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RESEARCH

Cardiovascular risk stratification among hypertensive patients: the influence of risk factors

Estratificação do risco cardiovascular entre hipertensos: Influência de fatores de risco

Estratificación del riesgo cardiovascular entre hipertensos: Influencia de factores de riesgo

Roberto Della Rosa Mendez[I], Mariana Alvina dos Santos[I], Anneliese Domingues Wysocki[I], Beatriz D'Alkmin Beltran Ribeiro[I], Luciana Ferreira Stauffer[I], Sebastião Junior Henrique Duarte[I]

[I] *Universidade Federal de Mato Grosso do Sul. Três Lagoas, Mato Grosso do Sul, Brazil.*

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ABSTRACT

Objective: to assess the cardiovascular risk in hypertensive patients and the influence of risk factors on the stratification scores. **Methods:** this is a cross-sectional study with hypertensive patients undergoing outpatient follow-up from November 2014 to February 2015. The Global Risk Score was used to assess cardiovascular risk. To assess the influence of the risk factors with the stratification of the cardiovascular risk score, the main components analysis was used. **Results:** 57 patients participated in the study, and the majority (93.1%) was considered to be at high cardiovascular risk; the analysis of the main components identified five components that explain 85.2% of the total variation. **Conclusion:** the cardiovascular risk assessment demonstrated the importance of the identification of risk factors and, consequently, the need to implement actions aimed at controlling these factors, which constitutes a challenge in the adequate management of arterial hypertension. **Descriptors:** Cardiovascular Diseases; Risk Factors; Hypertension; Nursing Assessment; Chronic Diseases.

RESUMO

Objetivo: avaliar o risco cardiovascular em hipertensos e a influência dos fatores de risco nos escores de estratificação. **Método:** estudo transversal, realizado com hipertensos em acompanhamento ambulatorial, no período de novembro de 2014 a fevereiro de 2015. O Escore de Risco Global foi utilizado para avaliar o risco cardiovascular. Para avaliar a influência dos fatores de risco com a estratificação do escore de risco cardiovascular utilizou-se a análise de componentes principais. **Resultados:** participaram do estudo 57 pacientes, sendo que a maioria (93,1%) foi considerada de alto risco cardiovascular; a análise dos componentes principais identificou cinco componentes que explicam 85,2% da variação total. **Conclusão:** a avaliação do risco cardiovascular demonstrou a relevância da identificação dos fatores de risco e, consequentemente, a necessidade de implementação de ações que visem o controle desses fatores, o que constitui um desafio no manejo adequado da hipertensão arterial.
Descritores: Doenças Cardiovasculares; Fatores de Risco; Hipertensão; Avaliação em Enfermagem; Doença Crônica.

RESUMEN

Objetivo: evaluar el riesgo cardiovascular en hipertensos y la influencia de los factores de riesgo en los escores de estratificación. **Método:** Estudio transversal, realizado con hipertensos en seguimiento ambulatorial, en el período de noviembre de 2014 a febrero de 2015. La puntuación de Riesgo Global fue utilizada para evaluar el riesgo cardiovascular. Para evaluar la influencia de los factores de riesgo con la estratificación del score de riesgo cardiovascular se utilizó el análisis de componentes principales. **Resultados:** participaron del estudio 57 pacientes, siendo que la mayoría (93,1%) fue considerada de alto riesgo cardiovascular; el análisis de los componentes principales identificó cinco componentes que explican el 85,2% de la variación total. **Conclusión:** la evaluación del riesgo cardiovascular demostró la relevancia de la identificación de los factores de riesgo y, consecuentemente, la necesidad de implementación de acciones que apunten al control de esos factores, lo que constituye un desafío en el manejo adecuado de la hipertensión arterial.
Descriptores: Enfermedades Cardiovasculares; Factores de Riesgo; Hipertensión; Evaluación en Enfermería; Enfermedad Crónica.

CORRESPONDING AUTHOR **Roberto Della Rosa Mendez** E-mail: roberto.mendez@ufms.br

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INTRODUCTION

Hypertension is considered a major public health problem and one of the major risk factors for cardiovascular disease (CVD). It is a complex and multifactorial disease, resulting from the imbalance of several systems, characterized by elevated and sustained pressure levels[1-2]. Estimates indicate that by the year 2025, the global prevalence of hypertension reaches 29% of the population[3].

In Brazil, population studies have shown a prevalence of hypertension above 30%, which increases with age[1,4].

Hypertension has distinguished itself among cardiovascular risk factors because it is a disease with high prevalence, chronicity, low control and high socioeconomic costs[5]. The hypertensive approach should take into account the characteristics of each individual, such as the coexistence of other risk factors and target-organ damages[1].

A major challenge for health professionals in the management of hypertension concerns the implementation of control measures, with primary prevention and early detection of the disease being the most effective ways to prevent the disease. Thus, these measures should be prioritized in disease control[1].

Cardiovascular risk stratification of the hypertensive goes beyond the mere adequacy of the pressure levels, also being based on the associated risk factors; This is a way of calculating the overall cardiovascular risk and projecting an individual's risk over time with a view to reducing CVD mortality[6]. The cardiovascular risk stratification is an important key to the prevention of cardiovascular events, not merely by the presence of pathologies or chemical changes in isolation, but by the attribution of values to the sum of risks due to multiple factors in each individual[7].

Given the importance of an individualized approach and based on the needs and risk factors presented by patients, there is a cardiovascular risk stratification in an important tool for health care planning and adequacy of measures to be achieved by both the patient and the multidisciplinary team.

OBJECTIVE

To assess cardiovascular risk in hypertensive patients and the influence of risk factors on stratification scores.

METHOD

Ethical aspects

The study was approved by the Research Ethics Committee involving human beings of the Federal University of Mato Grosso do Sul (*Universidade Federal do Mato Grosso do Sul*), following Resolution 466/2012 of the National Health Council. After invitation and clarification to the study subjects regarding the objectives of the research, it was applied the Consent Term in two copies, staying one with the participant and the other with the researcher.

Design, place of study and period

This was a descriptive, exploratory, cross-sectional study with a quantitative approach, carried out from November 2014 to February 2015, at the ambulatory *Centro de Especialidades Médicas* (Medical Specialities Center) of the Brazilian Unified Health System (*Sistema* Único *de Saúde*) from Três Lagoas city/MS. CEM has the cardiology outpatient clinic that treats patients with heart problems, including hypertensive patients, referenced from the Basic Health Units and Family Health Strategies of the municipality. The cardiology outpatient clinic works from Monday to Friday from 07:00 am to 11:00 am, attending a monthly average of 600 patients.

Study population and selection criteria

The study population consisted of hypertensive adults who were being followed up at the CEM during the period of data collection, and patients of both genders, over 18 years of age, were included. Patients who had some cognitive impairment and individuals who did not present the necessary information in the health records for risk score classification were not included in the study. Among the 57 individuals, all accepted to participate in the study.

Study protocol

For the data collection, a structured tool was used based on the literature review and a previous study[8]. This tool contains socio-demographic variables (gender, age, marital status, family income, employment status and schooling) and clinical variables (hypertension, systolic blood pressure (SBP), diastolic blood pressure, duration of treatment of hypertension, family history, diabetes *mellitus* (DM), low-density lipoprotein (LDL), high-density lipoprotein (HDL), total cholesterol, sedentary lifestyle, obesity, smoking, alcohol consumption, and Global Risk Score (GRS).

The collection was carried out by two fellows of the Scientific Initiation Program who underwent previous training. The interviews were conducted with the participants with an individualized and private approach. To complement the data obtained in the interviews, the medical records were reviewed.

Blood pressure (BP) measurements were performed on the day of the scheduled appointment, using a manual and calibrated sphygmomanometer. The calibration technique followed the recommendations of the Brazilian hypertension guideline[1]. The values of the blood glucose, total cholesterol, LDL and HDL tests were collected from information contained in the patients' medical records, and the most recent result of the tests performed in the last three months.

For the cardiovascular risk stratification, the recommendations of the I Brazilian Guideline on Cardiovascular Prevention[6] were used as methodological reference. Since cardiovascular risk is estimated based on the joint analysis of characteristics that increase the chance of an individual developing the disease initially the presence of clinical or subclinical manifestations of atherosclerotic disease or its equivalents (such as the presence of DM types 1 or 2, chronic kidney disease and patients submitted to arterial revascularization) in the individuals assessed. The patient who presented one of these criteria did not require other steps to have their cardiovascular risk stratified, being automatically considered HIGH RISK, since they have a risk greater than 20% in 10 years of presenting new cardiovascular events or a first cardiovascular event[6].

For those who were not included in the high-risk conditions in the first stage, the GRS was used for the stratification of cardiovascular risk. The GRS estimates the risk of myocardial infarction, Stroke, peripheral vascular insufficiency and heart failure in 10 years, considering variables such as age, total and HDL cholesterol, SBP, smoking and DM, classifying the individual such as low, intermediate and high risk.

After analyzing these variables and assigning scores to them according to gender[6], those with a probability < 5% of presenting the main cardiovascular events (Coronary Heart Disease - stroke, peripheral arterial occlusive disease or heart failure) in 10 years. Patients classified in this category and who presented a family history of premature CVD were reclassified and considered to be at intermediate risk.

Men with a calculated risk ≥ 5% and ≤ 20% and women with a calculated risk ≥ 5% and ≤ 10% of the occurrence of any of the cited events were considered as having an intermediate risk. Those with a calculated risk > 20% for men and > 10% for women over a 10-year period were classified as HIGH RISK.

Analysis of results and statistics

The data were initially stored in a spreadsheet of the Excel application, using the technique of double typing. After verifying transcription errors, they were exported to the SPSS software version 21. Data were analyzed using descriptive and/or analytical statistics, using absolute and relative indices. To assess the influence of risk factors with the stratification of the cardiovascular risk score, the main components analysis was used for the correlation matrix of variables considered cardiovascular risk factors: age, family history, SBP, DBP, total cholesterol, LDL, HDL, DM, sedentary, obesity and smoking, through which hierarchized cardiovascular risk factors were determined according to their influence on the total variation.

RESULTS

The study participants were mostly female (66.7%), older than 51 years (68.4%), with schooling from 1 to 5 years of schooling (52.6%), who lived with their partners (56.1%) and had a family income of up to 2 minimum wages (MW) (59.6%). Most of the patients were professionally inactive (68.4%), have been undergoing antihypertensive treatment for up to 2 years (38.6%), had a family history of CVD (71.9%), had DM (63.2 %), sedentary (78.9%), obese (52.6%) and was classified as having a high cardiovascular risk (94.7%) (Table 1).

When the mean value of the clinical variables between the genders was observed, men presented a mean of SBP (143.7 mmHg), DBP (94.2 mmHg) and blood glucose (123 mg/dl) higher than women. The evaluation of the lipid profile identified that the female patients presented values of total cholesterol (217.9 mg/dl) and LDL (117 mg/dl) higher than that of males (cholesterol 190.1 mg/dl, LDL 112, 4 mg/dL), except for HDL (women 54 mg/dl and men 44.4 mg/dl) (Table 2).

The analysis of the main components identified five components that explain 85.3% of the total variation (Table 3). The first component explained 31.6% of the data variance, being characterized by positive DBP and sedentary charges. In the second component, which explained 16.2% of the total variation, obesity and age were the main variables represented by negative and positive charges, respectively. The third component was characterized by negative charges of smoking and SBP, representing 13.9% of the total variance. The fourth component explained 12.9% of the variance and had as main variables total cholesterol and LDL with positive charges. The last component explained 10.6% of the variance and had as main variables with positive charges, smoking and age.

Table 1 – Socio-demographic characteristics, risk factors for cardiovascular diseases and overall risk score in hypertensive patients, Três Lagoas city, Mato Grosso do Sul State, Brazil, 2015

Variables		Total (N = 57) n	%
Gender			
	Female	38	66.7
	Male	19	33.3
Age bracket			
	20 to 35 years		12.3
	36 to 50 years	11	19.3
	51 to 65 years	21	36.8
	66 or more	18	31.6
Marital status			
	With a partner	32	56.1
	Without a partner	25	43.9
Family income (In Minimum Wages)			
	Up to 2	34	59.6
	From 2 to 4	18	31.6
	4 or more	5	8.8
Employment Status			
	Not active	39	68.4
	At Home	7	12.3
	Active	11	19.3
Schooling			
	Illiterate	6	10.5
	1 to 5 years	25	43.9
	6 to 10 years	15	26.3
	11 years or more	11	19.3
Hypertension Treatment Length (n = 54)			
	Up to 2 years	22	38.6
	From 3 to 5 years	10	17.5
	6 to 10 years	18	31.6
	11 or more	4	7.0
CVD Family History			
	No	16	28.1
	Yes	41	71.9
Diabetes *Mellitus*			
	No	21	36.8
	Yes	36	63.2
Dyslipidemia (n = 56)			
	No	29	50.9
	Yes	27	47.4
Sedentary			
	No	12	21.1
	Yes	45	78.9
Obesity			
	No	27	47.4
	Yes	30	52.6
Smoking			
	No	50	87.7
	Yes	7	12.3
Consumption of alcoholic beverages (n = 56)			
	No	43	75.4
	Yes	13	22.8
Global Risk Score			
	Low risk	1	1.8
	Intermediate risk	2	3.5
	High risk	54	94.7

Note: CVD – Cardiovascular Diseases. For the variables "time of treatment of hypertension", "dyslipidemia" and "consumption of alcoholic beverage", there was a loss in data collection.

Table 2 – Clinical variables among hypertensive patients, according to gender, Três Lagoas city, Mato Grosso do Sul State, Brazil, 2015

Variables	Female				Male				Total	
	n	Mean (sd)	Min	Max	n	Mean (sd)	Min	Max	n	Mean (sd)
SBP	38	133.2(18.5)	100	170	19	143.7(21.9)	120	180	57	136.7(20.1)
DBP	38	83.9(13.1)	60	120	19	94.2(20.4)	70	140	57	87.4(16.4)
Blood Glucose	32	114.9(46.3)	70	280	17	123(52.5)	81	307	49	117.7(48.1)
Cholesterol	31	217.9(44)	152	300	16	190.1(70.9)	117	359	47	208.4(55.5)
LDL	27	117(36.8)	60	198	15	112.4(52.8)	45	218	42	115.3(42.6)
HDL	29	54(15.3)	35	94	15	44.4(10.3)	27	62	44	50.8(14.4)

Note: SBP - Systolic Blood Pressure; DBP - Diastolic Blood Pressure; LDL – Low-Density Lipoprotein; HDL – High-Density Lipoprotein. For the variables «blood glucose», «cholesterol», «LDL» and «HDL», there was a loss in data collection.

Table 3 – Main components analysis with their respective matrix of eigenvectors for cardiovascular risk assessment in hypertensive patients, Três Lagoas city, Mato Grosso do Sul State, Brazil, 2015

Variables	Main component				
	1st	2nd	3rd	4th	5th
Age	-0.101	0.404	0.010	-0.050	0.331
SBP	0.169	0.057	-0.417	-0.289	-0.081
DBP	0.221	-0.089	-0.221	-0.197	-0.306
Total cholesterol	0.184	0.204	0.129	0.422	-0.023
LDL	0.193	0.065	0.112	0.367	-0.131
HDL	0.148	0.109	0.316	-0.159	-0.182
Family History	0.151	-0.362	-0.024	0.254	0.147
DM	0.131	-0.129	0.229	-0.201	0.556
Sedentary lifestyle	0.215	-0.012	0.103	-0.228	0.328
Obesity	-0.139	-0.423	0.102	0.027	-0.008
Smoking	0.012	0.005	- 0.477	0.284	0.392
Explained variance (%)	31.594	16.222	13.884	12.927	10.628
Cumulative variance explained (%)	31.594	47.817	61.702	74.629	85.258

Note: LDL – Low-Density Lipoprotein; HDL – High-Density Lipoprotein; SBP - Systolic Blood Pressure; DBP - Diastolic Blood Pressure; DM - Diabetes Mellitus

DISCUSSION

Of the 57 subjects evaluated, 66.6% were predominantly female, similar to previous studies[9-10], which showed a variation from 68.6% to 70.7%, and a higher proportion of hypertensive individuals in the range over 50 years of age. The literature has reported a similar prevalence of hypertension between men and women, although it is higher in men up to 50 years, reversing from the fifth decade of life[1].

In addition, gender and age factors are highly relevant in assessing the risk score, since after 45 years the risk score stratification score is higher for women in all age groups, consequently, higher cardiovascular risks[11]. However, there is a direct relationship between the increase in the age group and the predominance or appearance of associated risk factors for both genders[9,12-13].

In the population of the present study, it was also observed that more than half of the individuals (54.4%) had up to five years of study, were professionally inactive (68.4%) and had a family income of up to two minimum wages (59.6 %). Although the influence of socioeconomic factors on the occurrence of hypertension is difficult to establish[1], the literature has shown that there is an inverse correlation between the level of schooling[14] and socioeconomic conditions[15] with the prevalence of hypertension. The low concentration of income, schooling and employment inactivity are relevant data, given their potential in directly influencing the minimization of modifiable risk factors.

Thus, the management of patients with hypertension requires an appropriate strategy that takes into account the risk projected for the development of an unwanted event, not only through attention to blood pressure levels. Such a strategy should be able to synergistically consider the associated risk factors[1,11].

When analyzing the data regarding the lipid profile of the subjects studied in the light of the recommendations of the V Brazilian Guidelines for Dyslipidemia and Prevention of Atherosclerosis[16], it is verified that the average total cholesterol (208.4mg/dl) category is classified as borderline for the population over 20 years and although this value is not classified as high, it should be optimized to reach the desirable category below 200mg/dl[1].

It is worth noting that measurements of total and LDL cholesterol for cardiovascular risk assessment are the main therapeutic targets for CVD prevention. Although the LDL and HDL values found in the study subjects are within the acceptable and desirable values established in the national literature[16] for adults over 20 years of age, when we assessed the risk score of the study population, we verified that the therapeutic interventions need to be optimized so that the values of the lipid profile of subjects classified as high risk reach the established primary LDL goal <70 mg/dl and those classified as intermediate risk reach the LDL target <100 mg/dl[16]. High levels of cholesterol added to the presence of hypertension contribute in 50% to the attribution of risk in coronary diseases[9].

Another important finding demonstrated by the study is that the mean fasting blood glucose value was 117.7 mg/dl. According to the recommendations of the *Sociedade Brasileira de Diabetes* (Brazilian Society of Diabetes)[17], the therapeutic target of fasting blood glucose is <100 mg/dl. The presence of DM increases three times the odds of developing another risk factor for CVD, such as hypertension, and they are usually found concomitantly[9], as evidenced in this study in which 63.2% of hypertensive individuals had DM.

Regarding DM, one of the greatest challenges encountered by public health services is the metabolic control of these

individuals, making it necessary to develop effective and feasible programs for the primary prevention of type 2 DM in at-risk population, both for incidence control and for secondary prevention of their metabolic complications[6].

In the present study, most individuals had a CVD family history. Because inheritance is an immutable risk factor, its impact on the reduction of cardiovascular morbidity and mortality should be achieved through the control of modifiable factors, such as sedentary lifestyle, hypertension, DM, obesity, smoking, and dyslipidemia[6].

Among modifiable risk factors, hypertension is considered the most important for ischemic diseases and stroke[18]. The data found in the present study demonstrated mean values for SBP of 136.7 mmHg and DBP of 87.4 mmHg, values considered borderline[1]. In hypertensive individuals with borderline BP and high cardiovascular risk, or with 3 or more risk factors such as DM, metabolic syndrome or target organ damage, they should reach the BP target of 130/80 mmHg[1].

Sedentary lifestyle is one of the main modifiable risk factors associated with CVD morbidity and mortality[6]. On the other hand, the adoption of a regular active lifestyle is an important strategy of therapeutic orientation for the prevention of CVD and also control of hypertension[6]. The physically active individual tends to be healthier, with higher quality and life expectancy[19]. In addition, subjects who practice aerobic activities of moderate to intense intensity for approximately 150 minutes per week reduce the risk of CVD[20].

The INTERHEART study conducted in 52 countries of the five continents[21] found that the presence of risk factors - smoking, hypertension and DM increases the risk of myocardial infarction (MI) in 13 times and when added to dyslipidemia, the risk increases by 42 ,Three times. These data highlight the importance of implementing preventive strategies that are effective in reducing and/or controlling risk factors.

The high cardiovascular risk in the study population demonstrates the need to control risk factors in order to prevent future events, highlighting the importance of the role of nurses in public health policies and the development of intervention strategies in populations of high prevalence of modifiable risk factors[18].

The World Health Organization (WHO) has set as a target for 2025 a 25% reduction in the risk of mortality by non-communicable diseases (NCDs), including reducing risk factors such as tobacco use, sodium consumption, alcohol, sedentary lifestyle, hypertension, obesity and DM[22]. Brazil has also committed to the control of NCDs in line with what was established by WHO[23-24].

In this context, changes in habits and lifestyle have been described as an important factor in the treatment of hypertension, as well as the need to identify barriers that may contribute to low adherence to treatment and disease control[25].

Thus, non-medicinal recommendations for the prevention and control of hypertension have emphasized healthy eating, low sodium and alcohol consumption, adequate potassium intake, sedentary lifestyle and smoking, and control of body weight[6,26]. The nurse's role in the control of hypertension allows a broadening of the approach to the treatment of hypertensive patients with a focus on non-drug measures, allowing a greater success of the therapeutic scheme and control of risk factors.

One of the ways to operationalize the nurse's role in the treatment of hypertensive patients is the nursing consultation, which allows patient follow-up, an individualized care plan, including educational measures and the empowerment of the patient to take care of the maintenance of their health[27]. During the nursing consultation, it is necessary to carry out the evaluation and stratification of cardiovascular risk to direct the interventions from/through the needs of the patient.

Thus, stratification of cardiovascular risk in hypertensive individuals demonstrates to be an important tool in the care of hypertensive patients and allows the implementation of more appropriate therapeutic measures and, therefore, the prevention of cardiovascular events.

Contributions to the nursing sector

The present study demonstrates that the GRS is an important tool in the management of the hypertensive patient, and can thus assist the nurse in directing their care actions. The stratification of cardiovascular risk and identification of the present risk factors allows the nurse to plan individualized actions to meet the needs of each patient, and can articulate the care demanded with other points of the health care network.

Study limitations

The study was carried out in a restricted population with a limited number of participants, and the sample was chosen for convenience and not the sample calculation, which does not allow the generalization of the results. In addition, part of the data was obtained through interviews and thus, subject to memory bias.

CONCLUSION

In the present study, most of the individuals studied were classified as having a high risk for developing CVD, demonstrating the importance of controlling risk factors and consequently reducing cardiovascular risk. Implementation of strategies that minimize the impact of this high risk on the population are important and necessary. The knowledge of the cardiovascular risk of hypertensive patients helps in the development and implementation of strategies aimed at the control of risk factors and prevention of complications.

The present study results demonstrate that the population attended in the outpatient segment of cardiology brings with it a sum of risk factors to the appearance of a coronary event. The characterization of the main agents of risk in a given population direct the integrated health actions, which may be more specific to the needs of patients attended.

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