



High blood pressure in children and teenagers from public schools in Cuiabá, Mato Grosso*

Pressão arterial de crianças e adolescentes de escolas públicas de Cuiabá, Mato Grosso

Presión arterial de niños y adolescentes de escuelas públicas de Cuiabá - Mato Grosso

Maria Aparecida Vieira¹, Danielle Pedroso Dias Carmona², Luiz Alves dos Anjos², Tatiana de Souza², Mariano Martinez Espinosa³, Rosa Lúcia Rocha Ribeiro⁴, Dulce Aparecida Barbosa⁵

ABSTRACT

Objective: To describe the prevalence of high blood pressure among students aged 11 to 14 years from public schools in Cuiabá, Mato Grosso, Brazil. **Methods:** This cross-sectional study was conducted from May to November 2008. Cluster sampling technique was used to select clusters of 9 public schools. **Results:** The sample consisted of 329 students. They had a mean age of 12 years. More than a half of the students were “de cor parda – brown” (55.0%) and males (58.0%). A great number of students (11.2%) had high blood pressure. **Conclusion:** The prevalence of high blood pressure among the student was 11.2%. The two major risk factors for high blood pressure were body mass index and ethnicity (being “de cor parda – brown”). There is a need for routine monitoring and management of blood pressure in children and teenagers to prevent the development of high blood pressure in adulthood.

Keywords: Blood pressure/epidemiology; Child; Adolescent

RESUMO

Objetivo: Verificar a prevalência de níveis pressóricos elevados em escolares de 11 a 14 anos no município de Cuiabá, MT, Brasil. **Métodos:** Trata-se de um estudo transversal realizado no período de maio a novembro de 2008. A amostragem foi por aglomerados, sendo selecionados nove, totalizando 329 escolares. **Resultados:** A idade média dos 329 escolares foi a de 12 anos, sendo 58,4% do sexo masculino e 55,3% da cor/etnia parda. O índice de hipertensão arterial foi de 11,2%. **Conclusão:** A prevalência de hipertensão arterial foi de 11,2% nos escolares estudados, sendo os fatores de risco o índice de massa corpórea elevado e cor/etnia parda. A partir do estudo, considera-se necessária a monitorização rotineira da pressão arterial em crianças e adolescentes, com a finalidade de prevenção da hipertensão arterial na vida adulta.

Descritores: Pressão arterial/epidemiologia; Criança; Adolescente

RESUMEN

Objetivo: Verificar la prevalencia de niveles de presión elevados en escolares de 11 a 14 años del municipio de Cuiabá, MT - Brasil. **Métodos:** Se trata de un estudio transversal realizado en el período de mayo a noviembre del 2008. El muestreo fue realizado por conglomerados, siendo seleccionados nueve, dando un total de 329 escolares. **Resultados:** La edad promedio de los escolares participantes fue de 12 años, de los cuales el 58,4% del sexo masculino y el 55,3% de color/etnia parda. El índice de hipertensión arterial fue de 11,2%. **Conclusión:** La prevalencia de hipertensión arterial fue de 11,2% en los escolares estudiados, siendo los factores de riesgo el elevado índice de masa corporal y color/etnia parda. A partir del estudio, se considera que es necesaria la monitorización de rutina de la presión arterial en niños y adolescentes, con la finalidad de prevenir la hipertensión arterial en la vida adulta.

Descriptores: Presión arterial/epidemiología; Niños; Adolescente

* Study developed in public schools (city and state) from Cuiabá (MT), Brazil.

¹ Master in Nursing, Professor at the Nursing Program, Faculdade de Enfermagem da Universidade Federal de Mato Grosso - UFMT, Cuiabá (MT), Brazil.

² Scholars at the Nursing Program, Universidade Federal de Mato Grosso - UFMT, Cuiabá (MT), Brazil.

³ PhD, Professor at the Statistics Department – ICET da Universidade Federal de Mato Grosso - UFMT, Cuiabá (MT), Brazil.

⁴ PhD, Professor at the Nursing Program, Faculdade de Enfermagem da Universidade Federal de Mato Grosso - UFMT, Cuiabá (MT), Brazil.

⁵ PhD. Associate Professor at the Nursing Department, Universidade Federal de São Paulo –UNIFESP - São Paulo (SP), Brazil.

INTRODUCTION

According to the 5th Brazilian Guidelines on Hypertension⁽¹⁾, hypertension is characterized by the increase in tension levels associated with metabolic and hormone changes, cardiac and vascular hypertrophy.

Systemic arterial hypertension (SAH) affects 600 million worldwide, being responsible for 7.1 million deaths every year, corresponding to 13% of the world mortality. It is considered one of the main public health problems in the world⁽²⁾. In Brazil, 20% of the adult population is estimated to present hypertension⁽³⁾.

There is not much Brazilian data on this prevalence in children, but it is estimated at 1% to 11%⁽⁴⁾. In children under 10 it is usually secondary to renal conditions⁽⁵⁻⁶⁾. In a survey carried out in the city of Maceió-AL⁽⁷⁾, the prevalence found of high blood pressure was 9.4% in students; another study carried out with students aged 7 to 10 years old, in Cuiabá-MT⁽⁸⁾, found a 8.7% hypertension prevalence in the first assessment and 2,3% in the third assessment.

Considering the need for increasing knowledge about this disease among children, the study was carried out to check the prevalence of high blood pressure levels in students aged 11 to 14 years old, in the city of Cuiabá, MT.

METHODS

Epidemiological, cross-sectional study carried out from May to November 2008 in public schools (city and state) from Cuiabá - MT. The study population was formed by students aged 11 to 14 years old, enrolled in these schools to study in the morning and afternoon.

The sample was obtained using cluster sampling. We have selected nine clusters with a total of 329 students.

The study started after the project was approved by the Ethics Research Committee at Hospital Universitário Júlio Muller (Protocol # 572/08). Those responsible for the Municipal Secretariat and Education State secretariat authorized the project, the schools randomly chosen also authorized the project and guardians gave their written consent prior to the beginning of the study.

Blood pressure was assessed, according to the recommendations of the 5th Brazilian Guidelines on Hypertension⁽¹⁾ in two assessments with a five-minute interval between them, and the pressure levels were classified according to gender, age, and height percentile.

Data were processed at Excel program and with statistical programs SPSS V15 and MINITAB V15. For statistical analysis we have used descriptive techniques and we have determined measures of association between the dependent variable (BP classification) and explanatory variables (gender, color/ethnic group, children's history and family history) to infer, considering Chi-square test

at a 0.05 significance level. Additionally, Kruskal-Wallis non-parametric test was used to compare normal and altered blood pressure.

RESULTS

Of the 329 students surveyed, 58.4% were females and 55.3% considered themselves mixed race; 88.7% were classified as normotensive and 11.2% presented BP above normal values. Table 1 demonstrates that the population was similar regarding mean age, weight and height.

Table 1- Students characteristics according to BP classification, Cuiabá, MT, 2008

Variables	Normal BP n=292 (88.8%)		Altered BP n=37 (11.2%)	
	Mean	SD	Mean	SD
Age (years)	12.4	1.1	12.4	1.0
Weight (kg)	45.89	11.74	54.42	12.79
Height (cm)	155.0	9.6	159.6	9.1
BMI*	19.0	3.3	21.2	3.8
M SBP **	101.3	10.0	127.2	7.7
M DBP ***	60.7	7.4	74.4	7.9

*BMI – body mass index

** MSBP – mean systolic blood pressure

***MDBP – mean diastolic blood pressure

However, there is a significant statistical difference in the body mass index (BMI), $K=12.45 > X2 0.05; 1 = 3.84$ (Kruskal-Wallis test). Therefore, we may conclude that within usual levels, BMI for the altered category is superior to that of the normal category.

Table 2 – Students according to risk factors and BP classification, Cuiabá, MT, 2008

Risk factors	Normal BP n=292	Altered BP n=37	P Value
Gender			0.36
F	173 (59.2%)	19 (51.3%)	
M	119 (40.7%)	18 (48.6%)	
Color/Ethnic group			0.01
Mixed race	153 (52.4%)	29 (78.4%)	
White	74 (25.3%)	5 (13.5%)	
Black	65 (22.3%)	3 (8.1%)	
Children's history			0.69
No diseases	245 (83.9%)	32 (86.5%)	
Presented a disease	47 (16.1%)	5 (13.5%)	
Family history			0.81
No diseases	166 (56.8%)	19 (51.3%)	
Hypertension	79 (27.0%)	11 (29.7%)	
Other diseases	47 (16.1%)	7 (18.9%)	

Table 2 shows that variables color/ethnic group was a risk factor with statistical difference ($p=0.01$). The variable family history as a risk factor for the presence of altered blood pressure in the studied population was

proportionally more frequent; however, it was not statistically significant.

DISCUSSION

Results from the present study show the difference between blood pressure levels in the first assessment with a considerable decrease in pressure levels in the second assessment. The factors that may have influenced a higher pressure in the first assessment are anxiety and fear, since many of the students had never seen the procedure before.

In this study, we have identified an 11.7% prevalence of children and adolescents with initial blood pressure equal to or higher than the 90th percentile. Studies show a 7.7% to 16.2% variation⁽⁹⁾.

Regarding weight and BMI classification, there is an association with altered blood pressure. This relationship has been pointed out in the literature as one of the most important risk factor for the development of hypertension, just as it is in adults^(6-7,10). Published studies show that obesity in childhood contributes as one of the greatest predictors for hypertension in adult life. In some studies, authors found a 9.3% to 14 % prevalence of children with overweight risk^(9,11).

Of the students with altered BP, 29.7% had a history

of hypertensive parents. When both parents are hypertensive 50% of the children may develop this condition, however, if only one of them is hypertensive, this proportion decreases to 20% and 30%⁽¹²⁾. Children from hypertensive parents present higher blood pressure values even if they are within normal percentiles⁽¹³⁻¹⁴⁾.

As observed in Table 2, there is association between blood pressure and skin color. In our region there is a predominance of mixed race due to intensive migration and consequent miscegenation. Studies are conflicting regarding skin color and hypertension⁽¹⁵⁻¹⁶⁾. Prevalence and severity of hypertension are higher among black people which may be related with ethnic and/or socioeconomic factors⁽¹⁷⁾.

CONCLUSION

- Hypertension prevalence was 11.2% in students with mean age of 12 years old.
- Body mass index above the expected and mixed color/ethnic group were the main risk factors found.
- Monitoring blood pressure in children and adolescents is necessary at an early stage in life to prevent the onset of hypertension in adults as well as its related complications.

REFERENCES

1. Sociedade Brasileira de Cardiologia. Sociedade Brasileira de Hipertensão. Sociedade Brasileira de Nefrologia. V Diretrizes Brasileiras de Hipertensão Arterial [Internet]. São Paulo; 2006 [citado 2008 Mai 30]. Disponível em: http://www.sbn.org.br/Diretrizes/VDiretrizes_Brasileiras_de_Hipertensao_Arterial.pdf
2. World Health Organization. Global strategy on diet, physical activity and health. Cardiovascular disease: prevention and control. [Internet] 2008 [citado 2008 Mai 30] Available from: <http://www.who.int/dietphysicalactivity/publications/facts/cvd/en/>
3. Silva MAM, Rivera IR, Souza MGB, Carvalho ACC. Medida da pressão arterial em crianças e adolescentes: recomendações das diretrizes de hipertensão arterial e prática médica atual. *Arq Bras Cardiol.* 2007;88(4):491-5.
4. Rezende DF, Scarpelli RAB, Souza GF, Costa JO, Scarpelli AMB, Scarpelli PA, et al. Prevalência da hipertensão arterial sistêmica em escolares de 7 a 14 anos do município de Barbacena, Minas Gerais, em 1999. *Arq Bras Cardiol.* 2003;81(4):375-86.
5. Salgado CM, Carvalhaes JTA. Hipertensão arterial na infância. *J Pediatr (Rio J).* 2003;79(Supl 1):S115-24.
6. Garcia FD, Terra AF, Queiroz AM, Correia CA, Ramos PS, Ferreira QT, et al. Avaliação de fatores de risco associados com elevação da pressão arterial em crianças. *J Pediatr (Rio J).* 2004;80(1):29-34.
7. Moura AA, Silva MA, Ferraz MR, Rivera IR. Prevalência de pressão arterial elevada em escolares e adolescentes de Maceió. *J Pediatr (Rio J).* 2004;80(1):35-40.
8. Borges LM, Peres MA, Horta BL. Prevalência de níveis pressóricos elevados em escolares de Cuiabá, Mato Grosso. *Rev Saúde Pública = J Public Health.* 2007;41(4):530-8.
9. Silva MAM, Rivera IR, Ferraz MRTM, Pinheiro AJT, Alves SWS, Moura AA, Carvalho ACC. Prevalência de fatores de risco cardiovascular em crianças e adolescentes da rede de ensino da cidade de Maceió. *Arq Bras Cardiol.* 2005;84(5):387-92.
10. Araújo TL, Lopes MVO, Cavalcante TF, Guedes NG, Moreira RP, Chaves ES, Silva VM. Análise de indicadores de risco para hipertensão arterial em crianças e adolescentes. *Rev Esc Enferm USP.* 2008;42(1):120-6.
11. Lima EM. Avaliação de fatores de risco associados com elevação da pressão arterial em crianças e adolescentes. *J Pediatr (Rio J).* 2004;80(1):3-5.
12. Logomarsino FE, Saieh AC, Aglony IM. Recomendación de ramas: actualizaciones en el diagnóstico y tratamiento de la hipertensión arterial en pediatría: Rama de Nefrología, Sociedad Chilena de Pediatría. *Rev Chil Pediatr.* 2008;79(1):63-81.
13. Elias MC, Bolívar MSM, Fonseca FAH, Martínez TLR, Angelini J, Ferreira C, Kasinski N, et al. Comparação do perfil lipídico, pressão arterial e aspectos nutricionais em adolescentes, filhos de hipertensos e de normotensos. *Arq Bras Cardiol.* 2004;82(2):139-46.
14. Hansen ML, Gunn PW, Kaelber DC. Underdiagnosis of hypertension in children and adolescents. *JAMA.* 2007;298(8):874-9. Comment in: *JAMA.* 2008;299(2):168; author reply 168-9. *Nat Clin Pract Cardiovasc Med.* 2008;5(3):128-9.
15. Rosa AA, Ribeiro JP. Hipertensão arterial na infância e na adolescência: fatores determinantes. *J Ped.* 1999; 75(2): 75-82.
16. Rachid J, Lima MP, Rachid MBF. Rastreamento da hipertensão arterial sistêmica na infância. *J Bras Med.* 1996; 70: 16-22.
17. Santos AAC, Zanetta DMT, Cipullo JP, Burdmann EA. O diagnóstico da hipertensão arterial na criança e no adolescente. *Pediatria (São Paulo).* 2003; 25(4): 174-83.