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Increased cardiovascular risk and role of metabolic syndrome in hypertensive elderly

Risco cardiovascular aumentado e o papel da síndrome metabólica em idosos hipertensos

Aumento del riesgo cardiovascular y el papel del síndrome metabólico en personas hipertensas de la tercera edad

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ABSTRACT

Objective: To evaluate metabolic syndrome and cardiovascular risk for hypertensive elderly patients treated in primary care. **Methods**: A cross-sectional study carried out with 154 hypertensive elderly from a Basic Health Unit in the Federal District. A structured instrument investigated the profile of the elderly. For classifying the metabolic syndrome, the criteria proposed by the National Cholesterol Education Program - Treatment Panel for Adults III were considered. For cardiovascular risk analysis, the Framingham risk score was used. Statistical and inferential analysis was performed using ANOVA, chi-square test and Fisher's exact test, in addition to Odds Ratio and its 95% confidence interval to estimate cardiovascular risk among the groups. **Results**: 64.9% of the hypertensive elderly were obese. Metabolic syndrome was evidenced in 70.8%. It was noted that 27.2% had low, 46.8% moderate, and 26.0% high cardiovascular risk, and that being a woman and of advanced aged negatively influenced the risk. Older adults with metabolic syndrome showed 7.19 times more likelihood to have high cardiovascular risk. **Final considerations and implications for the practice**: The hypertensive elderly patients had high metabolic syndrome prevalence, which significantly increased cardiovascular risk. This result allows for a better planning of nursing care by the nurses in primary health care.

Keywords: Elderly; Hypertension; Metabolic Syndrome; Cardiovascular Diseases.

RESUMO

Objetivo: avaliar a síndrome metabólica e o risco cardiovascular de idosos hipertensos atendidos na atenção primária. **Métodos:** estudo transversal realizado com 154 idosos hipertensos de uma Unidade Básica de Saúde do Distrito Federal. Um instrumento estruturado investigou o perfil dos idosos. Para a classificação da síndrome metabólica, consideraram-se os critérios propostos pela *National Cholesterol Education Program – Adult Treatment Panel III*. Para análise do risco cardiovascular, utilizou-se o escore de risco de Framingham. Foi realizada análise estatística e inferencial com a utilização da ANOVA, teste qui-quadrado e exato de Fisher, além da *odds ratio* e seu intervalo de confiança de 95% para estimar o risco cardiovascular entre os grupos. **Resultados:** 64,9% dos idosos hipertensos eram obesos. Síndrome metabólica foi evidenciada em 70,8%. Observou-se que 27,2% apresentaram baixo, 46,8% moderado e 26,0% elevado risco cardiovascular, sendo que o sexo feminino e a idade avançada influenciaram negativamente o risco. Idosos com síndrome metabólica apresentaram 7,19 vezes mais chances de terem elevado risco cardiovascular. **Considerações finais e implicações para a prática:** os idosos hipertensos apresentaram uma elevada prevalência de síndrome metabólica que aumentou significativamente o risco cardiovascular. Este resultado possibilita um melhor planejamento da assistência de enfermagem pelo enfermeiro da atenção primária à saúde.

Palavras-chave: Idoso; Hipertensão; Síndrome Metabólica; Doenças Cardiovasculares.

RESUMEN

Objetivo: evaluar el síndrome metabólico y el riesgo cardiovascular de pacientes hipertensos de la tercera edad tratados en la atención primaria. **Métodos**: estudio transversal realizado con 154 personas de la tercera edad hipertensas de una Unidad Básica de Salud del Distrito Federal. Se investigó el perfil de estas personas a través de un instrumento estructurado. Para clasificar el síndrome metabólico se utilizaron los criterios propuestos por el *National Cholesterol Education Program – Adult Treatment Panel III*. Para analizar el riesgo cardiovascular, se utilizó el escore de riesgo de Framingham. El análisis estadístico e inferencial se realizó mediante ANOVA, chi-cuadrado y la prueba exacta de Fisher, además de la *odds ratio* y su intervalo de confianza del 95% para estimar el riesgo cardiovascular entre los grupos. **Resultados**: el 64,9% de las personas hipertensas de la tercera edad eran obesas. El síndrome metabólico se observó en el 70,8% de los casos. Se pudo observar que el 27,2% eran de riesgo cardiovascular bajo, 46,8% moderado y 26,0% alto, siendo que el sexo femenino y la edad avanzada influencian el aumento del riesgo. Las personas mayores de edad poseen 7,19 veces más probabilidades de tener un alto riesgo cardiovascular. **Consideraciones finales e implicaciones para la práctica:** los pacientes hipertensos de edad avanzada tenían una prevalencia elevada de síndrome metabólico que aumentaba, considerablemente, el riesgo cardiovascular. Este resultado permite una mejor planificación de la atención de enfermería por parte de las enfermeras en la atención primaria de la salud.

Palabras-clave: Anciano; Hipertensión; Síndrome Metabólico; Enfermedades Cardiovasculares.

INTRODUCTION

Systemic Arterial Hypertension (SAH) is a multi-factorial clinical condition characterized by sustained elevation of blood pressure levels ≥ 140 and/or 90 mmHg.[1] It is the most prevalent Chronic Non-Communicable Disease (CNCD) among the elderly, since its prevalence increases progressively with age.[2]

Among the Brazilian elderly, in 2013, only 22.3% declared not having any CNCD. Approximately half of them, 48.6%, declared having one or two and 29.1%, three or more diseases. In this population, SAH is accompanied by changes in the nutritional profile, as there has been an increase in obesity and other CNCDs.[3]

This setting has led to changes in the health status of the elderly and, consequently, to greater exposure to risk factors related to Metabolic Syndrome (MS), which represents a group of cardiometabolic risk factors that include abdominal obesity combined with elevated blood pressure, fasting glucose and triglycerides, as well as a reduction in the level of High-Density Lipoprotein (HDL).[4] MS has attracted the attention of the scientific community, not only due to the impact of the respective components, but mainly due to the high prevalence of cardiovascular risk factors.[5]

A number of studies carried out with elderly individuals in Brazil observed prevalence of MS that varied between 20 and 60%.[6-10] Aging is considered a risk factor for most cardiovascular diseases, as well as for numerous comorbidities, making the elderly the most heterogeneous and complex age group. For this reason, MS has been linked to cardiovascular events in the elderly.[11-13]

In this sense, some instruments are available for assessing cardiovascular risk (CVR). Among them, it is worth highlighting the Framingham Risk Score (FRS), a useful tool and easy to apply in everyday life. It classifies individuals as low, moderate, and high risk for developing cardiovascular disease in the next ten years, through a score that helps in the definition of therapeutic approaches.[2]

Few studies carried out in Brazil, with hypertensive elderly individuals, evaluated the relationship between MS and CVR, assessed by the Framingham score. Internationally, some studies have investigated this relationship.[13,14] Lifestyle interventions are known to be important strategies for preventing and treating MS.[1,4]

In this sense, the importance is considered of carrying out studies that support the evaluation and planning of the care provided by nurses, especially in the primary health care setting, the main place of care for the elderly with CNCDs. In view of the above, this study aims to assess the metabolic syndrome and cardiovascular risk of hypertensive elderly individuals treated in primary care.

METHOD

This is a cross-sectional study with a quantitative approach, carried out from July to August 2019 with elderly users of a Basic Health Unit (BHU) in the Federal District.

In calculating the sample size, the following statistical parameters were considered: 95% confidence level and 5% statistical error. The total number of elderly individuals registered in the Hypertensive Group at the BHU was considered for the calculation (N=300). The sampling was random, by means of a draw carried out according to the registration number of the elderly person in that group. The initial sample consisted of 160 elderly individuals, of both genders, and who met the following inclusion criteria: age greater than or equal to 60 years old, with a medical diagnosis of systemic arterial hypertension for more than six months. Six elderly individuals who did not complete data collection were excluded, ending the sample in 154 elderly.

The elderly were instructed to attend with a 12-hour fast at the unit, on a previously scheduled day and time. Blood collection was performed by venipuncture, preferably in the antecubital fossa, to measure the concentrations of triglycerides (TG), high density lipoprotein (HDL), low density lipoprotein (LDL), total cholesterol (COL), blood glucose in fasting (GLI), glycated hemoglobin (HbA1c), and hematocrit (HT). The biochemical tests were performed in a clinical analysis laboratory in the Federal District, financed by the research project budget.

A structured instrument was used to investigate demographic data (gender and age), lifestyle (smoking, drinking, physical inactivity and sleep), number of medications used, and presence of DM (self-reported). Subsequently, blood pressure (BP) was measured, a measurement taken following all the stages recommended in the VII Brazilian Guidelines on Arterial Hypertension. Blood pressure was measured using the auscultatory technique, with a calibrated sphygmomanometer, with an adapted cuff on the patient's left arm and a stethoscope positioned over the brachial artery line.[1]

To assess the anthropometric variables, weight, height, and waist circumference (WC) were measured. At the time of measurement, the elderly individuals were weighed in light clothing and barefoot. A portable scale with a 150 kg capacity and 100 g sensitivity (Plenna®) was used. For checking their height, a portable Sanny® stadiometer with a maximum height of 2.05 m was used. For this, the elderly individuals were measured in an upright position, with their hands lateral to their body, their head aligned to the horizon line, and with their heels aligned. The WC measurement was performed in a standing position, with an inelastic measuring tape (Sanny, with a length of 200 cm, and 1 mm divisions) that surrounded the natural waist line, in the narrower region between the chest and the hip, above the umbilical scar.[15]

The Body Mass Index (BMI) was calculated considering the weight (in kilograms) divided by the height (in meters) squared, being classified as normal (18.5 kg/m^2 to 24.9 kg/m^2), overweight (25 kg/m^2 to 29.9 kg/m^2), and obesity (≥30 kg/m^2).[3]

For classifying MS, the criteria proposed by the National Cholesterol Education Program - Adult Treatment Panel III (NCEP-ATP III) were considered, when three of the five submitted factors were found: 1) TG ≥ 150 mg/dL or use of medications for dyslipidemia; 2) SBP ≥ 130 mmHg, DBP ≥ 85 mmHg, or the use of antihypertensive medications; 3) GLI ≥ 110 mg/dL or using medications for DM; 4) HDL < 40 mg/dL (male) or < 50 mg/dL

(female) or using medications for dyslipidemia; and 5) WC ≥ 88 cm (female) and ≥ 102 cm (male).[4]

For analyzing the CVR, the FRS was used, where each variable has values that have specific scores, whether positive or negative. The total score of the instrument considers the following variables: gender, age, smoking, DM, HDL, LDL, SBP, and DBP. The score obtained corresponds to a percentage of probability of occurrence of coronary artery disease in the next 10 years. The elderly individuals were classified into the following categories: Low CVR < 10%; moderate CVR between 10 and 20%; and high CVR > 20% of having a cardiovascular event in the next ten years.[2]

Data was analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.0. Descriptive measures were calculated initially. The Kolmogorov-Smirnov test was adopted in analyzing the normality of the variables. The description for the continuous variables was based on means and standard deviations. ANOVA with Bonferroni adjustment was used in order to compare differences between the means of the variables evaluated. To check the differences between the proportions, the Chi-square test and Fisher's exact test were used. Odds Ratio and its 95% confidence interval were calculated to estimate the CVR among the groups. A significance level of 5% was adopted for all the tests.

This research is part of the project entitled "Approach to chronic non-transmissible conditions in primary health care" of the Health, Care and Aging Research Group of the Ceilândia College of the University of Brasília (*Faculdade de Ceilândia da Universidade de Brasília*, FCE/UnB), submitted to the Research Ethics Committee (REC) of the Health Secretariat of the Federal District (*Secretaria de Saúde do Distrito Federal*, SES/DF) and approved with opinion number 1,355,211 and CAAE 50367215.5.0000.5553. All the participants agreed to participate in the research and signed the Free and Informed Consent Form.

RESULTS

Of the 154 hypertensive elderly individuals, most were female (81.2%) and with a mean age of 68.1 ± 6.2 years old. Regarding the FRS, it was observed that 27.2% had low, 46.8% moderate, and 26.0% high CVR. There was a higher prevalence of women in those with low and moderate CVR (p=0.004) and it was found that the mean age increases according to the severity of the CVR (p=0.037) (Table 1).

Regarding the clinical and biochemical variables, it was observed that BMI, SBP, DBP, COL, TG, LDL, HDL, GLI, HbA1c, HT, and presence of DM showed statistical differences, since the hypertensive elderly individuals with high CVR showed worse results (Table 1).

When analyzing the lifestyle habits of the hypertensive elderly individuals, it was evident that sedentary lifestyle had a negative influence on CVR (p=0.000). It is noteworthy that, despite not showing statistical significance, a higher prevalence of smoking

Table 1. Demographic, anthropometric, biochemical, and clinical variables according to the Framingham cardiovascular risk of the elderly individuals. Brasília, 2019. (n=154).

Parameters	Low risk (n=42)	Moderate risk (n=72)	High risk (n=40)	p-value
Gender (female/male)	95.2/4.8	80.6/19.4	65.8/34.2	0.004**
Age (years old)	66 ± 5	68 ± 6	70 ± 7	0.037*
BMI (kg/cm^2)	30 ± 5	31 ± 5	33 ± 5	0.042*
WC (cm)	98 ± 11	99 ± 12	103 ± 12	0.078
SBP (mmHg)	134 ± 19	132 ± 16	152 ± 18	0.000*
DBP (mmHg)	79 ± 14	79 ± 12	89 ± 12	0.000*
COL (mmol/L)	183.7 ± 40.0	187.3 ± 44.0	214.8 ± 39.1	0.001*
TG (mmol/L)	131.2 ± 52.0	155.5 ± 76.0	186.9 ± 97.5	0.004*
LDL (mmol/L)	105.6 ± 39.2	109.4 ± 38.4	132.0 ± 35.4	0.011*
HDL (mmol/L)	51.8 ± 6.3	47.5 ± 9.5	43.5 ± 8.2	0.000*
GLI (mmol/L)	112.7 ± 54.0	113.0 ± 38.2	152.5 ± 71.5	0.001*
HbA1c (%)	6.0 ± 1.3	6.2 ± 1.3	7.3 ± 2.0	0.000*
HT (%)	42.7 ± 3.2	42.0 ± 3.9	44.6 ± 3.5	0.001*
DM (%)	38.1	59.7	84.2	0.000**

*ANOVA with Bonferroni adjustment; **Fisher's exact test. BMI: Body Mass Index; WC: Waist Circumference BFP: Body Fat Percentage; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; COL: Total Cholesterol; TG: Triglycerides LDL: Low-Density Lipoprotein; HDL: High-Density Lipoprotein; GLI: Glycaemia; HbA1c: Glycated Hemoglobin; HT: Hematocrit; DM: Diabetes *Mellitus*.

and alcohol consumption was observed in the group of elderly individuals with high CVR (Table 2).

According to the nutritional status, 10.4% of the hypertensive elderly individuals were eutrophic, 24.7% overweight, and 64.9% obese. The mean of the FRS was 11.8 ± 3.0 and, when relating it to the nutritional status, according to the presence or not of MS, it was evidenced that the elderly individuals with MS had higher medians of FRS, when compared to those without MS (p=0.000). In addition, a higher FRS was observed in the elderly individuals with MS and who were obese (FRS=8 to 20%) (Figure 1).

MS was found in 70.8% of the elderly individuals with hypertension, with 32.5% having three components, 26.0% with four, and 12.3% with five components. The prevalence of MS was significantly higher in the group of elderly individuals with high CVR since, in the elderly with MS, a 7.19 times greater risk for presenting high CVR was identified. Regarding the number of MS components, it was observed that those with four and five components showed, respectively, 4.01 and 3.74 times more probabilities of having high CVR (Table 3).

Table 2. Life habits and number of medications according to the Framingham cardiovascular risk of the elderly individuals. Brasília, 2019. (n=154).

	Low risk (n=42)	Moderate risk (n=72)	High risk (n=40)	p-value
Smoking	2 (4.8)	4 (5.6)	6 (15.8)	0.074*
Alcoholism	2 (4.8)	3 (4.2)	2 (5.3)	0.358*
Sedentarism	7 (16.7)	30 (41.7)	24 (63.2)	0.000*
Poor sleep	20 (47.6)	32 (44.4)	16 (42.1)	0.620*
Number of medications**	4.2 ± 2.3	4.0 ± 2.4	4.0 ± 2.2	0.889**

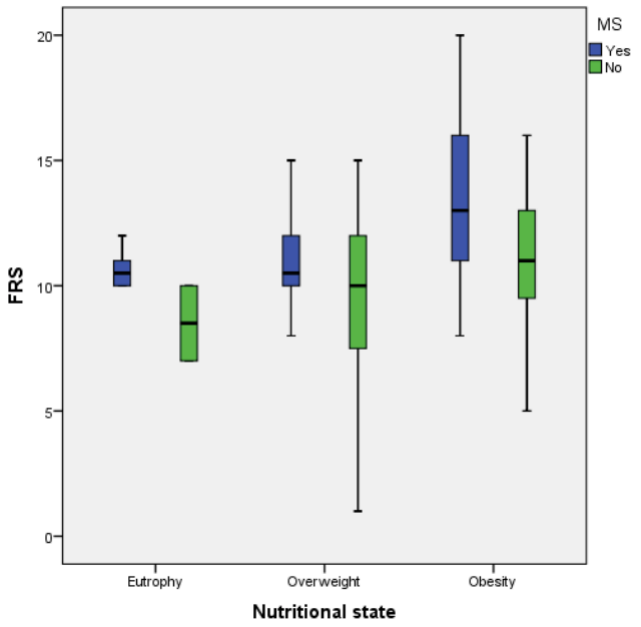
*Fisher's exact test; **ANOVA with Bonferroni adjustment.

Table 3. Prevalence, Odds Ratio and 95% confidence interval for the number of components of metabolic syndrome according to the Framingham cardiovascular risk of the elderly. Brasília, 2019. (n=154).

Number of CP N=154	Low risk			Moderate risk			High risk		
	n (%)	OR (95% CI)	p-value	n (%)	OR (95% CI)	p-value	n (%)	OR (95% CI)	p-value
1 (n=6)	3 (7.1)	2.79 (0.54-14.43)	0.219	3 (4.2)	1.14 (0.22-5.85)	0.870	-	-	
2 (n=39)	14 (33.3)	2.30 (1.06-4.98)	0.034	22 (30.6)	1.68 (0.80-3.49)	0.163	3 (7.5)	0.17 (0.05-0.60)	0.006
3 (n=50)	18 (42.9)	1.87 (0.89-3.91)	0.094	23 (31.9)	0.95 (0.48-1.88)	0.896	9 (22.5)	0.36 (0.15-0.85)	0.020
4 (n=40)	6 (14.3)	0.38 (0.14-0.99)	0.048	15 (20.8)	0.60 (0.28-1.25)	0.174	19 (47.5)	4.01 (1.83-8.74)	0.000
5 (n=19)	1 (2.4)	0.12 (0.01-0.91)	0.048	9 (12.5)	1.02 (0.39-2.69)	0.954	9 (22.5)	3.74 (1.37-10.18)	0.009
MS									
Yes (n=109)	25 (59.5)	0.49 (0.23-1.03)	0.062	47 (65.3)	0.60 (0.30-1.22)	0.161	37 (92.5)	7.19 (2.08-24.77)	0.001
No (n=45)	17 (40.5)	-		25 (34.7)	-		3 (7.5)	-	

*CP: Component; MS: Metabolic Syndrome.

Figure 1. Framingham Risk Score according to the nutritional status and presence of metabolic syndrome in the elderly. Brasília, 2019 (n=154); p=0.000 (ANOVA with Bonferroni adjustment).



FRS: Framingham Risk Score; MS: Metabolic Syndrome.

DISCUSSION

In this study, it was observed that a high number of hypertensive elderly individuals were overweight and presented MS. The number of elderly individuals who had MS in this study was considered high, since other studies have shown lower prevalence values. In Brazil, a prevalence of 29.2% was found in institutionalized elderly individuals in Natal-Rio Grande do Norte,[6] 42% in hypertensive patients, predominantly elderly residents in Juiz de Fora-Minas Gerais,[7] 45.2% in elderly individuals in Niterói-Rio de Janeiro,[8] 51% in the elderly at a Reference Unit for Physical Rehabilitation in Belém-Pará,[9] and 58.65% in elderly users of the single health system in the city of Goiânia-Goiás.[10] In international studies, the prevalence values ranged from 45.9% to 72.9%.[16-19] It is worth mentioning a study conducted in Egypt with hypertensive patients, in which they found an MS prevalence of 76.6%,[16] similar to that observed in this study.

It is known that some factors can influence MS, such as obesity. Obese individuals are more prone to MS.[20] In addition, obesity is an independent risk factor for developing systemic arterial hypertension, dyslipidemia and, greater insulin resistance. These pathologies aggregate the components that characterize MS, and, therefore, obese individuals are more predisposed to develop MS.[21] This high MS prevalence in these populations is usually due to continuous exposure to the various risk factors that predispose to the condition, them being inadequate diet, smoking, alcoholism, and physical inactivity, which directly or indirectly lead to an overweight condition and a consequent higher CVR.[22]

With CVR stratification, the results of this study demonstrated that the majority of the elderly individuals have a moderate risk of developing some cardiovascular event in the next ten years, according to the Framingham score. The gender, age, physical inactivity, biochemical parameters, and DM variables were related to CVR in this study.

Most of the studies conducted with the aim of analyzing the CVR showed a higher prevalence of low CVR. In a sample of hypertensive Brazilians, predominantly made up of elderly people, it was observed that 74% had low, 14% moderate, and 12% high CVR.[7] In the same vein, a study conducted with an adult Nigerian population found that 86.3% had low, 11.8% moderate, and 1.9% high CVR.[23] In a study conducted in Iran with adults diagnosed with MS, 77.5% had low, 16.3% moderate, and 6.3% high CVR.[14] On the other hand, 48% of the elderly Egyptian population had moderate to high CVR,[16] corroborating with the results evidenced in this study.

It was shown that being female significantly influences CVR. This predominance can be justified by the fact that women have greater survival indexes in relation to men, in addition to the strong relationship between blood pressure and menopause, due to the lower production of female hormones, such as estrogen, causing an increase in blood pressure levels,[24] and to the greater accumulation of abdominal fat in the post-menopausal period.[25]

Another fact observed in this study was that the mean age increases according to the severity of the CVR. In a population-based study conducted in Paraná, the simultaneity of CVR factors was analyzed and it was observed that 95.9% of the elderly individuals had two or more risk factors. It is known that advanced age is considered a non-modifiable cardiovascular risk factor that, when added to modifiable ones, increases the possibility of cardiovascular disease.[26]

High blood pressure levels were also evidenced in those with high CVR. In Brazil, SAH affects 32.5% of the adult individuals and more than 60% of the elderly people, directly or indirectly contributing to 50% of the deaths due to CVDs. In 2013, 29.8% of the deaths were due to CVDs, the main cause of death in the country. CVDs are also responsible for a high frequency of hospitalizations, with high socioeconomic costs. There is a direct and linear association between aging and SAH prevalence, related to the increase in life expectancy of the Brazilian population and to an increase in the elderly population in the last decade.[1]

Regarding physical inactivity, other studies also reinforce its negative influence on CVR.[27-29] It is evident that changes in lifestyle have a positive effect in reducing the FRS, decreasing the chance for the individuals to suffer coronary events in the next ten years.[30]

In this study, the elderly individuals with high CVR had a worse biochemical profile, especially with regard to dyslipidemia and glycemic control. Hypertensive, diabetic, and dyslipidemic elderly individuals have higher risk factors for the occurrence of CVD.[21] Other studies have also shown that dyslipidemia significantly increases CVR.[13,31,32]

Individuals with a higher CVR are more likely to develop type 2 DM, and those who already have a DM diagnosis can worsen their MS condition.[33] It is worth mentioning that, in this study, 84.2% of the elderly individuals with a high CVR had DM. In addition, CVDs are the leading cause of death among people with DM, accounting for approximately half of the deaths due to DM in most countries.[4] There is also a strong relationship between MS and developing DM, which intensifies the greater MS component number.[21] Alone, SAH already confers a cardiometabolic risk, which can further impair insulin resistance in the metabolism of individuals with MS.[34]

The results of this study showed that the hypertensive elderly individuals with MS and those who are obese had higher FRSs. MS significantly increased the chance of the elderly having a high CVR. Obese elderly individuals had a high CVR, a fact also observed in another study.[35] MS increases CVR through a chain of events that involve hyperglycemia, peripheral vasoconstriction, sodium retention, increased production of TG and LDL, atherosclerosis, systemic pro-thrombotic and pro-inflammatory conditions, which begin through insulin resistance generated by obesity.[21] It is known that the presence of at least three components of MS increases cardiovascular mortality by approximately 2.5 times.[36]

This study also demonstrated that MS has a significant influence on CVR, a result corroborated by other studies.[16,23,35,37-39] In addition, the prevalence of moderate and high CVR was statistically more evident in the elderly with MS, just as the number of components influenced CVR, a result similar to those of other research studies.[13,14,38]

A survey conducted in Italy evaluated the cardiovascular outcome of 1,191 hypertensive elderly individuals, 48.5% of whom had MS, noting that, during ten years of follow-up, 39 strokes and 120 coronary events occurred. The authors concluded that MS was related to CVR, especially in the elderly with DM, and with compromised blood pressure and blood glucose parameters.[40]

MS and CVR are largely preventable. Regular exercise, a healthy diet, and weight control are recommendations for modifying lifestyle, as they involve behavioral changes.[41] A randomized clinical trial conducted with elderly individuals in China aimed to assess the long-term effects of a community intervention in lifestyle on the biochemical indicators and on the prevalence of MS in 69 elderly individuals, demonstrating that physical exercise and dietary interventions decreased MS indicators and prevalence.[42]

In this context, it is known that a multidisciplinary approach to health is necessary, but MS can be identified routinely by the nurses working in primary health care. Knowing the possibilities for MS diagnosis criteria and the factors involved in this disorder, the nurse have an important role in terms of MS diagnosis, care planning, and prevention.

That said, the nursing professional has an important role in promoting health and in training the elderly to become responsible for their health. CNCD patients require special care strategies. The nursing professionals must ensure that these patients receive information, guidance, and adequate monitoring in order to adopt behaviors that prevent the emergence of other chronic conditions, especially MS.

In this study, some limitations should also be pointed out, especially in relation to the method, as it is a cross-sectional study that does not allow establishing causal relationships. Still, it is believed that there may be biases that were not controlled in the selection of the participants, since obesity was a variable present in most of the participants and these patients are at greater risk for developing MS. Therefore, it is suggested that future studies be carried out considering this criterion in the selection of the sample and the performance of multivariate analysis. Despite this, it is believed that the results of this study can contribute to generate scientific knowledge on this topic.

FINAL CONSIDERATIONS AND IMPLICATIONS FOR THE PRACTICE

The results of this study showed that elderly hypertensive patients had a high MS prevalence, which significantly increased CVR. Female gender, advanced age, physical inactivity, DM, clinical and biochemical parameters negatively influenced CVR in hypertensive elderly individuals. Identifying these factors allows for a better nursing care planning for the professionals working in primary health care.

It is important to emphasize that CVR and MS are preventable; therefore, primary health care professionals must actively act in order to implement effective preventive measures. Primary care is the gateway to population care, the place where prevention, diagnosis, and patient care takes place so, if care is effective to the point of identifying elderly individuals with high CVR and diagnosed with MS, the nursing professionals can develop plans for each patient to have a healthier lifestyle and teach them how to control their health. Based on the results obtained, it is suggested that similar studies be carried out periodically in order to identify the factors involved in these chronic conditions in the elderly population.

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AUTHOR'S CONTRIBUTIONS

Study design. Data acquisition and analysis, and interpretation of the results. Content writing and/or critical review. Approval of the final version of the article. Responsibility for all aspects of the content and integrity of the published article. Manoela Vieira Gomes da Costa. Marina Morato Stival.

Data analysis and interpretation of the results. Content writing and/or critical review. Approval of the final version of the article. Responsibility for all aspects of the content and integrity of the published article. Luciano Ramos de Lima. Izabel Cristina Rodrigues da Silva. Tania Cristina Morais Santa Barbara Rehem. Silvana Schwerz Funghetto.

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