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CARDIOVASCULAR RISK ASSESSMENT IN CLIMACTERIC WOMEN ASSISTED IN PRIMARY HEALTH CARE

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Abstract

This study evaluated cardiovascular risk and associated factors in climacteric women through a quantitative, transversal, and analytical approach. Probabilistic sampling was selected from clusters and later by random selection. Variables were investigated by structured and pre-tested questionnaires that included sociodemographic characteristics, lifestyle habits, anthropometric measures, clinical-obstetric factors and through the Framingham Global Risk Score. The final sample included 874 women aged 40 to 65 years, assisted in primary health care of Montes Claros/MG, Brazil. Exploratory descriptive analysis of the data was performed, considering the frequency distribution of the study variables. Bivariate analyzes searched for associations between the independent variables and the risk for cardiovascular diseases, using the chi-square test, and the associated variables were selected for the multivariate analysis up to the level of 20% ($p \leq 0.20$). In the adjusted analytical phase, Poisson regression with robust variance allowed obtaining the prevalence ratios (PR) and their respective 95% confidence intervals (95% CI), adopting the significance level of 5% ($p < 0.05$) for the final model. In this study, most climacteric women were at risk for cardiovascular disease, with an increased prevalence in postmenopausal women. The menopausal transition, associated with hormonal changes, unhealthy lifestyle habits, misinformation, in addition to clinical and obstetric factors, was shown to be harmful to cardiovascular health. These findings highlight the need to assess the main risk factors to institute preventive measures at this stage.

Keywords: Cardiovascular Risk; Climacteric; Family Health Strategy.

Resumo

Este estudo avaliou o risco cardiovascular e fatores associados em mulheres climatéricas por meio de abordagem quantitativa, transversal e analítica. A amostragem probabilística foi selecionada por conglomerados e posteriormente por seleção aleatória. As variáveis foram investigadas por meio de questionários estruturados e pré-testados que incluíram características sociodemográficas, hábitos de vida, medidas antropométricas, fatores clínico-obstétricos e por meio do Escore de Risco Global de Framingham. A amostra final incluiu 874 mulheres com idade entre 40 e 65 anos, atendidas na atenção primária à saúde de Montes Claros/MG, Brasil. Foi realizada análise descritiva exploratória dos dados, considerando a distribuição de frequência das variáveis do estudo. Foram realizadas análises bivariadas que buscaram associações entre as variáveis independentes e o risco para doenças cardiovasculares, por meio do teste qui-quadrado, e as variáveis associadas foram selecionadas para análise multivariada até o nível de 20% ($p \leq 0,20$). Na fase analítica ajustada, a regressão de Poisson com variância robusta permitiu obter as razões de prevalência (RP) e seus respectivos intervalos de confiança de 95% (IC95%), adotando-se o nível de significância de 5% ($p < 0,05$) para o modelo final. Neste estudo, a maioria das mulheres climatéricas apresentava risco de doenças cardiovasculares, com prevalência aumentada em mulheres na pós-menopausa. A transição da menopausa, associada a alterações hormonais, hábitos de vida pouco saudáveis, desinformação, além de fatores clínicos e obstétricos, mostrou-se prejudicial à saúde cardiovascular. Estes resultados destacam a necessidade de avaliar os principais fatores de risco para instituir medidas preventivas nesta fase.

Palavras-chave: Climatério; Estratégia Saúde da Família; Risco Cardiovascular.

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INTRODUCTION

The present study aimed to assess cardiovascular risk and associated factors in climacteric women assisted in primary health care of a city located in the Southeast region of Brazil.

Given the scarcity of studies representative of the Brazilian population on cardiovascular risk in this population, the findings of this study may constitute possible references for others, in different economic and social contexts, in order to bring about individual and collective changes to improve primary health care.

Cardiovascular risk and associated factors in climacteric women were assessed using a quantitative, cross-sectional and analytical approach. Probabilistic sampling was selected using conglomerates and then random selection. The variables were investigated using structured, pre-tested questionnaires that included sociodemographic characteristics, lifestyle habits, anthropometric measurements, clinical and obstetric factors and the Framingham Global Risk Score.

For the statistical analysis, descriptive exploratory data analysis was carried out, with the frequency distribution of the variables, followed by bivariate analysis, which looked for associations between the independent variables and the risk of cardiovascular disease, using the chi-square test. For the multivariate analysis, variables associated up to the 20% level ($p \leq 0.20$) were selected. In the adjusted analytical phase, Poisson regression with robust variance enabled prevalence ratios (PR) and their respective 95% confidence intervals (95% CI) to be obtained, with a significance level of 5% ($p < 0.05$) being adopted for the final model.

From a clinical point of view, the climacteric is established between 40 and 65 years of age and is characterized by the physiological state of progressive hypoestrogenism, which culminates in the definitive interruption of menstrual cycles. This decrease in sex hormones implies an increase in cardiovascular risk, since endogenous estrogens have protective effects on the cardiovascular system by promoting vasodilation and inhibition of the vascular response to injuries caused by the development of atherosclerosis.

Cardiovascular diseases remain the main cause of morbidity and mortality in women, with a significant increase in risk during the climacteric period. Brazil is going through a period of demographic transition, with a growing increase in life expectancy and an ageing population. As such, it is inevitable that the number of women in the climacteric will increase. The female population will experience this period at risk of developing cardiovascular disease, requiring the health system to implement resolutive actions and policies to control chronic non-communicable diseases, such as heart and cerebrovascular diseases.

The estimation of cardiovascular risk is of clinical interest, as it is the basis for initiatives to optimize or start treatments, making its use unquestionable as a method of stratification and prevention, especially in primary care, the main link between the user and the health system.

Thus, for a better understanding of the study, this research is structured in five sections, in addition to this introduction. The first refers to the theoretical-conceptual foundation, which presents the context between cardiovascular risk and the climacteric, through the stratification instrument and the variables analyzed. This is followed by the methodological procedures used to achieve the proposed objective. The third and fourth sections present the results and discussion. Finally, the last section presents the conclusion.

LITERATURE REVIEW

Cardiovascular diseases (CVD) are the leading cause of death from non-notifiable diseases worldwide, accounting for around 17.8 million deaths in the last five years, especially in low- and medium-developed countries (WHO, 2019). In Brazil, it represents an important cause of morbidity and mortality and is responsible for around 20% of deaths in individuals over the age of 30, its high prevalence being associated with inadequate control of risk factors (GARCIA *et al*., 2017).

CVD remains the leading cause of morbidity and mortality in women, affecting more than 36% of them worldwide, with a significant increase in risk during the menopausal transition (GUNNING *et al*., 2020). The term cardiovascular event refers to ischemic heart disease, cerebrovascular disease and peripheral arterial disease (BROTONS *et al*., 2014). Estimating cardiovascular risk is interesting because it leads to initiatives to optimize or start treatments, making its use as a stratification and prevention method indisputable, especially in primary care. Cardiovascular risk (CVR) establishes a context for experiencing a cardiovascular event in a specific period, usually 5 or 10 years. The method classically used to calculate risk involves estimates generated by the Framingham cohort study. This score is validated and is adopted by the I Brazilian Cardiovascular Prevention Guideline of the Brazilian Society of Cardiology (SBC) and sought to help reduce cardiovascular mortality by up to 25%, established by the World Health Assembly in May 2012 (SIMAO *et al*., 2013).

The Framingham Global Risk Score (FRS) includes a ten-year estimate of coronary, cerebrovascular, peripheral arterial disease or heart failure events. It estimates risk based on the following variables: age, gender, systolic blood pressure, use of antihypertensive therapy, smoking, diabetes mellitus, total cholesterol, HDL cholesterol and waist-to-hip ratio. These data are used to

calculate points which are assigned a percentage and, in this way, the patient is classified according to risk: high risk, intermediate risk and low risk (WILSON; D'AGOSTINO; LEVY, 1998).

The decrease in estrogen after menopause can impair vascular function and increase the expression of inflammatory cytokines. Associated with this, changes in other cardiovascular risk factors (e.g. serum lipid profile, redistribution of body fat) during this period increase the risk (ZHU *et al*., 2019). Older age, smoking, hypertension, diabetes mellitus, obesity and a sedentary lifestyle should be considered in risk assessments and, when associated with autoimmune diseases, a history of cancer, depression, age at menarche and menopause, hormone use, reproductive history and socioeconomic status, should alert us to the correct management of risk (NORRIS *et al*., 2020; SAEED *et al*., 2017; GARCIA *et al*., 2016).

The Family Health Strategy (ESF) is an important mechanism for providing adequate health care for women in the climacteric phase, since it is a model of care created by the SUS with a priority focus on developing health promotion and disease prevention actions, with population coverage of 63.6% (BRASIL, 2015). As it is the gateway to the SUS, it is in the ESF that climacteric women receive their main health care (BRASIL, 2008). The expansion of the Family Health Strategy has been associated with a reduction in mortality from cardiovascular and cerebrovascular causes, significant reductions in hospitalization rates for conditions amenable to outpatient care and reduced rates of complications from some chronic conditions, such as diabetes (BRASIL, 2004). But there are challenges. According to Guedes and Silva (2023), there seems to be a relationship between regional inequality in access to specialized public health care in Brazil. The authors consider public health to be the final solution to the problem faced by the user. As such, the authors suggest constant evaluation of the service, with the aim of establishing standards and actions that can add value, eliminating or replacing complex and time-consuming processes with simpler and more efficient ones.

In Brazil, women's health was incorporated into national health policies in the first decades of the 20th century, but during this period it was limited to demands related to pregnancy and childbirth. The maternal and child programs drawn up in the 1930s, 1950s and 1970s reflected a restricted view of women, based on their biological specificity and their social role as mothers and housewives, responsible for raising, educating and caring for the health of their children and other family members (BRASIL, 2004). In 1984, the Ministry of Health drew up the Comprehensive Women's Health Care Program (PAISM), marking, above all, a conceptual break with the guiding principles of women's health policy and the criteria for choosing priorities in this field (BRASIL, 2015).

The establishment of the PAISM is the result of dialogue between the government and civil society, built up by conferences held in Brazilian municipalities and states, forming a national pact. Its

objectives are: to promote the improvement of living and health conditions; to guarantee legally constituted rights and expand access to means and services for health promotion, prevention, care and recovery; to contribute to the reduction of female morbidity and mortality; and to qualify and humanize comprehensive care for women's health in the Unified Health System (SUS). In the context of cardiovascular health, it focuses on cardiovascular diseases and hypertension, monitoring SUS databases and statistics that include information on the frequency, mortality, recognition of diseases and emergency care for women with cardiovascular diseases and hypertension. In addition, it has the objective of implementing health care for women in the climacteric, through indicators of the existence of training programs to qualify care for this population, respective content and information groups on the subject in health units (BRASIL, 2015). Ensuring that women in this phase preserve their health becomes possible through risk stratification and prevention, through effective measures to control facilitating factors (HARVEY; COFFMANN; MILLER, 2015).

METHODS

This was a quantitative, analytical study, with a cross-sectional design and carried out between August 2014 and August 2015, in a municipality in the north of the region of Minas Gerais, Brazil. The target population was composed of women aged between 40 and 65 years old and registered in Basic Health Units (UBS) of the ESF in urban and rural areas.

The sampling was of the probabilistic type, with the participants selected by drawing lots, following a sampling plan in two stages: (1) by conglomerate, assuming each UBS as a sampling unit and (2) stratified random selection, according to the climacteric period (pre, peri and post menopause) among all women eligible for the study in each UBS. In cases where the selected women were not found, a new drawing was carried out until the number previously defined was completed, according to proportional sharing. The sample size was calculated based on the total number of women in the study age group registered in the UBS (N=30,018), considering a confidence level of 95% and a sampling error of 5%. As there are no previous studies on the subject in the region, a prevalence of 50% was estimated for the studied event, as it defines a larger sample size. Considering that this is a cluster sampling, the sample number identified by the calculation was multiplied by a correction factor equal to two and increased by 10% for possible losses. Thus, the minimum number of women to be evaluated would be 874 women. Exclusion criteria were pregnant women, postpartum women, bedridden, with a previous history of oophorectomy or hysterectomy and those with some cognitive difficulty.

The researchers carried out prior training with all collector-interviewers through meetings. At first, the validated questionnaires were presented, later, in-depth readings were carried out to clarify doubts and, at the end, the questionnaires were applied by the interviewers. The responsible researchers supervised the pilot study and data collection. Therefore, a pilot study with women belonging to the studied age group and who were not part of the final sample was carried out prior to data collection to train the team and define possible adjustments to the collection instruments. The women selected for this, and the subsequent phases of the study were invited by the community health agent to attend the UBS on a predetermined day and time, where the research was carried out. The pilot study allowed the questionnaire and the performance of the interviewers to be tested in practice. After this phase, field research was started. The dependent variable (cardiovascular risk) was obtained using the Framingham global risk score (WILSON *et al.*, 1998). The score estimates the risk based on the variables: age, sex, systolic blood pressure (SBP), use of antihypertensive therapy, smoking, diabetes mellitus, total cholesterol (TC) and high-density lipoprotein (HDL cholesterol).

These data are used to calculate a score assigned to a percentage (WILSON *et al.*, 1998) and, thus, the patient is classified according to risk: high risk, intermediate risk, and low risk. Patients were classified as: no cardiovascular risk (score ≤5%) and cardiovascular risk (score >5%).

The independent variables were dichotomized and covered three domains: sociodemographic, behavioral, and clinical. Regarding sociodemographic variables, they were categorized as follows: skin color, education, marital status, and formal work. Behavioral variables were represented by smoking, alcohol consumption, use of salt in food, daily fruit consumption, consumption of meat fat, and were investigated by self-report at the time of the interview.

The variables related to health status were hypertension, back problems, body mass index (BMI), anxiety, depression, climacteric symptoms, perception of health status, menopause period, waist-hip ratio, and Metabolic Syndrome. Hypertension and diabetes records were self-reported considering the answer: “Has a doctor ever told you that you have hypertension/diabetes?”. In cases where there was no previous diagnosis, blood pressure and fasting blood glucose measurements were collected.

Blood pressure was measured with a calibrated, arm, digital and automatic MicroLife device (MedLevensohn, Rio de Janeiro, Brazil) tested and validated by the British Hypertension Society (BELGHAZI *et al.*, 2007). This device was chosen because it allows the obtaining of blood pressure measurements in a simple, effective, inexpensive way, thus avoiding the evaluator's error. Three measurements were taken, with an interval of one minute between them, on the left upper limb in the sitting position. For analysis, the average of the last two was considered. If there was a difference between some of the measurements (greater than 4 mmHg), we waited for five minutes and followed up

with a new block of three measurements. Participants were categorized into: Normotensive and Hypertensive.

Information regarding the presence of arthritis/arthrosis/spine problems was collected through a statement by the interviewee herself, through a question adapted from the Ministry of Health's VIGITEL questionnaire (Surveillance of risk and protection factors for chronic diseases by telephone survey) (MALTA *et al*., 2015). The answers were categorized into: Yes and No.

To calculate the BMI, the measurement of height was carried out with the aid of the SECA 206 anthropometer (Seca GmbH & Co. – Germany) on a wall ninety degrees from the floor and without baseboards, with the woman in the proper position to assess this data; of weight (kg) using a portable SECA Omega 870 digital scale (Seca GmbH & Co. – Germany) and of the Body Mass Index (BMI) by the product of the division of body weight by height squared (P/E2). The BMI results were classified according to the WHO criteria (2000) in adults: Adequate weight (18.5 to 24.9); Overweight (25.0 to 29.9); Obesity (30.0 or above), finally, dichotomized into: non-obese (<30) and Obese (≥30) (WHO, 1998).

To assess the symptoms of depression, the Beck Depression Inventory (BDI) was used, a psychometric self-assessment device composed of 21 items that refer to depressive symptoms: sadness, failure, guilt, disappointment, desire to kill, irritation, decision, discouragement, pleasure, punishment/punishment, weakness, crying, interest in people, work, tiredness, weight loss, sexual interest, sleep, appetite, and physical problems. Beck's Inventory was translated and validated into Portuguese and has been widely applied in many studies with the purpose of diagnosing and classifying depression. Patients with scores greater than 15 were diagnosed with depression. Values between 16 and 20 were considered mild depression, moderate between 21 and 29 and severe equal to or greater than 30. The participants in this research were categorized as: Without symptoms and with symptoms (GORENSTEIN; ANDRADE, 1996).

Anxiety was investigated using the Beck Anxiety Inventory, Portuguese version, validated by Cunha (2001). This instrument has a symptomatic scale that measures the severity of anxiety symptoms, consisting of 21 items, with four response options, classifying anxiety symptoms as: minimum from 0 to 10, mild from 11 to 19, moderate from 20 to 30 and severe from 31 to 63, finally categorized as: with symptoms and without symptoms (WEDGE, 2001; GORENSTEIN; ANDRADE, 1996).

Climacteric symptoms were assessed using the Kupperman index. This instrument is adapted and validated, being widely used both for research purposes and in clinical practice, for monitoring the effects of the various treatments instituted in menopause (KUPPERMAN *et al*., 1953). The answers for each symptom investigated follow the following scale of scores: 0 (absence of symptoms); 1 (mild

symptoms); 2 (moderate symptoms) and 3 (severe symptoms). To calculate the total score, the symptoms surveyed have different weights, in which hot flashes (hot flashes) are more relevant (weight 4), paresthesia, insomnia and nervousness an intermediate value (weight 2) and other symptoms such as sadness, dizziness, weakness, arthralgia/myalgia, headache, palpitation and tingling have weight 1 (one). Multiplying the intensity of the symptom by the respective conversion factor and then adding the results obtained, a score capable of classifying the climacteric syndrome into mild, moderate, and severe is obtained. A mild climacteric syndrome was a score up to 19, moderate between 20 and 35, and severe greater than 35 (SILVEIRA *et al*., 2007). Responses were categorized into absent symptoms and present symptoms.

The health perception variable was obtained through self-report through the question: "Compared to people your age, how do you consider your health status?" The four response categories were dichotomized into positive (for the options “very good” and “good”) and negative (for the options “fair” and “bad”) (ERIKSSON *et al*., 2001).

For the categorization of climacteric phases, women with a regular menstrual cycle (from 28 to 28 days, 29 to 29 days) and in perimenopause with irregular menstrual cycle ranging from 2 to 11 months were classified as pre-menopausal and post-menopausal cycle. menstrual period interrupted for more than 12 months (SOBRAC, 2013).

Waist circumference (WC) was measured with the aid of a flexible and inelastic measuring tape TBW brand (ACT Medical-USA) with a graduation of 0.1 cm. During the measurement, the subject remained in an orthostatic position, with her arms along her body, relaxed abdomen and looking at a fixed point in front of her (WHO, 2000). AC values ≥ 88 cm were classified as altered according to NCEP/ATP-III (2001) (ALEXANDER *et al*., 2003). The waist-to-hip ratio was obtained by measuring with an inelastic millimeter measuring tape. For the hip, participants were instructed to wear thin pants and stand upright, with arms relaxed and feet together. The evaluators located the greater trochanters to place the tape horizontally around the hip over these bony points. Care was taken to keep the tape aligned in a horizontal plane, parallel to the floor. Tension was applied to the tape so that it fits tightly around the measured body part without wrinkling the skin or compressing the subcutaneous tissues. To measure the abdominal circumference, the midpoint between the last rib and the iliac crest was used, directly on the skin. To do so, the woman was asked to stand upright, with her abdomen relaxed and her arms extended along her body. The last rib at the end of inspiration and the iliac crest were located, the distance between the two points was measured and the midpoint was calculated. The tape was placed horizontally around the waist over the midpoint so that it was aligned in a horizontal plane. Tension was applied to the tape to fit tightly around this portion, without wrinkling the skin or compressing the

subcutaneous tissues. Both waist and hip measurements were taken three times and when greater than one and a half centimeters were taken again. For waist-to-hip ratio, the waist circumference value was divided by that of the hip. Values were grouped into: < 88 cm; ≥ 88 cm (ALEXANDER *et al*., 2003; WHO, 2000).

The variables that configure the presence of metabolic syndrome were evaluated by a team of professionals from the ESF. Women were classified as having Metabolic Syndrome (MS) by the presence of three or more of the components (Triglycerides, HDL-cholesterol, Fasting Glucose, AC and Systolic Blood Pressure), according to the criteria defined by the NCEP/ATP-III (2001). In the laboratory, lipid profile, fasting blood glucose and triglyceride levels were investigated. The blood sample was analyzed using the kits for triglycerides, cholesterol, and fasting glucose tests compatible with the Hitashi 912 equipment. The values were categorized as HDL: <50 mg/dL, Triglycerides: ≥150 mg/dL Fasting Glucose: ≥ 110 mg/dL CA: >88 cm BP: ≥ 130 mmHg for systolic ≥ 85 mmHg for diastolic (ALEXANDER *et al*., 2003). Patients were classified as with and without Metabolic Syndrome.

For data analysis, we used the statistical program SPSS (Statistical Package for the Social Sciences), version 21. Initially, an exploratory descriptive analysis of the data was performed, with frequency distribution of the study variables. Then, bivariate analyzes were performed, looking for associations between the independent variables and the risk for cardiovascular diseases, using the chi-square test, and the associated variables were selected for the multivariate analysis up to the level of 20% (p ≤ 0 ,20).

In the adjusted analytical phase, Poisson regression was used, with robust variance, the prevalence ratios (PR) and their respective 95% confidence intervals (95% CI) were obtained, and the significance level was adopted for the final model. 5% (p < 0.05).

Study participants agreed to participate in this research voluntarily and signed the Informed Consent Form, containing the study objective, evaluation procedure and voluntary nature of participation. The study project was previously evaluated and approved by the Research Ethics Committee (Protocol 817.166).

RESULTS

A total of 874 women aged between 40 and 65 years were interviewed, and of these 55.9% were at risk for developing cardiovascular disease. More than half of the women reported their skin color as non-white (81.7%), had an income above the minimum wage (55.7%), were married (64%), had

education with education middle and higher education (58.6%) and did not work outside the home (60.3%). Regarding behavioral habits, most did not smoke (86.6%), did not drink (77.5%), did not put salt in their food (94.4%), consumed up to two fruits a day (66.7%), did not eat meat fat (79.6%). Among the clinical conditions, more than half did not have hypertension (51.5%), had back problems (51.4%), were obese (73.9%), had symptoms of anxiety (57.6%), they had no depressive symptoms (60.4%), they had climacteric symptoms (61.9%), they had a good perception of health (53.9%), they were in pre-menopause (58%), they had altered WHR (66.4 %) and metabolic syndrome (53.4%).

Table 1 presents the results of the bivariate analysis between cardiovascular risk and the independent variables. After adjusted analysis, the variables education (p=0.001), work (p=0.014), marital status (p=0.020), smoking (p=0.001), arterial hypertension (p<0.001), metabolic syndrome (p<0.001), perception of health status (p=0.019), menopause (p<0001) and WHR (p=0.005), as shown in table 2.

Table 1 - Characterization of the sample and crude prevalence ratio (PR) for cardiovascular risks according to sociodemographic factors, behavioral habits, and clinical factors in climacteric women

Variables		No cardiovascular risk		Cardiovascular risk		PR ($CI_{95\%}$) Crude	p
		n	%	N	%		
Sociodemographic factors							
Skin colour	Not White	324	45.4	390	54.6	1.00	0.095
	White	61	38.1	99	61.9	1.34 (0.94-1.91)	
Family income	Above 1 minimum salary	30	46.9	34	53.1	1.00	0.636
	Below 1 minimum salary	355	43.8	455	56.2	1.13 (0.67-1.88)	
Marital status	With partner	270	48.3	289	51.7	1.00	0.001
	Without partner	115	36.5	200	63.5	1.62 (1.22-2.15)	
Schooling	Middle and high school	276	53.9	236	46.1	1.00	0.000
	Elementary school	109	30.1	253	69.9	2.71 (2.04-3.60)	
Job	Works	191	55.0	156	45.0	1.00	0.000
	Does not work	194	36.8	333	63.2	2.10 (1.59-2.76)	
Behavioural habits							
Smoking	Does not smoke	349	46.1	408	53.9	1.00	0.002
	Smokes	36	30.8	81	69.2	1.92 (1.26-2.92)	
Alcohol consumption	Does not drink	304	44.9	373	55.1	1.00	0.346
	Drinks	81	41.1	116	58.9	1.16 (0.84-1.61)	
Use of salt on food	Does not use salt on food	368	44.6	457	55.4	1.00	0.174
	Uses salt on food	17	34.7	32	65.3	1.51 (0.82-2.77)	
Daily fruit consumption	3 or more fruits	125	43.0	166	57.0	1.00	0.645
	Up to 2 fruits	260	44.6	323	55.4	0.93 (0.70-1.24)	
Consumption of meat fat	Does not eat meat fat	294	42.2	402	57.8	1.00	0.033
	Eats meat fat	91	51.1	87	48.9	0.69 (0.50-0.97)	
Clinical factors							
Arterial hypertension	Present	279	62.0	171	38.0	1.00	0.000
	Absent	106	25.0	318	75.0	4.89 (3.66-6.54)	
Back problems	Has back problems	200	48.1	216	51.9	1.00	0.022
	Does not have back problems	185	40.4	273	59.6	1.36 (1.04-1.78)	
Body mass index	Not obese	125	54.8	103	45.2	1.00	0.000
	Obese	260	40.2	386	59.8	1.80 (1.32-2.44)	
Anxiety	Without symptoms	166	44.7	205	55.3	1.00	0.723
	With symptoms	219	43.5	284	56.5	1.05 (0.80-1.37)	
Depression	Without symptoms	236	44.7	292	55.3	1.00	0.634
	With symptoms	149	43.1	197	56.9	1.06 (0.81-1.40)	
Climateric symptoms	Without symptoms	258	47.7	283	52.3	1.00	0.006
	With symptoms	127	38.1	206	61.9	1.47 (1.12-1.95)	
Perception of health status	Good	344	45.1	419	54.9	1.00	0.106
	Poor	41	36.9	70	63.1	1.40 (0.92-2.11)	
Menopause status	Premenopausal	270	53.3	237	46.7	1.00	0.000
	Postmenopausal	115	31.3	252	68.7	2.49 (1.88-3.30)	
Waist-to-hip ratio	< 88 cm	175	59.5	119	40.5	1.00	0.000
	≥ 88 cm	210	36.2	370	63.8	2.59 (1.94-3.45)	
Metabolic syndrome	With metabolic syndrome	285	61.0	182	39.0	1.00	0.000
	Without metabolic syndrome	100	24.6	307	75.4	4.80 (3.58-6.44)	

Source: Own elaboration.

Table 2 - Sample characterization and prevalence ratio (PR) aggravated for cardiovascular risks according to sociodemographic factors, behavioural habits and clinical factors of climacteric women

Variables		PR ($CI_{95\%}$) adjusted	p
Sociodemographic factors			
Schooling	Middle and high school	1.00	0.001
	Elementary school	1.20 (1.07-1.34)	
Job	Works	1.00	0.014
	Does not work	1.16 (1.03-1.31)	
Marital status	With partner	1.00	0.020
	Without partner	1.13 (1.02-1.26)	
Behavioural factors			
Smoking	Does not smoke	1.00	0.001
	Smokes	1.28 (1.11-1.49)	
Clinical factors			
Arterial hypertension	Absent	1.00	0.000
	Present	1.65 (1.45-1.88)	
Metabolic Syndrome	Absent	1.00	0.000
	Present	1.65 (1.45–1.88)	
Perception of health status	Positive	1.00	0.019
	Poor	0.86 (0.76-0.97)	
Menopause	Premenopausal	1.00	0.000
	Postmenopausal	1.30 (1.16-1.44)	
Waist-to-hip ratio	<88 cm	1.00	0.005
	≥ 88 cm	1.22 (1.06-1.41)	

Source: Own elaboration.

DISCUSSION

The present study evaluated the cardiovascular risk among climacteric women assisted in the Family Health Strategy, revealing an increased risk among those with low education, no formal work, no marital relationship, who smoke, hypertensive, with metabolic syndrome, postmenopausal, and with the changed WHR. Good perception of health status was considered a protective factor. Approximately 56% of participants were at risk for developing CVD. A Brazilian study showed that the increasing aging of the population, with an increase in the prevalence of non-communicable chronic diseases, has affected the emergence of some diseases in women. The role of women in society has also changed over the years, in the labor market, with an increasingly accelerated and stressful routine, lack of care with food issues and physical activity, in addition to the increased use of substances, such as alcohol and tobacco can increase the prevalence of cardiovascular risk factors (SANTOS-VIEIRA *et al*., 2017). In addition to the direct loss of estrogenic effects on the cardiovascular system, indirect effects resulting from the loss of estrogenic modulation of immune and prothrombotic proteins by the liver, changes in lipid and glycemic metabolism and autonomic regulation contribute to increased risk in those women in the climacteric period (HARVEY *et al*., 2015).

Cardiovascular diseases are the main cause of morbidity and mortality worldwide (MIRANDA *et al*., 2016). The prevalence of cardiovascular disease in women of reproductive age is low, however, it

increases considerably in women after menopause, and it can even reach double the prevalence during the decade following the last menstruation. A Chinese study that recruited hundreds of women from ten regions of China with no prior history of cardiovascular disease showed that postmenopausal women had the highest risk for fatal and non-fatal cardiovascular disease compared to premenopausal women (YANG *et al*., 2017).

Regarding education, it was observed that, among climacteric women, there was a 12% increase in the prevalence of cardiovascular risk in those who attended only elementary school. The increased cardiovascular risk in climacteric women with lower levels of education has already been demonstrated in other studies. Social issues including low educational levels, ethnic-social minorities, family responsibilities and environmental stressors hinder the participation of women in cardiovascular health prevention and rehabilitation programs, thus contributing to increased risk (NORRIS *et al*., 2020; ZHU *et al*., 2019).

The association between cardiovascular risk and working outside the home showed a higher prevalence among women without a job. A systematic review and meta-analysis also showed that occupation has similar results to education. Comparing women who worked in medium-level occupations (administrative and sales services) and those in low-level occupations (those without pay or who only did manual work), the former presented later menopause. Early menopause is associated with increased cardiovascular risk, corroborating the fact that women who work outside the home have a later menopause, thus presenting a lower risk of developing heart disease (SCHOENAKER *et al*., 2014; FLEMING *et al*., 2008).

Among the behavioral habits, smoker women had a higher cardiovascular risk compared to non-smokers. According to an Australian study that evaluated more than three hundred thousand women, comparing those who had never had a cardiovascular event and those who had already developed it, the latter had lower educational levels, were obese and hypertensive, and had a history of smoking (ZHU *et al*., 2019). In women, the deleterious effects of smoking seem to be greater, with synergistic effects in women who used hormonal strategies throughout their lives (GARCIA *et al*., 2016). Case-control studies relating smoking and anticipating the age of menopause demonstrate that the age of onset of menopause is anticipated from 12 to 18 months. The anticipation of menopause in smokers has been explained by the estrogen deficiency directly caused by tobacco, which may not only anticipate the onset of menopause symptoms, but also of estrogen-related diseases, such as osteoporosis and cardiovascular disorders (SAEED *et al.*, 2017).

Considering the history of arterial hypertension, hypertensive women had a higher risk. Endogenous estrogens maintain vasodilation and contribute to blood pressure control (GARCIA *et al*.,

2016). This study presents data like another that evaluated climacteric women diagnosed with coronary artery disease (CAD). The results showed a prevalence of almost 70% of hypertension among women with CAD. Hypertension, in addition to other risk factors, such as diabetes and sedentary lifestyle, increase oxidative stress, compromising the endothelial cells. Over time, structural changes in vessels occur and these lesions will facilitate thromboembolic phenomena, clinically presenting as acute myocardial infarction, stroke, among other ischemic events (MELO *et al*., 2018).

Climacteric women with metabolic syndrome had a higher cardiovascular risk in this study. The metabolic syndrome comprises changes such as: increased waist circumference, increased triglycerides, hypertension, hyperglycemia and decreased high-density cholesterol (ALEXANDER *et al*., 2003). A study demonstrated that visceral obesity is a marker of adipose tissue dysfunction and cardiovascular risk, being the main manifestation of the metabolic syndrome (HUBERT *et al*., 1983). The visceral adiposity index was developed to improve the accurate assessment of risk and is based on gender, waist circumference, body mass index and lipid parameters (AMATO *et al*., 2010). Disorders in lipid concentration that coincide with the decrease in estrogen in the menopause transition may contribute to cardiovascular disease (BAGYURA *et al*., 2020).

The post-menopausal phase represented a greater risk of developing cardiovascular disease than the pre-menopause. Changes in endogenous levels of sex hormones, such as those that occur during pregnancy and menopause, can affect cardiovascular risk through direct changes in the vasculature and cardiac muscle, as well as changes in coagulation and metabolism. Furthermore, exogenous hormones such as contraceptives or replacement therapies can modulate the hormonal environment and subsequently cardiovascular risk (SANTOS-VIEIRA *et al*., 2017). Similar data in Brazil showed that pre-menopausal patients had lower cardiovascular risk than post-menopausal patients, corroborating the findings of this study and those in the literature (LLOYD-JONES *et al*., 2019).

The results also showed that altered waist-hip ratio is significantly associated with increased cardiovascular risk. The impact of obesity, which determines an increase in the relationship, is greater in postmenopausal women and is explained by the redistribution of fat in the abdominal region and greater predisposition to metabolic syndrome (SAEED *et al*., 2017; AMATO *et al*., 2010). Being overweight was associated with the occurrence of later menopause, which would reduce the risk of developing cardiovascular disease, despite the present study showing an increased risk in women with a higher waist-to-hip ratio (ZHU *et al*., 2019). Cardiovascular prevention guidelines recommend that climacteric women should practice physical activities, reduce caloric intake, and keep BMI below 25 and waist below 35 inches (approximately 88 centimeters) with the intention of decreasing cardiovascular risk (SAEED *et al*., 2017; FLY *et al*., 2011).

Relating perception of health status and cardiovascular risk, good perception appears as a protective factor. Studies demonstrate that a person's own assessment of their general health is a powerful predictor of future morbidity and mortality. Self-assessment may reflect evidence of health problems that are not biochemically detectable or are not present in the medical evaluation, proving to be a protective factor (ERIKSSON *et al*., 2001).

CONCLUSION

The association between increased cardiovascular risk in climacteric women was verified in this study. This finding highlights the need to assess the main risk factors in order to institute preventive measures during this phase. The menopausal transition, associated with hormonal changes, especially the decrease in estradiol, can be detrimental to cardiovascular health, thus increasing the risk of disease (ZHU *et al*., 2019).

We recognize, however, the limitation of the cross-sectional study design, measuring the outcome and exposure simultaneously, failing to prove temporality. Likewise, the delimitation of the target population is a limitation, as it is not possible to make inferences for the entire female population, given that only the women seen by the ESF teams were assessed. Finally, another limitation refers to the risk score adopted in this study, which, although very useful and important for cardiovascular risk stratification, when used in isolation, has limited stratification capacity, especially for patients at intermediate risk or with suspected subclinical atherosclerosis, in whom it is necessary to complement diagnostic tests for risk reclassification (LLOYD-JONES *et al*., 2019; BRANT *et al*., 2017; AZEVEDO *et al*., 2012).

Recent recommendations emphasize inflammatory conditions and the use of the coronary calcium score for restratification in these situations, which was not yet mandatory at the time of data collection for this study in 2014 and 2015. In addition to clinical aspects, other factors should be considered when assessing climacteric women, including sociodemographic and behavioral factors, which would guide new approach guidelines for cardiovascular risk assessment (PRECOMA *et al*., 2019).

In this sense, this study alerts health professionals to assess climacteric women more carefully and judiciously, encouraging and promoting healthy lifestyles, valuing sociodemographic aspects, level of education and perception of the health situation, in addition to clinical manifestations for classification and adoption of assertive measures in each situation (KIM *et al*., 2018). These

recommendations are particularly important considering the prospect of a large increase in the female elderly population in the near future, which will represent the main group of users of health services.

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