Systemic Arterial Hypertension in Children-
Systematic Review

Youssef Elias Ammar1, Cristianne Confessor Castilho Lopes2*, Rodayne Khouri Nascimento3, Edvaldo Santana Pereira Junior4, José Francisco Dalcin5, Letícia Fernandes Cabral6, Melina Anantha Furtado de Sousa7, Paulo Sergio Silva8, Carolina Alves Quintanilha9, Pedro Otavio Piva Esposito10, Jessica Layra Garcia Ferreira11, Renata Mansur Caldeira12, Bruna Marra Silva13, Alan Marcelo Oliveira São Leão24, Paulo Vítor Ferreira dos Passos14, Eduardo Barbosa Lopes15, Guilherme Corrijo Olanda16, Lucas Castilho Lopes17, Maria Eduarda Castilho Lopes18, Marilda Morais da Costa19, Tulio Gamio Dias20, Heliude de Quadros e Silva21, Fabio Herget Pitanga22, Marivane Lemos23

1University of Southern Santa Catarina - Tubarão – SC – Brazil
2University of Joinville Region - Joinville – SC – Brazil
3Federal University of Santa Maria – Santa Maria – RS – Brazil
4University Brazil – Fernandopolis – SP – Brazil
5Federal University of Santa Maria – Santa Maria – RS – Brazil
6Faculty of Medicine of Campos - Campos dos Goytacazes – RJ – Brazil
7Faculty of Medicine of Campos - Campos dos Goytacazes – RJ – Brazil
8UniSociesc - Joinville – SC - Brazil
9Presidente Antônio Carlos University Center - Juiz de Fora – MG – Brazil
10University of Mogi das Cruzes – Mogi das Cruzes – SP - Brazil
11Peruvian Union University – Lima - Peru
12Alfredo Nasser University Center - Aparecida de Goiânia – Goiás - Brazil
13University of Uberaba – Uberaba – MG - Brazil
14Anhanguera-Uniderp University – Campo Grande – MS - Brazil
15Alto Vale do Rio do Peixe University - Caçador – SC – Brazil
16Federal University of Rio de Janeiro – Rio de Janeiro – RJ - Brazil
17Federal University of Santa Catarina - Florianópolis – SC - Brazil
18Alto Vale do Rio do Peixe University - Caçador – SC - Brazil
19Lutheran Educational Association - IELUSC College - Joinville – SC - Brazil
20USP School of Arts, Sciences and Humanities – São Paulo – SP - Brazil
21Alto Vale do Rio do Peixe University - Caçador – SC - Brazil
22Alto Vale do Rio do Peixe University - Caçador – SC - Brazil
23Contestado University – Concordia – SC – Brazil
24Severo Sombra University Faculty of Medicine - Vassouras – RJ - Brazil
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Introduction

Systemic arterial hypertension in adults is characterized by an irreversible increase in blood pressure levels, with pressure indicators equal to or greater than 140 mm Hg for systolic pressure or 90 mm Hg for diastolic pressure, after having repeatedly measured blood pressure and sustained [1,2].

In childhood, arterial hypertension conditions are rarely studied. Generally, systolic or diastolic pressure values equal to or below 90 are established for children under 13 years of age, but several factors must be considered for this classification [3-5]. Among these factors, gender, biotype, lifestyle, diet, age and especially obesity are correlated. It is extremely important to recognize and treat arterial hypertension in children due to its potential sequelae in adulthood. Hypertensive patients since childhood have worsened clinical conditions of arterial hypertension in adulthood [6,7].

Currently, pediatric care protocols do not establish Blood Pressure (BP) measurement as a routine test in children, and many cases end up being underreported or diagnosed late [8,9].

When the child fits at least one risk criterion, it is recommended that the BP be checked at least once a year, from the age of 3 during routine consultations. Three consecutive measurements with identical values or above 90 are predisposing factors for systemic arterial hypertension in adulthood, and should be monitored. The younger the child, the greater the likelihood that the hypertensive condition is related to a specific and identifiable medical condition [8,10].

Thus, this research systematically investigated the public health literature available from the last 5 years regarding arterial hypertension in children under 13 years of age, with emphasis on its primary causes.

Methods

This study constitutes a systematic review, classified as exploratory and descriptive. The elaboration of the research was bibliographical research in electronic databases on methods associated with a Systematic Literature Review (SLR) and SMARTER applications (Simple Multi-Attribute Rating Technique using Exploiting Rankings). The work carried out is qualitative and quantitative. The qualitative analysis of the data is carried out intuitively and inductively during the survey of the theoretical framework. It is also quantitative by using the multicriteria method. In addition, there is also a numerical experimental study in order to simulate an article selection situation based on the observed criteria. From bibliographical research, located in the databases: Systematized literature review carried out by searching the database Web of Science (Clarivate), Science Direct (Scopus), Wiley Online Library (John Wiley and Sons), Taylor and Francis (Taylor & Francis Group), and PubMed (NIH).

The search in the databases was carried out using the terminologies registered in the Health Sciences Descriptors created by the Virtual Health Library developed from the Medical Subject Headings of the US National Library of Medicine, which allows the use of common terminology in Portuguese, English and Spanish. The keywords used in the English language for the search in the databases were: systemic arterial hypertension in children. As a tool to support the decision in the selection and prioritization
of articles, a set of criteria were considered essential to represent the state of the art of the subject object of the research. This method has the following characteristics: (i) rigorous logic allows acceptance of the method as a decision support tool; (ii) simple to understand and apply with easily interpreted results. After all, the result obtained totaled 09 articles that contemplated the desired characteristics for the study.

Results

A systematic review of the literature was carried out with searches carried out in the databases Web of Science (Clarivate), Science Direct (Scopus), Wiley Online Library (John Wiley and Sons), Taylor and Francis (Taylor & Francis Group) and PubMed (NIH) and manual searches through a search platform, performed in the references of selected studies according to the defined criteria. The searches were carried out from January to March 2023, with temporal delimitation of publications from 2019.

The database search found a total combination of 343 articles, of which 22 were selected for full text reading. Of these, 07 were selected through the SMARTER method (Simple Multi-Attribute Rating Technique using Exploiting Rankings), which were included for descriptive data analysis (Table 1). In Figure 1, the stages and indicators used in the selection are described.

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Design</th>
<th>No</th>
<th>Study population</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUARESMA et al., 2019</td>
<td>Brazil</td>
<td>Cross-sectional</td>
<td>67</td>
<td>Children aged 10 to 17 years</td>
<td>The rate of adolescents with BP disorders was 19.4% - prehypertension 14.9% and hypertension 4.5%.</td>
</tr>
<tr>
<td>KAMIŃSKA et al., 2021</td>
<td>Saudi Arabia</td>
<td>Case study</td>
<td>1</td>
<td>7 year old child</td>
<td>The reported case shows that dealing with a child with acute, severe and sustained arterial hypertension, with nonspecific symptoms, requires a careful approach. Acute autonomic neuropathy may be the potential cause of hypertension.</td>
</tr>
<tr>
<td>LUCENA FILHO et al., 2022</td>
<td>Brazil</td>
<td>Cross-sectional study</td>
<td>577</td>
<td>Children aged 5 to 7 years</td>
<td>Association between physical activity and blood pressure as responsible for the role of mediation and moderation of adiposity components in early childhood.</td>
</tr>
<tr>
<td>BARBOSA et al., 2021</td>
<td>Brazil</td>
<td>Case report</td>
<td>1</td>
<td>8 year old child</td>
<td>Early and appropriate clinical management in pediatric patients diagnosed with arterial hypertension reduces morbidity and mortality and maximizes the chances of recovery.</td>
</tr>
<tr>
<td>HASELER; SINHA, 2022</td>
<td>London</td>
<td>NA* NA*</td>
<td>NA*</td>
<td>NA*</td>
<td>Future research should address the future risk of adverse cardiovascular outcomes, establish normative datasets for home BP monitoring, and elucidate the hemodynamic processes that distinguish hypertension in young people.</td>
</tr>
<tr>
<td>NGUYEN et al., 2021</td>
<td>Vietnam</td>
<td>Descriptive Cross-sectional Study</td>
<td>1080</td>
<td>Children aged 6 to 15 years</td>
<td>The results provided useful information in the early diagnosis and timely treatment of systemic hypertension in children.</td>
</tr>
<tr>
<td>VILLASÍS-KEEVER et al., 2021</td>
<td>Mexico</td>
<td>Cross-sectional study</td>
<td>619</td>
<td>Children aged 6 to 17 years</td>
<td>It is of paramount importance that cardiometabolic disorders be monitored in young patients to provide them with early interventions, such as lifestyle changes, and to avoid cardiovascular complications in adult life.</td>
</tr>
</tbody>
</table>

*ND: Not Described

Table 1: Characteristics and results of the included studies.
Discussion

For the World Health Organization (WHO), cardiovascular diseases are the main cause of death worldwide, and annually it is the disease with the highest morbidity and mortality, representing three out of every 4 deaths in low- and middle-income countries. It is strongly associated with lifestyle conditions, mainly dietary factors. It is not widely studied in children, being difficult to diagnose and correlate, making SAH frequent and worrying, since the monitoring of health conditions in children and adolescents is different from that of adults, mainly in terms of symptomatology [11].

In this literature review, in several databases and complementing the research on a search platform, only seven studies were identified that used original research exclusively on arterial hypertension in children. Of the studies carried out, six contemplate the reality of low- and middle-income countries, which does not represent data from epidemiological studies carried out in countries with a high human development index.

The prevalence of SAH in children in developed countries ranges from 3 to 6%, being affected by diagnostic conditions, when applying the American Academic guidelines of Pediatrics [18]. The application of these guidelines can increase this index to approximately 11%.

Regular pediatric visits also increase the chance of early diagnosis. Points to note should be the investigation of the primary causes, such as changes in lifestyle. Adiposity and excess weight are relevant factors, as approximately 13 to 17% of hypertensive children are overweight or obese, which are related to the primary causes [13]. The weight management strategy combined with physical activity and reduced sodium intake are important in the management of primary hypertension [15].

A sedentary lifestyle and inadequate nutrition, with the high consumption of processed foods and fast foods, are the main causes of increased cholesterol levels in the pediatric age group. In fact, the prevalence of hypertension is progressive with increasing
age, with an increasing incidence of development at younger and younger ages [16]. And there is also familial hypercholesterolemia (increased genetic cholesterol), which can start manifesting in childhood [19].

Primary hypertension is the most common diagnosis of hypertension in children. As a result, the new American Academy guidelines of Pediatric recommend a limited diagnostic evaluation for children and adolescents aged 6 years and older with history or physical examination findings of secondary hypertension, particularly children with a positive family history of hypertension and body mass index (BMI) above the 90th percentile [18].

Screening tests should include blood and urine biochemical tests (blood urea nitrogen test and creatinine) and electrolyte panel. In patients with a BMI above the 90th percentile, glucose and glycated hemoglobin, transaminases and a fasting lipid profile should be obtained. Renal ultrasonography is recommended in all patients younger than 6 years or in those aged 6 years or older with urinary profile findings. Additional studies should be obtained based on history, physical examination and abnormalities in screening laboratory tests, according to individual factors [20].

Among the secondary factors may be related to renovascular changes, such as renal artery stenosis [14] and cardiac changes, such as left ventricular hypertrophy, heart failure, left atrial enlargement, arrhythmias and aortic diseases that may be related to congenital factors or subsequent hypercholesterolemia [12,21,22].

Education and counseling on lifestyle modifications, such as promoting physical activity, promoting a healthy diet and regular consultations, can help identify and prevent hypertension in children [15]. In addition, the monitoring of associated genetic factors, metabolic risks and reduced obesity and sedentary lifestyle may be a combination of factors that result in education about lifestyles with hypertension control, with screening for economic risk factors, medical needs, risk factors and referral can help reduce the risk of developing high blood pressure [17].

Final Considerations

Systemic arterial hypertension in children is a growing clinical condition, and silent because it is not adequately screened in routine consultations. In addition, many health facilities in low- and middle-income countries lack the resources to effectively measure children’s blood pressure and establish adequate guidelines.

Furthermore, arterial hypertension is poorly detected and recognized, especially in obese children. It needs specific equipment for children, which restricts its use only to offices, making screening difficult in non-ambulatory settings. The main cause of hypertension, called primary, is overweight, and it is essential to establish an adequate diet, weight control and increased physical activity, requiring multidisciplinary care, which is also not very well established.

Lifestyle modification interventions are notoriously difficult, as the group of child patients present with specific vulnerabilities and needs. Secondarily, systemic arterial hypertension in children is usually related to other health conditions such as heart defects, kidney diseases, genetic conditions or hormonal disorders.

Therefore, the literature currently lacks consistent information that correlates in-depth studies on systemic arterial hypertension in children, mainly establishing valid guidelines that can be established in order to effectively track the impacts both in childhood and in adulthood.

References


