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HYPERTENSION IN CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW ABOUT PREVALENCE AND RISK FACTORS

HIPERTENSÃO EM CRIANÇAS E ADOLESCENTES: REVISÃO SISTEMÁTICA SOBRE PREVALÊNCIA E FATORES DE RISCO

HIPERTENSIÓN EN NIÑOS Y ADOLESCENTES: REVISIÓN SISTEMÁTICA SOBRE PREVALENCIA Y FACTORES DE RIESGO

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ABSTRACT

Objective: to determine the prevalence and risk factors of hypertension in children and adolescents in Brazil. **Method:** a systematic review of studies of prevalence of hypertension in children and adolescents in order to answer the question << *What is the prevalence of hypertension in children and adolescents in Brazil and the main risk factors associated* >>. Searches were conducted between 1st and November 11th, 2012, in Brazil SciELO, MEDLINE, LILACS and IBICS articles in Portuguese, published from 2002 to 2012. Obtained 4,100 articles, 20 were selected, made in Brazil. We used structured data collection form for data consolidation. **Results:** prevalence between 2.3% and 31.0%, reaching 51.7%. Major risk factors: obesity, poor diet, sedentary lifestyle, family history, anthropometric and urban life. **Conclusion:** there was heterogeneity of equipment to measure blood pressure. The found informations consolidate professional conducts and advancement in health practices in hypertension in children and adolescents. **Descriptors:** Blood Pressure; Risk Factors; Prevalence; Adolescent; Child.

RESUMO

Objetivo: verificar a prevalência e os fatores de risco de hipertensão arterial em crianças e adolescentes no Brasil. **Método:** revisão sistemática em estudos de prevalência de hipertensão em crianças e adolescentes com vistas a responder a questão << *Qual a prevalência da hipertensão arterial em crianças e adolescentes no Brasil e os principais fatores de risco associados* >>. As buscas foram realizadas entre 1º e 11 de novembro de 2012, na Scielo Brazil, MEDLINE, LILACS e IBICS de artigos em português, publicados de 2002 a 2012. Obteve-se 4.100 artigos, sendo selecionados 20, realizados no Brasil. Utilizou-se ficha de coleta estruturada para consolidação dos dados. **Resultados:** prevalência entre 2,3% e 31,0%, chegando a 51,7%. Principais fatores de risco: obesidade, dieta inadequada, sedentarismo, histórico familiar, indicadores antropométricos e vida urbana. **Conclusão:** houve heterogeneidade do equipamento para mensurar a pressão arterial. As informações encontradas consolidam condutas profissionais e avanço nas práticas de saúde na hipertensão arterial em crianças e adolescentes. **Descritores:** Pressão Arterial; Fatores de Riscos; Prevalência; Adolescente; Criança.

RESUMEN

Objetivo: verificar la prevalencia y factores de riesgo de hipertensión arterial en niños y adolescentes en Brasil. **Método:** revisión sistemática de estudios sobre la prevalencia de hipertensión en niños y adolescentes con el fin de responder a la siguiente pregunta: ¿Cuál es la prevalencia de hipertensión arterial en niños y adolescentes en Brasil y los principales factores de riesgo asociados? Las búsquedas se llevaron a cabo entre el 1º y el 11 de noviembre de 2012 en las bases de datos SciELO Brasil, IBICS, MEDLINE, y LILACS en artículos en portugués, publicados desde 2002 a 2012. Se obtuvieron 4.100 artículos, de los cuales se seleccionaron 20 realizados en Brasil. Se usó una ficha de recolección estructurada para la consolidación de datos. **Resultados:** la prevalencia fue del 2.3% al 31.0%, llegando al 51.7%. Los principales factores de riesgo fueron: obesidad, alimentación inadecuada, sedentarismo, antecedentes familiares, indicadores antropométricos y vida urbana. **Conclusión:** hubo heterogeneidad en el equipo para medir la presión arterial. Las informaciones encontradas consolidan conductas profesionales y avances en las prácticas de salud con la hipertensión arterial en niños y adolescentes. **Descriptores:** Presión Arterial; Factores de Riesgo; Prevalencia; Adolescente; Niño.

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INTRODUCTION

In the last 1990s and first decade of this century, there was substantial increase in the quantity of deaths due to injuries from NCDs worldwide, especially Cardiovascular Diseases (CVD) as the leading cause of death. According to a document from the World Health Organization (2008), which discusses the most common causes of death worldwide, ischemic heart disease (12.8%) and strokes, along with other cerebrovascular diseases (10.8%), corresponding to 23.6 % of deaths.¹ In Brazil, more than a third of the deaths are attributed to these diseases.²

Hypertension emerged as a major risk factor for cardiovascular events and early detection is an essential strategy to improve the health of the population and ensure the reduction of morbidity. Most diagnoses of hypertension occur in patients with advanced age, being well known factors that cause hypertension in adults. In this population the values related to normal blood pressure levels are well defined internationally. On the other hand, there are gaps in knowledge about hypertension in children and young people, particularly in relation to the clinical course and the role of environmental factors. However, several studies indicate the occurrence of hypertension in childhood or adolescence.³ In addition, the tension parameters in these age groups have not been widely established.⁴

The genetic and environmental factors are determinants in the occurrence of High Blood Pressure (HBP). Studies in many countries lack of uniformity with regard to methodological rules, especially with regard to resources for blood pressure measurement, data collection protocols and questionnaires for detecting information relating to lifestyle. It is possible that differences in methodological approach justified, in part, the different results found in studies of prevalence and risk factors of hypertension.³

Since 1990, the nurses started to value scientific evidence aimed at solving the complex problems of nursing practice.^{5,6} Therefore, the model defined as evidence-based nursing and evidence-based care enables better capacity to evaluate, in a systematic and critical, the information necessary for decision making in health care.⁷

In this perspective, this study has the premises:

- To determine the prevalence and risk factors of hypertension in children and adolescents in Brazil.

The understanding of this panorama can endorse professional practices through consolidated information internationally.

METHODOLOGY

Systematic review based on a survey of articles published from 2002 to November 2012, which searches were done during the period of 1st to 11th November 2012 in view to answer the question << ***What is the prevalence of hypertension in children and adolescents in Brazil and the main risk factors associated*** >>.

It is believed that this period represents the relevance of the topic in a decade of research. The seizure of the material was performed by two researchers using descriptors in English representing desired age, type of information and condition studied. The descriptors were categorized on hypertension (hypertension, blood pressure, high blood, and pressure), kids (teens, teenagers, adolescents, and children), type of study (prevalence, frequency), being grouped in combinations described below:

- a) Combination 1 (C1) - *hypertension; teens; prevalence.*
- b) Combination 2 (C2) - *hypertension, children; frequency.*
- c) Combination 3 (C3) - *blood pressure; adolescents; prevalence.*
- d) Combination 4 (C4) - *high blood; teens; prevalence.*
- e) Combination 5 (C5) - *high blood, children; prevalence.*
- f) Combination 6 (C6) - *pressure; teens; prevalence.*
- g) Combination 7 (C7) - *pressure; teenagers; prevalence.*

The combinations resulted from crosses with a representative of each category and were entered in the search field in SCIELO BRAZIL, MEDLINE, LILACS and IBECS (Virtual Health Library - VHL).

Considered for inclusion, articles published in Portuguese, made in Brazil, population of children and adolescents (0-20 years of age), the original data on the prevalence of hypertension and related risk factors. Exclusion criteria were review articles; lack of information on age, published before 2002. The selection of articles was used hierarchical methodology by reading the titles, abstracts and full reading as shown in Figure 1, and selected those that were related to the topic and that meet the established criteria.

The articles included in the study were analyzed using structured data collection form as the general characteristics (where it was

developed, publication year, journal of publication, sample size, age of the sample); characteristics of the methodology (method to measure blood pressure, number of measurements taken, terminology), plus characteristics of the subjects, the prevalence of hypertension and risk factors.

The search was performed using the seven combinations in both VHL and in SciELO Brazil. VHL, with C1 were found three articles, with only 1 in Portuguese. C2 was not found in any article. C3 were found in 1,085 articles, 982 were excluded because they were from another language, leaving 103 in the Portuguese language, and of these, 30 articles with duplicity and 1 was not found in the database, totaling 72 articles in Portuguese by combining 3. In C4 were found in 14 articles, 9 articles were excluded because they are of another language, leaving only 5 in Portuguese. Were excluded from these, 4 per duplicity is only 1 item C4. In the search to C5 were found 2,853 articles, 2,750 excluded by language, leaving 103 in Portuguese, which was duplicated in 56 articles and 2 were not found and are excluded, this combination finishing with 45 articles. In seeking to C6 were found 14 articles excluded by language articles 8, resulting in 6 in the Portuguese language, with these, duplicity 4, and leaving 2 articles. Finally, the last combination, C7, 53 articles were found, being excluded by

language 47 articles, summarizing up to 6 in Portuguese, which of these 4 showed duplication, resulting in two articles. Finally, 123 articles remained in Portuguese VHL.

We searched for the SciELO Brazil using the same combinations used in VHL. Thus, the combinations C1, C2, C4 and C6 articles were not found. C3 were found in 28 articles, 1 deleted for not being in Portuguese, leaving 27 articles. However, there were duplicated at 25, leaving two articles. C5 were found in articles 47 and 31 of these in Portuguese, excluding further 27 articles for duplicity, this combo ending with 4 articles. C7 were found in three articles being excluded for not being one in Portuguese, leaving 2, but with duplicity, resulting 0 items. In total, six were found in Scielo articles to be evaluated. Thus, in general, were included for assessment by way of both databases 129 articles. Step in the assessment under Article 45 were excluded, resulting in 84 articles (82 VHL and SciELO Brazil 2). The 84 articles have now been analyzed and the summary of these, 9 were not related to the topic, resulting in 75 articles (73 VHL and SciELO 2 BR). 75 of these 55 articles were excluded for the full reading, demonstrating that there is no relationship to their theme. Thus, for results we selected 20 articles, 18 resulting from VHL and SciELO Brazil 2.

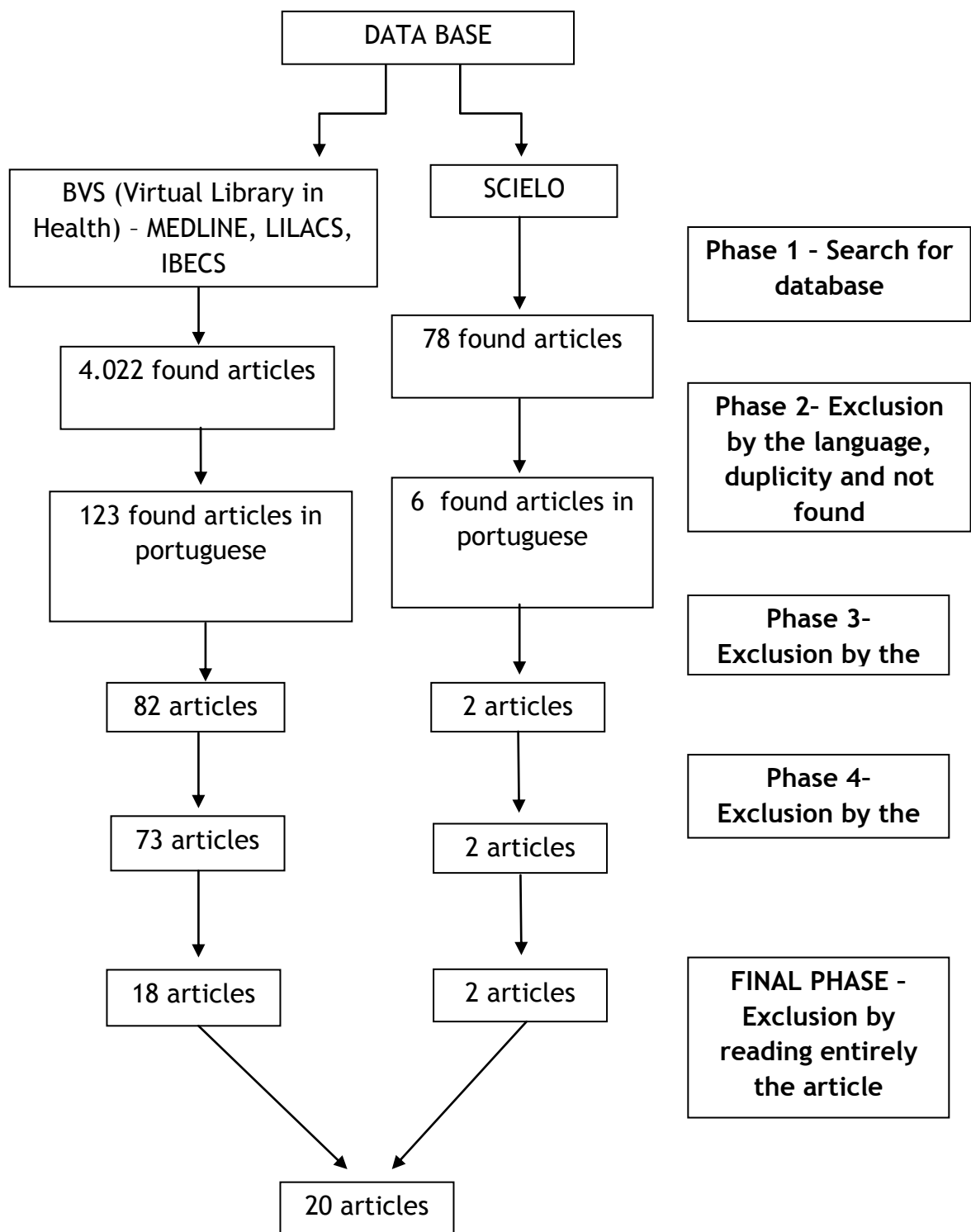


Figure 1. Flowchart of the methodological process used in the study.

To summarize the results was employed a presentation of information found and, later, the analysis and discussion of data.

RESULTS

After initial selection was done reading the titles and abstracts of articles, selected those who were related to the theme and meet the established criteria. The studies that did not show all the necessary information in the summary were read in full, resulting in 20 studies.

Twenty studies were categorized according to items that characterize a systematic review

of the literature. All studies were performed by two or more authors. As for the region of origin, it was found that nine (45%) were performed in the Northeast, four (20%) in the Southeast region, three (15%) in the Mid-west and four (20%) in the South it was noted the absence of studies in northern Brazil.

As the year of publication, it was found that two (10%) were published in 2004, one (5%) in 2005, two (10%) in 2006, three (15%) in 2007, four (20%) in 2009, three (15%) in 2010, four (20%) in 2011 and one (5%) in 2012.

Next, the characteristics of the studies included in this research, shown in tables.

Table 1. General characteristics of studies about the prevalence of high blood pressure in children and adolescents published between 2002 and 2012.

Study	Place of the research	Year	Journal	Sample	Age(years)
Moura et al ³⁶	Maceió - AL	2004	Jornal de Pediatria	1253	7-17
Oliveira et al ¹⁴	Feira de Santana-BA	2004	Arq. Bras. Endocrinol. Metab.	701	5-9
Silva et al ¹⁸	Maceió - AL	2005	Arquivos Brasileiros de Cardiologia	1253	7-17
Carvalho et al ⁹	Fortaleza-CE	2006	Arquivos Brasileiros de Cardiologia	29	14-18
Rosa et al ³⁵	Niterói - RJ	2006	Arquivos Brasileiros de Cardiologia	456	12-17
Borges, Peres e Horta ¹⁹	Cuiabá-MT	2007	Rev. Saúde Pública	601	7-10
Sakamoto et al ¹⁷	Maringá - PR	2007	Cienc. Cuid. Saúde	59	15 - 17
Silva e Júnior ²⁴	João Pessoa - PB	2007	Rev. Bras. Med. Esporte	674	14-17
Costanzi et al ²⁰	Caxias do Sul - RS	2009	Jornal de Pediatria	1413	7-12
Gomes e Alves ⁸	Recife - PE	2009	Cad. Saúde Pública	1878	14 - 20
Pereira et al ¹⁵	Itapetininga-SP	2009	Arquivos Brasileiros de Cardiologia	494	2-19
Vieira et al ²⁵	Cuiabá-MT	2009	Acta Paul Enferm.	329	11- 14
Ferreira e Aydos ¹¹	Campo Grande - MS	2010	Ciência & Saúde Coletiva	129	7-14
Hoffmann, Silva e Siviero ¹²	Caxias do Sul - RS	2010	Pediatria (São Paulo)	564	10-15
Queiroz et al ²²	João Pessoa - PB	2010	Arquivos Brasileiros de Cardiologia	750	6-9
Christofaro et al ¹⁰	Londrina - PR	2011	Arquivos Brasileiros de Cardiologia	1021	10-17
Mazaro et al ¹³	Sorocaba- SP	2011	Rev. Assoc. Med. Bras.	680	7-11
Polderman et al ²⁶	Aracaju - SE	2011	Nutr. Saúde Pública	1002	12-17
Pinto et al ¹⁶	Salvador - BA	2011	Cad. Saúde Pública	1125	7 - 14
Rinaldi et al ²³	Botucatu - SP	2012	Rev Paul Pediatr	903	6-14

In Table 2, it was noted that the studies used measurement methods of auscultation (80%) and automatic (20%). The frequency for measurements ranged from one (01)⁸ to

twenty-one (21)⁹ measurements, being the term "hypertension" the most used by the authors.^{8,10-18}

Table 2. Methodological characteristics of studies in children and adolescents.

Method for measurement of BP	Number of measurements	Terminology used
Auscultatory ³⁶	Two measurements	Prevalence of high blood pressure
Auscultatory ¹⁴	Two measurements	Arterial hypertension
Auscultatory ¹⁸	Two measurements	Prevalence of Hypertension
Auscultatory ⁹	14 in daytime and nighttime sleep 7 in	Gestational hypertension in adolescents
Automatic ³⁵	Six measurements	Pre-hypertension and increased pulse pressure
Auscultatory ¹⁹	Three measurements	Prevalence of high blood pressure
Auscultatory ¹⁷	Two measurements	Hypertension
Auscultatory ²⁴	Two measurements	High blood pressure
Auscultatory ²⁰	Three measurements	High blood pressure
Auscultatory ⁸	One measurement	Prevalence of hypertension
Auscultatory ¹⁵	Three measurements	Prevalence of hypertension
Auscultatory ²⁵	Two measurements	blood pressure
Automatic ¹¹	Two measurements	Prevalence of hypertension
Automatic ¹²	Two measurements	Prevalence of hypertension
Auscultatory ²²	Three measurements	High blood pressure
Auscultatory ¹⁰		Hypertension
	Two measurements	
Auscultatory ¹³		Hypertension
	Two measurements	
Automatic ²⁶	Uninformed	Blood pressure
Auscultatory ¹⁶	Two measurements	Hypertension
Auscultatory ²³	Three measurements	Prevalence of high blood pressure

Table 3. Characteristics of the subjects, the prevalence of blood pressure in studies with children and adolescents.

Subjects	Prevalence	Risk factors
Randomized 36	9,40%	Overweight and risk for overweight
Random 14	3,60%	Overweight, obesity, study in private school
Random 18	7,70%	Physical inactivity, risk of overweight, overweight and smoking
Convenience 9	51,70%	Pregnancy and Heredity
Random 35	13,40%	
Conglomerate 19	2,30%	Non informed
Not Telling 17	31,00%	Male and overweight
Random 24	Total of 7,4%, with 10,2% in boys and 5,1% in girls	Excess of body weight
Conglomerate 20	13,80%	Increased waist circumference, high and low socioeconomic level physical fitness
Stratified random 8	17,30%	Male sex, obesity, overweight and lack of physical activity
Randomized 15	8,90%	Obesity and Dyslipidemia
Conglomerate 25	11,20%	High body mass index and color/ethnicity brown
Convenience 11	15,8 in boys and 26,4% in girls	Obesity
Random 12	21,70%	Excess of body weight
Random 22	13,60%	Weight and abdominal circumference gain
Randomized 10	Total of 11,8%, with 13,4% - boys and 10,2%- girls	General obesity and abdominal obesity
Probability sample 13	5,30%	Excess of body weight
Simple random 26	16,9% in boys and 12,9% in girls	Overweight and obesity
Stratified random 16	4,80%	Overweight, female and eating pattern of risk
Convenience 23	2,90%	Excess of body weight

DISCUSSION

A systematic review is an essential activity for evidence-based practice, since it combines a lot of information in one study, facilitating information, refining studies and separating the lower academic rigor of highly reliable, serving as a scientific basis for the formulation of guides ducts.⁷

In this research it was found that auscultatory sphygmomanometers^{8,9,10,13-25} and automatic 11^{11-2,26-7} were used to measure blood pressure. In other studies²⁸⁻³¹, mercury sphygmomanometers, aneroid^{16,19,32-4}, and automatics³⁵⁻⁸ are also used to measure blood pressure. It is worth noting that the definition of normal blood pressure values in children by mercury sphygmomanometer is particularly difficult for widespread misinterpretation of sounds Korotkof. Some authors indicate automatic oscillometric devices, which represent a relatively new technology for measuring blood pressure.³⁹

In a study conducted in Índia40, hypertension is associated with obesity and is a significant factor to cause mortality in Indian children and adolescents. According to the findings of the articles included in this review hypertension prevalence ranged from 2.3% to 31.0% in children and adolescents, reaching 51.7% in a study that investigated high blood pressure in pregnant teenagers, a fact that worries because the risks that hypertension leads to the life of this population. This number reached the level of 25% in 32 studies that used the terminology high blood pressure. This prevalence has been discussed around 10% and 50% in 41 other

studies that corroborate this finding, while also reported an increased prevalence of hypertension, when participants had some risk factors such as obesity^{28-31,33-4,36,42-3}, smoking³¹, family history of hypertension^{44,31}, inactivity^{31,35,45}, abdominal circumference 29.31 and socioeconomic status.⁴⁶

CONCLUSION

It was possible to determine the prevalence of hypertension in children and adolescents and to identify risk factors observed by different studies in Brazil. There was heterogeneity in the choice of equipment to measure blood pressure.

Research has shown that the prevalence of hypertension in children and adolescents ranging from 2.3% to 31.0%, whereas in one study the percentage was 51.7% and its main risk factors obesity, improper diet and physical inactivity. Importantly, family history, anthropometric and urban life as important factors in the elevation of arterial blood pressure in this population.

Finally, the study has proved important as health professionals may be used for the preparation of consolidated information pipeline backed scientific studies, allowing a positive development in health practices, especially in relation to hypertension in children and adolescents.

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