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Prevalence of hypertension and risk factors in Sinop city (Mato Grosso/Brazil)

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Abstract. Hypertension is a chronic disease considered an important risk factor to high level of morbidity and mortality in the world. The objective was to evaluate the prevalence of hypertension and cardiovascular risk factors in Sinop (MT/Brazil). This cross-sectional study was conducted in 2014 between February and November. Data collection included self-reported behavioral risk factors and clinical measurements comprising blood pressure and anthropometry, totaling 649 adult subjects. The prevalence of hypertension was 39%, being higher in men (23%) than women (16%). Overall, 33.4% were obese and 39.9% were overweight; 12.5% smoke one or more packs of cigarettes per day; 68.9% were sedentary; 50.5% demonstrated altered waist/hip ratio; 22.8% and 50.8%, respectively, presented high and very high cardiovascular risk by waist circumference measure. *Odds ratio* analyses demonstrated that hypertension was associated with male subjects, increased age, excess weight and high waist/hip ratio as well altered waist circumference. This study showed high prevalence of hypertension, overweight and obesity in Sinop/MT. In addition, many hypertensive patients under anti-hypertensive treatment showed uncontrolled blood pressure levels. There was a significant association between hypertension and age, gender, body mass index, waist circumference and waist/hip ratio.

Keywords: Hypertension; obesity; cardiovascular disease.

Introduction

Systemic Arterial Hypertension (SAH) is a chronic disease characterized by high and constant systolic and diastolic blood pressure equal to or greater than 140mmHg and 90mmHg, respectively (Brasil, 2006; WHO, 2015). Epidemiological data from Pan American Health Organization (OPAS) (2013) shows that hypertension affects 30% of the adult population worldwide, of which one third are unaware of this condition. Among patients under medication, one of three are not able to restore blood pressure levels to normal (OPAS, 2013). In Brazil, studies indicate that the prevalence of hypertension varies between 23% and 41% (Barbosa et al., 2008; Cesarino et al., 2008; Costa et al., 2007; Gus et al., 2004; Lessa et al., 2006; Rosário et al., 2009; Pereira et al, 2007; Souza et al., 2007).

SAH is considered a public health problem and the most important risk factor for illness and mortality in the world (OPAS, 2013). It is associated with the development of cerebrovascular ailments, coronary artery problems, peripheral arterial problems, chronic renal failure, heart failure,

myocardial infarction, and can cause blindness (Brasil, 2006; OPAS, 2013). These complications account for approximately 9.4 million deaths worldwide each year (WHO, 2015). The risk of death may be aggravated if hypertension is not controlled, and associated with other risk factors such as smoking, obesity, and diabetes (OPAS, 2013).

Increased blood pressure levels have no specific cause and is a multifactorial clinical condition. Relevant risk factors are divided into two classes: the modifiable and non-modifiable. Among the non-modifiable are family history, age, sex, and race. Contrastingly, the modifiable variables include socioeconomic factors, sodium and alcohol intake, body-mass index (BMI), sedentary lifestyle, smoking habits, and metabolic syndrome (Brasil, 2006; SBC, SBH & SBN, 2010). Because these factors are modifiable, knowledge, as well as prevention or treatment of these risk factors, becomes a strategic tool for the prevention and control of hypertension.

Given the close relationship between hypertension and lifestyle habits, it is necessary to investigate the prevalence of the disease and associated risk factors in populations with diverse

characteristics, often determined by cultural and geographic aspects. For this reason, the objective of this study was to evaluate the prevalence of systemic arterial hypertension and its association with cardiovascular risk factors in Sinop/MT.

Methods

The observational and transversal study was performed in a convenience sample, on spontaneous demand, composed of adults, attending a supermarket chain in Sinop/MT. 649 people of both sexes were evaluated between February and November of 2014. Anthropometric and blood pressure measurements and interviews were conducted by an appropriately trained team of 15 individuals, including researchers, nurses, medicine and pharmacy students of the Federal University of Mato Grosso (UFMT), Sinop Campus; all members of the 100% Health team of UFMT/Sinop, linked to the Health Education Program (PET-Saúde). Pregnant women were excluded from the study. The interview was conducted based on a questionnaire including age, family history of chronic noncommunicable diseases (CND), physical activity, medication use, smoking, and alcohol intake. Systemic blood pressure was measured after completing the questionnaire; this allowed the individual to rest for approximately five minutes before measurements were taken. The method used was indirect, with an auscultatory technique, using an aneroid sphygmomanometer, with the patient in the seated position. Individuals who presented systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg were defined as hypertensive, according to criteria established by the VI Brazilian Guidelines on Hypertension (SBC, SBH & SBN, 2010). The anthropometric measurements were weight, height, BMI, waist circumference (WC) and hip circumference (HC). In order to measure weight and height, the research team used an anthropometric scale of the brand Caumaq LTDA, model AT180, with capacity for 180kg and precision up to 100g, where the individuals were weighed fully clothed with shoes on. Measurements of WC and HC were performed using an inextensible tape measure, with the patient standing erect and with the arms relaxed beside the torso. WC was measured in the horizontal plane, at the midpoint between the lateral iliac crest and the last rib. Regarding the risk of metabolic complications, WC was classified as normal, augmented, and greatly increased according to values <94 cm, between 94 and 102cm, and >102 cm for men; and <80 cm, between 80 and 88cm, and >88 cm for females (WHO, 2008). The HC was measured in centimeters in the area with the largest gluteal protrusion in a horizontal plane. The waist/hip ratio was obtained from the waist and hip circumference values and the cut-off points

recommended by World Health Organization were used for classification, values between <0.90 and <0.85 were considered normal for men and women respectively. The BMI is the ratio of weight in kilograms per square of height in meters (WHO, 2008). The BMI values were classified as <18.5 kg/m² (low weight); 18.5 to 24.9kg/m² (normal); 25.0 to 29.9kg/m² (overweight) and ≥ 30 kg/m² (obesity) (WHO, 2008).

The interview data was stored in the Microsoft Excel[®] database manager, year 2010. All questionnaires were reviewed, transcribed, and evaluated using R software. Prevalence estimates were calculated, averaged and crude odds ratios were calculated with confidence intervals (95% CI). The association between the various variables and the prevalence of arterial hypertension was tested using the χ^2 test with a significance level of 5%.

Ethical principles

This research was submitted to the Ethics Committee of the Hospital Julio Mueller, under protocol number 20754813.2.0000.5541 and was approved within ethical principles and current legislation.

Results and discussion

Table 1 shows the sociodemographic and lifestyle data. Of the 649 individuals evaluated, 54.7% were male and 45.3% female. The mean age was 48 years, with most participants between 30 and 59 years old (64.1%). 148 individuals (22.8%) had blood pressure equal to or greater than 140 and/or 90mmHg, while 105 (16.2%) showed values within the normal range, but used antihypertensive drugs (Table 1). Thus, the prevalence of hypertension reached 39% of the population evaluated (Figure 1). Among these individuals (hypertensive or with normal blood pressure using antihypertensive medications, N=253), the prevalence of hypertension among men was 23%, while in women it was 16% (Table 1).

The BMI was above the normal range in 73.3% of the sample (overweight = 39.9%, obesity = 33.4%), and BP was altered in 18.8% of the sample and 13.6% used antihypertensive medications and had normal BP. In the evaluation of waist circumference (WC), 22.8% presented an increased risk of developing cardiovascular diseases and 50.8% showed a much-increased risk. Hypertensive patients with altered BP (15.4%), as well as those with medication and blood pressure within normal values (11.4%), were among those who had a much higher risk of developing cardiovascular diseases. The waist/hip ratio was altered in 50.5% of the patients, in whom the prevalence of hypertension was higher (26.6%), and 10.9% used medication and had normal BP (Table 1).

Table 1 – Sociodemographic variables and lifestyle in a sample of hypertensive individuals with normal blood pressure under antihypertensive medication in Sinop/MT/Brazil.

(continued on next page)

Variable	Total		Hypertensive		Normal pressure with medication use	
	N	%	N	%	N	%
Gender						
Male	355	54.7	96	14.8	53	8.2
Female	294	45.3	52	8.0	52	8.0
Total	649	100	148	22.8	105	16.2
Age group						
18 to 29 years	81	12.5	02	0.3	03	0.5
30 to 59 years	416	64.1	93	14.3	59	9.1
≥ 60 years	152	23.4	53	8.2	43	6.6
Body mass index						
Low weight	4	0.6	00	0.0	00	0.0
Normal	169	26.0	26	4.0	17	2.6
Overweight	259	39.9	50	7.7	36	5.6
Obese	217	33.4	72	11.1	52	8.0
Smoking (cigarettes/day)						
0	568	87.5	129	19.9	97	15.0
< 10	47	7.2	10	1.6	05	0.8
10 a 20	29	4.5	07	1.1	02	0.3
≥ 21	5	0.8	02	0.3	01	0.2
Physical activity (weekly)						
Do not practice	447	68.9	111	17.1	64	9.9
Twice	56	8.6	10	1.5	09	1.4
3 times	146	22.5	27	4.2	32	4.9
Waist/hip ratio						
Normal	321	49.5	46	7.1	34	5.2
High	328	50.5	102	15.7	71	10.9
Waist circumference						
Normal	171	26.4	22	3.4	12	1.8
Increased	148	22.8	26	4	19	2.9
Greatly increased	330	50.8	100	15.4	74	11.4

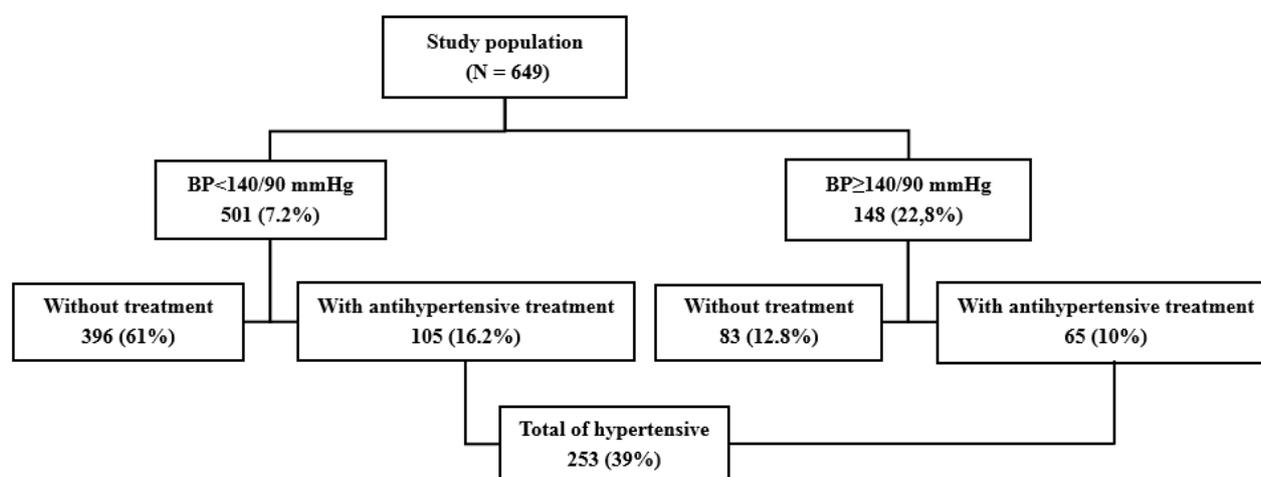


Figure 1. Prevalence of hypertension in a sample of individuals in Sinop/MT/Brazil. BP, Blood pressure.

Regarding lifestyle habits, 87.5% reported not smoking, while 12.5% smoked one or more packs of cigarettes per day. The prevalence of hypertension among those who were smokers was 3% and 1.3% of them used medication and maintained BP within normal parameters (Table 1). Sixty-eight percent of individuals reported being sedentary; 31% reported practicing physical activity two or three times a week. The prevalence of hypertension and hypertension under the use of controlled blood pressure medication was higher

among sedentary patients, being 17.1% and 9.9%, respectively (Table 1).

In the odds ratio analysis, the prevalence of SAH has a higher association with males ($p=0.004$) and increased age. The analysis also showed a positive association with higher than normal weight (overweight and obesity) and altered WC. However, alcohol consumption, smoking, and physical activity were not associated with hypertension in the odds ratio analysis (Table 2).

Table 2 - Risk factors associated with hypertension in a sample of individuals from Sinop/MT/Brazil.

Factor associated with hypertension			
Variables	OR	IC 95%	P
Sex			
Female	1	-	-
Male	1.72	1.18 - 2.53	0.004
Age group			
18-29	1	-	-
30-39	5.61	1.48 - 39.80	9.2×10^{-3}
40-49	8.06	2.31 - 55.10	6.7×10^{-4}
50-59	17.61	5.24 - 118.70	1.2×10^{-7}
≥ 60	19.56	5.82 - 131.28	2.9×10^{-8}
Body mass index			
Normal	1	-	-
Overweight	1.35	0.81 - 2.30	2.45×10^{-1}
Obese	2.77	1.69 - 4.66	4.52×10^{-5}
Waist circumference			
Normal	1	-	-
High	2.41	1.62 - 3.63	1.08×10^{-5}
Waist hip ratio			
Normal	1	-	-
High	3.18	2.08 - 4.99	5.2×10^{-8}
Physical activity			
Practicing	1	-	-
Not practicing	1.46	0.97 - 2.25	0.067
Smoking			
Non-smoker	1	-	-
Smoker	1.04	0,58 - 1.7	0.881
Alcohol intake			
Do not consume	1	-	-
Consume	1.31	0,88 - 1.94	0.17

The study had a high prevalence of hypertension, which reached 39% of the evaluated population. Population-based studies conducted in several Other Brazilian municipalities obtained similar prevalence rates of hypertension. Braga Jr. (2007), Lessa et al.(2006), Silva et al. (2012), Souza et al. (2007) and Rosário et al. (2009) observed a prevalence of hypertension at 28.3%, 29.9%, 40.1%, 41.4% and 30.1% of the population of Cuiabá/MT, Salvador/BA, Florianópolis/SC, Campo Grande/MS and Nobres/MT respectively. In another study

conducted in the city of Sinop, Martins et al. (2010), when evaluating a sample of 690 adults aged 20 to 59 years, found that 23.2% of the sample had SAH. This difference in the results of Martins et al. (2010), with the data obtained in this study, can be justified by the sampling method used in the two studies. An interesting finding of the study was the observation that 10% of the individuals evaluated presented high blood pressure even while being treated with antihypertensive medication. If only the hypertensive population with diagnosis and treatment is

considered, these values reach 38.2% of those evaluated. Several studies have reported elevated rates of high blood pressure in individuals under antihypertensive treatment. Gus et al. (2004), in a study, carried out in the state of Rio Grande do Sul, with a sample of 1,063 individuals, found that 30.1% of hypertensive patients did not present adequate blood pressure control. Pereira et al. (2007) when evaluating 707 subjects, of whom 286 were hypertensive patients and 134 were under antihypertensive treatment, found that in the sample of hypertensive patients, a total of 105 individuals (36.7%) were under treatment. Rosário et al., (2009) in a study of participants in Tuberão/SC that had high BP, showed that in the study with 1,003 individuals, 187 were on antihypertensive treatment, and of these, about 37.7% did not present BP control. Therefore, various studies corroborate a low rate of blood pressure control in hypertensive patients on antihypertensive treatment, suggesting failures in drug therapy, which may be related to no adherence to treatment, not the effectiveness of the medication or the combination therapy used in these patients (Rosário et al., 2009; Souza et al., 2007).

Another relevant finding in our study was the significant association between age, sex, BMI, WHR and WC, and elevation of blood pressure. In relation to age and hypertension, studies show that with increasing age the chances of developing hypertension also increase. Jardim et al. (2007), showed that the prevalence of hypertension in the age group of 18 to 29 years was 16.7%, whereas in the population over 60 the prevalence increased to 73.9%. Nascente et al. (2010) showed that the prevalence of hypertension from 30 to 39 years old was 14%, from 40 to 49 years old, increased to 34.6%, and in individuals aged 60 years or older, it reached 63.1%.

Regarding gender and the prevalence of hypertension, numerous studies corroborate the results of our study, showing that males are more likely to develop hypertension than females (Braga Jr. 2007; Martins et al., 2010; Jardim et al., (2007). Although these results are observed in numerous studies, some studies show that there is also a positive association between SAH and females. This can be observed in the study of Radovanovic et al. (2014), where SAH was predominantly present in females. The VI Brazilian Hypertension Guidelines shows that the overall prevalence of hypertension between men and women is similar, although it is higher in men up to 50 years SBC, SBH & SBN, 2010).

Above normal weight has been highlighted in several studies as one of the main risk factors for the development of hypertension. It has been observed that the prevalence of SAH is higher among those who are overweight, even amongst youth. A study by Moreira et al. (2013), with adolescents, shows that obesity is positively associated with SAH, which may increase the adolescent's risk for SAH by 1.27 times. Nascente et

al. (2010), in a study, carried out in Firminópolis/GO with 1,168 individuals, showed that the prevalence of overweight hypertensive patients was 36.5% and of obese hypertensive patients was 54.5%. Jardim et al. (2007) observed that there is a positive association between hypertension and above normal weight. Coqueiro et al. (2009) showed that the highest prevalence of hypertension was found among those who were overweight.

In addition to the positive association between above normal weight and increased BP, we also observed a positive association between WC and WHR and the increase in BP, corroborating other studies. Research by Jardim et al. (2007), and Rosário et al. (2009), found that increased or greatly increased WC is associated with the onset of hypertension. Lessa et al. (2006) found a positive association with central obesity and SAH. The WHR evaluation is rarely used in studies as an anthropometric variable to verify the chances of individuals being hypertensive; however in Brazil. Gus et al. (1998) found a significant association between WHR and SAH only among women.

When assessing the relationship between physical activity and increased BP, a significant association was not established. Other studies show similar results. Jardim et al. (2007), did not observe a correlation between SAH and sedentary lifestyle. Martins et al. (2010), in Sinop/MT, also found no association between physical activity and hypertension prevalence. On the other hand, Silva et al. (2012), showed that the chances of developing hypertension are higher in inactive individuals. It is known that the practice of regular physical activity has been shown to be a protective factor against the development of cardiovascular diseases. According to the Ministry of Health (2006), hypertensive patients should initiate regular physical activity, because, in addition to lowering blood pressure, exercise can considerably reduce the risk of coronary artery disease, stroke, overall mortality, and aid in weight control. A study by Lee et al. (2014) shows that the practice of physical activity, in addition to decreasing mortality from cardiovascular diseases, also increases life expectancy. This difference in outcome between studies may have occurred because of the differences between the parameters used to analyze physical activity practice, such as frequency, duration, intensity, and mode of physical activities used by the individuals that were evaluated by the researchers.

Regarding smoking, there was no positive association between smoking and BP increase. Costa et al. (2007), in a population of Pelotas/RS also found no association between smoking and SAH. Lessa et al. (2006) found that the prevalence of SAH was lower among smokers when compared to those exposed to other cardiovascular risk factors. Although our study found no association between increased BP and smoking, it is known that cessation of tobacco use is fundamental for the prevention of cardiovascular diseases (Rosário et al,

2009). Other studies have shown that the prevalence of SAH is higher among those who smoke. Nascente et al. (2010) shows that the prevalence of hypertension among ex-smokers (48.8%) and smokers (32.9%) was higher when compared to non-smokers (26.1%).

In the present study, alcohol consumption was not associated with increased BP. According to the VI Brazilian Guidelines for Hypertension (2010), there is an association between alcohol intake and BP changes depending on the amount ingested (SBC, SBH & SBN, 2010). It is well documented that high ethanol intake increases BP and is associated with increased morbidity and mortality from cardiovascular causes. On the other hand, the evidence of the correlation between a small intake of alcohol and the consequent reduction of blood pressure is still inadequate and requires further investigation. In hypertensive individuals, alcohol intake, acutely and dose-dependent, reduces BP, but elevation occurs within hours of consumption. Thus, to increase knowledge about the effects of ethanol on BP, additional studies should be performed.

Conclusion

The studied sample had a high prevalence of hypertension and above normal weight. There was a significant association of hypertension with age, gender, BMI, waist circumference, and waist/hip ratio. There was also a high prevalence of hypertensive individuals undergoing treatment with uncontrolled blood pressure levels. Such findings can be used as a data source for planning actions aimed at combating hypertension and its associated risk factors, as well as for investigating the factors that make individuals on antihypertensive medication maintain increased blood pressure level.

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