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Assessment of the cardiovascular risk in female professors at the end of their reproductive period

Avaliação do risco cardiovascular em mulheres docentes no fim do período reprodutivo

Evaluación del riesgo cardiovascular en mujeres docentes al final de su período reproductivo

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Abstract: Objective: To assess the cardiovascular risk in female professors at the end of their reproductive period. **Method:** A cross-sectional quantitative study conducted in a private university in southern Brazil in September 2018, including climacteric or post-menopausal women older than 44 years of age who had measured their cholesterol levels in the last year and who knew their systolic blood pressure level. Sociodemographic and clinical data were collected using a structured questionnaire; and the cardiovascular risk (CVR) was measured using the *Framingham* risk score. **Results:** There was a difference in the CVR between the phases (climacteric and menopause). All the climacteric women had a low CVR, whereas post-menopausal women were classified into low (73%), intermediate (24.7%), and high (2.2%) CVR risk. **Conclusion:** There was a significant relationship between menopause and increased CVR, justifying the fact that this is yet another risk factor for women.
Keywords: Risk Factors; menopause; Cardiovascular Diseases; Women; Nursing

Resumo: Objetivo: avaliar o risco cardiovascular em mulheres docentes do ensino superior no fim do período reprodutivo. **Método:** estudo quantitativo, transversal, realizado em universidade privada do Sul do Brasil, em setembro de 2018. Incluíram-se docentes no climatério ou menopausa (idade superior a 44 anos, com dosagem de colesterol no último ano e que conhecessem sua pressão arterial sistólica). Dados sociodemográficos e clínicos foram coletados a partir de questionário estruturado; o risco cardiovascular (RCV) foi mensurado por meio do

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escore de *Framingham*. **Resultados:** houve diferença no RCV entre as fases (climatério e menopausa). Todas as mulheres climatéricas apresentaram RCV baixo; já as mulheres na menopausa apresentaram RCV baixo (73%), RCV intermediário (24,7%) e RCV alto (2,2%). **Conclusão:** existe relação significativa entre menopausa e aumento do RCV, justificando ser mais um fator de risco para as mulheres.
Descritores: Fatores de Risco; Menopausa; Doenças Cardiovasculares; Mulheres; Enfermagem

Resumen: **Objetivo:** evaluar el riesgo cardiovascular en mujeres docentes de educación superior que se encuentran en el final de su período reproductivo. **Método:** estudio cuantitativo y transversal realizado en una universidad privada del sur de Brasil durante el mes de septiembre de 2018. Se incluyó a docentes que se encontraban en el climaterio o en la menopausia (más de 44 años, con medición de colesterol en el último año, y que conociesen su presión arterial sistólica). Se recopilaron datos sociodemográficos y clínicos a partir de un cuestionario estructurado; el riesgo cardiovascular (RCV) se evaluó por medio del puntaje de *Framingham*. **Resultados:** se registró una diferencia en el RCV entre las fases (climaterio y menopausia). Todas las mujeres en el período del climaterio presentaron un RCV bajo, mientras que las mujeres entradas en la menopausia presentaron RCV bajo (73%), intermedio (24,7%) y alto (2,2%). **Conclusión:** existe una relación significativa entre la menopausia y un aumento en el RCV, lo que justifica considerarlo como un factor de riesgo adicional para las mujeres.
Descriptores: Factores de riesgo; Menopausia; Enfermedades cardiovasculares; Mujeres; Enfermería

Introduction

Cardiovascular diseases (CVDs) are the main cause of death worldwide, accounting for 17.7 million deaths in 2015, which represents 31% of all deaths.[1] Furthermore, when mortality rates are stratified by gender, CVDs are the leading cause of death for women. In the United States, they stand out as the main cause of female mortality, accounting for nearly one out of five female deaths in 2017.[2] Moreover, it is possible to observe that incidence increases as hormone production by the ovaries decreases, which is physiologically characterized by the onset of menopause.[3]

The end of the female reproductive cycle is determined by the climacteric and menopause phases. Climacteric begins with the first symptoms of changes in the menstrual cycles and finishes with the onset of menopause, defined as cessation of menstruation for twelve consecutive months. The age for the onset of this process varies, the mean age being 51 years old. In this phase, women are at an increased risk of developing CVDs.[4] The transition to menopause is marked by a reduced production of the ovarian hormones (both estrogen and

testosterone), which have an important role in the endothelial function, vascular tone, and cardiac function, leading to an increased cardiovascular risk (CVR) in the post-menopausal period. In this period, the presence of some risk factors should be noted, including the following: decreased high-density lipoprotein cholesterol (HDL), increased low-density lipoprotein cholesterol (LDL), and changes in the metabolism and in blood pressure.[5] By 2030, the female Brazilian population is estimated to be above 113 million.[6] It is possible to extrapolate this information and predict that, in that same year, nearly 21% of the women in Brazil, i.e., approximately 24 million, will belong to the age group when climacteric and menopause occur.[6]

Given this context, the assessment of the CVR becomes relevant,[7] which is reinforced by the fact that, in the Brazilian scenario in the last ten years, circulatory system diseases are also the leading causes of death, followed by neoplasms and by respiratory diseases.[8] After climacteric, there is a significant increase in the incidence of CVDs, which is justified by the hormonal changes that have an impact on endothelial dysfunction, a factor known to be involved in the process of CVDs.[9]

The life expectancy of Brazilians increased to 75.8 years old, and, on average, women live longer than men: 79.4 and 72.9 years old, respectively.[10] In the female population, the clinical manifestations of CVDs may occur nearly 10 to 15 years after menopause, which is associated with the vascular protection provided by estrogen.[11] Considering the increased life expectancy among women, it is interesting to assess the menopause period focusing on the implementation of preventive actions.

The Framingham Risk Score (FRS) – a CVR predictor – is an instrument based on variables such as gender, age, systolic blood pressure (SBP), total cholesterol, HDL fraction, presence of diabetes *mellitus* (DM), and smoking. Each evaluated variable yields numerical values specific for women or for men. After summing the scores, the risk is classified as

low (<10%), intermediate or moderate (10 to 20%), and high (>20%). The assessment of these factors enables to determine the likelihood of an individual with no previous diagnosis to have a cardiovascular event within the next 10 years of life, and to establish measures to reduce this likelihood.[12]

Knowledge on the CVR among women has been inaccurate in early detection and consequently in the prevention of CVDs, which makes it significant to explore new risk factors so as to decrease morbidity and mortality rates due to these causes.[13] Considering the broad role of the nursing team in preventing cardiovascular events, it is essential for these professionals to acquire this knowledge in order to be able to develop health promotion programs and strategies aimed at reducing these rates and bringing benefits such as increased quality of life to these women.

The research question was the following: Which is the cardiovascular risk among female professors at the end of their reproductive period? This question generated the following objective: to assess the CVR in female professors at the end of their reproductive period.

Method

This is a cross-sectional quantitative study conducted in a private university in the region of Vale dos Sinos, southern Brazil. It included all the female professors, regardless of their area of activity (undergraduate, graduate, and language courses), who were either in the climacteric or in the menopausal period, i.e., over 44 years old (age established for the diagnosis of early menopause); who had their total cholesterol and HDL measured in the last year; and who knew their regular systolic blood pressure value. The sample did not include women with a history of previous cardiovascular events, such as acute myocardial infarction (AMI) or stroke, because the FRS does not apply to patients with diagnosed coronary diseases.[12] At the beginning of the research, the professors received information on the definition of the stages that characterize

the end of the female reproductive period, namely climacteric and menopause. Considering the total of female professors aged over 44 years old working at the university where the study was conducted, i.e., 213, a margin of error of 5%, and a degree of confidence of 95%, the sample size was estimated at 138 professors.

Data was collected using a closed-question questionnaire developed by the authors which included sociodemographic and clinical variables for sample characterization, in addition to the variables required for the calculation of the CVR. The invitation to participate in the study, as well as the research form, was sent to the participants' institutional email address, which was provided by the Human Resources department of the university. Five days after sending the first email, a new message was sent to the professors who had not answered the questionnaire yet, thus reinforcing the invitation. After receiving the answers, the percentage risk of developing CVDs over the next ten years was calculated and classified using the FRS, according to the following categories: low risk (<10%), intermediate risk (10% to 20%), and high risk (>20%).[12] Data collection took place in September 2018.

Data was entered into a database in the Statistical Package for Social Sciences (SPSS), version 20.0, and analyzed by means of descriptive statistics. The continuous variables were expressed as mean and standard deviation or as median and percentiles, according to data distribution. The categorical variables were presented as absolute numbers and relative frequencies. To relate the risk of developing CVDs to clinical variables, the Pearson's or Spearman's correlation coefficients were used, according to data distribution, and the association between the categorical data was assessed using the Chi-square test. A p-value <0.05 was considered statistically significant.

The project was approved in its ethical and methodological aspects by the Research Ethics Committee of the institution on 08/21/2018 (CAAE: 91756118.2.0000.5344). 91756118.2.0000.5344). A Free and Informed Consent Term was signed by the research

participants, and the research was conducted in accordance with the Guidelines and Regulatory Standards for Research Involving Human Subjects (CNS Resolution No. 466, of December 12th, 2012)[14] and with guidelines supplementing those of the National Health Council.[15]

Results

Of the total of 213 professors older than 44 years of age, 31 (14.6%) answered that they were not experiencing either menopause or climacteric. Another 15 professors (7%) answered that they did not have the data required for the research, and 27 professors (12.7%) did not reply the emails sent. The professors participating in the research covered all areas of knowledge, consisting of a final sample of 140 women who had been working as professors for a mean of 22.5 years (Table 1).

Table 1 – Sociodemographic and clinical characteristics of the sample. São Leopoldo, 2018.

Characteristics	Total n (%)
Participants	140 (100)
Time in teaching	22.5 ± 8.9
Age	56.5 ± 5.8
Age at climacteric	50 ± 2.9
Age at menopause	56.5 ± 3.4
Climacteric	51 (36.4)
Menopause	89 (63.6)
Systemic Arterial Hypertension in treatment	24 (17.1)
Increased total cholesterol	59 (42.1)
Low HDL (<40 mg/dL)	8 (5.7)
Smokers	9 (6.4)
Diabetics	4 (2.9)
Little activity and sedentarism	85 (60.7)

Note: Continuous variables expressed as mean ± Standard Deviation; categorical variables expressed as n (%).
Source: Research data, 2018.

The analysis of the association between the clinical variables and the reproductive phase found statistically significant relationships for total cholesterol, anti-hypertensive therapy, and increased total CVR score, with a p-value <0.05 for all the comparisons. The comparison between clinical variables and increased CVR revealed statistically significant relationships for increased SBP and menopause, with a p-value <0.05 for both (Table 2).

Table 2 - Associations between clinical variables. São Leopoldo, 2018.

Variable x phase of the reproductive cycle (climacteric/menopause)	***p* value**
Total cholesterol	<0.05*
High density lipoproteins	0.83*
Anti-hypertensive therapy	<0.05*
Increase of Cardiovascular Risk	<0.001*
Variable x increased CVR	***p* value**
Smoking	0.008*
High Systolic Arterial Pressure	<0.05*
Menopause	<0.05*

Note: *A p-value <0.05 denotes statistical significance.
Source: Research data, 2018.

According to the data presented in Table 2, there was a significant relationship (p<0.05) between the total cholesterol values and each phase (climacteric and menopause), indicating that the women's total cholesterol levels may undergo changes depending on the phase of the reproductive cycle they are undergoing. This relationship was not observed for HDL (p = 0.83).

With regard do SBP, only 2.1% of the participants reported to have high levels of SBP as their usual blood pressure value, but it is worth highlighting that they were receiving treatment.

The use of anti-hypertensive drugs showed a significant relationship ($p<0.05$) with the phase of the reproductive cycle. Thus, the use of anti-hypertensive therapy was more present in the menopause phase (21 participants – 23.6%) compared to climacteric (3 participants – 5.9%).

Regarding the use of tobacco, the results signal a significant correlation, relating its use with increased CVR ($p<0.05$). With regard to the CVR as calculated using the FRS, the following results were found: most of the sample participants showed low risk (116 women – 82.9%), followed by intermediate risk (22 – 15.7%) and by high risk (2 – 1.4%).

Table 3 shows the results of the FRS considering each phase of the reproductive cycle.

Table 3 - Framingham risk score according to the phase of the reproductive cycle. São Leopoldo, 2018.

Cardiovascular risk	Climacteric n (%)	Menopause n (%)
Low (<10%)	51 (100)	65 (73.03)
Intermediate (10-20%)	0 (0)	22 (24.71)
High (>20%)	0(0)	2 (2.25)

Note: The categorical variables are expressed as n (%).
Source: Research data, 2018.

This study revealed a difference in the degree of CVR according to the women's phase of the reproductive cycle ($p<0.05$), indicating that post-menopausal women had a significant relation to increased risk.

Discussion

Early knowledge of the CVR factors may considerably contribute to reduce deaths due to CVDs.[16] In view of this, the present study provided significant results, revealing a strong relationship between the variables obtained from women at the menopausal phase and increased CVR. In the phase of menopause, women experience changes in lipid metabolism and there may be a decrease in estrogen levels, which results in increased lipid profile values (total cholesterol, lipoproteins, and triglycerides) and has a direct influence on the process of

atherosclerosis and its effects on the organism.[17] In the present study, the results reveal a considerable number of professors with high total cholesterol levels, and a considerable increase in these levels was observed according to women's phase of the reproductive cycle.

Although lack of physical activity was not assessed in the FRS, sedentarism is known to be strongly associated with mortality from all causes and due to CVDs. It is also worth considering that the post-menopausal period seems to pose greater risks for obesity and overweight.[18] A clinical trial including 70 sedentary, obese, post-menopausal women between 50 and 79 years old, divided into a group that received training with physical activities and an untrained group, showed significant results in reducing CVR factors, thus reducing the risk of early death due to CVDs among the women in the intervention group.[19] There was a predominance of sedentarism in the sample of the present study, demonstrating that, although women know the importance of physical activity on quality of life, there is certain resistance to engage in this behavior. This was strongly justified by the busy daily routine of these professors, similar to that of all the women participating in the work market. A study aiming to analyze the association of sedentarism and physical activity with quality of life among women with a mean age of 52.6 (±4.6) years old concluded that spending less time in sedentary behavior as well greater physical activity levels were associated with better quality of life.[20]

Another factor that should be noted is the association between sedentarism and obesity, which together increase the risk of developing CVDs. According to current knowledge, physical activity results in benefits by attenuating the onset of chronic diseases such as SAH, DM, and dyslipidemia, in addition to reducing body fat and SBP levels, promoting effects on the control of fasting glycaemia and on HDL values.[18] A cross-sectional study conducted in China with 8,191 women found a prevalence of 13.22% for DM2. The authors identified an increased risk for DM2 in post-menopausal women compared to pre-menopausal women (adjusted OR [aOR] = 1.90, 95% CI = 1.51-2.37).[21]

In this sample of professors, low SAH and smoking rates are evidenced. However, a strong relationship was observed between these variables when they are present in the final results of the FRS. These variables are among the main modifiable risk factors that contribute to an increased CVR.[18] Smoking is an important independent risk factor for cardiovascular events and mortality and, in individuals older than 60 years of age, it doubles the CVR in comparison to non-smokers. At the same time, smoking cessation at this age still shows to be relevant in reducing these risks, with benefits increasing as the time of cessation increases.[22] Given the high prevalence of these risk factors and the possibility of modifying them through behavioral changes, it is possible to infer the importance of the role of nurses and of public policies in this scenario.

The study revealed a significant difference in the mean ages of women at the climacteric and menopausal phases, thus leading to an increased CVR as assessed by the FRS. Post-menopausal women showed all the risk levels (low – 10%, intermediate – 10 to 20%, and high >20%). Conversely, all the climacteric women presented a low CVR.

The fact that the CVR has a higher prevalence in the menopausal phase may be explained by more advanced age and consequently by the onset of a greater number of cardiovascular events, due to the actions of estrogen on the vascular system.[23] Given this fact, since climacteric occurs first, it is seen as the appropriate period for implementing strategies to prevent the development of CVDs. It should be reinforced that the aging process in the female population results in metabolic profile changes, which interfere with the composition and distribution of the adipose tissue, favoring increased body weight and reflecting in the evolution of atherosclerotic processes.[16]

There was a predominance of low risk scores (<10%) in the present study, possibly due to the adequate blood pressure levels found among the participants, to the low rate of diabetic women and smokers, and to the fact that mean age was below 60 years old. Such factors have an

influence on the score, thus having an effect on the final result.[24] A cross-sectional study that assessed CVR in 102 pre- and post-menopausal women with a mean age of 51.5 (±7.9) years old concluded that post-menopausal women showed the highest CVR (1.25±0.0 vs. 1.19±0.9). Furthermore, when considering the participants with a high CVR, those in the post-menopausal phase exhibited greater levels of body fat, total cholesterol, glucose, and LDL.[25]

The present study found the association of more than one risk factor among women with intermediate and high CVR. The presence of this association of factors is a characteristic feature of individuals with increased CVR.[18] The present results, obtained from a sample of female professors, highlighted the importance of early assessment of the CVR in women at the end of their reproductive period, restating the need for nursing preventing actions in these cases.

Conclusion

At the end of this research, it was possible to assess the CVR of 140 professors who were at the climacteric or the menopause phase and to observe the extent to which this phase of the reproductive cycle reflects in systemic changes. The study results revealed that increased CVR was significantly related to menopause, demonstrating that it is a risk factor for the female population.

In addition to changes resulting from the cessation of the ovarian hormone production in this period, the risk for developing CVDs increases when associated with other factors measured by the FRS, such as advanced age, high total cholesterol, SAH, DM, and smoking. The limitation of this study, also found in the FRS, was the lack of BMI assessment in this population, since obesity is also an indicator contributing to increased CVR.

It is possible to conclude that the FRS is an easy-to-handle and low-cost instrument that can be used to determine the CVR of the population, especially in the primary care setting; also,

the results obtained from this score may be used to guide preventive actions. Additionally, it is important to highlight that the instrument can be administered again after some time in order to investigate the results obtained with treatment adherence and acknowledgment of the CVR posed by each individual, since risk calculation is based on the current situation of each individual.

In view of the considerable increase in morbidity and mortality rates, actions to prevent diseases related to CVR can be understood as an essential strategy in nursing care. The implementation of interventions aiming to improve women's quality of life not only at the menopausal phase but also over the years will raise awareness on the impact on these interventions on women's health and will help them to cope with this phase experiencing a lower risk of developing CVDs. Therefore, new research studies on this theme should continue to be conducted, thus contributing to the dissemination of knowledge and of new strategies of disease prevention and health promotion in the population, as well as to the reduction of the morbidity and mortality rates due to CVDs.

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Conception, planning, and guidance of the research project, data analysis and interpretation, writing, and critical review.

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