

Risk factors associated to high pressure levels in university students

Fatores de risco associados aos níveis pressóricos elevados em universitários

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ABSTRACT

Objective: evaluating the association between risk factors and pressure levels in university students. **Methods:** descriptive, cross-sectional study, developed with 203 university students through a self-applicable questionnaire, built from the Ministry of Health instrument for the Telephonic Inquiry for the Surveillance of Risk Factors and Protection Against Chronic Diseases. The analysis of data was carried out using Kendall's tau coefficient. **Results:** 164 (80.8%) participants had normal pressure levels, nine (4.4%) had pre-hypertension, and 30 (14.8%) had hypertension. Regarding their lifestyles, 16 (7.9%) were smokers, 12 (5.9%) made abusive use of alcohol, 137 (67.5%) were active, 64 (31.5%) had abdominal adiposity, 29 (14.3%) were overweight or obese and 32 (15.8%) used salt in excess. **Conclusion:** the risk factors related to high pressure levels were being 35 years old or older, having abdominal adiposity, being overweight or obese. **Descriptors:** Hypertension; Cardiovascular Diseases; Risk Factors; Students.

RESUMO

Objetivo: avaliar a associação dos fatores de risco com os níveis pressóricos elevados em universitários. **Métodos:** estudo descritivo, transversal, desenvolvido com 203 universitários, por meio de questionário autoaplicável, construído com base no instrumento para Vigilância de Fatores de Risco e Proteção Para Doenças Crônicas por Inquérito Telefônico do Ministério da Saúde. A análise dos dados foi realizada pelo teste Tau de Kendall. **Resultados:** dos participantes do estudo, 164 (80,8%) possuíam níveis pressóricos referentes à pressão arterial normal, nove (4,4%) pré-hipertensão, 30 (14,8%) hipertensão. Quanto ao estilo de vida, 16 (7,9%) eram fumantes, 12 (5,9%) faziam uso abusivo de álcool, 137 (67,5%) eram ativos, 64 (31,5%) possuíam adiposidade abdominal, 29 (14,3%) estavam com sobrepeso ou obesidade e 32 (15,8%) faziam uso excessivo de sal. **Conclusão:** os fatores de risco relacionados aos níveis pressóricos elevados foram: ter 35 anos ou mais de idade, adiposidade abdominal, sobrepeso ou obesidade. **Descritores:** Hipertensão; Doenças Cardiovasculares; Fatores de Risco; Estudantes.

Introduction

Cardiovascular diseases are the first cause of death worldwide⁽¹⁾. Approximately 31.0% of deaths in 2015 happened due to this health problem, adding to 17.7 million people⁽²⁾.

An epidemiological study showed a potential association between cardiovascular diseases and a set of modifiable risk factors⁽³⁾, such as lifestyle, consumption of substances such as alcohol and alcohol, bad eating habits, overweight and obesity. These factors affect a considerable percentage of young people⁽²⁾, a group which includes most university students.

This data is correlated to systolic arterial hypertension, an important risk factor for vascular lesion problems⁽²⁾. A study carried out with students from a Public University in Piauí found that 8.7% of its students had arterial hypertension. In addition, it was found that even when the subjects were young, there was a high prevalence of obesity and abdominal fat, which are determinant for the increase in pressure levels⁽⁴⁾.

The clinical symptoms of cardiovascular diseases appear in adult life, but the accumulation of fat in the walls of the arteries starts in the first decade of life. Throughout the years, cardiovascular risk factors are more likely to accumulate, leading to an increased likelihood of dying from this type of disease⁽³⁾.

Due to the multiple etiologies of the cardiovascular diseases, ways to evaluate the cardiovascular risk in individuals were developed, allowing to identify population groups that are susceptible to death from cardiovascular factors⁽¹⁾. However, considering the above, these actions deserve more attention and care with regards to young individuals and should aim at a primary prevention of the cardiovascular diseases, that is, the actions should be taken before the individual gets sick.

Despite the scarcity of studies that measured the systolic arterial hypertension of university students, a research found among its participants pressure levels that were increased in 21.5% for men and

2.2% for women. It also found an association with the risk factors: being male, abdominal circumference, glycemia, triglyceride levels, HDL cholesterol, smoking, and being overweight⁽⁴⁾.

It stands out that university life brings about many intense changes in the life of individuals, with negative repercussions in health. Therefore, the investigation of risk factors for the increase of pressure levels in university students is vital, since the earlier these factors are changed, the lower the chance that the student will become ill once he becomes an adult or elder. The investigation of these factors is still often neglected by health professionals. As a result, the objective of this study was evaluating the association of risk factors and high pressure levels in university students.

Methods

This is a descriptive, cross-sectional study, developed with university students from all courses in the Coxim campus of the *Universidade Federal de Mato Grosso do Sul*.

The inclusion criteria for the study was: being enrolled in a theoretical class in a graduation course in the Coxim campus of the *Universidade Federal de Mato Grosso do Sul*. The exclusion criterion was being absent from the classroom during data collection, that is, not coming to class on the specific day in which data collection was scheduled. Data collection took place from July to August 2016. There were 367 students enrolled in the courses of the university, 65 in History, 85 in Arts, 59 in Information Technology, and 158 in Nursing. However, 24 among these were undergoing mandatory internships and could not be part of our sample.

Students were approached in the classroom, in a date previously scheduled with the course coordination and the professor who was in class at the time. Data from all classes from all years was collected, with the permission of the professor responsible for one of the subjects. Data collection happened at a separate

moment for each class. All students in the class were invited to participate in the study. There were two refusals and 138 students were not present in the date scheduled for collection. A total of 203 students participated.

They received information about the objectives of the research and the anonymity of the information gathered and were made aware that they had the right to refuse or abandon participation at any stage of the execution of the research. They were also assured they would not either have expenses nor be paid to participate and fill in the instrument. Those who accepted being part of the study signed the Free and Informed Consent Form. Students under 18 years of age took home the Free and Informed Consent form to obtain authorization from their parents in addition to signing it themselves. For these students, data collection was scheduled for a later date. Eight students were underage. Data collection was carried out by a properly trained research team.

The self-applicable questionnaire was built based on the instrument for the Telephonic Inquiry for the Surveillance of Risk Factors and Protection Against Chronic Diseases (VIGITEL)⁽⁵⁾ and included open and close questions related to the theme of the investigation, involving sociodemographic and economic aspects, physical activity, dietary habits, smoking, alcohol, and family history of chronic diseases. Later, anthropometric measures were taken, abdominal circumference and pressure levels.

The body weight of the students was measured using a digital scale with capacity for 150 kilograms (Kg) and precision of 100 grams. The person being evaluated was in an orthostatic position in the center of the scale, bare foot and with light clothing. The height of the participants was measured using a non-elastic measuring tape, with a 0.5 cm scale. It was attached to the wall and the person was erect, arms loose, hands open and placed on the thighs, heels brought together, tip of the feet apart, knees touching, and weight distributed on the two feet, with the head

adjusted, according to the Frankfurt plan⁽⁶⁾.

Based on this information, the Body Mass Index was calculated dividing the body mass in kilograms by the height in meters squared (Kg/m^2). The cutoff points suggested by the World Health Organization for adolescents and adults were used. As a result, students were classified as low weight, normal weight, or overweight/obese. Central obesity was determined by the abdominal circumference. The student was asked to remain in a supine position and breathe in deep. After expiration, the measure was taken with a non-elastic measuring tape, with a 0.5 cm scale, in the longest abdominal perimeter, between the last rib and the iliac crest⁽⁷⁾. Abdominal adiposity is defined by abdominal circumferences equal or above 94 cm in men and equal or above 80 cm in women⁽⁸⁾.

Systemic Arterial Pressure was measured according to recommendations from the VII Brazilian Directives for Hypertension⁽⁹⁾. A medium-adult sized manual sphygmomanometer was used to measure the pressure. Pressure levels were classified as follows. Normal: arterial systolic pressure $<120\text{mmHg}$ and arterial diastolic pressure $<80\text{mmHg}$; pre-hypertension: arterial systolic pressure from 121 to 139mmHg and/or arterial diastolic pressure from 81 – 89 mmHg; hypertension stage 1: arterial systolic pressure from 140 to 159mmHg and/or arterial diastolic pressure from 90 to 99 mmHg; hypertension stage 2: arterial systolic pressure from 160 to 179 mmHg and/or arterial diastolic pressure 100 to 109mmHg; hypertension stage 3: arterial systolic pressure $>180\text{mmHg}$ and arterial diastolic pressure $>10\text{mmHg}$. For the adolescents, the pressure levels were considered high when the arterial systolic pressure and/or arterial diastolic pressure percentiles (p) were above 95, according to age, sex, and age percentile. The height percentile was obtained using the growth graphics from the Centers for Disease Control and Prevention, and the arterial systolic pressure and arterial diastolic pressures were obtained using the table from the VII Brazilian Directives for Hypertension⁽⁶⁾. Data was divided in three

groups for analysis: normal hypertension, pre-hypertension, and hypertension (pressure levels related to the different hypertension levels).

To classify the individuals economically, a methodology used by the Brazilian Association of Research Companies was applied. Its criteria divides the population in eight groups: A1, A2, B1, B2, C1, C2, D and E⁽¹⁰⁾. This technique groups categories according to the purchasing power of urban people and families, to whether they hire maids, and to the educational level of the head of the family. In order to make data analysis and comparison easier, students were classified as belonging to the high (A/B), medium (C), or low (D/E) class.

Regarding physical activity, individuals who perform less than 150 minutes a week of moderate physical activity, or 75 minutes a week of vigorous activities were considered insufficiently active. This included physical activities, leisure, work, and travel times⁽¹¹⁾.

Regarding data analysis, the forms filled were reviewed to detect problems before data was computerized. Later, they were transcribed into an Excel 2010 spreadsheet. Answers were checked for possible mistakes, including mistakes in typing or omitted responses. A descriptive analysis of data was carried out using a relative frequency of all variables. To evaluate the association between them, they were submitted to Kendall's tau coefficient through the software Statistical Package for the Social Sciences, version 20.0. For all tests, associations were considered significant when $p < 0.05$.

The research followed ethical aspects prescribed by Resolution 466/12, from the National Council of Health. The project for this research was submitted to *Plataforma Brasil*, receiving the Certificate of Presentation for Ethical Appreciation nº 43290415,3,0000,0021. It was also approved by the Research Ethics Committee of the *Universidade Federal de Mato Grosso do Sul*, under protocol nº 1,065,671/15.

Results

The pressure levels of 164 (80.8%) of the participants was normal, nine (4.4%) had pre-hypertension, and 30 (14.8%) had hypertension. The mean pressure level for arterial systolic pressure was 106.8 ± 16.5 mmHg, while the mean for arterial diastolic pressure was 71.6 ± 9.4 mmHg.

In Table 1, it can be noted that the only socioeconomic factor associated to hypertension was being older than 35 years old ($p = 0.002$).

Table 1 - Correlation of high pressure levels and sociodemographic characteristics of university students. Coxim, MS, Brazil, 2016

Variables	Normal (n=164)	Pre-hyper- tension(n=9)	Hyperten- sion(n=30)	Total (n=203)	P
	n (%)	n (%)	n (%)	n (%)	
Sex (n=203)					0,101
Male	33 (20,1)	2 (22,2)	11 (36,7)	46 (22,7)	
Female	131 (79,9)	7 (77,8)	19 (63,3)	157 (77,3)	
Age group (years) (n=199)*					0,002†
≥ 24	108 (66,7)	4 (44,4)	10 (35,7)	122 (61,3)	
25 - 35	39 (24,1)	3 (33,3)	11 (39,3)	53 (26,6)	
>35	15 (9,2)	2 (22,3)	7 (25,0)	24 (12,1)	
Economic class (n=202)*					0,849
Low	24 (14,7)	1 (11,2)	4 (13,3)	39 (19,3)	
Medium	108 (66,3)	4 (44,4)	22 (73,3)	134 (66,3)	
High	31(19)	4 (44,4)	4 (13,3)	29 (14,4)	
Color (n=190)*					0,534
Answer	51 (33,6)	2 (22,2)	8 (27,6)	61 (32,1)	
Black/Brown	97 (63,8)	7 (77,8)	21 (72,4)	125 (65,8)	
Yellow	4 (2,6)	-	-	4 (2,1)	

*Frequency and percentage excluding cases in with no responses or signed as "I don't know"; †Statistically significant

Regarding their lifestyles, 16 (7.9%) were smokers, 12 (5.9%) made abusive use of alcohol, 137 (67.5%) were active, 64 (31.5%) had abdominal adiposity, 29 (14.3%) were overweight or obese – the last two had statistically significant relations to high pressure levels ($p = 0.002$ for both) –, 32 (15.8%) used salt in excess and 83 (41.7%) had a family history of hypertension (Table 2).

Table 2 - Correlation between high pressure levels and factors associated to lifestyle, excessive weight and family history of hypertension in university students. Coxim, MS, Brazil, 2016

Variables	Normal (n=164) n (%)	Pre-hyperten- sion(n=9) n (%)	Hyperten- sion(n=30) n (%)	Total (n=203) n (%)	P
Smoking (n=203)					0,525
Smoker	12 (7,3)	-	4 (13,3)	16 (7,9)	
Non-smoker	152 (92,7)	9 (100)	26 (86,7)	187 (92,1)	
Alcohol abuse (n=202*)					0,862
Yes	10 (6,1)	-	2 (6,7)	12 (5,9)	
No	153 (93,9)	9 (100,0)	28 (93,3)	190 (94,1)	
Physical activity (n=203)					0,541
Active	109 (66,5)	7 (77,8)	21 (70,0)	137 (67,5)	
Inactive	55 (33,5)	2 (22,2)	9 (30,0)	66 (32,5)	
Abdominal adiposity (n=203)					0,002†
Yes	43 (26,2)	3 (33,3)	18 (60,0)	64 (31,5)	
No	121 (73,8)	6 (66,7)	12 (40,0)	139 (68,5)	
Overweight/Obesity (n=203)					0,002†
Yes	15 (9,1)	3 (33,3)	11 (36,7)	29 (14,3)	
No	149 (90,9)	6 (66,7)	19 (63,3)	174 (85,7)	
Excessive use of sodium (n=203)					0,955
Yes	26 (15,9)	-	6 (20,0)	32 (15,8)	
No	138 (84,1)	9 (100,0)	24 (80,0)	171 (84,2)	
Hypertension father/ mother (n=199*)					0,764
Yes	68 (42,2)	3 (37,5)	12 (40,0)	83 (41,7)	
No	93 (57,8)	5 (62,5)	18 (60,0)	116 (5)	

*Frequency and percentage excluding cases in with no responses or signed as "I don't know"; †Statistically significant

Regarding the comparison between high pressure levels and the year of the course in which the students were enrolled, in both groups, from the first to the second, and from the third to the fifth, the frequency was equivalent (15) (Table 3). Students from the Nursing course had lower pressure levels (p=0.000).

Table 3 - Correlation between high pressure levels, course, and year of the course in which the students were enrolled. Coxim, MS, Brazil, 2016

Variables	Normal (n=164) n (%)	Pre-hyper- tension(n=9) n (%)	Hyperten- sion(n=30) n (%)	Total (n=203) n (%)	P
Year of the course (n=203)					0,578
1 - 2-	85 (51,8)	3 (33,3)	15 (50,0)	103 (50,7)	
3 - 5	79 (48,2)	6 (66,7)	15 (50,0)	100 (49,3)	
Course (n=203)					0,000*
Nursing	101 (61,6)	5 (55,6)	5 (16,7)	111 (54,7)	
History	13 (7,9)	1 (11,1)	5 (16,7)	19 (9,4)	
Information	17 (10,4)	1 (11,1)	7 (23,3)	25 (12,3)	
Technology	33 (20,1)	2 (22,2)	13 (27,2)	48 (23,6)	
Arts					

*Statistically significant

Discussion

The limitations of this study are related to the impossibility of collecting data more than once in the same class, since the professor would need to concede time from his class for each collection. This made data collection more difficult, especially with regards to obtaining permission from the professors and scheduling times that were acceptable for them and for the team that carried out data collection. Additionally, it was not possible to investigate institutional characteristics of the students, such as the number of disciplines they were studying, the time they spent in university, the projects they were involved in, and their respective associations with pressure levels.

This study has shown that abdominal adiposity, overweight and obesity have significant associations with high pressure levels. Therefore, these must be investigated. Abdominal adiposity is often neglected as a risk factor and is not routinely measured in population in most health services. The same is true for the Body Mass Index, even when the weight and height of the individuals are measured. Furthermore, when this information is assessed and informed, the person needs to receive guidance with regards to cardiovascular disease risks and necessary dietary habit changes. Therefore, these are challenges for health institutions and its professionals. However, the first essential initiative is the elaboration of protocols to track the risk factors that are important for the population, starting at a young age.

In addition, a significant number of students with high pressure levels was found, similarly to studies from Saudi Arabia⁽¹²⁾, China⁽¹³⁾ and Paraguay⁽¹⁴⁾. Therefore, it is essential to address students early, aiming to diminish these modifiable risk factors – that is, changing dietary habits and encouraging physical activity. Moreover, finding high pressure levels in university students reiterates that the guidance with regards to preventing hypertension must be offered as soon as possible to the population, and their pressure levels should be measured to identify cases in which these are high.

A significant percentage of participants had a family history of hypertension, abdominal adiposity, overweight, or obesity. A study carried out in Minas Gerais, Brazil, with low-income adolescents from a community, found that children and adolescents were severely overweight (36.0%), meaning they would be predisposed to being obese during adulthood. Additionally, 48.0% had a family history, which is a risk factor for cardiovascular diseases and arteriosclerosis⁽¹⁵⁾. Many studies relate obesity and overweight with high pressure levels^(2,4,13-14).

With regards to the socioeconomic class of university students researched, the one with the most prevalence of high pressure levels was the medium. A study with children and adolescents from 7 to 17 years of age in Rio Grande do Sul, Brazil, found a higher percentage of overweight among lower classes and public school students⁽¹⁶⁾.

In literature, the relation between excessive weight and economic levels is not defined, since there is not defined standard. Studies diverge with regards to this outcome. While some find relations, others find a higher risk of overweight among higher classes (A-B)⁽¹⁷⁾.

Other risk factors for the increase of systemic arterial pressure are smoking and alcohol abuse. The use of alcohol and the habit of smoking are present among students. This is worrying, since these factors are generally associated to increased risks of cardiovascular diseases. Smoking can lead to increased ar-

terial hypertension and cholesterol deposits in the blood vessels⁽¹⁸⁾.

Regarding the prevalence of hypertension in family history, this study found that, for more than half the students, at least one parent was diagnosed with systolic arterial hypertension, corroborating an investigation carried out with 79 people from 11 to 59 years old, in which more than half the individuals had a family history of cardiovascular disease, especially diabetes mellitus, cancer, cardiac diseases, and obesity⁽¹⁹⁾.

An investigation with Paraguayan university students found high arterial hypertension to be related with, among other things, diabetes mellitus type 2. The frequent cardiovascular risk factors found were alcohol use, overweight and obesity. More than 70.0% of the students had one or more cardiovascular risk factors⁽¹⁴⁾.

Regarding high pressure levels, the courses with the highest prevalence were History, Information Technology, and Arts, respectively. A study carried out in João Pessoa, Paraíba, Brazil, found that most Nursing students had healthy habits and stable clinical manifestations. In addition, it showed that this group of students is very worried regarding the use of alcohol and smoking, and associated them to hypertension and diabetes mellitus⁽²⁰⁾.

In an investigation with 550 university students, it was found that they mostly had chronic diseases as age increased. That means that preventive actions are needed for cardiovascular disease risk factors to be detected as early as possible in this population⁽⁴⁾.

Regarding the first years of university life, there are many concerns with regards to the increase in risk factors for cardiovascular diseases, since the lives of many students become less regular once they are far from home, when they start a new type of life, in a new environment. Therefore, university students must be periodically evaluated, to guarantee a preventive assistance that can detect early the risk factors that can lead to cardiovascular diseases and, as a result, con-

trol better the main risks to health, be they related to lifestyle, smoking, or alcohol abuse⁽⁴⁾.

Conclusion

In this study, risk factors related to high pressure levels were: being 35 years old or older, having abdominal adiposity, overweight, or obesity.

Collaborations

Pereira CSR, Furlan MCR, Santos Júnior AG, Barcelos LS and Maia ACF contributed for the conception and for the project, data analysis and interpretation, article writing, in the relevant critical review of the intellectual content and the final approval of the version to be published.

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