ORIGINAL ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

CARDIOVASCULAR RISK BY FRAMINGHAM SCORE AND C-REACTIVE PROTEIN PRIMARY HEALTH CARE

RIESCO CARDIOVASCULAR POR SCORE DE FRAMINGHAM Y PROTEÍNA C REACTIVA EN ATENCIÓN PRIMARIA DE SALUD

RISCO CARDIOVASCULAR PELO ESCORE DE FRAMINGHAM E PROTEÍNA C REATIVA NA ATENÇÃO PRIMÁRIA À SAÚDE

[1]Sarah Ohrana Freitas da Silva
[2]Eloisa Melo da Silva
[3]Karoliny Miranda Barata
[4]Kaila Correa Santos
[5]Afonso Pedro Guimarães Pinheiro
[6]Cecília Rafaela Salles Ferreira
[7]Walter de Souza Tavares
[8]Francineide Pereira da Silva Pena

[1]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0009-0003-7586-3863
[2]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0000-0002-1876-3095
[3]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0000-0001-5544-9137
[4]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0000-0002-8965-0266
[5]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0000-0001-5474-1689
[6]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0000-0001-6366-3440
[7]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0000-0002-8268-6207
[8]Universidade Federal do Amapá, Macapá - Amapá, Brazil. Orcid: https://orcid.org/0000-0001-8465-4252

Corresponding author
Sarah Ohrana Freitas da Silva
Av. Francisco Alves Correa 2256, Novo Horizonte, Macapá, AP – Brazil, CEP 68909-021, +55 (96) 98408-9961. E-mail: saraohana.sf@gmail.com

Submission: 29-04-2024
Approval: 25-10-2024

ABSTRACT
Introduction: Chronic disease is the main cause of morbidity and mortality in the world, with cardiovascular disease being one of the main causes of death, resulting from a combination of factors such as high blood pressure and diabetes mellitus. **Objective**: To evaluate the classification of cardiovascular risk using the Framingham Risk Score associated with the results of the C-Reactive Protein test in people with Diabetes Mellitus and/or Arterial Hypertension in a basic health unit. **Method**: Documentary, descriptive, quantitative study, with 100 medical records from April 2022 to December 202. Descriptive and inferential analysis was performed (Chi-square and Pearson's r correlation), values ($p<0.05$) were considered significant. **Result**: The sample consisted of 100 medical records of people with an average age of 58 years (SD=8.8), with a predominance of females (66%). When stratifying by the Framingham score, 47% were classified as low risk, 40% moderate and 13% high. Regarding C-reactive protein, there was a predominance of 56% with high risk, followed by 25% low and 19% moderate. There was no statistical significance in the comparison between scores. **Conclusion**: Cardiovascular risk stratification in Primary Health Care is essential for the development of strategies to promote health and reduce morbidity and mortality related to cardiovascular disease. It is recommended that C-reactive protein be used simultaneously with the Framingham score to assess cardiovascular risk factors.
Keywords: Cardiovascular risk; Arterial Hypertension; Diabetes Mellitus; C-reactive Protein; Framingham Score.

RESUMEN
Introducción: Las enfermedades crónicas son la principal causa de morbilidad y mortalidad en el mundo, siendo las enfermedades cardiovasculares una de las principales causas de muerte, como resultado de una combinación de factores como la hipertensión arterial y la diabetes mellitus. **Objetivo:** Evaluar la clasificación del riesgo cardiovascular mediante el Puntaje de Riesgo de Framingham asociado a los resultados de la prueba de Proteína C Reactiva en personas con Diabetes Mellitus y/o Hipertensión Arterial en seguimiento en una unidad básica de salud. **Método:** Estudio documental, descriptivo, cuantitativo, con 100 historias clínicas desde abril de 2022 a diciembre de 2023. Se realizó análisis descriptivo e inferencial (Chi-cuadrado y correlación r de Pearson), se consideraron significativos los valores ($p<0,05$). **Resultados:** La muestra estuvo compuesta por 100 historias clínicas de personas con una edad promedio de 58 años (DE=8,8), con predominio del sexo femenino (66%). Al estratificar por el puntaje de Framingham, el 47% se clasificó como de bajo riesgo, el 40% moderado y el 13% alto. En cuanto a la proteína C reactiva hubo un predominio del 56% con riesgo alto, seguido del 25% bajo y el 19% moderado. No hubo significación estadística en la comparación entre puntuaciones. **Conclusión:** La estratificación del riesgo cardiovascular en la Atención Primaria de Salud es fundamental para el desarrollo de estrategias para promover la salud y reducir la morbilidad y mortalidad relacionadas con la enfermedad cardiovascular. Se recomienda utilizar la proteína C reactiva simultáneamente con la puntuación de Framingham para evaluar los factores de riesgo cardiovascular.
Palabras clave: Riesgo Cardiovascular; Hipertención Arterial; Diabetes Mellitus; Proteína C-reactiva; Puntuación de Framingham.

RESUMO
Introdução: A doença crônica é a principal causa de morbimortalidade no mundo, sendo a doença cardiovascular uma das principais causas de óbitos, decorrente de uma combinação de fatores como a hipertensão arterial e diabetes mellitus. **Objetivo**: Avaliar a classificação do risco cardiovascular pelo Escore de Risco de Framingham associado ao resultado do exame de Proteína C Reativa em pessoas com Diabetes Mellitus e/ou Hipertensão Arterial em uma unidade básica de saúde. **Método**: Estudo documental, descritivo, quantitativo, com 100 prontuários no período de abril de 2022 a dezembro de 2023. Foi realizado análise descritiva e inferencial (Qui-quadrado e correlação r de Pearson), valores ($p<0,05$) foram considerados com significância. **Resultado**: A amostra foi composta por 100 prontuários de pessoas com média de idade 58 anos (DP=8,8), houve predomínio do sexo feminino (66%). Na estratificação pelo escore de Framingham 47% foram classificados em risco baixo, 40% moderado e 13% alto. Quanto à proteína c reativa houve predomínio de 56% com risco alto, seguido de 25% baixo e 19% moderado. Não houve significância estatística na comparação entre os escores. **Conclusão**: A estratificação de risco cardiovascular na Atenção Primária à Saúde é essencial para o desenvolvimento de estratégias de promoção da saúde e redução de morbimortalidade relacionada à doença cardiovascular. Recomenda-se o uso da proteína c reativa simultâneo ao escore de Framingham para avaliação de fator de risco cardiovascular.
Palavras-chave: Risco cardiovascular; Hipertensão Arterial; Diabetes Mellitus; Proteína C Reativa; Escore de Framingham.

REVISTA ENFERMAGEM ATUAL IN DERME

INTRODUCTION

Cardiovascular disease (CVD) is considered one of the main causes of premature death, accounting for one third of all deaths worldwide[1]. It is caused by a combination of factors that depend on synergistic interactions throughout the causal complex responsible for its development. It is considered that the increase in several risk factors can trigger a greater increase in cardiovascular risk than the increase in just one single risk factor[2].

Given the importance of recognizing risk factors, these are divided into two groups: non-modifiable ones, such as age, ethnicity, and family history, and modifiable ones, such as arterial hypertension (AH), diabetes mellitus (DM), dyslipidemia, smoking, sedentary lifestyle, and inadequate diet. Inadequate diet and lack of physical activity are primary risk factors for chronic noncommunicable diseases (NCDs), representing a prior determination in the causal chain in relation to AH, DM, and dyslipidemia[3]. Thus, among chronic diseases, DM and AH stand out as strong metabolic risk factors for the development of CVD[4].

Hypertension is a chronic disease that is associated with age, sex, race/color, family history, socioeconomic conditions, sedentary lifestyle, excessive salt intake, stress, alcoholism, smoking, overweight and obesity[5]. Persistent high blood pressure levels lead to reduced life expectancy due to increased risks of cardiovascular events, such as stroke, acute myocardial infarction, heart failure or peripheral arterial disease[6].

Diabetes mellitus is characterized by metabolic changes resulting from persistent hyperglycemia, resulting from defects in and/or the action of insulin produced by pancreatic beta cells, which can cause complications such as coronary artery disease[1]. Atherosclerotic cardiovascular disease is one of the main causes of morbidity and mortality in people with DM, resulting in high health costs. In addition, heart failure is also considered one of the main causes, in which hospitalization rates are twice as high in people with diabetes[7].

Therefore, the complexity and magnitude of CVDs affect the Unified Health System (SUS), mainly in Primary Health Care (PHC), which is responsible for the first level of care and attention to people with chronic diseases, as it is responsible for a set of individual, family and collective actions[4].

Thus, one of the strategies adopted in Brazil was risk stratification, and since 2006 the Ministry of Health has recommended the use of the Framingham Risk Score (FRS), with the assessment and classification based on the sum of points of the risk factors (age, sex, total and HDL cholesterol, systolic blood pressure, smoking and diabetes), estimating the risk of a cardiovascular event occurring in 10 years[8].

However, with the advancement of science, the emergence of inflammatory markers has gained ground in the assessment of cardiovascular risk, such as the use of the C-Reactive Protein (CRP) test, which has been

REVISTA ENFERMAGEM ATUAL IN DERME

associated with the assessment of cardiovascular risk due to the inflammatory process in the formation of atheroma plaques, showing a significant relationship with cardiovascular events[9].

From this perspective, primary health care becomes essential for the implementation of strategies aimed at promoting health, ensuring the integration of public policies with the population[10].

Considering the ERF and CRP as predictors for assessing cardiovascular risk, the question arose: what is the risk classification for cardiovascular disease measured by the Framingham score associated with the result of the C-Reactive Protein test recorded in the medical records of people with hypertension and/or DM treated at the Basic Health Unit (UBS) of the Federal University of Amapá (UNIFAP)?

The research proposal presented here is justified by the recommendation in the literature on the subject in question, associated with the absence of a study in the capital Macapá in a PHC service, which was sought and not identified. Thus, this study aims to evaluate the classification of cardiovascular risk by the Framingham Risk Score associated with the result of the C-Reactive Protein test in people with Diabetes Mellitus and/or Arterial Hypertension in a basic health unit.

METHODS

This is a documentary, descriptive, quantitative study on the topic of cardiovascular risk stratification for people with hypertension and/or DM in primary care. The research was conducted at the Basic Health Unit of the Federal University of Amapá, where people with hypertension and/or DM are being monitored, from April 2022 to December 2023.

The random sample consisted of 180 registered medical records of people being monitored for chronic diseases. However, after applying the inclusion and exclusion criteria, 80 were excluded, with the simple random sample consisting of 100 medical records.

The inclusion criteria were defined as: medical records of people with DM and/or hypertension being monitored, with complete completion of sociodemographic and clinical data and Framingham score; results of laboratory tests that show the biochemical profile (CRP, total cholesterol, HDL and HDL) that were performed at the Clinical Analysis Laboratory of the Congós Basic Health Unit (reference unit for users of the UNIFAP UBS); and medical records containing records of consultations carried out between April 2022 and December 2023.

Medical records registered in the Medical Archive and Statistics Service (SAME) of the UNIFAP UBS that were not at the filing location during the data collection period and registered medical records whose consultation information found that the person with hypertension and/or DM had a cardiovascular event (stroke, acute myocardial infarction, angina, heart failure, peripheral arterial disease, PAD) were excluded, noting that the Framingham score is considered to be an instrument for primary prevention.

REVISTA ENFERMAGEM ATUAL IN DERME

The medical record includes a nursing consultation form that allowed the collection of sociodemographic variables, clinical and biochemical variables, and the Framingham risk score. An Excel spreadsheet was created to organize and tabulate the variables of interest to the study. A sociodemographic and risk factor identification form was used to collect the variables. This form was systematized and developed by the researchers with closed questions to obtain sociodemographic and clinical characteristics.

The variables collected were information on sex, age, color/race, income, education, marital status, lifestyle habits (alcoholism, smoking, physical activity), personal and family history of hypertension; DM and CVD, treated and untreated systolic blood pressure, medications in use, capillary blood glucose, results of CRP tests, total cholesterol, HDL and LDL.

In the risk classification using the Framingham score, the assignment of points for each variable differs between the sexes and, from the sum of the scores, the percentage is obtained and the risk stratification is considered as low risk (<10%), moderate risk (10 to 20%) and high risk (20%). In relation, the classification of cardiovascular risk by CRP used the reference value of the clinical analysis laboratory that uses Immunoturbidimetry as the method of evaluating CRP and uses as a reference for inflammatory testing the normal value <8.0 mg/L and the following reference values for cardiovascular risk classification: low risk <1.0 mg/L; medium risk 1.0 to 3.0 mg/L; and high risk >3.0 mg/L[11].

For analysis and statistical treatment of the data, the statistical program - IBM SPSS Statistics version 29.0 for Windows[12] was used. Descriptive statistics were performed for mean and standard deviation (SD) measurements to characterize quantitative variables, and absolute and relative frequencies (%) to characterize qualitative variables. The statistical significance of differences between groups was assessed using the Chi-square test of independence (categorical variables), and for the association between measurable continuous variables, age, time since diagnosis, total cholesterol, HDL, LDL and systolic blood pressure, Pearson's r correlation. For all tests, a significance level of 5% ($p<0.05$) was considered.

For legal and ethical purposes between researchers and the data that were made available, a letter of consent was requested from the research site and the project was submitted to Plataforma Brasil, having been duly accepted under opinion no.: 74902823.5.0000.0003.

RESULTS

Of the 100 medical records that constituted the sample, 66% (n = 66) correspond to the female sex and 34% (n = 34) male, mean age of 58 years (SD = 8.8). Regarding race/color, there was a predominance of 54% (n = 54) self-declared brown, 26% (n = 26) white, 16% (n = 16) unknown and 6% (n = 6) self-declared black. The marital status was 43% (n = 43) married, 34% (n = 34) single, 9% (n = 9) widowed, 9% (n = 9) divorced and 5% (n = 5) in a stable union.

REVISTA ENFERMAGEM ATUAL IN DERME

Regarding education, 26% (n = 26) have completed high school, 22% (n = 22) have completed high school, 18% (n = 18) have incomplete high school and 17% (n = 17) have completed high school, 9% (n = 9) have incomplete high school, 7% (n = 7) have incomplete high school, while 1% (n = 1) are illiterate. The employment status is 40% (n = 40) self-employed non-contributing, 29% (n = 29) retired, 18% (n = 18) have formal employment and 13% (n = 13) are housewives. Regarding family income, 53% (n=53) have an income of 1 to 3 minimum wages, 30% (n=30) of 4 to 6 minimum wages, while 16% (n=16) have an income of less than 1 minimum wage and 1% (n=1) have a family income of more than 7 minimum wages.

As for clinical variables (Table 1), arterial hypertension is present in the majority (56%), as well as type 2 DM (90%), none of the participants had a previous diagnosis of cardiovascular disease.

Table 1 - Clinical variables of people with hypertension and/or diabetes - Macapá, AP, Brazil, 2024. (n=100).

VARIABLES		N	%
LIFE HABITS			
Alchool Ingestion	No	62	62,0
	Yes	38	38,0
Tobacco	No	74	74,0
	Yes	26	26,0
Physical Activities	Don't practice	49	49,0
	Practice	51	51,0
CLINICAL HISTORY			
Family history of diabetes mellitus			
	No	33	33,0
	Yes	67	67,0
Family history of High blood pressure	No	35	35,0
	Yes	65	65,0
Family history of heart disease	No	78	78,0
	Yes	22	22,0
UPDATED CLINICAL HISTORY			
High blood pressure	No	44	44,0
	Yes	56	56,0
	None	9	9,0
Diabetes Mellitus	DM Tipe 1	1	1,0
	DM Tipe 2	90	90,0
Heart disease	No	100	100,0
Medication	Oral Antidiabetic	38	38,0
	Oral Antidiabetic + Antihypertensive	39	39,0
	Oral Antidiabetic + Insuline	1	1,0
	Only Antihypertensive	9	9,0
	Only Insuline	3	3,0
	Antidiabetic + Antihypertensive + Insuline	6	6,0
	Antihypertensive + Insuline	4	4,0
Time ingesting alcohol	<5 years old	3	3,0
	5 a 10 years old	8	8,0
	>10 years old	26	26,0
	No use	63	63,0
Time smoking	<5 years ols	1	1,0
	5 a 10 years old	7	7,0
	>10 years old	17	17,0

REVISTA ENFERMAGEM ATUAL IN DERME

	No use	75	75,0
Time of High Blood Pressure diagnoses	<5 years old	7	7,0
	5 a 10 years old	21	21,0
	>10 years old	30	30,0
	no diagnoses	42	42,0
Time of Diabetes Mellitus diagnoses	<5 years old	16	16,0
	5 a 10 years old	31	31,0
	>10 years old	44	44,0
	no diagnoses	9	9,0

Source: Elaborated by authors (2024).

Complementing the clinical characteristics, systolic blood pressure had a mean of 132 (SD=17), capillary blood glucose at the time had a mean of 204.85mg/dL (SD=108). Total cholesterol had a mean value of 208.17dL/mg (SD=56), with a mean HDL of 49dL/mg (SD=12) and LDL of 119dL/mg (SD=39), and C-reactive protein had a mean of 3.4 (SD=2.3).

The Framingham classification indicates moderate risk in 40% of participants, with an alarmingly high risk in 56% for cardiovascular event by C-reactive protein (Table 2).

Table 2 - Cardiovascular risk classification - Macapá, AP, Brazil, 2024, (n=100).

CARDIOVASCULAR RISK CLASSIFICATION		**N**	**%**
FRAMINGHAM SCORE	Low Risk	47	47,0
	Moderate Risk	40	40,0
	High Risk	13	13,0
C-REACTIVE PROTEIN	Low Risk	25	25,0
	Moderate Risk	19	19,0
	High Risk	56	56,0

Source: Elaborated by authors (2024).

In the analysis of the association between sociodemographic/clinical variables and the Framingham score classification with age, duration of DM and blood pressure, it was found that there is an increasing correlation, in which the older the age group, the longer the disease duration, or even the increase in blood pressure, the higher the cardiovascular risk ($p<0.05$), and inversely proportional, the lower its levels of HDL cholesterol, the higher the cardiovascular risk (<0.001). The classification by the CRP score did not show an association with any of these variables ($p>0.05$).

Table 3 - Association between cardiovascular risk classification and age, time of diagnosis, total cholesterol, HDL, LDL and systolic blood pressure - Macapá, AP, Brazil, 2024, (n=100).

Variable	**Cardiovascular Risk Classification**			
	Framingham Score		**Score by PCR****	
	*r**	*p*	*r**	*p*
Age	0,4	**<0,001**	0	0,751
Time diagnoses HAS	-0,1	0,219	-0,1	0,199
Time diagnoses DM	0,1	**0,049**	0	0,387
Total Colesterol	0	0,478	0	0,942
HDL***	-0,4	**<0,001**	0	0,457
LDL****	0	0,995	0	0,957

REVISTA ENFERMAGEM ATUAL IN DERME

Systolic Blood Pressure	0,4	**<0,001**	0	0,913

Source: Elaborated by authors (2024).
Note: *Correlation is significant at the 0.05 level; **CRP – C-reactive protein; ***High Density Lipoprotein; ****Low Density Lipoproteins.

Table 4 shows the association between cardiovascular risk by Framingham and CRP scores and sociodemographic and clinical variables by Pearson's chi-square test. For sociodemographic variables, cardiovascular risk by Framingham score was higher for females (p<0.001), low risk was more present for participants with higher levels of education (p<0.001) and for employment status, being retired represents a higher risk (p<0.05). Regarding clinical issues, having a family history of hypertension was significant (p<0.05). No other association was statistically significant (p>0.05).

The investigation of cardiovascular risk by CRP also identified a higher risk for females (p<0.02), however, it did not present other statistically significant comparisons (p>0.05) (Table 4).

Table 4 - Classification of cardiovascular risk by score and association with sociodemographic and clinical variables - Macapá, AP, Brazil, 2024, (n=100).

VARIABLES		**CARDIOVASCULAR RISK Score of Framingham**						**CARDIOVASCULAR RISK Score PCR**					
		Low	**Moderate**	**High**	**Total**	***Qui****	***P***	**Low**	**Moderate**	**High**	**Total**	***Qui****	***P***
Gender	Male	4	19	11	34	31,698	**<0,001**	14	6	14	34	7,463	***0,024***
	Female	43	21	2	66			11	13	42	66		
Raça/cor	Ignored	5	11	0	16	9,518	>0,05	3	4	9	16	4,947	0,551
	White	12	7	5	24			9	3	12	24		
	Black	4	1	1	6			2	0	4	6		
	Brown	26	21	7	54			11	12	31	54		
Marital Status	Single	18	13	3	34	3,308	>0,05	5	8	21	34	9,137	,331
	Married	19	18	6	43			14	9	20	43		
	Stable Union	1	3	1	5			2	1	2	5		
	Widow(er)	4	3	2	9			3	1	5	9		
	Divorced	5	3	1	9			1	0	8	9		
School History	Illiterate	0	1	0	1	24,526	**0,017**	0	0	1	1	9,933	,622
	1º incomplete	11	5	2	18			3	6	9	18		
	1º complete	3	12	2	17			6	4	7	17		
	2º incomplete	2	4	1	7			1	1	5	7		
	2º complete	8	12	6	26			5	6	15	26		
	3º incompleto	7	1	1	9			3	0	6	9		
	3º completo	16	5	1	22			7	2	13	22		
Work History	Housewife	10	3	0	13	14,661	**0,02**	3	3	7	13	1,789	,938
	Self-employed non-contributor	17	14	9	40			9	9	22	40		
	Formal	11	7	0	18			6	3	9	18		
	Retired	9	16	4	29			7	4	18	29		
Family Income	<1 Salary mínimum	10	6	0	16	7,073	0,314	2	4	10	16	4,604	0,595
	1 a 3 Salaries mínimum	22	24	7	53			14	10	29	53		
	4 a 6 Salaries mínimum	15	9	6	30			8	5	17	30		

REVISTA ENFERMAGEM ATUAL IN DERME

	>7 salaries mínimum	0	1	0	1			1	0	0	1		
Alcohol ingestion	No	32	24	6	62	2,192	0,334	14	12	36	62	0,571	0,772
	Yes	15	16	7	38			11	7	20	38		
Smoking	No	38	28	8	74	2,528	0,282	18	12	44	74	1,821	,402
	Yes	9	12	5	26			7	7	12	26		
Physical Activity	Don't practice	26	18	5	49			14	8	27	49	,865	,649
	Pratice	21	22	8	51			11	11	29	51		
Family History HA	No	15	18	2	35	4,154	0,125	6	8	21	35	1,905	,386
	Yes	32	22	11	65			19	11	35	65		
Family History DM	No	13	16	4	33			8	6	19	33	,050	,975
	Yes	34	24	9	67			17	13	37	67		
Family History DCV	No	34	33	11	78			20	14	44	78	,275	,871
	Yes	13	7	2	22			5	5	12	22		
Personal History HA	No	25	18	1	44	8,583	**0,014**	13	8	23	44	,872	,647
	Yes	22	22	12	56			12	11	33	56		
Tipe of DM	Não	5	2	2	9	2,761	0,599	2	3	4	9	4,348	,361
	DM tipe 1	1	0	0	1			1	0	0	1		
	DM tipe 2	41	38	11	90			22	16	52	90		

Source: Elaborated by authors (2024).
Note: *Pearson's chi-square.

The presence of a higher percentage of low risk (=47) according to the Framingham score contrasts with the fact that, of these, n=26 are classified as high risk according to the CRP (Table 5). In the relationship between the two scores, there is no significant comparative association between them (p>0.05).

Table 5 - Association between Framingham score and CRP for cardiovascular risk classification - Macapá, AP, Brazil, 2024, (n=100).

CARDIOVASCULAR RISK CLASSIFICATION							
		SCORE PCR*			Total	Qui**	*P*
		LOW RISK	MODERATE RISK	HIGH RISK			
FRAMINGHAM SCORE RISK	LOW RISK	13	8	26	47	1,281	0,865
	MODERATE RISK	8	8	24	40		
	HIGH RISK	4	3	6	13		
Total		25	19	56	100		

Source: Elaborated by authors (2024).
Note: *C-reactive protein; **Pearson's chi-square; p = p value with statistical significance if p<0.05.

DISCUSSION

In this study, the sociodemographic and clinical characteristics of people with hypertension and/or DM being monitored at a PHC health unit in northern Brazil are similar to studies from different regions of the country[13,14]. Regarding cardiovascular risk classification, the study population showed a predominance of 47% with low risk in the stratification by FRS and 56% classified as high risk by CRP.

FRS is considered an indispensable method for the initial assessment of people with NCDs, evaluating sociodemographic, clinical and laboratory variables in clinical practice, allowing the identification and stratification of cardiovascular risk[15], offering support for the management of care

REVISTA ENFERMAGEM ATUAL IN DERME

and follow-up of people screened in a preventive manner, especially in primary health care[16]. However, it has been shown that high CRP values represent greater formation of atheroma plaques, associated with significant cardiovascular events; clinical studies have demonstrated its usefulness as a marker of atherosclerotic risk[11], which makes it conducive to predicting cardiovascular disease[17].

In the association between the Framingham score and the sociodemographic and clinical variables, it was possible to observe that the higher the age, duration of DM and the increase in blood pressure, there is a significant increase in cardiovascular risk, corroborating a study carried out with people with hypertension and/or diabetes, in addition to these, high levels of total cholesterol were also shown to be significant for stratification of higher risk[13]. Thus, for the clinical context, the associations evidenced between the variables indicate continuous risk[2], therefore, follow-up in the PHC with appointments according to stratification will allow control and prevention of cardiovascular events.

In a cross-sectional epidemiological study, there was a prevalence of high risk for people over 60 years of age, exposing the correlation with aging associated proportionally with risk factors[14]. From this perspective, age is considered a factor of concern, since the aging process is associated with progressive physiological losses causing the occurrence of non-communicable chronic conditions such as coronary disease, characterizing this population with higher risk stratification[10,18]. In contrast, the population of this study had an average age below 60 years; however, most of them have hypertension associated with DM, which increases the risk of cardiovascular events[2,4].

HTN acts synergistically with other risk factors for CVD, and its pro-atherogenic effect will be greater the greater the number and intensity of these other risk factors[2]. The Global Burden of Diseases (GBD) study indicates that systolic blood pressure was responsible for the largest number of disability-adjusted life years lost due to CVD globally[19].

An observational study on the prevalence of risk factors for cardiovascular diseases in people with diabetes indicates that the time since diagnosis of DM is related to a higher risk of CVD[20]. DM is associated with the development or worsening of atherosclerosis due to the interaction of metabolic disorders that corroborate the progression of damage to blood vessels[18,20].

High levels of HDL cholesterol are related to a lower cardiovascular risk in the stratification by ERF[13]. Corroborating these data, in the present study the correlation was significant, showing that high cardiovascular risk is related to low levels of HDL cholesterol in the population studied.

In the association between Framingham stratification and CRP, the female population showed predominance, in agreement with another study. This association may be related to the fact that women seek health services more often[15], as well as the greater survival and association with the menopause period, in this phase of the life cycle the female hormones decrease (estrogen) which influences the reduction of cardiovascular protection, occurring an increase in blood pressure levels[21], which, when not treated properly, predisposes to cardiovascular complications.

The ERF classification shows low risk in participants with higher levels of education. In a similar study, lower levels of education are related to high cardiovascular risk, highlighting the importance of considering socioeconomic variables, as they influence the individual's health[8].

REVISTA ENFERMAGEM ATUAL IN DERME

Another statistically significant data was work status, indicating that there is a higher risk associated with retired people. However, no studies were identified that associated this variable with cardiovascular risk. However, it is inferred that retired people have a higher risk due to their age and lifestyle habits maintained over the years. In addition, income can also influence the maintenance of healthy habits to reduce risks, contributing to the emergence of chronic conditions.

In this study, CRP does not present a statistically significant comparison with the other variables. On the other hand, a study indicates a strong association with the risk of hypertension and a family history of cardiovascular disease[9], variables also used in this study. The data obtained suggest that CRP is an independent factor when related to other risk factors. In this context, the literature recommends complementing the usual assessment of risk factors by CRP for primary prevention in people with NCDs[2].

There was no statistically significant association between the two scores analyzed. In comparison with another study, the correlation between the risk classification by the two scores was low, due to greater disagreement in the stratifications, in which the ERF underestimated a large part of the stratification by CRP[9]. This finding corroborates the results of this study.

Monitoring and following up on care to control risk factors is essential, since, through strategic actions, it is possible to prevent the onset and progression of the disease to complications such as the onset of CVD, thus contributing to health promotion, reduction of hospitalizations and mortality from cardiovascular disease[5].

The strategic action plan for tackling chronic diseases and non-communicable diseases, launched in 2021 by the Ministry of Health, includes as a strategic action in PHC for the promotion, prevention and care of the health of people with NCDs, the increase in the coverage of screening services and identification of cardiovascular risk with a view to creating a score for cardiovascular risk stratification[22].

Therefore, taking into account that people with hypertension and DM are affected to a greater extent by factors associated with CVD that corroborate with the increase in mortality and decrease in quality of life, it is essential to stratify the risk and monitor this population in PHC[14].

Currently, there are many cardiovascular risk calculators for population stratification, developed from the Framingham studies, but they use some different variables, presenting different practical applicability and disagreement in the classification[23].

The American Heart Association recently launched PREVENT (Predicting Risk Of Cardiovascular Disease Events), a new cardiovascular risk calculator that provides greater scope for assessing risk factors and allows for a careful assessment of related factors[24]. The Brazilian Society of Cardiology proposes a new risk stratification that adds other associated risk factors, considering four levels of risk, which are: very high risk, high risk, intermediate risk and low risk[25].

However, the Cardiovascular Health Strategy in Primary Health Care launched in 2022 by the Ministry of Health highlights that there is still no tool established based on the study of the Brazilian population, leading to important differences between risk stratifiers[4]. However, the Ministry of Health recommends the use of the ERF in PHC due to the strong association of risk factors assessed in the Brazilian population[8].

The data obtained in this study corroborate other studies that suggest the use of CRP for better

REVISTA ENFERMAGEM ATUAL IN DERME

clinical assessment due to its significant predictive value for CVD[26,27]. Thus, this study proposes its simultaneous use with the Framingham score already recommended in primary care to promote the assessment strategy, considering the specificities of the population studied and taking into account practicality and applicability in PHC.

The limitations include the sample size, the study design, and the lack of information at the time of collection on eating habits, making it impossible to assess it as an important risk factor related to lifestyle habits.

CONCLUSIONS

The population actively monitored for NCDs participating in this study presents high cardiovascular risk (56% (n=56) when stratified by CRP), in contrast, in the ERF there is a predominance of low risk (47% (n=47), with no association in the relationship between the two scores. The data obtained show that CRP contributes by providing a careful clinical assessment. The ERF showed high risk related to age, time since diagnosis of DM, systolic blood pressure, low HDL cholesterol levels, being retired and family history of hypertension.

Given the importance of CVD risk stratification, it is necessary to use strategies, tools and approaches that can contribute to the qualification of care for people with NCDs, control of morbidity and mortality, reduction of hospitalizations and, consequently, low cost for the health system.

To this end, the use of CRP as a predictive biomarker for CVD is recommended, allowing a more comprehensive clinical evaluation, simultaneously with the ERF to assess risk factors considering the specificities of the population studied, thus contributing to comprehensive and individualized care, in addition to allowing practical application in PHC, which is considered the gateway and responsible for primary prevention.

REFERENCES

1. Oliveira GMM, Brant LCC, Polanczyk CA, Malta DC, Biolo A, Nascimento BR, et al. Estatística Cardiovascular – Brasil 2023. Arq. Bras. de Cardiol [Internet]. 2024 [citado 2024 Mar 10]; 121(2):e20240079. Disponível em: https://abccardiol.org/article/estatistica-cardiovascular-brasil-2023/. doi: 10.36660/abc.20240079

2. Barroso WKS, Rodrigues CIS, Bortolotto LA, Mota-Gomes MA, Brandão AA, Feitosa ADM, et al. Diretrizes Brasileiras de Hipertensão Arterial – 2020. Arq. Bras. de Cardiol [Internet]. 2021 [citado 2023 Jan 20]; 116(3):516-658. Disponível em: https://abccardiol.org/article/diretrizes-brasileiras-de-hipertensao-arterial-2020/. doi: 10.36660/abc.20201238

3. Bensenor IM, Goulart AC, Santos IS, Lotufo PA. Prevalência de fatores de risco cardiovascular no Mundo e no Brasil. Rev Soc Cardiol Estado de São Paulo [Internet]. 2019 [citado 2023 Jan 22]; 29(1):18-24. doi: http://dx.doi.org/10.29381/0103-8559/2019290118-24

4. Ministério da Saúde (BR). Estratégia de saúde cardiovascular na atenção primária à saúde: instrumento para profissionais e gestores [Internet]. Brasília-DF: Ministério da Saúde; 2022. [citado 2023 Jan 13]. Disponível em: http://189.28.128.100/dab/docs/portaldab/publicacoes/guia_ecvok.pdf.

5. Gama, GGG, Portela PP, Pires CGS, Mendes AS, Moraes MA, Mussi FC. Associação de características sociodemográficas com fatores de risco cardiovascular em homens hipertensos. Rev Baiana Enferm [Internet]. 2022 [citado 2023 Fev 5]; 36: e45904. doi: 10.18471/rbe.v36.45904

6. Silva CHO, Menezes AC, Silva AF, Bianco PDA, Silva DP, Monte LM, et al. Hipertensão como fator de risco cardiovascular na população em situação de rua de São Paulo. Saúde Coletiva [Internet]. 2021 [citado 2023 Jan 21]; 11(70):8951-62. doi: https://doi.org/10.36489/saudecoletiva.2021v11i70p8951-8962

7. ElSayed NA, Aleppo G, Aroda VR, Bannuru RR, Brown FM, Bruemmer D, et al. American Diabetes Association, 10. Cardiovascular Disease and Risk Manegement: Standards of Care in Diabetes – 2023. Diabetes Care. 2023 [cited 2023 Jan 20]; 46(s1):158-190. doi: https://doi.org/10.2337/dc23-S010

8. Ministério da Saúde (BR), Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Caderno de Atenção Básica nº 35 - Estratégias para o cuidado da pessoa com doença crônica. Brasília-DF: Ministério da Saúde; 2014 [citado 2023 Jan 06]. Disponível em: http://189.28.128.100/dab/docs/portaldab/publicacoes/caderno_35.pdf.

9. Vieira DCA, Moura CM. Utilização da PCR ultrassensível associada ao Escore de Risco de Framingham como preditores da doença arterial coronariana em pacientes atendidos no laboratório Santa Lúcia em Muriaé – Minas Gerais. RBB [Internet]. 2021 [citado 2024 10 Mar 10]; 1(1). Disponível em: https://revistadabiomedicina.com.br/index.php/12222/article/view/26.

10. Haito SM, Moreira KFA, Freitas JLG, Souza RA, Farias ES. Risco cardiovascular em hipertensos cadastrados em uma unidade de saúde no norte do Brasil. Rev Bras Promoc Saúde [Internet]. 2020 [citado 2023 Fev 25]; 33. doi: https://doi.org/10.5020/18061230.2020.10400

11. Roberts WL. CDC/AHA Workshop on Markers of Inflammation and Cardiovascular Disease: Application to Clinical and Public Health Practice: laboratory tests available to assess inflammation-performance and standardization: a background paper. Circulation [Internet]. 2004 [cited 2014 Abr 12]; 110(25):e572-6. DOI: https://doi.org/10.1161/01.CIR.0000148986.52696.07

12. IBM Corp. Released 2023. IBM SPSS Statistics for Windows, Version 29.0. Armonk, NY: IBM Corp.

13. Cunha LCC, França AKTC, Santos MSB, Santos EM. Risco cardiovascular em hipertensos e diabéticos acompanhados em uma unidade básica de saúde. Saud Pesq [Internet]. 2023 [citado 2024 Mar 10]; 16(2):e11508. doi: 10.17765/2176-9206.2023v16n2.e11508

14. Ferreira RF, Reis ES, Muller EV. Estratificação de risco cardiovascular em pacientes de unidades básicas de saúde em União da Vitória-PR. Rev Saúde Pública Paraná [Internet]. 2022 [citado 2024 Mar 20] 5(1):57-71. doi: https://doi.org/10.32811/25954482-2022v5n1p57

15. Silva ARMC, Nery SBM, Bezerra GMD, Melo GA, Mendes JSA, Oliveira GAL, et al. Evaluation of cardiovascular risk by the Framingham score in hypertensive patients seen at a basic health unit in the municipality of Piripiri-PI. RSD [Internet]. 2021 [cited 2024 Mar 11]; 10(4):e13810413909. doi: https://doi.org/10.33448/rsd-v10i4.13909

16. Ferreira GS, Oliveira GVB, Campos GA, Mendes LFR, Afonso LAM, Silva MV, Santana TMGQ. Risco cardiovascular pelo escore de Framingham em serviços de cardiologia de uma cidade de médio porte de Minas Gerais. Rev. Med Minas Gerais. 2020;30 (Supl 4): S69-S76. doi: https://dx.doi.org/10.5935/2238-3182.v30supl.4.10

17. Sercelik A, Tanriverdi O, Askin L, Turkmen S. A associação da relação proteína c-reativa/albumina em pacientes com ectasia da artéria coronária isolada. Arq. Bras. Cardiol [Internet]. 2021 [citado 2023 Fev 03] 116(1):48-54. Disponível em: https://abccardiol.org/wp-content/uploads/articles_xml/0066-782X-abc-116-01-0048/0066-782X-abc-116-01-0048.x47225.pdf. doi: https://doi.org/10.36660/abc.20190476

18. Fonseca ALM, Brito RA, Carvalho AICC, Amorim ALM, Reis BPA, Letti AG. Escore de risco de Framingham em pacientes diabéticos na estratégia saúde da família. Rev Baiana Saúde Pública [Internet]. 2021 [citado 2024 Mar 10] 45(3):129-144. doi: https://doi.org/10.22278/2318-2660.2021.v45.n3.a3455

19. Mensah GA, Fuster V, Murray CJL, Roth GA; Global Burden of Cardiovascular Diseases and Risk Collaborators. Global Burden of Cardiovascular Diseases and Risks, 1990-2022. J AM Coll Cardiol [Internet]. 2023 [cited 2024 Mar 10]; 82(25)2350-2473. doi: https://doi.org/10.1016/j.jacc.2023.11.007

20. Cardoso H, Bello CT, Andrade L, Rosário FS, Louro J, Nogueira C, et al. High prevalence of cardiovascular disease and risk factors among type 2 diabetes patients followed in a hospital setting in Portugal: The PICT2RE observational study. Rev Port Cardiol [Internet]. 2023 [cited 2024 Mar 15] 42(4):319-330. doi: https://doi.org/10.1016/j.repc.2022.04.011

21. Santos LB, Lima WL, Souza JMO, Magro MCS, Duarte TTP. Risco cardiovascular em usuários hipertensos da atenção primária à saúde. Rev enferm UFPE [Internet]. 2018 [cited 2024 Abr 12];12(5):1303-9. doi: https://doi.org/10.5205/1981-8963-v12i5a234979p1303-1309-2018

22. Ministério da Saúde (BR). Plano de ações estratégicas para o enfrentamento das doenças crônicas e agravos não transmissíveis no Brasil 2021-2030. Brasília-DF: Ministério da Saúde; 2021. [citado 2024 Mar 15]. Disponível em: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/publicacoes-svs/doencas-cronicas-nao-transmissiveis-dcnt/09-plano-de-dant-2022_2030.pdf/

23. Malta DC, Pinheiro PC, Teixeira RA, Machado IE, Santos FM, Ribeiro ALP. Estimativas do risco cardiovascular em dez anos na população brasileira: um estudo de base populacional. Arq. Bras. Cardiol [Internet]. 2021 [citado 2024 Jan 21]; 116(3):423-31. Disponível em: https://www.scielo.br/j/abc/a/tnNCyBrq3YLzDjtMj7VpHSG/?format=pdf&lang=pt. doi: https://doi.org/10.36660/abc.20190861

24. Larkin H. What to Know About PREVENT, the AHA's New Cardiovascular Disease Risk Calculator. JAMA [Internet]. 2024 [cited 2024 Mar 15]; 331(4):277-279. doi: 10.1001/jama.2023.25115.

25. Précoma DB, Oliveira GMM, Simão AF, Dutra OP, Coelho OR, Izar MCO, et al. Atualização da diretriz de prevenção cardiovascular da sociedade brasileira de cardiologia 2019. Arq. Bras. Cardiol [Internet]. 2019 [citado 2024 Mar 15]. Disponível em: http://publicacoes.cardiol.br/portal/abc/portugues/aop/2019/aop-diretriz-prevencao-cardiovascular-portugues.pdf. doi: 10.5935/abc.20190204

26. Lee HS, Lee JH. Early elevation of high-sensitivity C-reactive protein as a predictor for cardiovascular disease incidence and all-cause mortality: a landmark analysis. Sci Rep [Internet]. 2023 [cited 2024 Mar 20]; 13(1):14118. doi: 10.1038/s41598-023-41081-w

27. Koziarska-Rościszewska M, Gluba-Brzózka A, Franczyk B, Rysz J. High-Sensitivity C-Reactive Protein Relationship with Metabolic Disorders and Cardiovascular Diseases Risk Factors. Life (Basel) [Internet]. 2021 [cited 2024 Mar 20]; 11(8):742. doi: 10.3390/life11080742

Funding and Acknowledgment: We declare that this research did not receive funding.

Authorship criteria (author contributions):

Sarah Ohrana Freitas da Silva: contribuiu substancialmente na concepção e planejamento do estudo, bem como na obtenção, análise, interpretação dos dados, redação, revisão crítica e aprovação final da versão publicada;

Eloisa Melo da Silva: contribuiu na obtenção dos dados, assim como na revisão crítica e aprovação final da versão publicada;

Karoliny Miranda Barata: contribuiu na obtenção e interpretação dos dados, assim como na revisão crítica e aprovação final da versão publicada;

Kaila Correa Santos: contribuiu na obtenção dos dados, assim como na revisão crítica e aprovação final da versão publicada;

Afonso Pedro Guimarães Pinheiro: contribuiu na obtenção e interpretação dos dados, assim como na revisão crítica e aprovação final da versão publicada;

Cecília Rafaela Salles Ferreira: contribuiu na análise e interpretação dos dados, assim como na redação, revisão crítica e aprovação final da versão publicada;

Walter de Souza Tavares: contribuiu na análise e interpretação dos dados, assim como na revisão crítica e aprovação final da versão publicada;

Francineide Pereira da Silva Pena: contribuiu substancialmente na concepção e planejamento do estudo, bem como na obtenção, análise, interpretação dos dados, redação, revisão crítica e aprovação final da versão publicada.

Declaration of conflict of interest

Nothing to declare

Scientific Editor: Francisco Mayron Morais Soares. Orcid: https://orcid.org/0000-0001-7316-2519