FATORES ASSOCIADOS À HIPERTENSÃO ARTERIAL NÃO CONTROLADA EM PACIENTES ATENDIDOS EM UNIDADES DE ATENÇÃO PRIMÁRIA

FACTORS ASSOCIATED WITH UNCONTROLLED ARTERIAL HYPERTENSION IN PATIENTS FROM PRIMARY HEALTH CARE

Karina Borges Kroth[1], Clara Dominguez da Silva[2], Jéssica Borges Kroth[3], Helena Maria Silveira Fraga Maia[4]

[1]Corresponding author. Nutrition undergraduate student at the State University of Bahia. Salvador, Bahia, Brazil.
http://orcid.org/0000-0003-1228-9609. karinakroth@hotmail.com
[2]Medicine undergraduate student at the State University of Bahia. Salvador, Bahia, Brazil. claradominguez89@gmail.com
[3]Physical Therapist resident in the Multiprofessional Care to Critical Patients at the Sírio-Libanês Hospital.
São Paulo, São Paulo, Brazil. jessica.bkroth@hsl.org.br
[4]PhD in Public Health. Professor at the State University of Bahia. Salvador, Bahia, Brazil. helenafragamaia@gmail.com

RESUMO | Introdução: A Hipertensão Arterial Sistêmica constitui-se como uma das principais causas para o desenvolvimento de afecções cardiovasculares, sendo o controle pressórico a melhor alternativa para sua prevenção. Objetivo: Avaliar a prevalência de Hipertensão Arterial não controlada e seus fatores associados em pacientes atendidos em unidades de atenção primária. Métodos: Estudo transversal com indivíduos em tratamento em Unidades de Saúde do Distrito Sanitário Cabula-Beirú na cidade do Salvador, Bahia, de março a julho de 2013. Análises bivariadas e multivariadas utilizando a regressão logística foram realizadas. A magnitude da associação entre as variáveis analisadas e o não controle pressórico foi estimada pelo cálculo da razão de chances (IC95%) e regressão logística. Os dados foram analisados pelo programa Stata e o projeto foi aprovado pelo Comitê de Ética em Pesquisa da Universidade do Estado da Bahia. Resultados: Destes, 159 (53,5%) apresentavam hipertensão arterial não controlada. A baixa escolaridade (OR=1,71; IC95%: 1,02 – 2,86) e renda familiar (OR=4,09; IC95%: 1,03 – 15,21), a cor da pele preta ou parda (OR=2,64; IC95%:0,97 – 6,32) e a obesidade (OR=2,37; IC95%: 1,09 – 5,17) se mostraram associados a falta de controle dos níveis pressóricos. A presença de diabetes concomitante (OR=0,56; IC95%: 0,34 – 0,95) configurou-se como fator de proteção. Conclusão: Os resultados sugerem uma elevada prevalência de hipertensão arterial não controlada e sua associação com fatores sociais, hábitos de vida e patologias concomitantes. O conhecimento destas características pode proporcionar um planejamento mais específico de ações de promoção e prevenção de saúde para esses subgrupos na Atenção Primária à saúde.

Palavras-chave: Hipertensão. Controle. Prevalência. Atenção Primária de Saúde. Doenças cardiovasculares.

ABSTRACT | Introduction: Systemic Arterial Hypertension is one of the main causes for the development of cardiovascular diseases, and blood pressure control is the best alternative for its prevention. Objective: To evaluate the prevalence of uncontrolled arterial hypertension and its associated factors in patients from primary health care units. Methods: A cross-sectional study with hypertensive individuals from Health Units of the Cabula-Beirú Health District in the city of Salvador, Bahia, from March to July 2013. Bivariate and multivariate analyses using Odds Ratio (OR) were performed. The magnitude of the association between the variables and uncontrolled hypertension was estimated by the calculation of the odds ratio (95% CI) and logistic regression. The data were analised by the software Stata and the project was approved by the Ethics Committee in Research of the State University of Bahia. Results: Were included 297 hypertensive patients aged 18-87 years. Of these, 159 (53.5%) had uncontrolled hypertension. Low education level (OR=1,71; CI95%: 1,02 – 2,86) and family income (OR=4,09; CI95%: 1,03 – 15,21), black or brown skin color (OR=2,64; CI95%:0,97 – 6,32) and obesity (OR=2,37; CI95%: 1,09 – 5,17) were associated with poor blood pressure control. The presence of concomitant diabetes (OR=0,56; CI95%: 0,34 – 0,95) was a protective factor. Conclusion: The results suggest a high prevalence of uncontrolled hypertension and its association with social factors, life habits and concomitant pathologies. The knowledge of these characteristics may provide more specific planning of health promotion and prevention actions for these subgroups in Primary Health Care.

Keywords: Hypertension. Control. Prevalence. Primary Health Care. Cardiovascular diseases.

INTRODUCTION

Systemic Arterial Hypertension (SAH) is one of the main causes for the development of cardiovascular diseases[1,2], once one out of every three adults in the world presents this condition[1]. In Brazil, this scenario is evidenced in a similar manner, given that SAH has been detected increasingly earlier among the Brazilian population, thus contributing towards the increase of its prevalence and illnesses arising from this pathology[2]. SAH has a direct association with other cardiovascular conditions, such as coronary artery disease (CAD) and cerebrovascular accident (CVA)[3].

According to the DATASUS[4] in 2012, the average prevalence of SAH, in line with the regions of the country, varied between 22.3% and 43.9% of the population. The best alternative to prevent the development of cardiovascular complications is the control of blood pressure levels[5].

In the population of individuals with high blood pressure in the country, uncontrolled blood pressure levels can reach up to 71.1%[6-9], evidencing that despite the relevance of controlling the blood pressure, low levels of control are presented. Explanations for justifying the lack of control of the blood pressure in hypertensive individuals are not clearly understood. Some researchers merely ratify the need for adhesion to treatment with medication in order to maintain the blood pressure within adequate levels[6,7]. Nevertheless, obesity, insulin resistance, smoking and excessive ingestion of alcohol are some of the comorbidities and conditions existing in hypertensive individuals which can increase blood pressure, interfere in the treatment[1,2] and, as such, contribute towards an increase in the risk of cardiovascular diseases[2].

Despite the high prevalence and social and economic relevance, no studies were identified that verify the association between the lack of control of blood-pressure levels with socio-economic and clinical factors or those related to the lifestyle habits in the city of Salvador. In other regions of the country this information is also scarce, mainly in relation to healthcare in the primary healthcare network[5].

The identification of factors associated to the lack of control of the blood pressure levels can help reduce morbimortality, the length of stay in the health service, as well as costs related to the healthcare[2]. Accordingly, the present study has the purpose of evaluating the prevalence of uncontrolled SAH and associated factors in patients treated at primary healthcare units.

MATERIALS AND METHODS

A cross-sectional study with hypertensive patients and/or those using antihypertensive medication under treatment at primary healthcare units of the Cabula Beirú Health District (DSCB) in the city of Salvador, Bahia. All patients at the unit during the period of collection, who accepted to participate in the study and who signed the Informed Consent Form, were included in the study. The sample was consecutive and of convenience.

Data collection was performed during the period from March to July, 2013 by professionals of the Municipal Health Department (SMS) and by students of the health courses of Universidade do Estado da Bahia (UNEB), all associated to the Educational Program for Health Work – "*PET-Saúde*".

A semi-structured instrument developed by researchers was used, consisting of blocks of socio-demographic questions related to lifestyle habits, clinical conditions and anthropometric measures. Among the socio-demographic variables those included were gender, age in years, and skin color as defined by the interviewer and classified in accordance with the IBGE[10]. Subsequently, this variable was collapsed to white and black or brown in the phase of analysis. Marital status was categorized as married or common-law marriage and single, separated, widow(er) or divorced. Schooling was defined as illiterate, complete or incomplete elementary education, complete or incomplete secondary education or higher education. Family income was categorized as under two minimum wages or greater or equal to two minimum wages.

Uncontrolled systemic blood pressure was considered as levels of SBP$\geq$ 140 mmHg and/or DBP$\geq$ 90 mmHg[11] and the presence of Diabetes Mellitus (DM), $\geq$126 mg/dl fasting[12], obtained from measurement

by health service professionals and informed by patients, respectively.

With reference to the lifestyles the questions were whether patients added salt to their meals, whether they consumed five or more daily portions of fruit, vegetables and cereals per day[13], whether they eat red meat with apparent fat and chicken with skin and all of these variables were considered as categorical.

It was also verified whether they smoked and a high level of consumption of alcoholic beverages was considered for those who referred to drinking more than four – for women, and five – for men, doses of alcohol in one sole occasion. The level of physical activity was classified as per the international physical activity questionnaire (IPAQ)[14].

The anthropometric profile was evaluated through the Body Mass Index (BMI), and the waist circumference (WC) was measured with an inelastic measurement tape. Both information interpreted in accordance with the World Health Organization[13] classification.

The magnitude of the association between variables and the lack of control of blood pressure levels was estimated using the odds ratio (OR), adopting the confidence interval of 95% (CI95%) as precision measure. Subsequently, multivariate analyses were performed using logistic regression, from the theoretical model defined a priori, itemizing the risk factors in hierarchical blocks. The strategy used for the input of the blocks of variables was the forward type (anterograde process). The variables that demonstrated statistical levels of significance remained in the model, whereby $p < 0.10$. The statistical package used was the Stata (version 10.0). The project research was approved by Plataforma Brasil/ CEP UNEB (Report 241.434/2013) and financed by PRO Saúde/PET-Saúde 2012.

RESULTS

There were 297 adults included, of ages between 18 and 87 years with the diagnosis of Systemic Arterial Hypertension and/or using antihypertensive medication under treatment in Family Health Units (USF), Emergency Units and Primary Healthcare Units (UBS). Out of these, 159 (53.5%) presented pressure levels compatible with uncontrolled Arterial Hypertension.

In accordance with Table 1 it is verified that the individuals were, in a greater proportion, of the female gender (81.5%), age group between 40 and 59 years (53.2%), single, separated, widows or divorced (52.9%), illiterate or with incomplete or complete elementary education (71.0%), family income below two minimum wages (55.9%) and with skin color black or brown (92.6%).

Table 1. Prevalence of uncontrolled Systemic Arterial Hypertension according to social, lifestyle and clinical characteristics of patients treated in Health Units of Cabula Beirú Health District, Salvador, Bahia, 2013.

Variáveis	n= 297	%	Prevalência da HAS não controlada (%)	Valor de p*
Sexo				
Feminino	242	81,5	56,6	
Masculino	55	18,5	40,0	**0,026**
Idade (anos)				
18 – 39	24	8,1	58,3	
40 a 59	158	53,2	58,2	
≥ 60	115	38,7	46,9	0,123
Situação conjugal				
Casado ou vivendo em união estável	140	47,1	50,7	
Solteiro, separado, viúvo ou divorciado	157	52,9	56,1	0,357
Escolaridade				
Analfabeto/1° grau completo ou incompleto	211	71,0	57,4	
2° grau completo ou incompleto/Superior	86	29,0	44,2	**0,039**

Variáveis	n= 297	%	Prevalência da HAS não controlada (%)	Valor de p*
Renda familiar (em SM)				
< 2	279	93,9	55,9	
≥ 2	18	6,1	44,1	**0,001**
Cor da pele				
Branca	22	7,4	31,8	
Preta/parda	275	92,6	55,3	**0,034**
Adição de sal à comida pronta				
Não	223	75,1	53,8	
Sim	74	24,9	52,7	0,868
Ingere pelo menos 5 porções de frutas, hortaliças e cereais/dia				
Não	221	74,4	56,6	
Sim	76	25,6	44,7	0,075
Come carne vermelha com gordura aparente				
Não	220	74,1	50,9	
Sim	77	25,9	61,1	0,125
Come frango preparado com pele				
Não	271	91,2	53,5	
Sim	26	8,8	53,8	0,973
Tabagista				
Não	270	90,9	53,7	
Sim	27	9,1	51,8	0,854
Uso regular de bebida alcoólica				
Não	234	78,8	55,1	
Sim	63	21,2	47,6	0,289
Faz atividade física regular pelo menos três vezes na semana				
Não	243	81,8	55,6	
Sim	54	18,2	44,4	0,139
Tem diabetes concomitante				
Não	176	59,3	59,1	
Sim	121	40,7	45,5	**0,021**
Índice de Massa Corpórea				
IMC < 25kg/m2	64	21,5	35,9	
IMC ≥ 25kg/m2	117	39,4	54,7	
IMC ≥ 30kg/m2	116	39,1	62,1	**0,003**
Circunferência da Cintura				
Baixa ou adequada	69	23,2	40,6	
Elevada ou muito elevada	228	76,8	57,5	**0,014**

With regard to lifestyles, most informed that they do not add salt to their prepared meals (75.1%), do not eat 5 portions of fruit, vegetables and cereals per day (74.4%), do not eat red meat with apparent fat (74.1%), and do not eat chicken prepared with the skin (91.2%). It was verified that the individuals, in their majority, referred to not smoking (90.9%), not ingesting alcoholic beverages (78.8%) and not performing physical activities (81.8%). It was also observed that 40.7% of the individuals had concomitant diabetes to SAH; 39.4% were overweight, 39.1% were obese and 76.8% had significant or very significant waist circumference.

Pursuant to Table 2, it was verified that the lack of control of arterial hypertension was associated to lower schooling level (OR=1.71; CI95%: 1.02 – 2.86), family income equal to or below two minimum wages (OR=4.09; CI95%: 1.02 – 16.43) and obesity (OR=2.31; CI95%: 1.06 – 5.05). On the other hand the presence of concomitant diabetes (OR= 0.56; CI95%: 0.33 – 0.93) appeared as a protection factor for uncontrolled blood pressure levels.

Variáveis	OR bruta (IC95%)	OR ajustada (IC95%)
Situação conjugal		
Casado ou união estável	0.80 (0,510 – 1,274)	0,79 (0,49 – 1,27)
Solteiro, separado, viúvo ou divorciado	1,00	1,00
Escolaridade		
Segundo grau – Superior	1,00	1,00
Analfabeto – Primeiro grau	1,69 (1,02 – 2,81)	1,71 (1,02 – 2,86)
Renda familiar (em SM)		
< 2	6,34 (1,79 – 22,39)	4,09 (1,02 – 16,43)
≥ 2	1,00	1,00
Cor da pele		
Branca	1,00	1,00
Preta – Parda	2,64 (1,04 – 6,69)	2,47 (0,97 – 6,32)
Adição de sal à comida pronta		
Não	1,00	1,00
Sim	0,95 (0,54 – 1,61)	0,80 (0,46 – 1,40)
Ingere pelo menos 5 porções de frutas, hortaliças e cereais/dia		
Não	1,60 (0,95 – 2,71)	1,41 (0,81 – 2,46)
Sim	1,00	1,00
Come carne vermelha com gordura aparente		
Não	1,00	1,00
Sim	1,51 (0,89 – 2,56)	1,60 (0,91 – 2,82)
Come frango preparado com pele		
Não	1,00	1,00
Sim	1,01 (0,45 – 2,27)	1,07 (0,46 – 2,50)
Tabagista		
Não	1,00	1,00
Sim	0,92 (0,42 – 2,04)	0,99 (0,41 – 2,39)
Uso regular de bebida alcoólica		
Não	1,00	1,00
Sim	0,73 (0,42 – 1,29)	0,69 (0,37 – 1,29)
Faz atividade física regular pelo menos três vezes na semana		
Não	1,56 (0,86 – 2,82)	1,36 (0,73 – 2,52)
Sim	1,00	1,00
Tem diabetes concomitante		
Não	1,00	1,00
Sim	0,57 (0,36 – 0,92)	0,56 (0,33 – 0,93)
Índice de Massa Corpórea		
IMC < 25kg/m2	1,00	1,00
IMC ≥ 25kg/m2	2,15 (1,14 – 4,02)	2,02 (0,99 – 4,12)
IMC ≥ 30kg/m2	2,91 (1,54 – 5,49)	2,31 (1,06 – 5,05)
Circunferência da Cintura		
Baixa ou adequada	1,00	1,00
Elevada ou muito elevada	1,97 (1,14 – 3,41)	1,48 (0,76 – 2,87)
Idade		
18 – 39	1,00	1,00
40 – 59	0,99 (0,41 – 2,37)	1,12 (0,43 – 2,89)
≥ 60	0,61 (0,25 – 1,48)	0,73 (0,27 – 1,94)
Sexo		
Feminino	1,00	1,00
Masculino	0,51 (0,28 – 0,92)	0,62 (0,32 – 1,19)

Table 3 contains the data related to the final model of the logistic regression analysis. It can be observed that being illiterate or having complete or incomplete elementary education, family income of under two minimum wages and skin color black or brown act as risk factors for uncontrolled blood pressure levels. In a similar manner, overweight or obese individuals present a 2.06 and 2.37 higher chance of uncontrolled blood pressure levels when compared to eutrophic individuals, respectively. However, the presence of Diabetes Mellitus proved to be a protection factor significantly associated to a lower chance of developing uncontrolled SAH (OR= 0.57; CI95%: 0.34 – 0.95), confirming the findings of the bivariate analysis. It should be observed that adjustment for gender and age was made.

Table 3. Final model of the predictors of uncontrolled Systemic Arterial Hypertension of patients treated in Health Units of Cabula Beirú Health District, Salvador, Bahia, 2013.

Variáveis	OR bruta (IC95%)	OR ajustada (IC95%)
Escolaridade		
Segundo grau – Superior	1,00	1,00
Analfabeto – Primeiro grau	1,69 (1,02 – 2,81)	1,71 (1,02 – 2,86)
Renda familiar (em SM)		
≥ 2	1,00	1,00
< 2	6,34 (1,79 – 22,39)	3,96 (1,03 – 15,21)
Cor da pele		
Branca	1,00	1,00
Preta – Parda	2,64 (1,04 – 6,69)	2,47 (0,97 – 6,32)
Tem diabetes concomitante		
Não	1,00	1,00
Sim	0,57 (0,36 – 0,92)	0,57 (0,34 – 0,95)
Índice de Massa Corpórea		
IMC < 25kg/m2	1,00	1,00
IMC ≥ 25kg/m2	2,15 (1,14 – 4,02)	2,06 (1,01 – 4,18)
IMC ≥ 30kg/m2	2,91 (1,54 – 5,49)	2,37 (1,09 – 5,17)

DISCUSSION

In the present study it was verified that over half of the patients treated in Health Units of Cabula Beirú Health District presented uncontrolled SAH. Similar figures were found for São José do Rio Preto (65.7%) by Lessa & Fonseca[6] and in the municipality of Salvador (60%), by Knight et al[7]. The high prevalence of uncontrolled SAH suggests that cardiovascular events could be avoided by means of improving pressure levels, once the reduction of 5 mmHg only in systolic pressure could reduce mortality due to CVA in 14% and to coronary diseases in 9%[5].

Low adhesion to treatment with medication[6,7], the severity of the pathology8, the presence of comorbidities[1,2,7], unhealthy lifestyles and the lack of knowledge of the individual about the disease[7] are some of the factors that can contribute towards the low control rates for blood pressure. In the investigated healthcare units, the lack of health education groups may have contributed for such a high frequency of lack of blood pressure control. It is possible that many patients have difficulties in understanding what is said during medical appointments and without due clarification they may face difficulties in understanding the chronicity of the disease, the recommended posology, and the need of adopting conservatory measures, such as reducing the quantity of salt in the food, doing physical activities and controlling stress. It is important to note that during the data collection period the primary healthcare units were in a phase of adaption to new management of the Municipal Health Department, with the change of the mayor and political party. These aspects of central management also prompted

changes in the management of the Health District and could have contributed towards the inoperativeness of the health education groups.

It was also observed that the male gender was conceived as a protection factor for uncontrolled SAH. This relation was not present in the investigation performed in Porto Alegre by Souza et al[15], where men (75.0%) obtained a higher prevalence of uncontrolled blood pressure in relation to women (62.4%). Despite the fact that women seek for health services with more frequency, the installation of the menopause could justify lower rates of blood pressure control in this group[15].

Low schooling levels also presented a relation with uncontrolled SAH in this present research. Gomes et al[16] in an investigation carried out in Alagoas, Maceió, identified that 34% of the patients with completed elementary education presented uncontrolled blood pressure levels in comparison to only 4% among those with completed secondary education. Individuals with unfavorable socio-economic integration may be more susceptible to chronic stress, causing the increase in the blood pressure levels[17]. Furthermore, patients with low schooling levels present greater risks of abandoning the SAH treatment and may demonstrate greater difficulty in understanding the proposed therapeutics, as well as to the necessary changes in behavior in order to control this disease[18].

In the study under issue, the hypertensive individuals that had low income presented statistically significant association with uncontrolled blood pressure. In a similar manner, in a research performed with 290 hypertensive individuals cared for in primary healthcare, it was verified that individuals with income below or equal to three minimum wages presented greater frequency of uncontrolled SAH (73.5%) in comparison with those receiving over three minimum wages (26.5%)[19]. The lack of financial resources is a factor that influences not only the development of this pathology but also its control and could be related to the difficulty of access to the health services and of understanding the recommendations made by the team, occasioning low adhesion to the treatment[20].

A high prevalence was verified of individuals who added salt to their prepared meals and consumed red meat with apparent fat. Conversely, there was a predominance of a diet with insufficient fruit and vegetables. Despite these variables not having presented a statistically significant association to uncontrolled SAH, the adoption of a DASH (Dietary Approaches to Stop Hypertension) diet plan, comprising a rich diet of fruit and vegetables, as well reduced contents of cholesterol, saturated fat and sodium, represent an essential factor for the maintenance of adequate blood pressure levels[1,2]. Hypertensive individuals following the DASH diet and with a daily ingestion of only 1600 mg of sodium, can manifest effects on blood pressure levels similar to those under medication[21].

Carlsson et al[22] determined that the daily intake of fruit represents a protection factor for uncontrolled blood pressure levels in hypertensive men (OR=0.59), but not for women. It is possible that changes in lifestyles wield a more significant impact for the primary prevention of SAH[22] and, therefore, the consequence of low quality diet on the blood pressure in this population is not so expressive. Nevertheless, the long-term continuity of these habits may occasion negative consequences to their health[2].

A statistically significant association was observed between the skin color black or brown and uncontrolled blood pressure levels in the study under discussion. Bosworth et al[23] observed a positive association between Afro-American individuals and inadequate blood pressure control when compared to white individuals (OR = 1.70). This data is corroborated by Lessa & Fonseca[6] in a research carried out with low-income hypertensive individuals in the city of Salvador, Bahia. These authors verified that there is an improved control of SAH in individuals of white skin color, not verifying significant difference among those of skin color brown and black, despite these presenting lower control rates.

In the present investigation a statistically significant association was observed between overweight and obesity and uncontrolled blood pressure levels. This association was referenced by Lloyd-Jones et al[24] in a research performed with hypertensive individuals who participated in the 'Framingham Heart Study'. After calculation the odds ratio, it was verified that those with overweight and obesity had, respectively, 1.26 and 1.55 more chance of presenting uncontrolled blood pressure levels in comparison to eutrophic individuals. Considering that the reduction of one kilogram in weight is

associated to a decrease of approximately 1mmHg in the systolic and diastolic blood pressure, weight loss in individuals with high BMI becomes one of the most indicated non-pharmacological treatments for the control of blood pressure levels in hypertensive individuals[24].

A high waist circumference was another anthropometric measure associated to the lack of control of blood pressure levels. SAH is associated to a greater accumulation of abdominal fat, independently of the body weight, once excess visceral fat may be considered as an independent predictor of resistance to insulin, contributing towards increase blood pressure levels[25].

The presence of concomitant diabetes to SAH, in the present study, was identified as a protection factor for uncontrolled blood pressure levels. The knowledge that this is a common pathology in diabetic individuals is already consolidated in literature. The effective control of blood pressure levels can reduce the risk of these diseases[9]. The existence of other pathologies associated to SAH can contribute towards improved control of blood pressure levels and to the adoption of a more effective adoption of the therapeutics by these patients[7]. Accordingly, it is possible to understand diabetes as being a protection factor for uncontrolled SAH in the present investigation.

Among the advantages for the development of the present study emphasis is given to the possibility of access to a population that is the scope of scarce researches and of field data collection, in various units of the District, including emergencies, USF and UBS, permitting a greater reach of participants. The training of the team for data collection and the involvement of a multiprofesional health team were also positive points of this study.

The use of blood pressure information measured by professionals from the health units could be considered as a possible limitation, but considering the training in service and the daily practice of this procedure, this information was considered as reliable. In a similar manner, fasting glycaemia was referred by the participant considering that this information, for the participant, is relevant and memorized once it is a health event valued in common sense.

CONCLUSION

The results of this investigation permit to infer that the patients treated at primary healthcare units have a high prevalence of uncontrolled SAH. This condition is associated to socio-demographic and anthropometric factors and to the occurrence of concomitant pathologies. This study can contribute, in a more effective manner, to direct the identification and treatment of hypertensive patients who present factors associated to the lack of control of blood pressure levels. Furthermore, the knowledge of these characteristics may provide a more specific action plan in the health promotion and prevention for these sub-groups in Primary Healthcare, as well as serving as an instrument to reaffirm the importance of controlling blood pressure levels as common practice in relation to the care of the patient, with the purpose of reducing diseases caused by this condition. In this respect new researches with a broader analytical power should be carried out to investigate the hypothesis identified using blood pressure and fasting glycaemia measured in the field for the analyses and considering also other variables related to healthcare management in the first-level healthcare of SUS.

CONTRIBUTIONS OF THE AUTHORS

The authors Kroth KB, da Silva CD, Kroth JB and Fraga-Maia H participated in the conception, study design, search and statistical analysis of the research data, interpretation of the results, paper writing and final approval of the version to be published and by all aspects of the work ensuring the accuracy and integrity of any part of the work. The author Kroth KB has also participated in the referral of the scientific article.

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