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Cardiovascular risk in hypertensive and diabetic individuals followed up in a basic health unit

Risco cardiovascular em hipertensos e diabéticos acompanhados em uma unidade básica de saúde

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ABSTRACT
To determine the cardiovascular risk using the Framingham Risk Score in hypertensive and/or diabetic individuals followed-up in a health unit. Cross-sectional study with 141 individuals evaluating sociodemographic, economic, clinical, nutritional, and laboratory data, and application of the Framingham Risk Score. Mean age was 58.5 ±10.5 years; 67.4% were women; the prevalence of hypertension was 79.4%; diabetes mellitus, 46.8%; and both comorbidities, 26.2%. The analysis pointed out difference by sex: women had higher body mass index (p=0.002), total cholesterol (p=0.047), and high-density lipoprotein (p<0.001). Cardiovascular risk was: 27%, low risk; 35.4%, moderate risk; and 37.6%, high risk. There was a higher predominance of high cardiovascular risk in men (56.5%). In the stratification of cardiovascular risk, the factors related to high risk were older age (p<0.001), higher values of total cholesterol (p=0.002) and systolic blood pressure (p=0.001), higher prevalence of diabetes mellitus (p=0.041), and lower values of high-density lipoprotein (p=0.016).

Keywords: Cardiovascular Diseases; Cardiovascular Risk; Hypertension; Diabetes Mellitus; Primary Health Care.

RESUMO
Determinar o risco cardiovascular pelo Escore de Framingham em indivíduos hipertensos e/ou diabéticos acompanhados em uma unidade de saúde. Estudo transversal com 141 indivíduos com avaliação de dados sociodemográficos, econômicos, clínicos, nutricionais e laboratoriais e aplicação do Escore de Framingham. A média de idade foi 58,5 ±10,5 anos; 67,4% foram mulheres; prevalência de hipertensão arterial, 79,4%, diabetes *mellitus*, 46,8%; e ambas as comorbidades, 26,2%. A análise apontou diferença por sexo: mulheres apresentaram maior índice de massa corporal (p=0,002), colesterol total (p=0,047) e lipoproteína de alta densidade (p<0,001). O risco cardiovascular foi: 27%, risco baixo; 35,4%, moderado; e 37,6%, alto. Houve maior predomínio de alto risco cardiovascular nos homens (56,5%). Na estratificação do risco cardiovascular, os fatores relacionados ao alto risco foram: maiores idades (p<0,001), maiores valores de colesterol total (p=0,002) e pressão arterial sistólica (p=0,001), maior prevalência de diabetes *mellitus* (p=0,041) e menores valores de lipoproteína de alta densidade (p=0,016).
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Palavras-chave: Doenças Cardiovasculares; Risco Cardiovascular; Hipertensão; Diabetes *Mellitus*; Atenção Primária à Saúde.

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INTRODUCTION

Hypertension (HT) and diabetes mellitus (DM) are the chronic diseases that most affect the Brazilian population and are associated with cardiovascular diseases (CVDs) and their complications[1].

Data from the Global Burden of Disease (GBD) 2019 showed that Acute myocardial infarction (MI) and Cerebrovascular accident (CVA), the main cardiovascular complications, were also the leading causes of disability-adjusted life years (DALYs) in age groups 50 to 74 years and 75 years and older. In addition, MI, CVA, and DM were the biggest contributors to health loss in people aged 50 years and older[2]. Moreover, the treatment of these complications has been significantly burdening the *Sistema Único de Saúde* (SUS) [Brazilian Unified Health System][1].

In Brazil in 2019, CVDs accounted for 27% of all deaths according to the Mortality Information System (SIM)[3]. A Brazilian study on cardiovascular mortality demonstrated that this mortality rate has been decreasing in the period from 2000 to 2017; however, the total number of deaths from CVDs increased[4].

Studies conducted in the Brazilian population show that Family Health Strategy (FHS) coverage and better quality of care in PHC are able to reduce morbidity and mortality from CVDs[5,6].

Considering the importance of Primary Health Care (PHC), the Ministry of Health established the Cardiovascular Health Strategy (CVS) through Ordinance GM/MS No. 3,008, NOVEMBER 4, 2021, aiming to qualify the comprehensive care to people with conditions considered risk factors for CVDs. This action sought to contribute to the control of blood pressure and glycemic levels, adherence to treatment, reduction of complications, hospitalizations, and morbidity and mortality, in order to strengthen the Health Care Network and qualify the care for people with chronic diseases[7].

In this sense, the tracking and stratification of cardiovascular risk (CVR) are included as primary prevention actions that aim to recognize people and classify the risk, enabling the organization of individual and collective actions of the health team. Thus, it becomes possible to plan actions considering the user's need and adherence, as well as the distribution of resources available in health services[8].

Furthermore, the objective of continuous tracking of the evolution of HT and DM is fulfilled, through early identification of risk factors for aggravation and directing the necessary preventive or care interventions[9].

Therefore, CVR scores have become important support tools for public health, especially for PHC teams, helping in decisions regarding counseling and treatment of users. In this line, the World Health Organization (WHO) recommends identifying individuals with high CVR by means of scores or calculators that estimate the aggregate risk of risk factors[10].

The Framingham Risk Score (FRS) is a tool for stratification of CVR aimed at identifying the risk of an individual developing a CVD within the next ten years[11]. It is an assistive technology capable of identifying more vulnerable individuals and facilitating the organization of health care.

In practice, CVR stratification makes it possible to better direct the health actions of the Family Health Team (FHT). Thus, people classified at lower risk may benefit from collective health education activities. For people at intermediate risk, offers of individual consultations and collective care can be organized in an interleaved manner. For users with higher CVR, the team can organize a more intensive agenda of individual care, with the construction of unique therapeutic projects, home visits, and family approach[8].

It is assumed that chronic conditions have been a constant concern for society, families, and public administrators, and are considered as priority problems in public health. In this case, PHC, through the FHT, plays an important role of developing actions at the primary level of

care directed to health promotion, prevention of diseases of the individual and the community within the limits generated by the Health Care Networks.

Thus, the interest in the subject came from the identification of the high number of people registered with HT and/or DM in the municipality of Paço do Lumiar, state of Maranhão (MA), highlighting the need to develop actions of health promotion and prevention with a view in reducing the impacts of these diseases on the health of the community.

Moreover, as far as we know, this is the first study that stratifies the CVR of hypertensive and diabetic patients from Maranhão followed-up in PHC, which may generate subsidies for implementation of this tool in other realities.

Considering the above, the present study aimed to stratify the CVR using the FRS in patients with HT and/or DM followed-up by a Family Health Team in the municipality of Paço do Lumiar, Maranhão.

METHODOLOGY

Cross-sectional study conducted in the PHC of the municipality of Paço do Lumiar, Maranhão, Brazil.

This study included individuals with SAH and/or DM, undergoing follow up in the PHC, aged 30 to 74 years, with total cholesterol (TC) and fractionated (HDL-c and LDL-c) tests performed within a maximum of three months. Pregnant women and patients unable to answer the questionnaire due to cognitive issues or hearing impairment were not included.

The sample size was calculated considering a population of 236 individuals registered and followed by the FHT as having hypertension and/or diabetes in the study unit. The prevalence used for high CVR was 14.7%[12], with a 4% error margin and 95% confidence level. The sample size resulted in 133 individuals. To account for losses during data collection, the sample was corrected by 5%, totaling 139 individuals.

Data collection was performed from September 2021 to June 2022, using a structured form containing demographic, socioeconomic, nutritional, clinical, and laboratory information. Selected individuals signed the Informed Consent Form (ICF).

The socioeconomic and demographic variables of interest were sex, age (years), family income (minimum wages), and education (years of study). Clinical and lifestyle variables were evaluated, including diagnosis of SAH, DM, practice of physical activity, smoking habits, and alcohol consumption.

Blood pressure (BP) measurement followed the recommendations of the Brazilian Guidelines on Hypertension - 2020[13]. We used a digital sphygmomanometer (Omnron® Hem-7122) validated by the British Hypertension Society and Association for Advancement of Medical Instrumentation[14]. Three measurements were taken with intervals of one to two minutes and additional measurements were taken only if the first two differed by more than 10 mmHg. The mean of the last two measurements was recorded.

Anthropometric assessment was performed by measuring body weight, height, and waist circumference (WC). Body weight (kg) was measured using a calibrated scale (Filizola®, Brazil) with a maximum capacity of 150 kg and subdivisions every 100 g. Height (cm) was obtained with the aid of a portable stadiometer (Alturexata®, Brazil) with a scale of 0 to 220 cm and precision of 0.1 cm.

To evaluate the adequacy of weight in relation to height, we calculated the body mass index (BMI), obtained by the ratio between the weight and the square of the height. To assess central adiposity and CVR, WC was measured at the midpoint between the last rib and the iliac crest at expiration, using a non-stretchable anthropometric tape measure (Sanny®, Brazil)[15].

For physical activity practice, we

considered the WHO recommendation of at least 150 to 300 minutes of moderate to vigorous aerobic activity per week for all adults, including those living with chronic diseases or disability[16].

Information was collected from the medical record about the time of diagnosis of SAH and/or DM, tests such as TC, high-density lipoprotein cholesterol (HDL-c) and low-density lipoprotein cholesterol (LDL-c) taken within the last 3 months, and medications in use recorded at the last medical visit.

The FRS was applied to obtain the CVR by the following criteria: age, serum concentrations of TC and HDL-c, treated and untreated systolic blood pressure (SBP), presence of DM, and smoking. For each criterion evaluated, a score - that varied according to sex -, was established. Then, the points were added; and, from the total, the CVR classification was determined: Low, < 10%; moderate, 10% to 20%; and high, > 20%[11].

The statistical analysis was performed in the Stata® program, version 14.0, considering a significance level of 5%. Categorical variables were presented by frequencies and percentages, and numerical variables by mean and standard deviation (± SD) or median and interquartile range (p25-p75). Numerical variables normality was verified by the Shapiro-Wilk test. To compare demographic, clinical, nutritional, and laboratory variables by sex, Student's t-test or Mann-Whitney test were adopted, when appropriate.

To investigate the association of demographic, clinical, nutritional, and laboratory variables with CVR stratification by the participants' FRS, analysis of variance (ANOVA) or Kruskal-Wallis was used; and to compare proportions, the chi-square test was used.

The research project was approved by the Research Ethics Committee of the Hospital Universitário da Universidade Federal do Maranhão (Opinion: 4.807.286). All procedures performed in this study were in accordance with the ethical standards of the Research Ethics Committee and with the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards.

RESULTS

We assessed 141 individuals with a mean age of 58.5 ± 10.5 years. There was a higher frequency of women (67.4%), participants with a partner (66%), family income lower than two minimum wages (90%), and with nine years of education (53.2%). Alcohol consumption was reported by 16.3%, and sedentarism by 83.7% (Table 1).

Table 1. Distribution of demographic, socioeconomic, and lifestyle variables of hypertensive and diabetic patients followed up in a health unit in the municipality of Paço do Lumiar, Maranhão, 2022

(Continua)

Variables	n	%
Sex		
Female	95	67.4
Male	46	32.6
Elderly		
Yes	69	48.9
No	72	51.1
Marital status		
Without a partner	48	34.0
With a partner	93	66.0
Family income		
< 1 minimum wage salary*	26	18.4
≥ 1 and ≤ 2 minimum wage salaries	101	71.6
≥ 2 and ≤ 3 minimum wage salaries	11	7.8
> 3 minimum wage salaries	3	2.2
Education		
No education	23	16.3
1 to 9 years of education	75	53.2
10 to 12 years of education	38	27.0
13 or more years of education	5	3.5
Smoking		

(Conclusão)

Variables	n	%
Yes	3	2.1
No	138	97.9
Alcohol consumption		
Yes	23	16.3
No	118	83.7
Sedentarism		
Yes	118	83.7
No	23	16.3

* Minimum wage in Brazil in 2021: R$ 1,100.00.

The prevalence of hypertensive individuals was 79.4%; diabetics, 46.8%. Regarding the use of continuous medication, 78% reported use of antihypertensives, with a higher percentage of angiotensin receptor blockers (61.7%); 45.4% used antidiabetics, with a higher prevalence of biguanides (41.1%); and 15.6% used lipid-lowering agents (Table 2).

Table 2. Distribution of clinical variables and medication use of hypertensive and diabetic patients followed up in a health unit in the municipality of Paço do Lumiar, Maranhão, 2022

(Continua)

Variables	n	%
HT		
Yes	112	79.4
No	29	20.6
DM		
Yes	66	46.8
No	75	53.2
HT and DM		
Yes	37	26.2
No	104	73.8
ANTIHYPERTENSIVES		
Yes	110	78.0
No	31	22.0
Beta blockers		
Yes	21	14.9
No	120	85.1
ARBs		
Yes	87	61.7
No	54	38.3
ACEI		
Yes	10	7.1
No	131	92.9
CCBs		
Yes	18	12.8
No	123	87.2
Diuretics		
Yes	25	17.7
No	116	82.3
ANTIDIABETICS		
Yes	64	45.4
No	77	54.6
Sulfonylureas		
Yes	34	24.1
No	107	75.9
Biguanides		
Yes	58	41.1
No	83	58.9
DPP-4 inhibitors		
Yes	3	2.1
No	138	97.9
Insulin		
Yes	5	3.5
No	136	96.5
LIPID-LOWERING AGENTS		
Yes	22	15.6
No	119	84.4

HT: hypertension; DM: diabetes mellitus; ARBs: angiotensin receptor blockers; ACEI: angiotensin-converting enzyme inhibitors; CCBs: calcium channel blockers; iDPP-4: dipeptidyl peptidase 4 inhibitors.

When analyzing the nutritional and laboratory indicators by sex, they showed statistically significant difference: BMI ($p = 0.002$), TC ($p = 0.047$), and HDL-c ($p < 0.001$). Mean WC in women was 98.1 ±11.7 cm; SBP 143.9 ±22.8 mmHg; DBP 85.4 ±11.3 mm/hg; and LDL-c 121.2 ±43.3 mg/dL. In men: WC 96.2 ±9.7 cm; SBP 145.7 ±22.1 mmHg; DBP 85.9 ±10.8 mmHg; LDL-c 112.8 ±37.5 mg/dL. However, there was no difference in any of the indicators, neither in men nor in women (Table 3).

Table 3. Distribution of variables by sex in demographic, nutritional, clinical, and laboratory data of hypertensive and diabetic patients followed up in a health unit in the municipality of Paço do Lumiar, Maranhão, 2022

Variables	Total (n = 141)		Female (n = 95)		Male (n = 46)		p
	Mean	SD	Mean	SD	Mean	SD	
Age (years)	58.5	10.5	57.5	10.8	60.6	9.6	0.112
BMI (Kg/m²)	27.7	5.1	28.6	5.4	25.9	3.6	0.002*
WC (cm)	97.5	11.1	98.1	11.7	96.2	9.7	0.346
SBP (mmHg)	144.5	22.5	143.9	22.8	145.7	22.1	0.650
DBP (mmHg)	85.6	11.1	85.4	11.3	85.9	10.8	0.790
TC (mg/dL)	199.9	42.9	204.9	42.1	189.6	43.2	0.047*
HDL-c (mg/dL)	50.5	6.1	51.8	6.1	47.6	5.2	< 0.001*
LDL-c (mg/dL)	118.5	41.6	121.2	43.3	112.8	37.5	0.261

BMI: body mass index; WC: waist circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol; HDL-c: high density lipoprotein - cholesterol; LDL-c: low density lipoprotein - cholesterol.

* p-value <0,05

Regarding the CVR by FRS, 27% of individuals showed low risk; 35.5%, moderate; and 37.6%, high. Regarding sex, 56.5% of men were classified as high risk; as for women, only 28.4% were in this category (Figure 1).

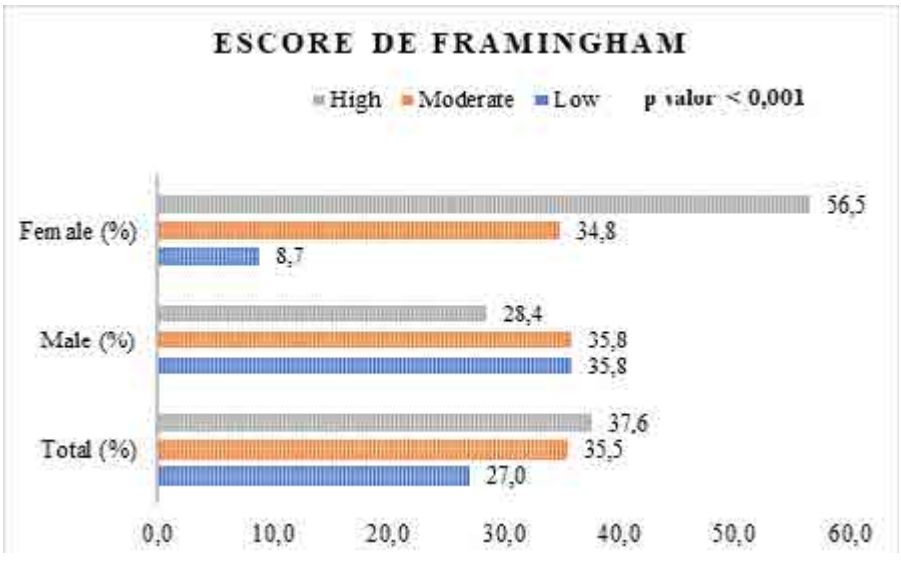

Figure 1. Prevalence of cardiovascular risk of hypertensive and diabetic patients by sex followed up in a health unit in the municipality of Paço do Lumiar, Maranhão, 2022.

The variables that presented significant difference by risk group were age, TC, HDL-c, SBP, and DM. Age revealed a difference when comparing low vs. moderate and low vs. high risk groups ($p < 0.001$). The TC and HDL-c showed a difference when comparing low vs. high and moderate vs. high risk, with lower TC values ($p = 0.002$) and higher HDL-c values ($p = 0.016$) in the lower risk group. SBP showed a difference when comparing low vs. moderate and low vs. high risk, with lower values in the low risk group ($p = 0.001$). DM expressed difference in the groups low vs. high and moderate vs. high risk ($p = 0.041$) with higher prevalence in the high risk. There was no significant difference in the groups regarding: smoking ($p = 0.235$), BMI classification ($p = 0.213$), WC ($p = 0.549$), and DBP ($p = 0.253$) (Table 4).

Table 4. Distribution of variables, according to the CVR by Framingham risk score in demographic, nutritional, clinical, and laboratory data of hypertensive and diabetic patients followed-up in a health unit in the municipality of Paço do Lumiar, Maranhão, 2022

(Conclusão)

Variables	Framingham risk score			p
	Low	Moderate	High	
Risk factors for FRS				
Age (years), Md (P24-P75)	50 (42-59) [ab]	61 (53-66)	64 (57-69)	< 0.001
TC (mg/dL), Md (P24-P75)	190.5 (167-218) [b]	188.5 (170-210) [b]	215 (186-246)	0.002
HDL-c (mg/dL), Md (P24-P75)	50 (50-55) [b]	50 (50-52) [b]	50 (45-51)	0.016
SBP (mmHg), Md (P24-P75)	126.1 (119-136) [ab]	145 (134-159)	155 (134-173)	0.001
DM, n (%)	14 (36.8) [b]	20 (40.0) [b]	32 (60.4)	0.041
Smoking, n (%)	2 (5.3)	0 (0.0)	1 (1.9)	0.235

(Conclusão)

Variables	Framingham risk score			p
	Low	Moderate	High	
Other clinical and nutritional variables				
BMI classification, n (%)				
< 25 kg/m²	9 (23.7)	14 (28.0)	21 (39.6)	
≥ 25 and < 30 kg/m²	14 (36.8)	19 (38.0)	22 (41.5)	0.213
≥ 30 kg/m²	15 (39.5)	17 (34.0)	10 (18.9)	
WC classification, n (%)				
< 80cm and < 90cm	6 (15.8)	7 (14.0)	11 (20.7)	
≥ 80 and < 88cm and ≥ 90 and >104cm	4 (10.5)	8 (16.0)	11 (20.7)	0.549
≥ 88cm and ≥ 104cm	28 (73.7)	35 (70.0)	31 (58.5)	
DBP (mmHg), Mean (±DP)	81.6 (9.1)	86.8 (11.5)	87.2 (11.5)	0.253

[a]Low risk vs. moderate risk; [b]Low risk vs. high risk; [c]Moderate risk vs. high risk. SD: standard deviation; DM: diabetes mellitus; BMI: body mass index; WC: waist circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol; HDL-c: high-density lipoprotein-cholesterol; LDL-c: low-density lipoprotein-cholesterol

DISCUSSION

This study showed that men had higher CVR compared to women. Research conducted in Brazil with hypertensive and diabetic patients followed-up in PHC revealed similar data, in which the prevalence of high CVR in men was 58%[17]. In contrast, a population-based research conducted in Brazil confirmed that only 21.6% of men had high CVR. However, in the 70- to 74-year age group, almost all men had high CVR[18].

A cohort of 53,122 adults aged 35 to 65 years in Malaysia found higher CVR in men and attributed this risk to higher prevalence of smoking, high SBP, low HDL-c, and higher prevalence of diabetes[19].

The latest edition of the 2019 National Health Survey (NHS) showed that the proportion of men (69.4%) who consulted a physician within the 12 months prior to the survey was lower than that of women (82.3%)[20]. Thus, the higher prevalence of men with high CVR in the present study may be related to the fact that men seem to take less care of their health.

Regarding the CVR of the general study population, a prevalence of high CVR of 37.6% was identified. When compared to a population-based study with 22,093 participants of different sampling, ethnic, and cultural characteristics, whose objective was to assess the prevalence of CVR, a lower prevalence of high risk was identified (29.2%)[21].

Concerning the difference by sex in demographic, nutritional, and laboratory variables, BMI, TC, and HDL-c are highlighted for higher mean values in women. A survey of Iranians aged between 15 and 70 years also identified that women had higher BMI than men; and when comparing the lipid profile by sex, the mean values of TC and HDL-c were also higher in women[22].

Although women had higher rates of obesity than men, the CVR in this study was about twice as low in the female population. The lower CVR in women can be attributed to the fact that they had higher HDL-c serum concentrations, thus demonstrating the cardioprotective effect of HDL-c and its potential to reduce CVR.

Regarding the female population, it is known that the risk of developing CVDs in premenopausal women is lower, increasing after menopause. Estrogen is often recognized for its cardioprotective role and is directly associated with lower incidence of CVDs in women prior to menopause[23,24].

In these findings, 55% of the women were younger than 60 years (data not shown in table). This suggests that their age may be a contributing factor to the lower CVR, as in this age group the cardioprotective effect of estrogen still persists. Thus, the lower CVR in women may be related to the cardioprotective effect of both estrogen and HDL-c.

Although women and men share the most classic risk factors (age, smoking, SAH, DM, TC, triglyceride, LDL-c, and HDL-c), the significance and relative weighting of these factors are different[25]. Thus, women and men present similar cardiovascular characteristics, but the specific risk is different by sex.

When the variables that proved to be risk factors in determining FRS by risk group were evaluated, there were significant differences: age, TC, HDL-c, SBP, and DM. The highest mean values of age, TC levels, SBP, and presence of DM were related to the highest CVR. In contrast, higher HDL-c values were related to lower risk.

SAH has been noted as the most important risk factor for the onset of cardiovascular events. It was identified by the GBD 2017 that elevated SBP was the main risk factor, responsible for 10.4 million deaths worldwide[26]. Corroborating these data, the present research revealed that high CVR was related to high SBP levels and age.

Hypertension in the elderly population may result from the fact that, as physiological aging occurs, a series of changes take place at the vascular level, leading to structural and functional alterations of the vascular walls[27].

Age predisposes to CVD, regardless the presence or absence of other risk factors. The incidence of coronary heart disease can increase by up to 25% in the presence of additional risk factors, such as family history of coronary heart disease, menopause, dyslipidemia, sedentary lifestyle, smoking, presence of obesity, or type 2 diabetes mellitus (DM2)[28].

Therefore, preventing age-related increases in BP would largely reduce the vascular consequences usually attributed to aging; in conjunction, intensive treatment, consisting of a target SBP of 110 to less than 130 mmHg, would relieve a large proportion of the population the burden of CVDs related to SAH[29].

In the present study, it was found that 78% of the participants used antihypertensives. However, even with this use, the mean SBP values (144.5 mmHg) were still high. The mean (155 mmHg) was higher for high CVR, suggesting that, in the PHC follow-up, adherence to drug and non-drug therapy should be reviewed in order to achieve goals of BP control and thus reduce CVR.

Another important measure that aids in reducing BP is related to the implementation of healthy eating. A meta-analysis suggests that the DASH (Dietary Approach to Stop Hypertension) diet may be an effective dietary measure to reduce BP[30].

Furthermore, evidence supports that moderate to vigorous physical activity can decrease the risk of adverse cardiovascular events and mortality in the general population. An observational cohort study, aiming to investigate the risk of cardiocerebrovascular events and death from all causes in patients with controlled hypertension and association with physical activity, identified that the group with controlled hypertension not engaged in any moderate or

moderate to vigorous physical activity had a high risk of adverse outcomes, which was comparable to or even higher than the risk of patients with uncontrolled hypertension who practiced physical activity[31]. Therefore, BP control through antihypertensives, healthy eating, and physical activity has the potential to improve CVR.

DM expressed difference in the low vs. high and moderate vs. high risk groups. In the high CVR group, 60.4% had this condition. Despite advances in treatment, people with DM2 remain at high risk for CVDs, the leading cause of morbidity and mortality in this population. This corroborates the results of a systematic review whose purpose was to estimate the prevalence of CVDs among adults with DM2: CVD was found in 32.2% of the population, which accounted for approximately half of all deaths during the study period[32].

A randomized trial of 577 Chinese people with impaired glucose tolerance showed that lifestyle intervention delayed the onset of DM2 and reduced the incidence of cardiovascular events by 26% and cardiovascular mortality by 33%, in addition to increasing life expectancy. These findings provide strong evidence for continuing efforts to implement lifestyle changes in order to stem the global epidemic of DM2 and its consequences[33].

With regards to the lipid profile, the individuals in all the CVR groups presented HDL-c averages at desirable levels as recommended by the Brazilian Society of Cardiology's Cardiovascular Prevention Guideline - 2019 (≥40mg/dL)[34]. However, in the high-CVR group, HDL-c levels were lower, which is justifiable, as lower levels of this lipoprotein indicate increased CVR once the decrease in HDL-c seems to be a marker for the presence of atherogenic lipoproteins such as "apolipoprotein B"[35].

The Framingham study showed that the HDL-c level was more robust as a risk factor for coronary heart disease than the LDL-c level. HDL-c is associated with a 2% to 3% decrease in the risk of coronary heart disease and is highly prognostic in the onset of cardiovascular events[11].

It was identified in this study that elevated levels of TC are related to higher CVR. Analysis of an Iranian cohort of 6,504 individuals revealed that the presence of dyslipidemia can increase the 15-year risk of CVDs and its complications by 1.59 times, even after adjustment for confounding factors[36].

There is evidence that statins and other hypolipemic agents reduce CV outcomes when lower LDL-c levels are present[37,38]. Statins are hypolipemiants of first choice for the treatment of hypercholesterolemia because they have proved reduction of all-cause mortality, coronary ischemic events, need for revascularization, and stroke[34].

This research identified that only 15.6% of patients studied were on hypolipemiants, a small proportion compared to the prevalence of high CVR, suggesting that the increase in mean LDL-c (118.5 mg/dL) in the study population may be related to the low use of hypolipemiants.

BMI and WC showed no significant difference by CVR. Note that there was a higher prevalence of obesity in the group with low CVR (39.5%) and low prevalence in the high CVR (18.9%). The same occurred with WC, in which the majority (70.3%) of patients classified as low CVR had WC above 88 cm for women and 102 cm for men. This phenomenon can be explained by the fact that many obese and individuals with high WC have a "metabolically healthy" profile, as demonstrated in the research by Camhi and Katzmarzyk[39]. This event can be substantiated by the so-called "obesity paradox", in which overweight or obese individuals have a more favorable prognosis than normal weight patients. Since the obesity paradox has been confirmed for some CVD outcomes, none of the obesity indices are used to predict CVD risk in the Framingham Risk Score[40].

Although BMI and WC have limitations in their use and are not accurate predictors of CVDs,

it is important to monitor them, considering their low cost and ease of clinical application, especially in this population at risk. Patients with high BMI and WC, even with low CVR, should be monitored so that, in the course of time, they do not evolve to high CVR.

This study had some limitations. The first is related to the type of study (cross-sectional), which does not allow the establishment of causal relationships. The second is related to the fact that it was developed in a single unit, but with a representative sample of patients undergoing follow up there. Therefore, the results cannot be generalized to all hypertensive and diabetic patients followed by the FHT. Another limitation is that there is not yet a specific score developed for the Brazilian population; therefore, it can overestimate or underestimate the risk in the population. Despite this, the Brazilian Society of Cardiology recommends the use of the FRS for assessment of CVR. However, when applying it in clinical practice, it is necessary to individualize the treatment and carefully evaluate the calculated CVR.

CONCLUSION

The findings showed that the CVR was high (37.6%), above what is found in the Brazilian population, being more prevalent in males. The factors related to high CVR were older age, higher concentration of TC, lower concentration of HDL-c, higher SBP values, and presence of DM. Therefore, they were constituted as high risk for CVDs.

The results of this study showed that the FRS is a useful tool in clinical practice, easy to use for estimating CVR, and can be used on a large scale in the population served in PHC. It ensures comprehensive and individualized care, improves quality of life, reduces the rates of cardiovascular complications and the burden to the health system.

THEREFORE, ITS USE IS RECOMMENDED IN ORDER TO ACHIEVE IMPROVEMENTS IN THE PROMOTION AND PREVENTION ACTIONS OF CVDS, AS WELL AS TO CONTRIBUTE TO THE ACHIEVEMENT OF THE SUSTAINABLE DEVELOPMENT GOALS, WHICH AIMS TO REDUCE PREMATURE MORTALITY.

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