between July and November 2021 in the MEDLINE, CINAHL, WoS and EMBASE databases and in the Virtual Health Library portal. Duplicate articles were identified with EndNote software and the process of selecting the studies was presented in the PRISMA statement diagram. **Results:** 13 articles with one or more factors associated with high cardiovascular risk were selected, according to the Framingham score of 10 years. No selected article investigated the factors associated with high risk of 30 years. Poor eating habits, low socioeconomic status, low physical activity/sedentary lifestyle, impaired sleep pattern, abdominal adiposity, increased levels of Specific Prostatic Antigen in men, pre-frailty in older women, marital status (divorced or widowed man), profession (driver) and color (white woman) are associated with high cardiovascular risk of 10 years. **Conclusion:** risk factors that do not make up the Framingham score should be investigated during the collection of nursing data aiming at the implementation of actions to prevent and promote cardiovascular health.

Keywords: Heart disease risk factors. Health risk behaviors. Longitudinal studies. Adult. Observational study.

INTRODUCTION

Cardiovascular diseases (CVD) are the main causes of morbidity and mortality worldwide⁽¹⁾ and the reduction of their occurrence will only be possible by changing the lifestyle of the population through the prevention and control of their risk factors. Thus, among such factors, cardiometabolic (systolic blood pressure, low density lipoprotein cholesterol – LDL – and body mass index – BMI – elevated and renal dysfunction) stand out; behavioral (smoking, dietary risks, alcohol use and low physical activity); environmental (air pollution and environmental temperature)⁽¹⁾; and social (income level, educational level, employment status and neighborhood socioeconomic factors)⁽²⁾.

These factors promote cardiovascular risk (CVR) due to its clustering and multiplicative interaction⁽³⁾. Such estimation of the risk of illness contributes to the modification of people's life habits, thus facilitating adherence to the necessary treatments and healthy behaviors⁽³⁾.

Among the scores that estimate CVR, the most

well-known and used worldwide is the Framingham score, which allows the estimation of risk in 10⁽³⁾ and in 30 years⁽⁴⁾. The 10-year score estimates an individual's risk of being diagnosed with coronary heart disease, cerebrovascular accident, peripheral arterial disease, and heart failure in the next 10 years. In addition, this can be calculated in people aged between 30 and 74 years⁽³⁾ and considers a high risk when it is higher than 20%. Already at the age of 30, which estimates the risk of having the diagnosis of coronary death, myocardial infarction, cerebrovascular accident, coronary artery disease combined with coronary insufficiency and angina pectoris, cerebrovascular accident plus transient ischemic attack, intermittent claudication and congestive heart failure, in the next 30 years, in people aged between 20 and 59 years, is considered to be a high cardiovascular risk when it is higher than 40%⁽⁴⁾.

The authors of the Framingham scores of 10⁽³⁾ and 30 years⁽⁴⁾ described two equations that can be used in the calculation of cardiovascular risk,

*Nurse. Master in Nursing. PhD student at the Federal University of Minas Gerais. Professor at the Health Sciences Training Center at the Federal University of Southern Bahia. Teixeira de Freitas, Bahia, Brazil. Email: renatapassinho@gmail.com. ORCID ID: <https://orcid.org/0000-0003-0605-1610>

**Nurse. Doctor in Nursing. Professor at the Nursing Department at the Federal University of Tocantins. Palmas, Tocantins, Brazil. Email: renansalazar@gmail.com. ORCID ID: <https://orcid.org/0000-0001-5140-4046>

***Nurse. Doctor in Nursing. Professor at the Nursing Department, Health Sciences Sector, Federal University of Paraná. Curitiba, Paraná, Brazil. Email: adrianompimenta@gmail.com. ORCID ID: <https://orcid.org/0000-0001-7049-7575>

especially considering the feasibility of their use in Primary Health Care (PHC) and the use of traditionally known cardiovascular risk factors. The first equation uses as variables age, BMI, systolic blood pressure, the use of antihypertensive medication (yes or no), current smoking (yes or no) and the diagnosis of diabetes (yes or no). The second equation uses, instead of BMI, the laboratory variables total cholesterol and high Density lipoprotein cholesterol (HDL-c).

However, for the calculation of CVR by Framingham score, other relevant cardiovascular risk factors, such as those related to eating habits, sedentary behavior and socioeconomic position of the individual, are not considered.

Thus, the hypothesis of this study discussed whether poor eating habits, low socioeconomic status and sedentary behavior are associated with high CVR in adults, according to the Framingham score at 10 and 30 years.

Therefore, this study aimed to investigate in the scientific literature the factors associated with high CVR in 10⁽³⁾ and in 30 years⁽⁴⁾, since, as well as the components included in the Framingham score (blood pressure, BMI, age, smoking and diabetes mellitus) there may be other determinants for this outcome. In addition, there are no published reviews that consider the high CVR according to the Framingham score and its associated factors, which shows the novelty of the research.

METHOD

Integrative literature review carried out in six stages: 1) identification of the theme and selection of the hypothesis or research question; 2) establishment of criteria for inclusion and exclusion of studies; 3) definition of the information to be extracted from the selected

studies; 4) evaluation of the studies included in the integrative review; 5) interpretation of the results; and 6) presentation of the review/synthesis of knowledge⁽⁵⁾.

The research question was elaborated considering the acronym PECO (P: population; E: exposure; C: comparator; O: result), adapted from the acronym PICOS for the inclusion of exposure, instead of intervention, in observational studies⁽⁶⁾. The guiding question of the review was: "Which factors are associated with high CVR in 10 and 30 years in adults?"

In addition, for the elaboration of the search strategy based on the acronym PECO, we used controlled terms, their synonyms and free terms, combined with the Boolean operators "AND" and "OR", respecting the search characteristics in each base consulted. It is emphasized that, in order to ensure the quality of the search strategy according to each database, a consultation was carried out with the services of two librarians.

The search was conducted in July and August 2021, through the journal portal of the Coordination for the Improvement of Higher Education Personnel (CAPES), in the bases Medical Literature Analysis and Retrieval System Online (MEDLINE/PubMed via National Library of Medicine), Web of Science (WoS); *Excerpta Medica Database* (EMBASE); and Cumulative Index to Nursing and Allied Health Literature (CINAHL). The Virtual Health Library (VHL) portal was also accessed for investigating research published in the Latin American and Caribbean Literature in Health Sciences (LILACS) databases, *Índice Bibliográfico Español en Ciencias de la Salud* (IBECS) and *Literatura Peruana en Ciencias de la Salud* (LIPECS).

Chart 1. Search expressions used in the integrative literature review according to the PECO strategy and the use of Boolean operators. Belo Horizonte, MG, Brazil, 2021.

BASES	SEARCH STRATEGIE
*NIH/ †MEDLINE; ‡CINAHL; §WoS; and VHL portal	(Adult OR "Young Adult" OR "Middle Aged" OR Aged) AND ("Risk Factors" OR "Cardiometabolic Risk Factors" OR "Cardiometabolic Risk Factor" OR "Heart Disease Risk Factors" OR Income OR Poverty OR "Life Style" OR "Healthy Lifestyle" OR Exercise Psychological OR "Psychological Stresses" OR "Stresses, Psychological" OR "Life Stress" OR "Life Stresses" OR "Stress, Life" OR "Stresses, Life" OR "Stress, Psychologic" OR "Psychologic Stress" OR "Stressor, Psychological" OR "Psychological Stressor" OR "Psychological Stressors" OR "Stressors, Psychological" OR "Psychological Stress" OR "Stress, Psychological" OR Employment AND Diet OR "Sedentary behavior" OR "Feeding Behavior") AND ("Framingham Heart Study" OR "Framingham Heart Studies" OR "Heart Studies, Framingham" OR "Heart Study, Framingham" OR "30-year Framingham" OR "10-year Framingham" OR "Framingham Risk Score")

**EMBASE	(‘adult’/exp OR ‘aged’/exp OR ‘middle aged’/exp) AND (‘cardiometabolic risk’/exp OR ‘risk factor’/exp OR ‘income’/exp OR ‘social status’/exp OR ‘lifestyle’/exp OR ‘mental stress’/exp OR ‘physical activity’/exp OR ‘healthy lifestyle’/exp OR ‘occupation’/exp OR ‘feeding behavior’/exp OR ‘poverty’/exp OR ‘sedentary lifestyle’/exp OR ‘heart disease risk factor’/exp) AND (‘framingham risk score’/exp OR “Framingham Heart Study” OR “Framingham Heart Studies” OR “Heart Studies, Framingham” OR “Heart Study, Framingham” OR “30-year Framingham” OR “10-year Framingham”)
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*NIH = National Library of Medicine; †MEDLINE = Medical Literature Analysis and Retrieval System Online; ‡CINAHL = Cumulative Index to Nursing and Allied Health Literature; §WoS = Web of Science; ||VHL = Virtual Health Library; **EMBASE = *Excerpta Medica Database*.

Source: The authors.

In addition, the inclusion criteria for the selection of articles were primary, observational epidemiological studies (cross-sectional, case-control or cohort), performed with people between 20 and 74 years (age group included in the estimation of cardiovascular risk in 10(3) and 30 years⁽⁴⁾, which brought in their results one or more associated factors/risk factors related to high CVR estimated by the Framingham score. As for the language, we opted for articles in English, Portuguese and Spanish, without year restriction. Exclusion criteria consisted of studies with people who were diagnosed with prevalent cardiovascular disease (CVD) (cerebrovascular accident, angina, aneurysm, arrhythmia, arterial insufficiency, acute myocardial infarction, heart failure and thrombosis) and cancer^(3,4), as well as publications belonging to the gray literature.

The initial selection in each database was made through the reading of the titles and abstracts, by the three authors of this research and by two collaborating students of the third author’s research group, and to identify the duplicates, was used the software manager of bibliographic references EndNote – Clarivate Analytics (register via CAPES Journals). To present the selection process of the studies, we used the diagram of the declaration Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA), version 2020⁽⁷⁾, adapted. The process of identification of the articles included in this review and data extraction took place after searching the four databases and the Virtual Health Library during the months of August, September, October and November 2021. For this, we used an instrument previously elaborated and validated by another author⁽⁸⁾, which has as items: identification (title of publication, title of journal, databases, authors, countries of origin of authors, language, year of publication, institution of study and type of publication); introduction and objectives (introduction and objective/ research question/

hypothesis); methodological characteristics (study design, sample, technique for data collection, and data analysis); results; and conclusions (conclusions and level of evidence).

Furthermore, the use of an instrument to extract key information from each article selected in the integrative review is necessary for the execution of step three of this type of study⁽⁵⁾. After transcription of the articles selected by the three authors of this study, who made independent reviews, for the instrument mentioned above, the main author organized the publications in a table containing study identification (Study 1, Study 2, etc.) database, country, year, sample, type of study and level of evidence⁽⁹⁾. The synthesis of knowledge was presented in descriptive form, with the gathering of information about the research question investigated according to cardiovascular risk factors.

Finally, this integrative review was performed considering the ethical aspects regarding the authorship of the researched and selected articles. Because it is a research conducted exclusively with scientific texts for the review of the scientific literature, it is not necessary to approve a Research Ethics Committee, according to Resolution 510/2016 of the National Health Council, article 1, single paragraph, item VI.

RESULTS

The initial research in the four databases chosen and in the Virtual Health Library resulted in a total of 12,180 works. Then, with the elimination of duplicate publications between the databases, 11,002 works remained for analysis. With the reading of the titles and abstracts, 217 publications remained. Considering the eligibility criteria, 53 original articles were selected to be read in full. Finally, 13 articles were selected that brought in their results one or more factors associated with high cardiovascular risk according to the Framingham

score of 10 years. No article selected in this review 30 years (Figure 1).
investigated the factors associated with high risk of

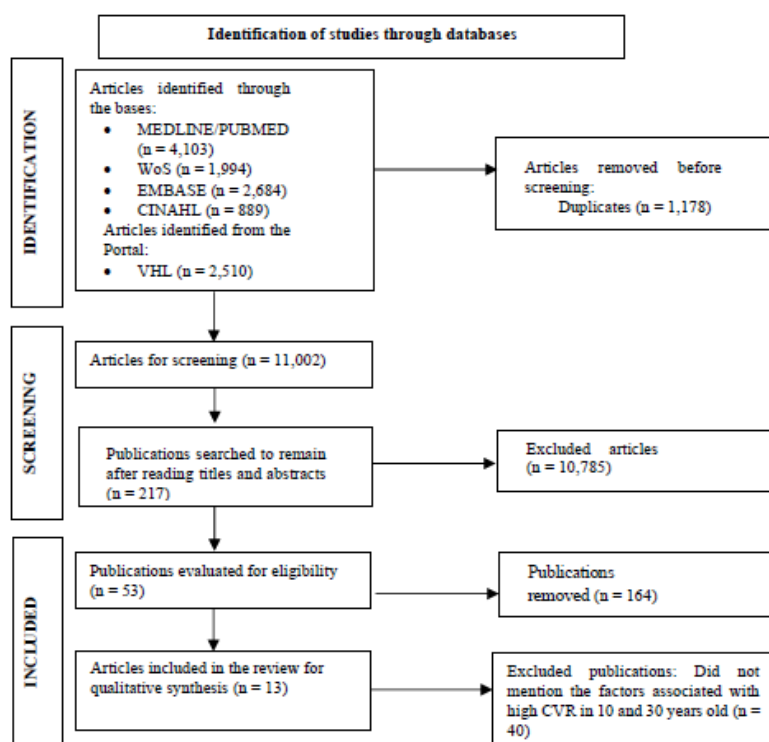


Figure 1. Diagram of selection of primary studies, drawn from the statement Preferred Reporting Items for Systematic Review and Meta-Analyses 2020 (PRISMA). Belo Horizonte, MG, Brazil, 2021.

Source: The authors.

The set of articles that composed the sample of this integrative review is characterized as follows: Canada, South Korea and Finland were the countries with the highest number of published studies on factors associated with high cardiovascular risk and were selected in this review (three articles each), followed by Brazil (two articles), United States of America and Mexico (one article each). Most of the selected studies were published in 2016 (four articles), followed by 2015

(three articles), 2017 and 2020 (two articles each), and 2012 and 2019 (one article each). Regarding the publication languages, considering the inclusion criteria for the selection of publications, all the studies analyzed were in English. Regarding the type of study and the level of evidence, of the 13 publications selected, 12 are cross-sectional studies (level of evidence 2C) and one is a prospective cohort study (level of evidence 1B) (Chart 2).

Chart 2. Studies included in the integrative literature review. Belo Horizonte, MG, Brazil, 2021.

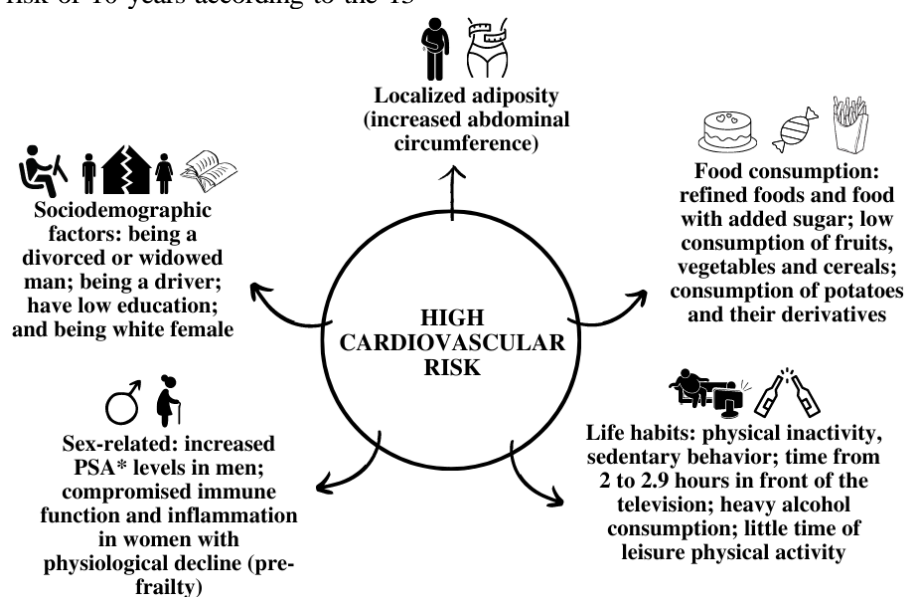
Study identification	Base	Country	Year	Sample	Type of study	Level of evidence
S1*(10)	EMBASE†	Canada	2020	985 women ≥55 years without CVD†	Cross-sectional	2C
S2*(11)	EMBASE†	Canada	2020	104 women aged 55 years or older and without CVD†	Cross-sectional	2C
S3*(12)	PubMed/MEDLINE	United States	2019	273 people diagnosed with rheumatoid arthritis	Cross-sectional	2C
S4*(13)	PubMed/MEDLINE	Brazil	2017	87 adults living with the human immunodeficiency virus and not using antiretroviral therapy	Cross-sectional	2C
S5*(14)	PubMed/MEDLINE	Finland	2017	1,398 individuals	Cross-sectional	2C

S6 ^{*(15)}	PubMed/ MEDLINE [†]	Mexico	2016	1,196 men and women aged 20-80 years without a diagnosis of CVD [‡]	Prospective cohort	1B [¶]
S7 ^{*(16)}	PubMed/ MEDLINE [†]	South Korea	2016	14,111 individuals ≥ 20 years old	Cross-sectional	2C
S8 ^{*(17)}	PubMed/ MEDLINE [†]	Brazil	2016	598 men aged ≥ 40 years	Cross-sectional	2C
S9 ^{*(18)}	PubMed/ MEDLINE [†]	Finland	2016	10,185 participants aged 25-74 years without CVD [‡]	Cross-sectional	2C
S10 ^{*(19)}	PubMed/ MEDLINE [†]	South Korea	2015	12,933 male workers	Cross-sectional	2C
S11 ^{*(20)}	PubMed/ MEDLINE [†]	Canada	2015	2,730 people between 30 and 74 years old and without CVD [‡]	Cross-sectional	2C
S12 ^{*(21)}	PubMed/ MEDLINE [†]	Finland	2015	4,031 adults without CVD [‡]	Cross-sectional	2C
S13 ^{*(22)}	WoS ^{§§§}	South Korea	2012	2,998 women aged 20 to 79 years without CVD [‡] or diabetes	Cross-sectional	2C

*S1, 2, 3(...) = Study 1, 2, 3(...). [†]EMBASE = *Excerpta Medica Database*; [¶]Level of evidence 1B: Cohort from the start of the disease; ^{||}Level of evidence 2C = Observation of Therapeutic Results (outcomes research) and/or Ecological Study; [†]PubMed/MEDLINE = Medical Literature Analysis and Retrieval System; ^{§§§}WoS = Web of Science. [‡]CVD = cardiovascular disease.

Source: The authors.

Figure 2 shows the factors associated with high cardiovascular risk of 10 years according to the 13 articles selected in this integrative review.



*PSA = Prostate Specific Antigen.

Figure 2. Factors associated with high cardiovascular risk according to the results of the 13 studies selected in the integrative literature review. Belo Horizonte, MG, Brazil, 2021.

Source: The authors.

Non-traditional cardiovascular risk factors were identified in the results of the articles selected in this review, such as marital status (being a widower)⁽¹⁷⁾, occupation (being a driver)⁽¹⁹⁾ and sleep^(16,18), in addition to those related to the sex of the individuals (increased levels of specific prostatic antigen – PSA⁽¹⁷⁾ and being a white woman⁽²⁰⁾), and the pre-frailty state in women^(10,11). In addition, the traditional risk factors found were increased

abdominal circumference^(13,14,17,20), low schooling⁽²⁰⁾, consumption of unhealthy foods^(15,20), sedentary lifestyle^(12,14, 18, 19,22) and heavy alcohol consumption⁽¹⁹⁾.

DISCUSSION

This integrative review showed that factors associated with high cardiovascular risk are directly

related to the population's lifestyle, sleep pattern, abdominal adiposity, food consumption and characteristics according to gender and sociodemographic factors.

First, increased abdominal circumference was associated with high cardiovascular risk of 10 years, according to the Framingham score, in the cross-sectional studies identified in this review (p value = 0.04⁽¹³⁾; p value < 0.001⁽¹⁴⁾; p value = 0.013⁽¹⁷⁾; OR: 2.25; 95% CI: 1.33-3.83; p value = 0.006⁽²⁰⁾). Excess visceral adipose tissue is associated with ectopic fat deposition, which is responsible for metabolic changes that affect the risk of developing diseases such as type 2 diabetes mellitus, obesity and CVD⁽²³⁾.

Another factor associated with high cardiovascular risk of 10 years, according to the Framingham score, was inadequate food consumption. In this review, food consumption considered at risk was presented with increased intake of refined grains, corn tortillas, soft drinks and sugar added to the food (RR: 2.98; 95% CI: 1.46, 6.10; p value = 0.020)⁽¹⁵⁾. High consumption of fresh fruits and vegetables (intake greater than or equal to three times/day) decreased the risk of having intermediate and high CVD scores at 10 years in 47% and 54%, respectively, compared to low consumption. Similarly, high intake of breakfast cereals (intake greater than or equal to four times/week) decreases the risk of having intermediate and high CVD scores in 10 years by 41% compared to low intake. In contrast, high consumption of potatoes and potato products increases the risk of having intermediate and high CVD risk scores at 10 years in 1.6 and 1.9 times, respectively, compared to low consumption⁽²⁰⁾.

It is noteworthy that the intake of added sugar is responsible for an increased risk of coronary events⁽²⁴⁾ and that low intake of fruits and vegetables is considered a risk factor for cardiovascular diseases⁽²⁵⁾.

Among the modifiable factors related to life habits, this review demonstrated that physical inactivity⁽¹⁹⁾ (OR: 1.28; 95% CI: 1.03 - 1.57; p value = 0.020), even when related to aging (0.1% prevalence of high cardiovascular risk in 10 years among elderly women aged 70 to 79 years)⁽²²⁾; sedentary behavior (p value = 0.019)⁽¹²⁾, including the short total daily accumulated duration of combat this behavior (less than five minutes) (p value = 0.018, r = 0.063)⁽¹⁴⁾; time from 2 to 2.9 hours in

front of the television (geometric mean of 4.28%; 95% CI: 4.11 - 4.46; p value = 0.008)⁽¹⁸⁾; and heavy alcohol consumption (OR: 1.83; 95% CI: 1.52 - 2.001; p value < 0.001)⁽¹⁹⁾ are associated with high cardiovascular risk in 10 years, according to the Framingham score.

Moreover, it is widely known that the risks associated with sedentary time are higher among people who are not physically active, and that sedentary behavior is an important risk factor for the occurrence of cardiovascular diseases⁽²⁶⁾. There is an association (Population Attributable Fraction – PAF: 8.64; 95% CI: 6.60 - 10.73) between time watching television (TV) and mortality from cardiovascular diseases (incident CVD, incident acute myocardial infarction, incident cerebrovascular accident and heart failure) and the replacement of time in front of TV by sleeping, walking or performing moderate or vigorous physical activity was associated with the reduction of this risk⁽²⁷⁾.

Heavy alcohol consumption (binge drinking) in single or several occasions in the month is associated with a higher prevalence of overweight (PR: 1.29; 95% CI: 1.12 - 1.49; p value < 0.001)⁽²⁸⁾ and may increase cardiometabolic risk factors⁽²⁹⁾, the cardiovascular risk. In a cross-sectional study conducted with 242 university students, alcohol consumption among young men was evidenced with a risk factor for cardiovascular diseases⁽³⁰⁾.

In addition, short and insufficient sleep was demonstrated in this review as one of the factors associated with high cardiovascular risk in 10 years in women (OR: 1.7; 95% CI: 1.36 - 2.14; p value < 0.001)⁽¹⁶⁾. Adherence to a healthy sleep pattern is associated with lower risks of mortality from all causes, including cardiovascular disease. Comparing participants with an unfavorable sleep pattern, those with a favorable sleep pattern present 24 to 42% lower risks of mortality from CVD⁽³¹⁾.

Some sociodemographic factors were shown in this review to be associated with high cardiovascular risk of 10 years, such as being divorced or widowed (p value = 0.010)⁽¹⁷⁾ and being a driver (OR: 1.38; 95% CI: 1.14 - 1.65); p value < 0.001⁽¹⁹⁾. White women (OR: 2.54; 95% CI: 1.13 - 5.71; p value = 0.027) had twice the intermediate or high cardiovascular risk of 10 years when compared to non-white individuals participating in the study⁽²⁰⁾.

Concerning education, having a few years of

study (reference group in the logistic regression performed) is considered as a strong predictor of intermediate or high cardiovascular risk, while having completed high school (OR: 0.32; 95% CI: 0.18 - 0.56; p value = 0.001) and the superior (OR: 0.43; 95% CI: 0.30 - 0.59; p value <0.001) are protective factors associated with intermediate and high cardiovascular risk⁽²⁰⁾.

Thus, a longitudinal study conducted in 20 countries showed that low education is an indicator of broader social disadvantage and that brings harm to the individual, along with low income, with regard to access to effective and timely health care, failing to pay for the necessary health care and living in neighborhoods with poor access to health services, especially in countries that lack universal health coverage. In addition, individuals with low income and low education have lower financial conditions to afford healthier diets, including fruits and vegetables, especially in poorer countries. Thus, in low-income countries and among people with low education, higher risk rates (Hazard ratio – HR) of severe cardiovascular diseases (HR: 2.23; 95% CI: 1.79 - 2.77) were found compared to high and middle income countries, even among individuals with low education⁽³²⁾.

Some non-traditional risk factors are also associated with the risk of developing CVD⁽²⁾, such as the individual's marital status. This may have an impact on cardiovascular outcomes because widowed individuals have a higher risk of developing cardiovascular diseases or being readmitted to the hospital for previous CVD (OR: 2.69; 95% CI: 1.60 - 4.52; p value <0.001)⁽³³⁾.

A Nigerian study on cardiovascular risk factors among professional drivers found high prevalence of physical inactivity (52.6%) and alcohol consumption (51.3%), and moderate prevalence of hypertension (36.2%) and hypertriglyceridemia (23.7%) among this group of workers⁽³⁴⁾. In addition to the higher prevalence of traditional cardiovascular risk factors among these professionals, the increased cardiovascular risk of illness due to stress during the exercise of the profession is highlighted.

One of the studies included in this review showed that white women had a risk of CVD twice as high as non-white women⁽²⁰⁾. However, the study itself mentioned that a small number of non-white individuals participated. The literature indicates a higher risk of cardiovascular disease among the black population, especially due to the

socioeconomic vulnerability that implies risk factors and health behaviors that favor illness⁽³⁵⁾.

Increased levels of prostatic specific antigen (PSA) in men⁽¹⁷⁾ ($p > 0.001$)⁽¹⁷⁾ and pre-frailty in women were identified in this review as associated with high cardiovascular risk (OR: 1.52; 95% CI: 1.12 - 2.05⁽¹⁰⁾, as well as high concentration of myokines (221.98 ± 63.33)⁽¹¹⁾). A cross-sectional Korean study identified that serum levels of total PSA within the reference range have an inverse association with subclinical atherosclerosis and CVD mortality, indicating a possible role of PSA as a predictive marker for subclinical and clinical CVD⁽³⁶⁾.

In addition, with regard to the state of pre-frailty and frailty (impaired immune function and inflammation in women with physiological decline) in women over 55, the two studies included in this review identified specific biomarkers (interleukin 6, erythropoietin, heart-type fatty acid binding protein 3, fibroblast growth factor 21 and interleukin 15) considered at risk for CVD and fragility biomarkers that are exacerbated with the risk of CVD^(10,11). Such association may be justified due to the sharing of chronic inflammation and insulin resistance in both situations of illness and, thus, there may be an increase in severity when they occur simultaneously⁽³⁷⁾.

A recent study published by the American Heart Association⁽³⁹⁾ addressed a set of eight metrics (diet, physical activity, nicotine exposure, sleep health, BMI, blood lipids, blood glucose and blood pressure) for the construction of what is considered an ideal cardiovascular health. Furthermore, it is important to note that, in addition to biological and behavioral risk factors, social determinants in health and psychological health were considered as essential for the optimization and preservation of cardiovascular health.

The non-traditional cardiovascular risk factors presented in this review (highlighting food consumption, lifestyle and sleep quality) are consistent with current metrics for optimal cardiovascular health, which reinforces the need to consider in clinical propaedeutic aiming at prevention and reduction of high cardiovascular risk. The report of non-traditional risk factors in the literature will help in evidence-based practice and in the provision of care increasingly directed to people with high lifestyle change and the choice of better therapeutic approaches to avoid the occurrence of

cardiovascular diseases, thus reducing their mortality.

The limitations of this review are the search for the literature restricted to articles that estimated high cardiovascular risk through the Framingham score of 10 and 30 years, which generated an excessive amount of exclusions from the studies initially found that dealt with cardiovascular risk estimated by other existing scores; that calculated only the cardiovascular risk of 10 years, but did not investigate its associated factors; approach to cardiovascular diseases as an outcome, without estimating cardiovascular risk. Few publications investigated the high cardiovascular risk, which made it difficult to select articles with this outcome for this review. No studies were found that investigated factors associated with high cardiovascular risk of 30 years, which demonstrates the need for publications in which this outcome is estimated.

As implications for the advancement of scientific knowledge for nursing, the report of non-traditional risk factors should be considered during clinical propaedeutic and in the educational process in health with the population, aiming at reducing the high CVR and as a consequence of cardiovascular diseases.

CONCLUSION

The integrative review answered the guiding

question by showing that poor eating habits, low socioeconomic status, sedentary lifestyle, impaired sleep, abdominal adiposity, increased PSA levels in men, frailty in older women, marital status (divorced or widowed man), profession (driver) and color (white woman) are associated with high CVR, according to the Framingham score of 10 years.

Thus, such factors should be investigated during the collection of nursing data aiming at the implementation of actions to prevent and promote cardiovascular health. It is important to note that the Framingham score was designed to be used primarily in primary health care due to its reliability and low cost. Therefore, it is essential to implement intervention strategies in health services focused on behavioral change of individuals in order to prevent the development of a high cardiovascular risk and, consequently, a CVD in the future.

This review also showed that there is a gap in the literature regarding longitudinal studies that investigate the association between non-traditional risk factors and high cardiovascular risk of 10 and 30 years. The predominant level of evidence in the included articles was 2C, according to the Oxford classification, therefore, there is a need to conduct prospective research that allow the establishment of an adequate causality relationship.

Finally, the absence of studies demonstrating the factors associated with high cardiovascular risk in 30 years suggests the need for research to include this outcome.

FATORES ASSOCIADOS AO ALTO RISCO CARDIOVASCULAR SEGUNDO O ESCORE DE FRAMINGHAM: REVISÃO INTEGRATIVA

RESUMO

Objetivo: investigar na literatura científica os fatores associados ao alto risco cardiovascular de 10 e de 30 anos. **Método:** revisão integrativa da literatura realizada entre julho e novembro de 2021 nas bases de dados MEDLINE, CINAHL, WoS e EMBASE e no portal da Biblioteca Virtual de Saúde. Os artigos duplicados foram identificados com o software EndNote e o processo de seleção dos estudos foi apresentado no diagrama da declaração PRISMA. **Resultados:** foram selecionados 13 artigos com um ou mais fatores associados ao alto risco cardiovascular, segundo o escore de Framingham de 10 anos. Nenhum artigo selecionado investigou os fatores associados ao alto risco de 30 anos. Os maus hábitos alimentares, a baixa posição socioeconômica, a baixa prática de atividade física/sedentarismo, o padrão de sono prejudicado, a adiposidade abdominal, os níveis aumentados do Antígeno Prostático Específico nos homens, a pré-frailidade em mulheres mais velhas, o estado civil (homem divorciado ou viúvo), a profissão (motorista) e a cor (mulher branca) se associam ao alto risco cardiovascular de 10 anos. **Conclusão:** fatores de risco que não compõem o escore de Framingham deverão ser investigados durante a coleta de dados de enfermagem visando à implementação de ações de prevenção e promoção da saúde cardiovascular.

Palavras-chave: Fatores de risco de doenças cardíacas. Comportamentos de risco à saúde. Estudos longitudinais. Adulto. Estudo observacional.

FACTORES ASOCIADOS AL ALTO RIESGO CARDIOVASCULAR SEGÚN LA PUNTUACIÓN DE FRAMINGHAM: REVISIÓN INTEGRADORA

RESUMEN

Objetivo: investigar en la literatura científica los factores asociados al alto riesgo cardiovascular de 10 y 30 años. **Método:** revisión integradora de la literatura realizada entre julio y noviembre de 2021 en las bases de datos MEDLINE, CINAHL, WoS y EMBASE y en el portal de la Biblioteca Virtual de Salud. Los artículos duplicados fueron identificados con el software EndNote y el proceso de selección de los estudios fue presentado en el diagrama de la declaración PRISMA. **Resultados:** fueron seleccionados 13 artículos con uno o más factores asociados al alto riesgo cardiovascular, según la puntuación de Framingham de 10 años. Ningún artículo seleccionado investigó los factores asociados al alto riesgo de 30 años. Los malos hábitos alimenticios, la baja posición socioeconómica, la baja práctica de actividad física/sedentarismo, el patrón de sueño comprometido, la adiposidad abdominal, los niveles crecientes del Antígeno Prostático Específico en los hombres, la prefragilidad en mujeres mayores, el estado civil (hombre divorciado o viudo), la profesión (conductor) y el color (mujer blanca) se asocian al alto riesgo cardiovascular de 10 años. **Conclusión:** factores de riesgo que no componen la puntuación de Framingham deberán ser investigados durante la recolección de datos de enfermería para la implementación de acciones de prevención y promoción de la salud cardiovascular.

Palabras clave: Factores de riesgo de enfermedades cardíacas. Comportamientos de riesgo a la salud. Estudios longitudinales. Adulto. Estudio observacional.

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Corresponding author: Renata Soares Passinho. Universidade Federal do Sul da Bahia. Campus Paulo Freire. Praça Joana Angélica, 250, São José – Teixeira de Freitas – BA, CEP: 45988-058. E-mail: renatapassinho@gmail.com.

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