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Factors associated with lack of blood pressure control in men

Fatores associados ao descontrole da pressão arterial em homens

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Resumo

Objetivo: Verificar os fatores associados ao descontrole da pressão arterial em homens.

Métodos: Estudo exploratório, de corte transversal, realizado em centro de referência para doenças cardiovasculares, em Salvador-BA, *Iócus* para o núcleo de referência do programa de saúde do homem do Ministério da Saúde. Amostra foi selecionada por conveniência totalizando 130 homens atendidos em centro de saúde, submetidos a entrevista, avaliação clínica e antropométrica. Na análise bivariada empregou-se o Qui-quadrado de *Pearson* ou Exato de *Fisher* realizando-se posteriormente análise de regressão logística múltipla sendo a OR corrigida pelo modelo de *Poisson*. Adotou-se significância estatística de 5%.

Resultados: Constatou-se alta prevalência de descontrole da pressão arterial (65,4%), de hábitos de vida inadequados e de excesso de peso. Não houve associação estatisticamente significante entre descontrole dos níveis pressóricos e variáveis sociodemográficas, hábitos de vida e medidas antropométricas. Na regressão, o descontrole da pressão arterial associou-se ao uso inadequado da medicação (RP: 1,35, IC 95%: 1,03; 1,76).

Conclusão: O uso inadequado da medicação foi reforçado como importante fator associado ao descontrole. Medidas efetivas para mudança deste panorama são emergenciais e desafiam profissionais e autoridades públicas.

Resumo

Objective: Verify the factors associated with lack of blood pressure control in men.

Methods: Exploratory and cross-sectional study undertaken at a referral center for cardiovascular diseases in Salvador-BA, where the referral center of the Ministry of Health's male health program is located. A convenience sample was selected, totaling 130 men attended at a health center, submitted to interview, clinical and anthropometric assessment. In the bivariate analysis, Pearson's Chi-squared or Fisher's Exact test was employed, followed by multiple logistic regression analysis. The OR was corrected by means of Poisson's model. Statistical significance was set at 5%.

Results: The high prevalence of lack of blood pressure control (65.4%), inappropriate living habits and overweight was verified. No statistically significant association was found between lack of pressure control and sociodemographic variables, living habits and anthropometric measures. In the regression, the lack of blood pressure control was associated with inappropriate medication use (PR: 1.35, 95% CI: 1.03; 1.76).

Conclusion: Inappropriate medication use was emphasized as an important factor associated with lack of control. Effective measures to change this situation are urgent and challenge professionals and public authorities.

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Introduction

Systemic arterial hypertension (SAH) is a global public health problem, due to its high prevalence and because it is acknowledged as the main risk factor of cardiovascular morbidity and mortality.[1]

In view of this evidence, disease control is fundamental, but hardly satisfactory around the globe. Countries in South America presented borderline control rates, such as Mexico (19,2%), Argentina (18%), Chile (11.8%) and Ecuador (6.7%).[2] In Brazil, these rates have ranged between 10% and 57.6%.[3]

In terms of sex, men have their blood pressure under control less than women.[4] This fact can be related to the social gender constructions that influence how they perceive the care for their health. Overall, men face difficulties to acknowledge their health needs, cultivating the idea that rejects the possibility of illness. These characteristics hamper the compliance with the medical treatment and self-care practices.[5]

Hypertension monitoring and control avoid the emergence and progression of disease complications, reduce the number of hospitalizations and cardiovascular mortality. Thus, they emerge as a governmental proposal and are recommended through policies in favor of health promotion and protection and against the disease, which can be observed in the Strategic Action Plan for Coping with Non-Transmissible Chronic Diseases. Linked to this plan, The National Comprehensive Care Policy for Man's Health focuses on the importance of establishing distinguished strategies for the male population.[5]

Coping with hypertension control can be better oriented when the extent to which the blood pressure is out of control and the associated factors are identified. Nevertheless, there are gaps in the literature about how the lack of control over hypertension and its associated factors are assessed in men who had access to the services offered in the man's health program. In order to implement, propose or offer health services, it is fundamental to know these individuals' health conditions. In case of hypertension, its control is a fundamental target in directing care and treatment. It is fundamental to know how the risk factors involved in its control behave in order to better guide the health actions. Knowing the levels of lack of control over hypertension and the related factors can also guide the planning of the therapeutic resources and the assessment of the range and effectiveness of the health and nursing care practices. In addition, it evidences relevant health indicators in a population groups that should be the target of health care that takes the gender perspective into account. This illustrates the scientific and social relevance of this study.

Based on the above, the objective was to verify the factors associated with lack of blood pressure control in men.

Methods

Exploratory and cross-sectional study developed at a referral center for cardiovascular diseases in Salvador-BA, where the referral center of the Ministry of Health's male health program was located.

One hundred and thirty men constituted a convenience sample (73 between 28 - 59 years and 57 over 60 years of age) and were contacted during routine service between October 2013 and July 2014, on different weekdays and during the morning and afternoon shifts. The inclusion criteria were medical diagnosis of hypertension (ICD-I10/I15), age 20 years or older, conscious and oriented to time and place. Patients with physical limitations to obtain the anthropometric measures were excluded.

The data were collected at a private room, through an interview and clinical assessment, using tools with closed questions. About the sociodemographic characteristics, information was surveyed about age, self-declared race/color, marital situation, education, employment and family income. Data about smoking and alcohol consumption included the identification of active smokers;

consumption, type, quantity and frequency of alcohol use. The eating habits were obtained through the tool proposed by the Surveillance Program of Risk and Protection Factors for Chronic Illnesses by Telephone Survey, in order to identify the consumption of vegetables, salads, fruits and the way the foods are prepared. Compliance with the medication treatment was identified by the use or not of the prescribed drugs.

To assess the activity level, the short version of the International Physical Activity Questionnaire - IPAQ, adopting the classification by Matsudo et al.[6] very active, active, irregularly active and sedentary. For the section on the time spent sitting, the sitting time spent during the week was considered in minutes x 5, added up to the time spent during the weekend x 2 and individuals who remained seated ≥ 240 minutes/day were classified as sedentary.[7]

To assess the stress level, the Perceived Stress Scale was applied, which measures the extent to which individuals perceive the situations as stressful. It contains 14 items and the score can range from zero to 56.[8] To analyze the answers, the cut-off point was determined according to the mean score (20 points) and stress levels were classified as low and high.

To measure the blood pressure, an automated Omron HEM 705 CP device was used. The cuff size was chosen by measuring the arm length and circumference. The pressure was measured on the upper arm, sitting down, arm resting at the height of the heart, uncovered, hand palm turned upward, elbow slightly flexed, after five minutes of rest, for three consecutive times, with one to two-minute intervals between one measure and the other. Before the measures, the participants were instructed not to speak and/or cross their legs. It was certified that they did not have a full bladder; that they had not exercised in the past 90 minutes and drunk coffee, eaten or smoked in the past 30 minutes. Men who, after three consecutive measures, presented on average systolic blood pressure inferior to 140 mmHg and diastolic pressure inferior to 90 mmHg were considered to have their blood pressure under control. Men with uncontrolled blood pressure presented pressure levels equal to or higher than the levels mentioned.[1]

For the anthropometric measures, the men used light and disposable clothing and took of their shoes and any accessories. To measure the height, a portable *Alturexata* stadiometer was used. The weight (*in kilos*) was determined using digital *g.tech* scales, verified by the Institute of Metrology, with 0.1Kg variation, maximum capacity of 150 Kg and minimum 2.5 Kg. The body mass index (BMI) corresponded to the ratio between the weight and the height[2] and was interpreted in accordance with the cut-off points proposed by the World Health Organization.[9]

To measure the waist circumference, the men stood upright, breathing normally, arms aside their body and feet joined, with their back turned towards a horizontal mirror that displayed the abdominal region. The measure was taken at the midpoint between the lower rib and the iliac crest at the medium axillary line, using a flexible, non-extendible 0.5cm graduated measuring tape of 1.5m length. The examiner was standing in front of the participant. She passed the measuring tape at waist height, at the midpoint and read the measure during a normal expiration movement. To assess and classify this parameter, the criterion of the International Diabetes Federation was used, which proposes increased risk for men with a waist circumference ≥ 90 cm.[10]

To measure the hip circumference, the examiner remained in the position described, encircling the measuring tape around the maximum protrusion of the hip muscles. The waist-hip ratio was determined by dividing the waist circumference (cm) by the hip circumference (cm) and the parameters obtained were interpreted according to Heyward and Stolarczyk.[11]

The data constituted a database and were processed in the software Statistical Package for the Social Sciences, version 18.0. Absolute and relative frequencies were analyzed and means and standard deviations for age were calculated. To verify the association between lack of blood

pressure control and the variables of interest, Pearson's Chi-square or Fisher's Exact test was employed. The estimated prevalence ratios (PR) were calculated with their respective 95% confidence intervals. Statistical significance was set at 5% for all tests.

To estimate the independent contribution of each variable to the probability of lack of blood pressure control, multiple logistic regression analysis was applied. The selection of the variables associated with lack of blood pressure control was guided by the literature on controllable and non-controllable risk factors.[1] Next, the variables with $p \leq 0.20$ in the bivariate analysis were included in the regression model: use of prescribed medication, level of physical exercise and waist circumference. Age, education, income and employment situation were considered as potential adjustment variables. The backward modeling procedure was applied. To choose the model, the Akaike Information Criterion (AIC) was used, choosing the model with the lowest coefficient. To assess the degree of accuracy and the adjustment quality of the logistic model, the Hasmer-Lemeshow test was applied and the area of the ROC curve was analyzed.

In the Hosmer and Lemeshow test, it was analyzed whether the null hypothesis could be accepted or rejected (Ho=model is well adjusted). The test with $p > 0.05$ does not reject Ho, that is, evidencing the model's good adherence to the data. The Roc curve assesses the discriminatory capacity of the model, evidencing that an area of 0.50 above the curve represents reasonable discriminatory power.

In view of the high prevalence of lack of blood pressure control in the sample, distancing from the parameters estimated for the Odds Ratio, the estimated PR and their respective 95% confidence intervals were calculated, using Poisson's robust regression model.

The study was registered in the *Plataforma Brasil* under Ethical Assessment Submission Certificate (CAEE) 09870313.4.0000.5531.

Results

In the study population, adults between 28 and 59 years of age were predominant (56.2%), with a mean age of 58.32 (SD 9.99), self-declared race/color black (89.2%), marital situation with partner (74.6%), family income of up to two minimum wages (64.6%), socioeconomic class C1-C2 (66.9%), finished/unfinished primary education (50.8%), professionally active (60.0%) and family providers (94.6%) (Table 1).

The prevalence of men with uncontrolled pressure levels corresponded to 65.4%.

Concerning the sociodemographic variables, a higher prevalence of lack of blood pressure control was observed in adults between 28 and 59 years (69.9%), self-declared race/color white (71.4%), marital situation without partner (69.7%), secondary to higher education (70.3%), no occupation (71.2), family income of up to two minimum wages (69.0%). No statistically significant association was found between lack of blood pressure control and these variables (Table 1).

Table 1. Prevalence of PR of lack of blood pressure control according to sociodemographic characteristics of hypertensive men

Sociodemographic characteristics	n(%)	Prevalence (%)	p-value	PR	95% CI
Age			0.225*		
28 -I 59 years	73(56.2)	69.9			
≥60 years	57(43.8)	59.6		0.85	(0.66; 1.11)
Race/Color			0.770†		
White	14(10.8)	71.4			
African-American (mulatto and black)	116(89.2)	64.7		0.91	(0.63; 1.29)
Marital situation			0.547*		
With partner	97(74.6)	63.9			
Without partner	33(25.4)	69.7		1.09	(0.83; 1.43)
Education			0.245*		
Secondary to higher education	64(49.2)	70.3			
Up to primary education	66(50.8)	60.6		0.86	(0.67; 1.11)
Employment Situation			0.259*		
Unemployed	52(40.0)	71.2			
Employed	78(60.0)	61.5		0.86	(0.68; 1.11)
Monthly family income			0.236*		
>2 MW	46(35.4)	58.7			
Up to 2 MW	84(64.6)	69.0		1.18	(0.89; 1.56)

*p-value of Pearson's Chi-squared test † p-value of Fisher's exact test; MW - Minimum Wage; PR - Prevalence Ratios

Concerning the living habits, a higher prevalence of lack of blood pressure control was ob-

served in smoking men (70.0%), with excessive alcohol consumption during the week (66.7%) and at weekends (72.3%), consumption of vegetables (67.5%), salad (65.6%) and fruit (67.5%) less than five times/week, who did not add salt to their food (67.0%), showed high stress levels (66.2), did not take the medication prescribed (90.0%) and their physical activity level differed from the recommendations (70.1%). As to the anthropometric measures, men with a non-recommended waist circumference, overweight and high WHR presented a higher prevalence of lack of blood pressure control. No statistically significant association was found between lack of blood pressure control, living habits and anthropometric measures (Table 2).

Before using Poisson's robust regression strategy, the best adjusted logistic model was chosen by applying the lowest Akaike Information Criterion. The accuracy of the model was assessed by means of the ROC curve, whose area corresponded to 0.622,

Table 2. Prevalence and PR of lack of blood pressure control according to living habits and anthropometric measures of hypertensive men

Variables	n(%)	Prevalence (%)	p-value	PR	95% CI
Smoking (n=130)			1.000†		
No/Quit	120(92.3)	65.0			
Yes	10(7.7)	70.0		1.08	(0.70; 1.65)
Alcohol consumption during the week (n=130)			1.000†		
Not excessive	118(90.8)	65.3			
Excessive	12(9.2)	66.7		1.02	(0.67; 1.56)
Alcohol consumption at weekends (n=130)			0.210*		
Not excessive	83(63.8)	61.4			
Excessive	47(36.2)	72.3		1.18	(0.92; 1.50)
Vegetable consumption (n=130)			0.521*		
5 or more days per week	50(38.5)	62.0			
< 5 days per week	80(61.5)	67.5		1.09	(0.83; 1.42)
Salad consumption (n=130)			0.951*		
5 or more days per week	40(30.8)	65.0			
< 5 days per week	90(69.2)	65.6		1.01	(0.77; 1.32)
Fruit consumption (n=130)			0.507*		
5 or more days per week	47(36.2)	61.7			
< 5 days per week	83(63.8)	67.5		1.09	(0.83; 1.43)
Added salt to prepared food (n=130)			0.526*		
No	94(72.3)	67.0			
Yes	36(27.7)	61.1		0.91	(0.68; 1.23)
Stress level (n=130)			0.842*		
Low	62(47.7)	64.5			
High	68(52.3)	66.2		1.03	(0.80; 1.32)
Takes prescribed medication (n= 122)			0.093†		
Yes	112(91.8)	61.6			
No	10(8.2)	90.0		1.46	(1.13; 1.88)
Physical activity level IPAQ (n=130)			0.170*		
Active/very active	53(40.8)	58.5			
Irregularly active A/B and sedentary	77(59.2)	70.1		1.20	(0.91; 1.57)
Physical activity level time spent sitting (n=129)			0.542†		
Active	2(1.6)	100.0			
Sedentary (≥ 240 minutes day)	127(98.4)	64.6		0.64	(0.57; 0.73)
Waist circumference (n=130)			0.079*		
Recommended (<90 cm)	24(18.5)	50.0			
Not Recommended (≥90cm)	106(81.5)	68.9		1.38	(0.90; 2.10)
Body mass index (BMI) (n=130)			0.385*		
Eutrophic	29(22.3)	58.6			
Overweight	101(77.7)	67.3		1.15	(0.82; 1.60)
Waist-hip ratio (WHR)			0.323†		
Low	13(10.0)	46.2			
Moderate	50(38.5)	68.0		1.47	(0.79; 2.73)
High/very high	67(51.5)	67.2		1.45	(0.79; 2.68)

*p-value of Pearson's chi-squared test †:p-value of Fisher's exact test; PR - Prevalence Ratios

and the quality of the model by means of the Hosmer-Lemeshow test, resulting in p=0.97.

The final result of Poisson's robust regression model evidenced that not taking the medication showed a statistically significant association with lack of blood pressure control, that is, the hypertensive men who referred being unable to take the medication presented a 35% increase in lack of blood pressure control (PR: 1.35; 95% CI: 1.03; 1.76). Although no statistically significant association was found between lack of blood pressure control and waist circumference (PR: 1.40, 95% CI: 0.89; 2.22) and physical activity level (PR: 1.12, 95% CI: 0.84; 1.49), men who had a waist circumference ≥ 90 cm and were sedentary presented an upward trend in their loss of blood pressure control (Table 3).

Table 3. Association between predicting variables and lack of blood pressure control in hypertensive men

Variables	PR	95% CI
Waist circumference		
Recommended (<90 cm)	1.00	1.00
Not Recommended (≥90cm)	1.40	(0.89; 2.22)
Takes prescribed medication*		
Yes	1.00	1.00
No	1.35	(1.03; 1.76)
Level of physical activity IPAQ		
Active/very active	1.00	1.00
Irregularly active A/B and sedentary	1.12	(0.84; 1.49)
	AIC = 161.6449	

Model adjusted for income; *p-value < 0.05; PR - Prevalence Ratios; IPAQ - International Physical Activity Questionnaire

Discussion

As a study limitation, it is highlighted that the sample size may not have been sufficient to detect some of the associations tested and the convenience sampling.

As observed, the men assessed, despite being monitored at a referral center for cardiovascular diseases, presented unsatisfactory pressure levels, showing a high prevalence of lack of blood pressure control. This prevalence was similar to other studies that investigated both sexes,[4,12] but lower than the levels found in studies undertaken in Rio Grande do Sul (75%)[13] and São Paulo (78%).[14] It should be highlighted that the variation in the method used to verify pressure levels influences the achievement of better blood pressure levels and that hypertension control results from a complex system of biological, socioeconomic, cultural and health structure aspects.[3]

Inappropriate blood pressure control can be attributed to characteristics related to the delivery of health services and to the user. Low control rates are related with an inappropriate approach of the clients, ineffective treatment, low treatment adherence, difficulty to access the services and purchase the drugs.[3,15]

In this study, no statistically significant association was found between lack of blood pressure control and sociodemographic characteristics. The results are in accordance with the literature, which appoints a higher prevalence of uncontrolled blood pressure among younger people,[16] with a higher education level,[4,13,17] lower income,[4,13] and without a partner.[18] Nevertheless, the higher prevalence of lack of control was found in white men and other studies have demonstrated lower lack of control in African-Americans.[4,17,19,20]

Although no association was observed between living habits, anthropometric measures and lack of blood pressure control, the higher prevalence of lack of control in smoking men, with a non-recommended level of physical activity, overweight, high stress levels, excessive alcohol consumption during the week and at weekends, vegetable, salad and fruit consumption less than five times/week and inappropriate compliance with prescribed medication, is relevant from the clinical viewpoint, as it evidences men who are refractory to the therapeutic objective and challenges health professionals and public authorities to reflect and assess the practices adopted to control the disease.

These study results are in line with Brazilian and international studies that show a higher prevalence and association of factors with lack of blood pressure control in smoking individuals,[15] alcohol drinkers,[13,16,21] obese,[16,20-22] sedentary people,[4,13] with a high level of stress,[21] with incorrect medi-

cation compliance[4,23] and non-recommended waist circumference.[22]

In this study, the higher prevalence of lack of blood pressure control was found for men who did not add salt to their food, despite knowing that excessive salt intake is associated with higher rates of lack of control.[24] Nevertheless, there was no statistical significance and blood pressure control is associated with multiple factors.

The multivariate analysis showed the association between non-use of the medication and lack of blood pressure control, as it calls for effective interventions, mainly by the nursing and medical team, with a view to minimizing the determinant problems of inappropriate use. This result evidences the importance of rescuing the facilitating and hindering factors related to treatment compliance, a complex process and influenced by different variables[25] and which refers to the degree of compliance with the therapeutic measures indicated, whether involving medication or not, in order to maintain blood pressure control.[26] It is also valid to highlight the importance of using validated tools to assess medication treatment adherence, in view of the influence of this variable on the lack of blood pressure control.

The results of this study show that the nursing team can greatly contribute to help hypertensive people in the management of their disease. The effectiveness of measures that facilitate medication treatment compliance should be shared with them, such as associating medication intake with daily activities and with a particular time, registering the medication times, planning so as not to let the drugs finish and acquiring the habit of taking the drugs along. In addition, factors hindering compliance, i.e. the side effects and insecurity in medication use, need to be addressed in the care and treatment process.[26]

It is fundamental for these people to receive help to get to know, understand and accept the disease and the treatment and to value the change in living habits and blood pressure control and as a form of preserving their own life. Health education activities and a dialogical relationship between nurse and client, considering cultural perspectives, socioeconomic conditions, preferences, concerns, doubts, projects and self-care conditions become essential.[26,27] The prescribed therapeutic regimen also needs to be in line with the access to anti-hypertensive medication the public health service offers.[26,28]

The management of hypertension through the use of simple, effective, accessible and continuing strategies, such as health information technology, permit approximation, orientation of clients and family members and monitoring of pressure levels through telephone calls and frequent messages.[29] The residential monitoring of blood pressure should also be stimulated.[28] The combination of these actions offers tools for the individuals to consider themselves as agents responsible for self-care.

The gender variable also stands out in the context of hypertension control as, in comparison with women, men present lower rates of treatment and knowledge of the disease,[16] higher rates of lack of control,[16,20,22] lesser compliance with medication intake and larger number of absences from medical appointments.[26] These behaviors may be related with the fact that they seek medical care less frequently and when the disease and the symptoms have already installed; have shorter appointments; prioritize treatment to the detriment of health promotion and disease prevention possibilities. In addition, the search for services and self-care practices may not be a priority when they threaten the feasibility of the family provider's social role.[5,16] Understanding these behaviors represents an advance in the promotion of health care practices and the implementation of health education strategies with empowerment of the men, aiming to stimulating changes in risk behaviors.

Conclusion

Unsatisfactory rates of lack of blood pressure control were evidenced, as well as a high prevalence of inappropriate living habits and overweight. Problems in the medication therapy strongly influence the lack of control. These data can reflect the low level of

treatment compliance and the health service access structure and need to be confronted by aggregating and sharing practices and knowledge, involving the hypertensive patients, their family, social and scientific community, institutions and health and nursing teams and public authorities as stakeholders.

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Collaborations

Portela PP and Mussi FC contributed to the conception of the project, analysis and interpretation of the data, writing of the article, adaptation to the journal standards and approval of the final version for publication. Gama GGG contributed to the data collection and approval of the final version for publication. Santos CAST collaborated with the analysis plan, data interpretation and approval of the final version for publication.

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