

Children and adolescents with familiar history of high blood pressure: risk factors for cardiovascular diseases*

Crianças e adolescentes com história familiar de hipertensão arterial: indicadores de risco cardiovasculares

Niños y adolescentes con historia familiar de hipertensión arterial: indicadores de riesgo cardiovasculares

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ABSTRACT

Objective: To identify the risk factor for cardiovascular diseases among children and adolescents with family history of high blood pressure. **Methods:** Descriptive Study with 141 individuals aged 6 to 18 years from a community in Fortaleza, Brazil. Data were collected at the participants' home. **Results:** The most common risk factors were salt intake, sedentary lifestyle, and inadequate intake of vegetables. The mean blood pressure was higher among male than female. **Conclusion:** Early identification of risk factors for high blood pressure may be an important strategy to prevent the development of other cardiovascular diseases.

Descriptors: Hypertension; Risk factors; Child; Adolescents

RESUMO

Objetivo: Identificar em um grupo de crianças e adolescentes com história familiar de hipertensão arterial a presença de indicadores do risco para hipertensão arterial. **Métodos:** Estudo desenvolvido com 141 indivíduos de seis a 18 anos em uma comunidade de Fortaleza com coleta de dados realizada no domicílio. **Resultados:** Os indicadores de risco mais presentes foram a ingestão de sal, sedentarismo e ingestão inadequada de legumes. As médias de pressão arterial foram maiores nos indivíduos do sexo masculino. Aqueles que referiram fazer uso de sal na alimentação e não consumir diariamente frutas e legumes apresentaram menores médias. **Conclusão:** Considera-se a necessidade da identificação precoce de indicadores de risco para hipertensão arterial a fim de prevenir eventos cardiovasculares.

Descritores: Hipertensão; Fatores de risco; Crianças; Adolescentes

RESUMEN

Objetivo: Identificar en un grupo de niños y adolescentes con historia familiar de hipertensión arterial, la presencia de indicadores de riesgo para hipertensión arterial. **Métodos:** estudio desarrollado con 141 individuos de seis a 18 años en una comunidad de la ciudad de Fortaleza con recolección de datos realizada en el domicilio. **Resultados:** los indicadores de riesgo que aparecieron con más frecuencia fueron la ingestión de sal, sedentarismo y escasa ingestión de legumbres. Los promedios de presión arterial fueron mayores en los individuos del sexo masculino. Aquellos que refirieron hacer uso de sal en la alimentación y no consumir diariamente frutas y legumbres presentaron menores promedios. **Conclusión:** se considera la necesidad de identificar precozmente los indicadores de riesgo para hipertensión arterial a fin de prevenir eventos cardiovasculares.

Descriptores: Hipertensión; Factores de riesgo; Niños; Adolescentes

* Part of the PhD thesis named Follow up of Children and Adolescents with familiar history of high blood pressure, presented to the Nursing Post Graduation Course of Universidade Federal do Ceará – UFC – Fortaleza (CE), Brazil.

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INTRODUCTION

The healthy life habits and styles decisively contribute to the health maintenance, both for adults, children and adolescents. Many times, the control of risk factors related to life style is part of the proposed treatments for certain diseases, helping slow down the disease strike. Among the health alterations caused by several factors is blood pressure hypertension.

Worldwide, investigations have taken place in order to demonstrate the importance of children and adolescent high blood hypertension risk factors. This period is when one's life style is being structured⁽¹⁾, and it can have elements that would impact on the adult life diseases development risk.

The risk factor denomination is used to indicate a variable that is believed to be related to the probability one has to develop a disease, but actually, risk factors are incidence determiners; thus, its replacement by risk indicators is being discussed⁽²⁾. Countless risk indicators would justify the blood pressure alterations, such as: obesity, heredity, tabagism, the habit of consuming alcoholic drinks, high salt intake and a sedentary life style

When analyzing juvenile primary hypertension cases, some risk indicators may be more present than others, such as obesity, related to the inadequate food intake, and heredity⁽³⁾. Other authors also consider children and adolescent blood pressure alteration factors, besides the above mentioned, initial high blood pressure values, age, sex, salt intake, the habit of drinking alcoholic beverages, tabagism, a sedentary life style and genetic-environmental interaction⁽⁴⁾. However, regarding salt consumption, alcoholic beverages intake, and tabagism, the literature consulted lacks providing enough information about this age bracket.

As previously recognized, the body weight reduction, even when it is still in the overweight group, decreases considerably blood pressure⁽⁵⁾. In Brazil, although malnutrition is still frequent, overweight and obesity indicators have increased considerably among young people⁽⁶⁾.

Another concerning habit is tabagism. Abandoning the habit is recommended by the V Diretrizes Brasileiras de Hipertensão Arterial (V Brazilian Guidelines for Blood Pressure Hypertension)⁽⁷⁾ due to its association with a higher incidence of blood pressure alterations and cardiovascular mortality.

Another aspect worth highlighting is the salt intake. A study suggests blood pressure elevation and salt consumption are related.

In Brazil, especially in the Northeast region, the salt intake reduction is not easily followed, because, apart from the industrialized products, the fish and sea food consumption is high, which also have high amounts of

salt. The salt consumption impacts on the blood pressure, however, are diminished by the fact there are individual blood pressure responses, according to the product consumption.

Another favorable initiative to reduce blood pressure is the physical activities practice. Such practice demonstrates not only to influence on the blood pressure values, but also decrease the cardiovascular diseases risk, and help reduce the body weight⁽⁸⁻⁹⁾. The authors, however, are unanimous when stating that, in order for the physical activity to be beneficial, it has to occur at least three times a week, during thirty minutes.

The familiar incidence of high blood pressure, confirmed by several studies^(3-4,10), is one of the reasons why young populations have their blood pressure assessed. In this type of occurrence, there is an aggravating factor. Individuals with a normal blood pressure and a long family history of hypertension have more cardiovascular diseases risk indicators⁽¹⁰⁾.

This new paradigm changes the hypertension understanding with regard to the pediatric age bracket and highlights the need of studies that investigate the indicators associated to high blood pressure indicators. The identification of possible risk indicators provides the early intervention opportunity in a sequence of events associated to the significant adult morbidity and mortality⁽¹¹⁾.

In a recent study developed in Fortaleza – state of Ceará⁽¹²⁾ – with 342 school children ranging from 6 to 18 years of age and with a history of familiar cardiovascular alterations, which was a not an inclusion criteria, it was possible to verify high blood pressure values in 44.7% of the subjects. Other risk indicators were also detected, such as familiar history (55.6%), a sedentary life style (51.5%), tabagism (38.0%) and overweight/obesity (16.8%).

The present study aimed to identify, in a group of children and adolescents with a family history of hypertension, the presence of risk indicators for high blood pressure.

METHODS

This is a transversal study, developed in one of the care units of the Programa Saúde da Família (Family Health Program), in a district of Fortaleza-CE, from October 2006 to June 2007.

The population chosen was children and adolescents (6 to 18 years old) that were part of the families receiving care at a Unidade Básica de Saúde da Família (UBASF – Family Health Basic Unit) area, and were related to (parents, uncles and aunts, grandparents) people diagnosed with high blood pressure. The familiar factor was one of the inclusion criteria for this sample, regardless of the

degree of kinship or the number of relatives who had high blood pressure. One hundred forty one people participated in the research, and they were selected through the records regarding the patients being treated for high blood pressure at UBASF, and through domicile visits. From this number, 92 were children (from 6 to 12 years old) and 49 were adolescents (from 12 to 18 years old). The total number of children and adolescents with relatives who had blood pressure hypertension, according to UBASF records, was 205. All children were searched for, however, when the researchers arrived at the domiciles, several individuals did not live in the registered locations.

The data collection was performed by one researcher and three undergraduate students who received training and the approval of the Informed Consent Term. An instrument which allowed recording the blood pressure, weight, height, (for the body mass index assessment); the child's arm circumference; and the cuff used. Moreover, the instrument had questions regarding identification data and high blood pressure risk indicators (tabagism, the habit of drinking alcoholic drinks, sedentary life style, salt consumption, and inadequate fruit and vegetable intake).

Those who smoked and drank alcoholic beverages, regardless of quantity and periodicity, were considered tabagists and alcohol consumers, for most of them could not inform the real quantities intaken. Concerning the salt consumption, the individuals were asked whether they added salt to the food daily without measuring the quantities. As to a sedentary life style, it would be the case of anyone who did not exercise at least three times a week. Activities such as riding a bicycle and playing soccer more than three times a week or regularly were considered exercising. With regard to fruit intake, they could be eaten both *in natura* or mixed to food, but its consumption should be daily. The same parameter was applied to the vegetables consumption. As to weight values, they were collected in a unique occasion, with no previous fasting, with a minimum of clothes, through a digital scale – Plenna Futura Digital – which has 150 kg capacity and 100 g accuracy. In order to measure height, a non-distensible metric tape with 150 cm was utilized. It was fixed on a flat surface wall, with no baseboard, a 90° angle with the ground, and a 50 cm distance from the floor, where the individual was measured with no shoes, parallel feet and heels, buttocks, posterior thorax, shoulders, and the posterior part of the head against the wall.

The blood pressures were checked twice, with a one minute interval between measurements, and aneroid sphygmomanometers, cuffs with 6cm, 6,5cm, 8cm, 9cm, 10cm, 11cm, 12cm and 13cm of width, and a biauricular stethoscope, and the diaphragm was adopted for the sounds hearing. The cuff width used was the closest to

40% of the individual's arm circumference.

The international recommendations and guidelines to the blood pressure measurement protocols were utilized in the measurement⁽¹³⁾. Before the blood pressure was measured, individuals were asked about previous exercising, urinating, and time since the last meal. The participants remained seated in a calm environment for, at least, five minutes. The blood pressure was always verified in the right arm, twice, and the second value was the one considered for analysis. When a difference equal or superior to 6 mmHg was verified between the systolic blood pressure (SBP) and/or diastolic blood pressure (DBP), a new verification was performed and this measurement value was the one considered for analysis. The SBP was determined by the Korotkoff (K1) sounds start, and the DBP, by the disappearance of the K2 sounds⁽⁷⁾.

The children and adolescents' pressure values interpretation was performed based on the classification established by the V Diretrizes Brasileiras de Hipertensão Arterial (V Brazilian Guidelines for Blood Pressure Hypertension)⁽⁷⁾. According to this classification, blood pressure can be: normal (under percentile 90); limitrophe (equal to percentile 90 and under than percentile 95); hypertension stage 1 (between percentile 95 and percentile 99 plus 5 mmHg); hypertension stage 2 (above 5 mmHg of percentile 99). In this study, subjects with percentiles above 95 were considered with altered blood pressure values.

The body mass index (BMI) results found were compared to the values established by the National Center for Health Statistics, according to sex and age. The BMIs under percentile 5 are considered low weight; the percentile between 5 and 85 is considered normal; the percentile between 86 and 94 is classified as overweight; the percentile equal or superior to 95 is classified as obesity⁽¹⁴⁾.

For the data analysis, the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL) version 1.3 was used, and in order to associate the non-paired category variables, Fisher's Exact Test was utilized. For those variables whose distribution was not normal, the variables distribution comparison was performed by Mann Whitney Test.

Complying with the scientific research ethical aspects, the study proposal was approved by the Research Ethics Committee of Universidade Federal do Ceará, according to the recommendations regarding researches developed with human beings⁽¹⁵⁾.

RESULTS

One hundred forty one participants were included in this study, of which 71 (50.4%) were females and 70

Table 1 – Children and adolescents according to systolic and diastolic blood pressures, and sex. Fortaleza, 2007.

Variables	Sex								P value
	Masculine				Feminine				
	Measurements	Average	Median	Se*	Measurements	Average	Median	Se*	
SBP	70	115.2	112.0	1.6	71	110.5	110.0	1.0	0.118
DBP	70	76.5	76.0	1.2	71	74.1	74.0	0.9	0.292

*Se: standard error

Table 2 – Presence of risk indicators for high blood pressure according to children and adolescents' age bracket. Fortaleza, 2007.

Risk Indicators	6 - < 12 years old (92 Children)		12 – 18 years old (49 Adolescents)	
	n°	%	n°	%
Sedentary Life Style	46	76.7	58	71.6
Habit of consuming alcohol	-	-	11	13.6
Tabagism	-	-	3	3.7
Inappropriate vegetables intake	47	78.3	58	71.6
Inappropriate fruit intake	28	46.7	51	63
Salt intake	59	98.3	79	97.5
Overweight	6	10	10	12.3
Obesity	3	5	6	7.4

(49.6%) were males. The individuals' distribution according to blood pressure average and sex is presented on Table 1.

As it is possible to verify through Table 1, the systolic blood pressure (SBP) and diastolic blood pressure (DBP) averages were higher for males than for females, in all evaluations, but with no statistical significance. The blood pressure hypertension risk factors presence according to the age bracket was presented on Table 2.

In Table 2, the total number of children and adolescents, respectively 92 and 49, was considered for the relative frequencies. According to this table, almost 100% of the children consumed salt, followed by 78.3% of the individuals who had an inadequate vegetable intake. The habit of drinking alcoholic beverages and tabagism were present only among the adolescents, which was expected, once these substances usage usually starts in the adolescence.

The risk indicators presence among adolescents was different from the children's. Risk factors such as tabagism and the habit of drinking alcoholic beverages appear. A fact worth highlighting was the vegetables (71.6%), fruit (63.0%), and salt (almost 100%) inadequate intake frequency.

The sedentary life style was present for more than half the children (76.7%) and adolescents (71.6%). However, the weight alterations (overweight and obesity) were higher among the adolescents: 12.3% and 7.4%, respectively. The SBP and DBP distribution based on the risk factors can be verified in Table 3.

When analyzing the SBP and DBP distribution according to the risk indicators in Table 3, the Exact Test and Mann-Whitney Test were utilized.

It is possible to verify that there is no significant statistical difference for any of the risk indicators with p values superior to 0.01.

The SBD and DBP were higher for the individuals with a regular consumption of alcoholic beverages. As to the salt usage in food, the SBP and DBP value averages were higher for those who stated not using salt in the food. According to the fruit and vegetables intake, the averages for both SBP and DBP were higher for the participants who did not consume such food items.

The participants who presented both overweight and obesity had higher SBP and DBP average values. The participants' distribution according to SPB and DBP percentiles and blood pressure hypertension risk indicators was presented in Table 4. According to Table 4, among the subjects who had a sedentary life style (104), the high blood pressure percentiles were smaller⁽⁵⁾. The participants with high blood pressure did not smoke or drink alcoholic beverages. All of them, however, consumed salt with their food, in varied amounts.

It is also worth highlighting that most participants did not usually consume vegetables daily, and only 9.7% ate fruit everyday. As it is evidenced, 20% presented altered BMIs. Among the indicators, the only one that presented a significant statistical difference was the daily fruit intake ($p=0,044$).

Table 3 – Systolic Blood Pressure (SBP) and diastolic blood pressure (DBP) for children and adolescents according to the risk indicators. Fortaleza, 2007.

Table 1. Risk factors for stroke (n=2007)									
Variables	Weekly sports practice								P Value
	Less than three times				Three times or more				
	Measurements	average	median	Se*	Measurements	average	median	Se*	
SBP	104	112.4	111.0	1.2	104	114.3	112.0	2.1	0.399
DBP	104	75.0	74.0	0.9	104	76.3	78.0	1.2	0.300
Tabagism									
		No				Yes			
SBP	138	112.8	112.0	1.0	138	119.3	122.0	4.8	0.203
DBP	138	75.3	76.0	0.8	138	76.7	76.0	4.1	0.780
Habit of consuming alcoholic drinks									
		No				Yes			
SBP	130	112.7	112.0	1.1	130	115.3	112.0	3.2	0.302
DBP	130	75.1	76.0	0.8	130	78.2	76.0	2.8	0.291
Salt daily consumption									
		No				Yes			
SBP	3	118.0	126.0	10.1	3	112.8	112.0	1.0	0.427
DBP	3	76.0	80.0	6.1	3	75.3	76.0	0.8	0.720
Vegetables daily intake									
		No				Yes			
SBP	105	111.9	112.0	0.9	105	115.8	111.0	2.8	0.637
DBP	105	74.5	74.0	0.8	105	77.8	78.0	1.8	0.152
Fruit daily intake									
		No				Yes			
SBP	79	111.6	112.0	1.2	79	114.5	112.0	1.7	0.465
DBP	79	73.7	74.0	0.9	79	77.4	76.0	1.2	0.717
Overweight									
		No				Yes			
SBP	138	111.8	112.0	2.0	138	115.3	122.0	3.8	0.575
DBP	138	74.4	76.0	0.8	138	76.7	76.0	4.1	0.567
Obesity									
		No				Yes			
SBP	138	112.7	112.0	1.0	138	119.3	122.0	4.8	0.615
DBP	138	75.3	76.0	0.8	138	77.4	76.0	4.3	0.780

Table 4 – Children and adolescents according to risk indicators and Systolic and Diastolic blood pressure percentiles conjunct elevation. Fortaleza, 2007.

ressure	Risk indicators													
	Sed		Tab		Alcoh		SC		IVI		IFI		Alt BMI	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
ormal	99	95.2	3	100	11	100	131	94.9	101	96.2	78	98.7	20	80
ltered	5	4.8	-	-	-	-	7	5.1	4	3.8	1	1.3	5	20
value	1.000		-		-		1.000		0.372		0.044		-	

Legend: Sed: sedentary life style; Tab: tabagism; Alcoh: Alcoholic drinks consumption; SC: salt consumption; IVI: inadequate vegetable intake; IFI: inadequate fruit intake; Alt BMS: Altered Body Mass Index (overweight/obesity)

DISCUSSION

Studies^(6,11-12) have demonstrated the importance of risk indicator researches for cardiovascular diseases in children and adolescents. Interventions in the risk factors detected, even in this phase, mainly through the children and adolescents' involvement in the educational strategies adopted, determines beneficial changes to the risk profile identified⁽¹¹⁾. This aspect is relevant for children and adolescents risk indicators tend to persist in adult life,

and contribute to the cardiovascular diseases establishment in age brackets that are getting younger and younger.

As to the blood pressure, based on what was revealed in this study, the SBP and DBP averages were higher for males than for females. Such finding corroborates with the study⁽¹⁶⁾ that identified through a research with 151 children and adolescents between 6 and 17 years old, in a period of 6 months, a larger number of male children and adolescents with higher SBP and DBP than female children and adolescents.

Regarding the blood pressure average values obtained, the fact males had higher averages was already reported by other authors⁽¹⁷⁾, when studying the blood pressure in Israeli children and adolescents. However, comparing the findings with other authors⁽¹²⁾, it was possible to observe differences, for the SBP was higher in males and the DBP was higher in females.

As to the body weight, obesity is an independent risk indicator for several health alterations, including blood pressure hypertension⁽¹⁸⁾. Therefore, the preventive measures related to child obesity are necessary, as much as the co-morbidities identification, aiming to minimize chronic complications.

The fact overweight and obesity possibly have a damaging role since childhood for the cardiovascular system have been discussed in studies⁽¹¹⁾. Authors developed a transversal study, assessing 672 children between 2 and 11 years old, from which 14% presented overweight, and 3.7%, obesity. It was also verified that, the higher the BMI, the higher the systolic blood pressure. In the present study, it was possible to verify the presence of overweight (10% and 12.3%, respectively for children and adolescents) and obesity (5% and 7.4%, respectively for children and adolescents). Such values are above the ones found by other authors⁽¹²⁾ for the adolescents in the mentioned study, which summing up the overweight and obesity values identified a 16.8% index.

The weight loss results in the consistent blood pressure reduction⁽¹⁹⁾. In order to loose weight, physical activities have an important role. Children and adolescents tend to become obese and sedentary and the obesity itself will only make them even more sedentary⁽²⁰⁾. Three aerobic activity sessions a week, for thirty minutes are the minimum recommended.

In this study, children were found to be more sedentary than adolescents, respectively, with 76.7% e 71.6%. However, the weight gain (overweight and obesity) was lower in children (15%). As to blood pressure, both for SBP and DBP, values were higher for those who stated practicing sport activities three or more times a week. Such data are opposite to data found in other studies⁽¹⁶⁾. With regard to what was found in another study⁽¹²⁾, (51.5% of the participants had a sedentary life style), the sedentary life style index was found to be high in the present study, (76.7% for children and 71.6% for adolescents).

Another important risk indicator investigated by several researchers is the salt intake with food. This is one of the main environmental factors among the multi-factor aspects involved in the blood pressure hypertension pathogenesis. According to epidemiologic evidences, the salt intake is an outstanding factor, particularly for those individuals who have a genetic predisposition for the disease⁽²¹⁾.

The exaggerated sodium intake is frequent in the western world, and due to an average of 20% of the population that develop hypertension, it is possible to observe the existence of a variable human sensitivity regarding the sodium⁽²²⁾. These

are determined sodium-sensitive individuals. Because it is not possible knowing who is a sodium-sensitive individual without tests, the intake of 6 grams of salt a day is the amount recommended for a healthy diet⁽⁷⁾.

In the present study, almost 100% of the participants used salt with food in varied quantities. However, the ones who stated they did not have that habit presented higher SBP and DBP. As to the daily vegetable intake, 78.3% of the children and 71.6% of the adolescents presented an inadequate intake. As to fruit intake, 46.7% of the children and 63% of the adolescents did not have an adequate intake. In a similar study⁽¹²⁾, the salt, vegetables and fruit daily consumption indicators were not investigated. Therefore, it is not possible to compare behaviors with school individuals living in the same region.

Regarding the habit of drinking alcohol, there are controversies about its effect on the blood pressure. There is a lower incidence of Cerebral Vascular Accidents in people who consume from one to two drinks per day than for the abstemious people. In spite of this fact, reducing the amount of alcohol results in lower systolic and diastolic blood pressures⁽¹⁹⁾. In this study, the habit of drinking alcoholic drinks was present for 13.6% of the individuals assessed (only among the adolescents) and the SBP and DBP were higher for those who stated they had the habit of consuming alcoholic drinks. Such habit was referred by the participants as a "social" habit.

The tabagism is also considered a determining factor for blood pressure elevation. It was a habit for three adolescents in this study. In the studies observed⁽¹⁾, the habit of smoking presented a low prevalence: it was reported as a habit by only 2.4% of the students assessed.

Although there were no statistical associations among the variables, differences were verified between the blood pressure of those who presented and those who did not present risk indicators. This may be considered a predictive factor for the establishment of high blood pressures in the future, according to what is affirmed by some authors regarding the presence of risk indicator⁽³⁾.

FINAL CONSIDERATIONS

The identification of children with a high blood pressure and, mainly, knowing its association to risk indicators, such as obesity, is essential in order to attribute a new dimension to the preventive measures adopted for the infant population. Studies⁽¹¹⁻¹²⁾ show the importance of an early identification of risk indicators so as to prevent cardiovascular events in the future. As confirmed by such studies, this approach is still neglected in our field concerning the infant population, even those children and adolescents who have family members under follow up by high blood pressure treatment programs. According to what was evidenced, the results show a small difference from the

indicators profile presented by this children and adolescents and other similar populations in the same region⁽¹²⁾. Apparently, the orientation given to the family members who have a high blood pressure by the healthcare unit is not interfering in the behavior adopted by other family members, such as demonstrated by the presence of several risk indicators, when compared to another study in the same region⁽¹²⁾, except for the tabagism and alcohol consumption, that was lower in the present study. Some indicators assessed in this study, such as the daily salt, vegetables and fruit intake, could not be compared to other studies for not being part of the indicators assessed, but they were verified to be inadequate by this study.

It is worth reinforcing the need for actions and a better follow up of individuals with blood pressure hypertension, and they cannot be disconnected from the other family members, specially children and adolescents, who comprise a group that is still under development and could easily adhere

to changes on their life style. Verifying that healthy life habit promotion actions directed to children and adolescents who have family members with high blood pressure is not performed is a concerning fact due to the context where the study took place. As previously mentioned, all the participants should also be under the Programa Saúde da Família (Family Healthcare Program) follow up, which should assist all family members, not only those who already have diagnosed diseases. This demands larger intervention articulations, which should not only be driven by curative actions, but also, and mainly, by preventive aspects, where health education has an essential role.

Therefore, it is fundamental to identify the interventions regarding hypertension risk indicators, for their influence is unquestionable in future cardiovascular diseases. The sum of such indicators contributes to the definitive blood pressure hypertension establishment in other stages of life, and only a behavior change regarding risk indicators can alter this forecast.

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