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Prevalence of systemic arterial hypertension in children of the state public network of Carmel of Cajuru-MG

ABSTRACT | Objective: To analyze sixth year students from state public schools in the municipality of Carmo do Cajuru / MG in order to identify those with a predisposition and prevalence to Systemic Arterial Hypertension. Method: Quantitative, descriptive, cross-sectional research. A structured questionnaire was used for parents or legal guardians of the children, as well as anthropometric measurements and blood pressure measurements. The variables of interest were analyzed and presented using descriptive statistics, mean, absolute frequency and percentage. Results: The studied sample counted with the participation of 119 (64 girls and 53 boys) of which 65.5% were 11 years old and 33.9% were 12 years old. Regarding the mean blood pressure, 100% of the boys and 93.7% of the girls were within normal limits. Conclusion: From the realization of this study, we see that it is necessary to reflect on agents considered to be risk factors for the development of hypertension.

Keywords: Child; Student; Blood pressure; Public health.

RESUMEN | Objetivo: Analizar estudiantes de sexto año de escuelas públicas del municipio de Carmo do Cajuru / MG para identificar a aquellos con predisposición y prevalencia de hipertensión arterial sistémica. Método: Investigación cuantitativa, descriptiva, transversal. Se utilizó un cuestionario estructurado para los padres o tutores legales de los niños, así como mediciones antropométricas y mediciones de la presión arterial. Las variables de interés se analizaron y presentaron mediante estadística descriptiva, media, frecuencia absoluta y porcentaje. Resultados: La muestra estudiada contó con la participación de 119 (64 niñas y 53 niños) de los cuales 65.5% tenían 11 años y 33.9% tenían 12 años. En cuanto a la presión arterial media, el 100% de los niños y el 93,7% de las niñas se encontraban dentro de los límites normales. Conclusión: a partir de la realización de este estudio, vemos que es necesario reflexionar sobre los agentes considerados factores de riesgo para el desarrollo de hipertensión.

Palavras claves: Niño; Estudiante; Presión arterial; Salud pública.

RESUMO | Objetivo: Analisar estudantes dos sextos anos das escolas públicas estaduais do município de Carmo do Cajuru/MG com o intuito de identificar aqueles com predisposição e prevalência à Hipertensão Arterial Sistêmica. Método: Pesquisa quantitativa, descritiva, de delineamento transversal. Foi utilizado questionário estruturado destinados aos pais ou responsáveis legais pelas crianças, bem como a realização de medidas antropométricas e aferição da pressão arterial. As variáveis de interesse foram analisadas e apresentadas utilizando a estatística descritiva, média, frequência absoluta e porcentagem. Resultados: A amostra estudada contou com a participação de 119 (64 meninas e 53 meninos) das quais 65,5% com 11 anos e 33,9% com 12 anos. Com relação à média da pressão arterial 100% dos meninos e 93,7% das meninas dispuseram dentro dos limites normais. Conclusão: A partir da realização deste estudo, vemos que se fazem necessárias reflexões sobre agentes considerados como fatores de risco para o desenvolvimento da hipertensão.

Palavras-chaves: Criança; Estudante; Pressão Arterial; Saúde Pública.

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INTRODUCTION

Cardiovascular diseases (CVD) currently stand out very clearly in terms of the cause of premature deaths. Systemic arterial hypertension (SAH) is considered as the main risk factor for the development of CVD, constituting a public health problem worldwide. ^(1,2,3)

Hypertension is a condition in which the force that the blood makes against the walls of the arteries is very great according to the age of the individual. It is commonly associated with adulthood, however this manifestation has its roots in childhood, as it is a pathology of silent and asymptomatic involvement. The literature shows that

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children with high blood pressure levels are more likely to become hypertensive adults. ^(2,4)

In the last decades, the prevalence of high Blood Pressure (BP) has increased among children, and the lack of diagnosis can lead to the non-treatment of the disease and its persistence until adulthood. ⁵ National studies the prevalence of altered BP in children varies between 3,6 and 15,8%. ² Thus, the literature shows that it is essential to measure BP from the age of three, once a year, or earlier, when the child has risk factors. ^(2,4)

The high number of SAH disorders in childhood is associated with the risk factors to which these children are exposed. Precisely genetic factors, overweight, low birth weight and the absence of breastfeeding (BF) influence the development of high blood pressure levels. The lifestyle that the younger groups follow is also added to the rise in BP, such as poor eating habits and sedentary lifestyle habits. ⁽⁵⁾

Although, in most cases, there is no cure for SAH, it is known that there are treatments to control it. Non-drug treatments must be adhered to by individuals who have changes in systemic blood pressure and other individuals who are willing to become hypertensive. The measures include practicing physical activity regularly, having balanced eating habits. And the medication treatment is given by a doctor made from the administration of medications most suitable for the individual's case. ⁽³⁾

Considering that researches have shown an increase in the incidence of hypertension in childhood due to the increasingly early exposure to risk factors, it is necessary to evaluate the profile of these individuals, as it is of fundamental relevance for the municipality and health teams of locality know and, if necessary, carry out actions aimed at this area. ^(2,4)

Through the early detection of SAH in children, it is possible to con-



Non-drug treatments must be adhered to by individuals who have changes in systemic blood pressure and other individuals who are willing to become hypertensive.



trol and less likely to trigger and / or worsen hypertension. Thus, the study aimed to analyze sixth-year students from state public schools in the municipality of Carmo do Cajuru-MG in order to identify those with predisposition and prevalence to Systemic Arterial Hypertension.

METHOD

This is a descriptive, cross-sectional study with a quantitative approach, carried out in six public schools in the municipality of Carmo do Cajuru-MG that agreed to participate in the study.

This is a descriptive, cross-sectional study with a quantitative approach, conducted in the city of Divinópolis, Minas Gerais. Carmo do Cajuru is a municipality of 22,478 inhabitants ⁶, located in the Midwest of the state of Minas Gerais.

According to data obtained from the Minas Gerais State Education Secretariat/ Subsecretariat for the Development of Basic Education (2018), it has six state public schools, distributed in urban and rural areas, where approximately 202 students enrolled in the sixth year in 2018. Thus, to participate in the study, children aged up to 12 years 11 months and 29 days were selected, in which they attend the 6th years of such schools.

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Among the sociodemographic variables, it was investigated: sex, age, color / race, family income and education of parents or legal guardians.

Age was presented in full years. The color / race was asked whether white, brown or black. The economic class was assessed according to the minimum wages received by the family: up to a minimum wage, up to two and up to three or more. Education was considered in elementary, secondary and higher education, being complete and / or incomplete.

Among the health variables, birth weight, gestational age, duration of exclusive breastfeeding, history of Systemic Arterial Hypertension and Diabetes Mellitus (DM) were researched. Birth weight was classified as: <2,500 kg (low weight), 2,500 kg to 2,999 kg (insufficient weight), 3,000 kg to 3,999 kg (adequate weight) and > 4,000 kg (macrosomal). The length of pregnancy will ask whether it is premature (<37 weeks) or not premature (> 37 weeks). Breastfeeding time investigated whether breastfeeding was less than six months, equal to or greater than six months or not breastfeeding. As for the diseases reported by individuals, both personal and family (parents, grandparents and others) were considered. The anamnesis contained some pre-established diseases such as diabetes mellitus and SAH.

For lifestyle variables, eating habits, physical activity practices, and hours of technological leisure were considered. In terms of eating habits, he verified the frequency of consumption of fruits and fast foods, none, once, twice and three or more times a week. The practice of physical activities verified whether he "practices" or "does not practice", which and how many times a week. The hours of technological leisure were limited to one hour, up to two hours and three hours or more.

Weight, height, BMI and blood pressure were measured. Weighing was carried out with barefoot children, wearing a school uniform, on a digital scale. The height proceeded with barefoot children, wearing a



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school uniform, in an upright position, leaning on a flat vertical surface, arms hanging with hands flat on the thighs, the heels together and the tips of the feet apart, forming an angle of 60 °, knees in contact and head up. A two meter measuring tape was used. BMI was calculated by dividing body weight by square height and classified according to age in the Technical Standard of the Food and Nutrition Surveillance System⁷, being marked thinness (<0.1 percentile), thinness (≥ 0.1 percentile and <percentile 3), eutrophic (> percentile 3 and <percentile 85), overweight (> 85 percentile and ≤ percentile 97), obesity (> percentile 97 and ≤ 99.9 percentile) and severe obesity (> 99.9 percentile).

The BP measurement was carried out in the school environment, with explanation and demonstration of the measurement procedures according to the age parameters mentioned in the 7th Brazilian Guideline for Hypertension.³ Such procedures included the initial condition of rest, with the individual seated, the left arm in the supine position and supported at the height of the heart. The equipment used for measurement was a pressure device previously calibrated with cuffs proportional to the circumference of the child's arm. Systolic (SBP) and diastolic (DBP) blood pressure were measured, and measurements were taken during school periods: morning (7:00 am to 11:30 am) and afternoon (1:00 pm to 5:30 pm). Scheduling was carried out according to the availability of time that each school offered, being before or after the break and / or even in Physical Education classes. In this way, 5 minutes of sitting rest were considered for the subject under resting conditions, and a minimum of 10 to 15 minutes if they are performing physical activities and the next measurement will be at least two minutes after the first.

The classification occurred accor-

Table 1 - Sociodemographic characteristics of the participating students and their parents or legal guardians, 2018, Carmo do Cajuru (MG).

Variáveis	N	%
Idade	n (118)	
11	78	66,1
12	40	33,9
Total	118	100,0
Sexo	n (117)	
Feminino	64	54,7
Masculino	53	45,3
Total	117	100,0
Raça	n (118)	
Branca	52	44,0
Negra	10	8,5
Parda	56	47,5
Total	118	100,0
Escolas	n (119)	
Rurais	27	22,7
Urbanas	92	77,3
Total	119	100
Renda familiar	n (114)	
Até um salário mínimo	44	38,6
Até dois salários mínimos	48	42,1
Três salários mínimos ou mais	22	19,3
Total	114	100,0
Tipo de moradia	n (111)	
Alugada	26	23,4
Própria	85	76,6
Total	111	100,0
Escolaridade da mãe e/ou da responsável legal pela criança	n (117)	
Ensino Fundamental Completo	11	9,4
Ensino Fundamental Incompleto	35	29,9
Ensino Médio Completo	37	31,6
Ensino Médio Incompleto	18	15,4
Ensino Superior Completo	7	6,0
Ensino Superior Incompleto	9	7,7
Escolaridade do pai e/ou responsável legal pela criança	n (112)	
Ensino Fundamental Completo	6	5,3
Ensino Fundamental Incompleto	50	44,7
Ensino Médio Completo	28	25,0
Ensino Médio Incompleto	19	17,0
Ensino Superior Completo	3	2,7

ding to age by the 7th Brazilian Guideline for Hypertension of the Brazilian Society of Cardiology (2016) in normotensive individuals (BP <90th percentile), borderline (BP between 90th to 95th percentiles), stage 1 hypertension (90th to 95th percentile plus 5 mmHg) and stage 2 hypertension (BP > 99th percentile plus 5 mmHg).

For the presentation of the study variables, descriptive statistics, mean, absolute frequency and percentage were used. This study was carried out according to the principles that guide the conduct of research involving human beings, according to resolution 466/2012, and all procedures that involved the subjects were approved by the Human Research Ethics Committee of the Fundação Educacional de Divinópolis - FUNEDI opinion No. 2.928.131, CAAE No. 95890718.4.0000.5115.

RESULTS

The sample studied had the participation of 119 students, the majority of whom were 11 years old, corresponding to 66,1% of the sample, 78 students, followed by 40 students with 12 years old, representing 33,9%. It is noted the proportion of 64 students (54,7%) female and the remaining 53 students (45,3%) male. The race with the most evidence was brown with a total of 56 individuals (47,5%) followed by the white progeny with 44% in which it accounts for a total of 52 students. It is observed that 22,7% of the children in study are students of rural schools, which accounts for a total of 27 students and the remaining 92 students (77,3%) come from urban institutions.

In continuity, pertinent to the family income we see the highlight of 48 of the families whose receive up to two minimum wages representing 40,3% of the study, proceeding those in which they receive up to a mini-

Ensino Superior Incompleto	6	5,3
Total	112	100,0

Source: the authors (2018)

Table 2 - Gestational data and first months of life of the participating students, 2018, Carmo do Cajuru (MG).

Variáveis	N	%
Peso ao nascer	n (119)	
Menor que 2.500kg	16	13,4
Entre 2.501kg e 2.999kg	32	26,9
Entre 3.000kg e 3.999kg	65	54,7
Maior que 4.000kg	6	5,0
Total	119	100,0
Idade gestacional do nascimento	n (118)	
Maior que 37 semanas	86	72,9
Menor que 37 semanas	32	27,1
Total	118	100,0
Tempo de amamentação do leite materno	n (118)	
Igual ou superior a seis meses	70	59,3
Inferior a seis meses	41	34,7
Não amamentou	7	6,0
Total	118	100,0
Mãe na gravidez teve diabetes gestacional	n (119)	
Não	117	98,3
Sim	2	1,7
Total	119	100,0

Source: the authors (2018)

Table 3 - Presence of NCDs in family members and participating students, 2018, Carmo do Cajuru (MG).

Variáveis	N	%
Tem hipertensão	n (116)	
Não	94	81,0
Não sabe	17	14,7
Sim	5	4,3
Total	116	100,0
Histórico de hipertensão na família	n (119)	
Não	21	17,6
Sim	98	82,4
Total	119	100,0
Histórico de diabetes mellitus na família	n (114)	
Não	51	44,7
Sim	63	55,3

imum wage counting a total of 44 individuals (37%). It can be seen that the majority of students (71%) live in their own residence, with 85 students in the sample. The education of mothers or legal guardians for children is based on complete secondary education 37 (31,1%) followed by complete primary education 35 (29,4%). Incomplete elementary education is the education of most parents or legal guardians for children, with a total of 50 men representing 42% of the sample.

The gestational data and the first months of life are shown in table 2. The majority of children (54,7%) with a weight of 3,000 kg and 3,999 kg at birth are corresponding to 65 students. 72,9% of the students (86) studied were born with a gestational age greater than 37 weeks. The duration of breastfeeding was highlighted by 70 children whose percentage represented 59,3%, being equal to or greater than six months. Regarding gestational diabetes, of the sample obtained, in 98,3% (117) students the mother did not have diabetes during the gestational period.

Related to Chronic Noncommunicable Diseases (NCDs), as shown in Table 3, it can be seen that the majority of students under study (81%) do not have hypertension, with a total of 94 students. Relevant to the family, it is seen that 98 students (82,4%) have cases of hypertension. Among the family members with the highest number of citations were maternal grandmother, paternal grandmother, maternal grandfather, paternal grandfather, other relatives, mother and father, respectively. Related to Diabetes Mellitus 55,3% (63) of the students reported family members with such pathology. In this case, the ones with the highest number of mentions were maternal grandmother, other relatives, paternal grandmother, paternal and maternal grandfather, mother and father, concomitantly.

Total	114	100,0
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Source: the authors (2018)

Table 4 - Lifestyle of participating students, 2018, Carmo do Cajuru (MG).

Variáveis	N	%
Consome quantas frutas por dia n (117)		
Nenhuma	22	18,8
Uma	44	37,6
Duas	25	21,4
Três ou mais	26	22,2
Total	117	100,0
Consome quantos fast-foods por dia n (117)		
Nenhum	31	26,5
Um	38	32,5
Dois	26	22,2
Três ou mais	22	18,8
Total	117	100,0
Horas de lazer tecnológico por dia n (117)		
Até uma hora	28	23,9
Até duas horas	44	37,6
Três horas ou mais	45	38,5
Total	117	100,0
Realiza atividade física n (119)		
Sim	84	75,1
Não	35	29,4
Total	119	100,0
Quantas vezes realiza atividade física por semana n (82)		
1 dia	8	9,7
2 dias	40	48,8
3 dias	15	18,3
4 dias	7	8,5
5 dias ou mais	12	14,7
Total	82	100,0

Source: the authors (2018)

Table 5 - BMI and BP mean of participating students, 2018, Carmo do Cajuru (MG).

Variáveis	Meninas		Meninos	
	N	%	N	%
IMC	n (64)		n (55)	
Magreza Acentuada (< Percentil 0,1)	-	-	-	-
Magreza (≥ Percentil 0,1 e < Percentil 3)	4	6,3	1	1,8
Eutrofia (> Percentil 3 e < Percentil 85)	47	73,4	43	78,2
Sobrepeso (> Percentil 85 e ≤ Percentil 95)	11	17,2	7	12,7

Regarding the children's lifestyle, as described in Table 04, there are 44 students consuming only one fruit a day (37,6%). 32.5% of individuals eat a type of fast-food a day, equivalent to 38 students. Pertaining to technological leisure 38,5% (45) of the sample made three hours or more, followed by those of up to two hours with 37,6% (44) of the study. Regarding physical activity, most say they perform, with 84 students accounting for 75,1%. Among the most developed activities mention football, walking and cycling, among the least mentioned are ballet, jazz, volleyball, running, capoeira, burning and jumping. It is seen that two days a week is the largest number of days highlighted to practice physical activity 48,8%.

Through anthropometric measurements and, consequently, the calculation of the Body Mass Index (BMI), it is noted that the variable eutrophy stood out in both sexes. It can be seen that in the female gender of the total of 64 participating students, 47 (73,4%) of them have an ideal weight for their age, followed by 11 (17,2%) with overweight. Of the total of 55 male students, 43 (78,2%) are in the appropriate weight for their age (Table 5).

Regarding the average BP of the participating students, it is observed that the normal BP predominates. In the male gender, all 55 (100%) students participating in the research had their average pressure within normal limits. Among the 64 girls, 60 (93.7%) of them showed the mean BP within normal limits, and the rest were in borderline 2 (3.1%), stage 1 2 hypertension (3.2%), as shown in table 5.

DISCUSSION

The present study aimed to identify the prevalence of systemic arterial hypertension as well as the predisposition of students to develop it, through the association of risk factors. Cases of

Obesidade (> Percentil 97 e ≤ Percentil 99,9)	2	3,1	4	7,3
Obesidade Grave (> Percentil 99,9)	-	-	-	-
Total	64	100	55	100
Média pressão arterial	n (64)		n (55)	
Normal (< Percentil 90)	60	93,7	55	100
Limítrofe (Entre Percentis 90 a 95)	2	3,1	-	-
Hipertensão Estágio 1 (Percentil 90 a 95 mais 5mmHg)	1	1,6	-	-
Hipertensão Estágio 2 (> Percentil 99 mais 5mmHg)	1	1,6	-	-
Total	64	100	55	100

Source: the authors (2018)

arterial hypertension in childhood are important statements of cardiovascular health in the adult individual, since children with blood pressure values above the 90th percentile, often become hypertensive adults, thus making studies of the prevalence of hypertension in children and adolescents important instruments evaluation of the cardiovascular health of this population, in view of the imminent risk of cardiovascular complications in these individuals.⁽⁸⁾

Regarding blood pressure, the study showed a prevalence of normal BP in both sexes, but in the female sex there was a small minority with changes in the mean of the measurements. Hypertension is more common in females as well as risk factors in which it can trigger it, as in the case of obesity due to hormones, which is more frequent in females.⁽⁸⁾

The prevailing white race in the sample suggests a relationship with the non-change in BP. Recent studies show that in relation to race / color, black individuals reach the highest BP levels. In this way, racial differences and children's SAH are directly linked.⁽⁹⁾

Among the majority of children assessed, the family income ranges between one and up to two minimum wages and the education of the parents or legal guardian varied between complete high school and incomplete elementary school. It is noteworthy that the low level of education of pa-

rents can directly interfere in low family income. The bibliography shows that the link between SAH and low family socioeconomic status can lead to inappropriate life situations, in which they predispose or may be integrated with the higher prevalence of arterial hypertension and risk elements for its elevation.⁽¹⁰⁾ In contrast, others mention that in developing countries, such as Brazil, families with better purchasing power, children are more likely to be overweight, as well as to have cardiovascular diseases, including SAH, when compared to less affluent ones, and in regions or less developed states, the proportion of obese people increases as income increases.⁽¹¹⁾ Thus, the study showed a high prevalence of low education and low income, corroborating with the studies previously described, however we did not identify the relationship between low purchasing power and the increase in the prevalence of high BP.

Low birth weight is closely related to prematurity and is a predictor of cardiometabolic diseases in children and adolescents and adults. Newborns born with a weight <2,500 kg, act with different mechanisms to adapt to extrauterine life, among which the increasing metabolism of carbohydrates and the resulting high adiposity, in which they increase the future risk of chronic diseases, such as hypertension, as quoted by studies of Barker's theory.⁽¹²⁾ However, in the study car-

ried out, we identified that the child members are similar to the literature, as they were born with the appropriate weight, suggesting no correlation between the predisposition to SAH even its alteration.

Regarding the breastfeeding time greater than six months and the pressure levels found, it was found that children who breastfed for more than six months showed a lower prevalence of changes in BP than children who breastfed for less than six months. Among the various benefits given by breastfeeding, it emphasizes the prevention of different cardiovascular risk factors, such as obesity, dyslipidemia, diabetes and SAH. The implication of breastfeeding in SAH prevention is related to the low sodium content of breast milk in relation to processed foods, the presence of long-chain unsaturated fatty acids in breast milk and the possibility of preventing overweight / obesity.^(13,14)

The presence of SAH and DM in parents or grandparents occurred in a large part of the sample studied. The presence of such pathologies in the family is a precipitating factor for developing SAH, diabetes mellitus and other cardiovascular diseases.⁽¹⁵⁾ There is a connection between the presence of the disease in the family and the increase in blood pressure levels in children. However, in the present study, there was no increase in the prevalence of high BP in students and the presence of pathology in family members.⁽⁵⁾

Although NCDs appear more repeatedly in adulthood, the recognition of harmful behaviors to health has been demonstrated in the literature, with a focus on young individuals. "Inadequate eating habits, insufficient levels of physical activity, obesity and excessive time in sedentary technological leisure activities are some of the most common behaviors during youth".⁽¹⁵⁾

Regarding the students' habitual

fruit intake, the consumption of only one fruit a day was highlighted, with the need to encourage greater consumption per day. Daily intake of at least 400 grams of fruits and vegetables, corresponding to five servings. ⁽¹⁵⁾ Stimulating the consumption of these foods daily can prevent the onset of CVD. They also mention that these foods are capable of decreasing the vascular inflammatory process, regulating blood pressure levels. ⁽⁵⁾

In this research, technological leisure time did not influence the prevalence of obesity and high BP. Literature elucidates that technology has been taking over more and more in the lives of most children. This fact keeps young people away from physical activities, leaving them more and more predisposed to developing obesity and its associated factors, in addition

to tripling the risks of developing cardiovascular diseases. However, if the family is mentioned as the first source of influence, it is responsible for instilling values about healthy lifestyle habits or factors such as physical inactivity, poor diet and excessive food intake throughout the education and development process. ^(14,15)

Thus, the diagnosis of risk factors in the age group for children and adolescents is emphasized, in order to prevent future complications and enabling the reversal of the condition.

CONCLUSION

From the realization of this study, we identified the need to reflect on the risk factors for the development of hypertension and broaden our views regarding the lack of effective public

policies for the prevention and treatment of this disease. It is necessary to promote changes in population behavior, focusing on educational programs, healthy eating, social communication, physical exercise, as well as media education associated with bad health habits. Such actions, in order to be better accepted by the population, must consider the stage of development in which the child is in family functioning and ethnic and cultural background issues.

Our findings point to the need for greater efforts by the government in order to establish public policies focused on nutrition, with the aim of sensitizing and raising awareness among the family, the school and society in general to the importance of avoiding sedentary activities, encouraging the physical exercise and healthy eating. 🐦

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