REVIEW ARTICLE

CARDIOVASCULAR RISK FACTORS IDENTIFIED IN ADULT PATIENTS RECEIVING PRIMARY HEALTH CARE: AN INTEGRATIVE REVIEW

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Highlights: (1) Early identification of cardiovascular risk factors in Primary Health Care strengthens preventive actions, reduces morbidity and mortality, and supports evidence-based care. (2) Hypertension was identified as the main cardiovascular risk factor in Primary Health Care, frequently associated with diabetes, dyslipidemia, obesity, and smoking. (3) Emerging factors such as depression, chronic kidney disease, preeclampsia, arterial stiffness, and cancer history demonstrate potential to improve cardiovascular risk stratification in clinical practice.

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ABSTRACT

Objective: To provide a synthesis based on current scientific evidence regarding the factors that trigger cardiovascular diseases and can be identified by healthcare professionals during the care of the adult population in Primary Health Care. **Methods:** This study consists of an Integrative Literature Review of publications from 2019 to 2024, conducted using BVS, Scopus, Web of Science (WoS), and PubMed databases. The guiding research question was: "What information on the identification of cardiovascular risk factors is necessary to support healthcare professionals in primary care during the delivery of care to adult patients?". **Results:** Rayyan software was used to assist in bibliographic management, resulting in a total of 26 articles included in the study. To facilitate data comparison, enhance the understanding of relationships among risk factors, and optimize the analysis, similarity analysis was performed using IRaMuTeQ software. The main risk factors identified were hypertension, diabetes, dyslipidemia, smoking, physical inactivity, obesity, gender, age, and depression. **Conclusion:** Although cardiovascular disease risk factors are relatively easy to identify, their diagnosis in primary care is often delayed, increasing the risk of adverse events and compromising overall health outcomes. Early detection enables more effective preventive actions and a reduction in morbidity and mortality. Therefore, improving the technical and scientific knowledge of PHC professionals is essential, aligning with the objective of this study to compile evidence on the factors that trigger CVD in the adult population.

Keywords: risk factors; cardiovascular diseases; adult; primary health care; healthcare professionals.

INTRODUTION

Cardiovascular diseases (CVDs) are among the leading causes of death worldwide. According to the Pan American Health Organization (PAHO), among CVDs, acute myocardial infarction stands out, occurring when an interruption obstructs blood flow to the heart, primarily due to the accumulation of lipids within the inner walls of the coronary arteries that supply the myocardium[1]. The high incidence of CVDs has posed a significant challenge for health systems, particularly in primary care[2]. Over the past decade, the identification and control of risk factors for these conditions have become a priority, with efforts focused on promoting lifestyle changes, managing comorbidities, and improving access to preventive care[1,3].

Considering different age groups, the main risk factors for CVDs include hypertension, diabetes mellitus, dyslipidemia, smoking, physical inactivity, obesity, and family history[4]. Among older adults, hypertension predominates as the most important risk factor, given its high prevalence in this population[5,6]. In women, the most common risk factors are hypertension – especially during menopause due to the significant physiological changes associated with this phase – as well as diabetes mellitus[1,7].

Several studies have demonstrated that both hypertension and diabetes increase progressively with advancing age[8]. Despite being easily identifiable, these conditions are often underdiagnosed and detected late in primary care settings due to their frequently asymptomatic nature, which hinders adequate control and leads to a substantial increase in the risk of acute myocardial infarction and stroke[9].

The management of CVD risk factors is still predominantly carried out at the secondary or tertiary levels of care[4]. According to PAHO studies, early detection and management of risk factors are often insufficient in primary care, which may result in reduced effectiveness of preventive interventions and increased likelihood of sequelae and mortality[1]. Therefore, it is crucial to strengthen the management of CVD risk factors within primary care, where early detection and initial management can make a significant difference, contributing to improved health outcomes and reducing the overall burden of CVDs in the population.

Thus, the objective of this study was to provide a synthesis based on current scientific evidence regarding the factors that trigger cardiovascular diseases, which can be identified by healthcare professionals during the care of the adult population in Primary Health Care.

METHODS

This study consists of an Integrative Literature Review (ILR), conducted in six steps[10]. The overall purpose of an ILR is to synthesize knowledge on a given topic through a comprehensive review of the literature across different sources. This body of evidence enables researchers to make better use of findings from multiple studies, democratizing access to information and ensuring the inclusion of the most up-to-date evidence in the field of interest[11].

The guiding research question was: What evidence is available in the literature regarding the factors that trigger cardiovascular diseases that can be identified by healthcare professionals during the care of the adult population in Primary Health Care? This research

question was developed based on the PICo strategy, where P – Population – refers to healthcare professionals; I – Interest refers to information on the identification of cardiovascular risk factors; and Co – Context – refers to primary care. It is noteworthy that this strategy supported both the formulation of the review question and the selection of descriptors.

The literature search was conducted between May and June 2024, using the Virtual Health Library (VHL) portal. Searches were performed in the following databases: Latin American and Caribbean Health Sciences Literature (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Nursing Database (BDEnf), Scopus Preview (SCOPUS), Web of Science (WoS), and the National Library of Medicine (PubMed).

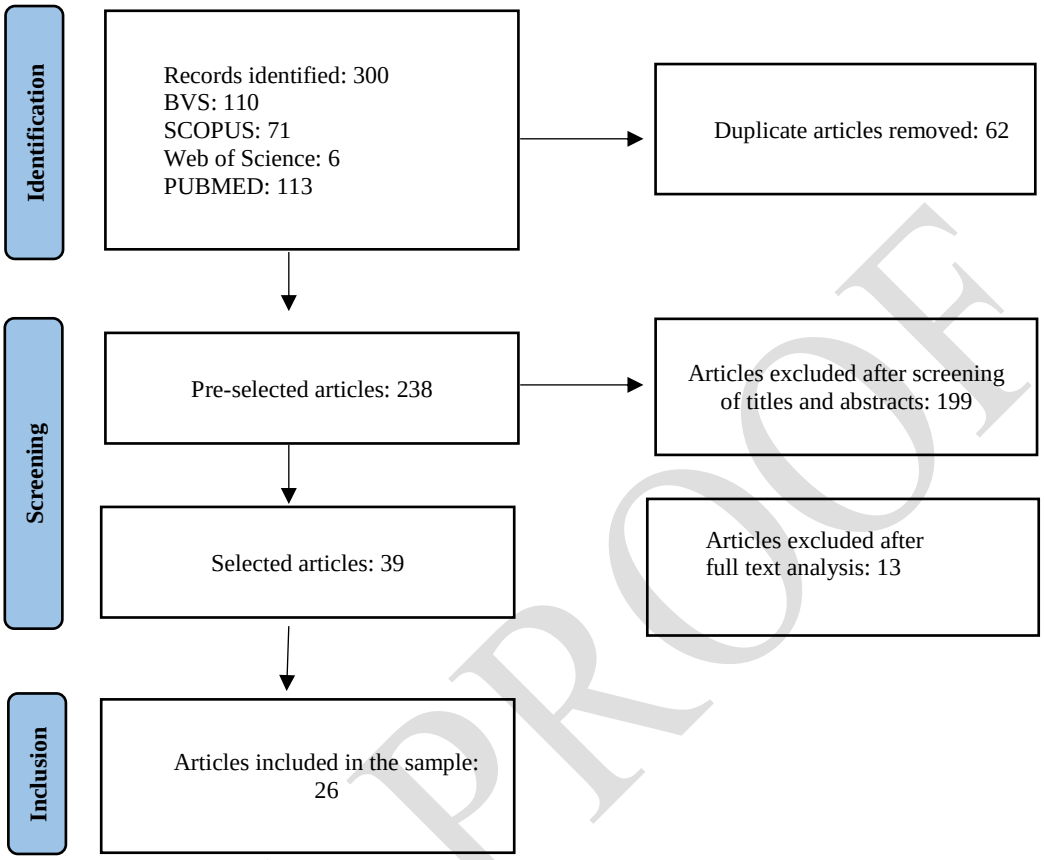
The following terms were used for the search: "Cardiovascular Risk Factors," "Cardiovascular Risk Score," "Primary Health Care," "Basic Care," and "First Level of Health Care," according to the Health Sciences Descriptors (DeCS) platform. Subsequently, search strings were developed in both Portuguese and English using the Boolean operators AND and OR to establish relationships between the terms.

The inclusion criteria were original documents (articles and guidelines) and review studies available electronically in full text, addressing the main topic, published in English, Spanish, or Portuguese, and recent studies from the last five years (2019-2024). The following types of publications were excluded: editorials, commentaries, descriptive reflections, experience reports, and articles whose titles were not related to the topic.

After the database searches, a total of 300 manuscripts were identified and exported to Rayyan software to assist with bibliographic management. Of these, 62 were duplicates and were removed, resulting in 238 articles. Subsequently, titles and abstracts were screened independently by two reviewers, with disagreements resolved through consensus and, when necessary, by a third reviewer.

After this stage, 39 articles were selected for full-text reading. A critical analysis of the included studies was then performed to identify the best available evidence, systematizing the lines of reasoning most closely related to the research topic. The studies were analyzed according to the synthesis of results and the risk factors addressed. The search and selection process is illustrated in Figure 1.

Figure 1 – Flowchart of the article selection process from database searches. Santarém, Pará, Brazil, 2025



Source: Prepared by the authors (2025)

The risk factors addressed in the manuscripts were subjected to similarity analysis, which is grounded in graph theory as an ideal mathematical model for studying relationships between objects. This approach enables the identification of word co-occurrences and the detection of patterns and relationships within textual datasets[12,13]. This analysis was conducted using IRaMuTeQ (*Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*) software.

RESULTS

The sample consisted of 26 manuscripts, characterized according to authorship, year of publication, and synthesis of results (Table 1).

ID	Author; Year; Country	Results
01	Ordúnez, *et al.* (2022); United States	The HEARTS application complements clinical judgment by assisting both healthcare professionals and individuals in understanding CVD risk, emphasizing the importance of identifying and modifying risk factors, and supporting interventions implemented within global health strategies.
02	Szőllősi *et al*. (2023); Hungary	Reducing alcohol consumption through primary care and preventive services is essential to decrease the burden of cardiovascular diseases in countries with a high cardiovascular risk profile.
03	Tin *et al.* (2022); China/Hong Kong	The detection of electrocardiographic abnormalities proved to be useful in improving risk stratification in the management of hypertension.
04	Silva *et al.* (2021); Brazil/Minas Gerais	The TG/HDL-C ratio has been shown to be a useful indicator for routine use in Primary Health Care as a risk factor for cardiovascular diseases.
05	Précoma *et al*. (2019); Brazil	Hypertensive individuals have a high prevalence of other cardiovascular risk factors, highlighting the importance of identifying these factors, assessing overall risk, and continuously monitoring care and outcomes.
06	Rantanen *et al*. (2019); Finland/Harja valte Kokemäki	Poor self-rated health is associated with depressive symptoms and a perceived decline in physical health and may be useful for detecting depressive symptoms in patients at risk for cardiovascular diseases and diabetes.
07	Di Giacomo *et al.* (2023); Italy	Emotional dysregulation affects self-care and psychological outcomes. Interventions focused on emotional regulation strategies can improve psychological well-being and reduce the risk of comorbidities and severe cardiovascular diseases.
08	Doble *et al.* (2023); United Kingdom	The implementation of a case-finding protocol for individuals at high cardiovascular risk may contribute to reducing the incidence of severe cardiovascular events and their associated costs to the healthcare system.
09	Rachamin *et al.* (2021); Switzerland	Women in primary care have poorer LDL-C control compared to men, regardless of cardiovascular risk. It is necessary to improve awareness, assessment, and management of elevated LDL-C to reduce gender disparities in CVD prevention.

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10	El Baou *et al.* (2023); England	The management of depression through psychological interventions may reduce the risk of cardiovascular diseases (CVDs).
11	Hanif *et al.* (2021); Bangladesh	In Bangladesh, one in four adults is at high risk of CVDs, with men being more vulnerable. Non-laboratory-based risk prediction charts are effective in low-resource settings, and the government should invest in training primary healthcare professionals to use them and manage risk control in areas without access to laboratory testing.
12	Strongman *et al*. (2023); England	Developers of the QRISK3 model should incorporate variables related to cancer history into future cardiovascular risk prediction models, as the increased risk of heart disease may arise from cancer-related factors independent of traditional risk determinants. These include treatment-related cardiotoxicities, such as those associated with chemotherapy and radiotherapy, which are not currently accounted for in QRISK3 scoring systems.
13	Abril-López *et al.* (2021); Ecuador	The Framingham Risk Score (FRS) has proven to be effective in estimating cardiovascular disease (CVD) risk in primary care settings. Its broader use across different healthcare units is recommended to improve risk assessment, support the implementation of preventive and care strategies, and ultimately enhance patient prognosis and quality of life.
14	Hippisley-Cox *et al.* (2024); United Kingdom	In external validation, QR4 demonstrated a higher C-statistic than QRISK3 for both genders, indicating greater predictive accuracy. QR4 also outperformed the ASCVD and SCORE2 risk scores, providing more precise prediction of CVD risk in the United Kingdom and identifying new at-risk groups compared with other international risk scoring systems.
15	Crump *et al.* (2021); Sweden	Preterm birth has been associated with an increased risk of heart failure in adulthood.
16	Sun *et al.* (2021); United Kingdom	The inclusion of polygenic risk scores (PRSs) alongside conventional risk factors may modestly improve the prediction of first-onset CVD, and, if applied at scale, could provide meaningful benefits for population health.
17	Kamieńska; Chlabicz, (2022); Poland	Arterial stiffness is an important factor associated with the incidence of CVDs and an increased risk of cardiovascular events. It can be measured noninvasively, providing a promising method for the detection of subclinical cardiovascular diseases.
18	Matsushita *et al*. (2023); 41 countries across Europe, the Middle East, Asia, Australasia, and the Americas	The inclusion of chronic kidney disease (CKD) measures improved the prediction of CVD risk beyond SCORE2 and SCORE2-OP, helping clinicians and patients refine risk estimation and personalize preventive therapies for cardiovascular disease.

19	Venetkoski *et al*. (2022); Finland	Pre-eclampsia significantly increases the risk of CVD in Finnish women, with magnitudes comparable to those reported in other countries.
20	Bechraki *et al*. (2022); Greece	The obesity index may be useful for predicting and refining cardiovascular disease risk in primary care settings.
21	Ortiz *et al*. (2022); Spain	Further research should investigate the optimal method for cardiovascular (CV) risk assessment that incorporates the evaluation of chronic kidney disease (CKD) in the general population.
22	Touloumi *et al*. (2020); Greece	The burden of cardiovascular risk factors among Greek adults is alarming. There is considerable preventive potential, and urgent actions are needed at both the healthcare system and societal levels.
23	Armas-Padrón *et al*. (2022); Spain	In addition to the low prevalence of ideal cardiovascular health (CVH) scores, an inverse relationship was observed between CVH and an ankle–brachial index (ABI) ≤ 0.9, as well as unfavorable outcomes among hypertensive patients in an urban population.
24	Calling, *et al*. (2021); Sweden	The TC/HDL-C ratio and non-HDL cholesterol (non-HDL-C) are clinical predictors of ischemic heart disease (IHD) in middle-aged women. However, non-HDL cholesterol, which shows a linear association with IHD, may be easier to calculate and interpret in clinical practice, facilitating the early identification of IHD risk in women.
25	Barroso *et al*. (2021); Brazil	HTN has a high prevalence and is one of the main risk factors for cardiovascular and renal diseases, with combined genetic, environmental, and social determinants.
26	Flood *et al*; (2022); United States	Hypertension and diabetes are modifiable risk factors for cardiovascular diseases that contribute to nearly one-third of all deaths in the Region of the Americas each year.

Table 1– Synthesis of the articles included in the Integrative Literature Review. Santarém, Pará, Brazil, 2025

Source: Prepared by the authors (2025)

Similarity analysis revealed hypertension as the main risk factor for cardiovascular diseases, placed at the center of its relationship with other risk factors such as diabetes, age, dyslipidemia, smoking, and obesity, which appear in proximity. This finding suggests that these risk factors frequently coexist and interact with each other, thereby potentiating cardiovascular risk (Figure 2).

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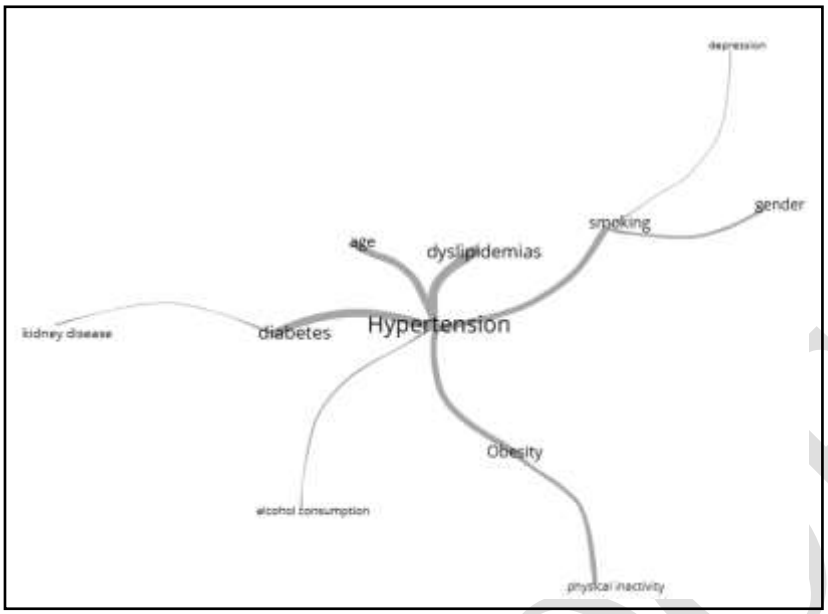

Figure 2 – Interrelationship among the main risk factors for cardiovascular diseases identified in the study through similarity analysis (IRaMuTeQ, 2022). Santarém, Pará, Brazil, 2025. Source: Prepared by the authors (2025).

It was further evidenced that, within PHC settings, additional risk factors such as physical inactivity, alcohol consumption, kidney disease, gender, and depression are also relevant in the composition of overall CVD risk. Additionally, the importance of incorporating variables that are often underreported in clinical practice was observed, such as symptoms of anxiety, oncological diagnosis, ethnic background, personal and family history of CVD, history of pre-eclampsia, congenital anomalies, chronic obstructive pulmonary disease (COPD), behavioral patterns and unhealthy dietary habits, alterations in the ankle-brachial index (ABI), preterm birth, and arterial stiffness. Although less frequently addressed, these factors may have a potential impact on cardiovascular risk stratification.

DISCUSSION

Hypertension was identified as the main risk factor for cardiovascular diseases and is associated with other risk factors such as diabetes, age, dyslipidemia, smoking, and obesity. The interaction between hypertension and dyslipidemia may exert a synergistic effect, exacerbating cardiovascular risk. When both factors are present, the risk is not merely additive but may be multiplicative, resulting in an even greater threat to cardiovascular health. Elevated

cholesterol levels and other dyslipidemias are important risk factors for atherosclerosis, which, in turn, contributes to the development of hypertension and CVDs[14]. It is noteworthy that differences in LDL-C control between men and women represent an important issue[15,16], as they indicate that women often face additional barriers in cholesterol management. This highlights the need to improve awareness and therapeutic strategies for elevated LDL-C to reduce inequalities in CVD prevention[17]. Studies indicate that the relationship between total cholesterol and HDL cholesterol (TC/HDL-C) and non-HDL cholesterol (non-HDL-C) are clinical predictors of ischemic heart disease (IHD) in middle-aged women, providing important insights into cardiovascular risk assessment[18,19].

According to the National Health Survey[20], overweight currently affects more than half of the adult population (60.3%), corresponding to approximately 96 million individuals, with a higher prevalence among women (62.6%). These rates directly impact the incidence of CVDs[21]. Therefore, obesity becomes a major risk factor not only for CVDs but also for other conditions such as diabetes, hypertension, and certain types of cancer. It is also associated with additional challenges, as societal stereotypes may lead to discrimination. In this context, beyond physical health, social and psychological aspects of individuals may also be affected[22,23]. Furthermore, obesity is one of the most significant risk factors for hypertension, and studies have demonstrated that increases in body mass index (BMI) are directly associated with elevated blood pressure. Obesity leads to hemodynamic and metabolic changes that contribute to increased blood pressure, and weight loss is recommended as an effective intervention to reduce blood pressure in overweight or obese individuals. This approach has clinically significant effects and a substantial impact on CVD prevention, potentially leading to a meaningful reduction in cardiovascular risk through lifestyle interventions or pharmacological treatment[24,25,26].

Diabetes, particularly type 2 diabetes, is closely associated with hypertension due to shared mechanisms such as insulin resistance and chronic inflammation. The coexistence of these conditions significantly increases the risk of cardiovascular complications[9].

Regarding age, arterial stiffness increases with aging, leading to greater resistance to blood flow and, consequently, elevated blood pressure[9,27].

Smoking is a well-established risk factor for CVDs, as nicotine induces vasoconstriction and increases blood pressure, while other components of tobacco contribute to inflammation and endothelial damage[26].

Kidney disease is both a cause and a consequence of hypertension. Reduced renal function affects the regulation of blood volume and electrolyte balance, which may lead to increased blood pressure. Adequate management of hypertension in patients with chronic kidney disease (CKD) is crucial to slow disease progression and prevent cardiovascular complications[28]. Studies emphasize the importance of including CKD-related measures in cardiovascular risk prediction, as this allows for the identification and management of individuals at high risk of developing CVDs. Furthermore, incorporating CKD measures into risk prediction has important implications for clinical practice, promoting a more proactive approach to the management of patients with CKD[29,30]. This is particularly relevant in older adults, in whom the coexistence of CKD and CVD is common and associated with high morbidity[28].

Regarding physical inactivity, the WHO highlights that lack of physical activity is a modifiable risk factor for CVDs. Regular physical activity has a direct antihypertensive effect, in addition to aiding in weight and glycemic control, and contributing to the reduction of cardiovascular complications[3].

With respect to gender, alcohol consumption, and depression, these factors are interconnected, as gender differences influence the risk of hypertension and the occurrence of cardiovascular events. Men tend to present higher risks of alcohol consumption and depression at younger ages, whereas women exhibit an increased risk after menopause[31]. The implementation of strategies aimed at reducing high levels of alcohol consumption is strongly recommended, as evidence supports that interventions targeting alcohol reduction in PHC can significantly decrease the burden of CVDs[8,31,32].

Integrated physical and mental health dimensions are associated with an increased risk of cardiovascular diseases (CVDs). As modifiable variables, these factors play a crucial role in population morbidity and mortality[33,34,35]. In addition, stress – affecting approximately 90% of the global population – is another factor strongly associated with diseases of the circulatory system. Emotional dysregulation resulting from stress may impair self-care and cardiovascular

health. Interventions focused on emotional regulation can improve psychological well-being and reduce the risk of CVDs and other comorbidities[31].

Preterm birth has been identified as a factor associated with an increased risk of developing CVDs throughout life[36]. This relationship has gained increasing attention, as it highlights the importance of perinatal factors in cardiovascular health. Early identification and appropriate management of risk factors in individuals born preterm may represent a significant opportunity to reduce the long-term burden of CVDs[37].

Pre-eclampsia, a hypertensive disorder of pregnancy, has also been identified as a significant risk factor for the development of CVDs[38]. Women who experience pre-eclampsia are often exposed to elevated blood pressure levels, proteinuria, and other metabolic dysfunctions during pregnancy – conditions that may persist or evolve after childbirth, increasing the risk of CVDs later in life[38].

The ABI is a marker of systemic atherosclerosis and is therefore associated with both atherosclerotic risk factors and CVDs[6]. ABI reflects arterial stiffness and vascular health; when reduced, it is associated with a higher risk of cardiovascular events. This finding reinforces the importance of regular assessment of this index in hypertensive patients[39].

Arterial stiffness reflects the loss of elasticity of blood vessels, a process that may precede the development of cardiovascular events such as myocardial infarction and stroke and has increasingly been recognized as an early marker of subclinical cardiovascular disease[39,40].

Attention should be given to the need to include cancer survivorship variables in cardiovascular risk scores, as a history of cancer not only suggests a potential genetic or environmental predisposition but also reflects the long-term effects of treatments such as chemotherapy and radiotherapy, which may lead to cardiotoxicity[41].

Certain risk factors, such as ethnicity, prior history of CVD, family history of CVD, COPD, and unhealthy lifestyle and dietary habits, were also identified in the reviewed studies. These factors are considered important predictors, with strong evidence indicating their contribution to the development of CVDs in the population and are relatively easy to identify in clinical practice[42,43,44].

Approaches involving health technologies highlight the diversity of CVD factors and emphasize the growing role of such technologies in PHC for risk identification. The HEARTS application is described as a promising tool for cardiovascular risk management, being useful

for both healthcare professionals and patients. The QR4 system is considered more accurate in predicting CVDs, as it incorporates more complex variables compared to QRISK3[45,46,47].

Além disso, a evolução na previsão de risco cardiovascular é evidente com a incorporação de novas variáveis, como histórico de câncer, escores de risco poligênico (PRSs) o que possibilita uma abordagem mais personalizada na medicina preventiva, superando modelos tradicionais como o QRISK3[47,48,49]. O Framingham Risk Score (FRS), por sua vez, é destacado por sua aplicabilidade global, oferecendo uma estimativa de risco a longo prazo baseada em fatores simples e amplamente disponíveis[50,51].

Furthermore, advancements in cardiovascular risk prediction are evident with the incorporation of new variables, such as cancer history and polygenic risk scores (PRSs), enabling a more personalized approach in preventive medicine and surpassing traditional models such as QRISK3[47,48,49]. The Framingham Risk Score (FRS), in turn, is highlighted for its global applicability, providing long-term risk estimates based on simple and widely available factors[50,51].

Another tool identified for the detection of CVDs involves electrocardiographic abnormalities[51]. Early identification of changes such as arrhythmias, ventricular hypertrophy, myocardial ischemia, and conduction abnormalities may indicate underlying conditions, including heart failure, coronary artery disease, and cardiomyopathies[51,52]. Additionally, continuous or periodic electrocardiogram (ECG) monitoring may assist in cardiovascular risk assessment in asymptomatic individuals, contributing to risk stratification within PHC. Studies conducted in Hong Kong, Portugal, and Brazil confirm that these approaches support the identification and management of cardiovascular risk factors[53,54,55].

In-depth knowledge of cardiovascular risk factors, particularly their early identification in Primary Health Care, is essential for the effective prevention of cardiovascular diseases[35,55]. PHC represents the first point of contact between the population and the healthcare system and is therefore the ideal setting for screening, guidance, and early interventions[3]. Timely identification of these factors by trained professionals enables the implementation of personalized care strategies, which not only contribute to reducing morbidity and mortality but also optimize healthcare system resources[1,4,25,50]. This understanding reinforces the need for continued professional education in PHC, as well as the integration of technologies and clinical

tools that enhance the capacity for diagnosis and monitoring of these risk factors, as highlighted in the analyzed studies.

Despite the wealth of information provided by the analyzed studies, several limitations should be acknowledged. Most studies employed diverse methodological approaches, which hindered the standardization of results and their comparability. In addition, a lack of studies integrating psychosocial factors – such as chronic stress and social determinants of health – with basic clinical assessments in cardiovascular risk evaluation within PHC was identified. Another limitation observed was the underreporting of certain emerging factors, such as cancer history, arterial stiffness, and pre-eclampsia, which, although relevant, are not yet widely incorporated into PHC screening practices. These gaps highlight the need for further research addressing cardiovascular risk in a more comprehensive and systemic manner, aligned with the realities of primary care settings.

CONCLUSION

The findings of the analyzed studies provide a comprehensive overview of current practices and challenges in the prevention and management of CVDs. The integration of new tools and approaches, the consideration of gender inequalities, innovation in risk prediction models, and the emphasis on emotional health are crucial aspects for improving the effectiveness of interventions. Hypertension emerged as the primary risk factor for CVDs in PHC, followed by dyslipidemia, smoking, obesity, diabetes, age, gender, kidney disease, depression, physical inactivity, and alcohol consumption. The importance of identifying additional factors – such as depressive symptoms, anxiety, cancer, ethnicity, prior history of CVD, family history of CVD, pre-eclampsia, congenital anomalies, chronic obstructive pulmonary disease, unhealthy lifestyle and dietary habits, alterations in the ABI, preterm birth, and arterial stiffness – was also highlighted, although these were less frequently addressed. These findings reinforce the need for effective strategies for diagnosis, monitoring, and prevention within primary care, with the implementation of evidence-based approaches aimed at identifying cardiovascular risk factors. Such strategies contribute to improving population health outcomes and strengthening the overall effectiveness of healthcare systems.

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