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Review Article

PEDIATRIC HYPERTENSION IN SAUDI ARABIA- A SYSTEMATIC REVIEW

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Abstract:

Background: Because of its rising incidence in recent decades, juvenile hypertension has become an important public health issue. High blood pressure increases childhood mortality and morbidity, precedes adult hypertension, and increases cardiovascular events in age.

Objectives: This study aims to summarize current evidences regarding prevalence, risk factors and consequences of hypertension in children and adolescents in Saudi Arabia.

Methods: For article selection, the PubMed database and EBSCO Information Services were used. All relevant articles relevant with our topic and other articles were used in our review. Other articles that were not related to this field were excluded. The data was extracted in a specific format that was reviewed by the group members.

Conclusion: Literature shows a prevalence of pre-hypertension ranging from 5.2%- 6.5% while hypertension had prevalence of 3.8%- 17.2% in Saudi children which is comparable to figures reported worldwide. It is well recognized that hypertension in childhood and adolescent persists into adulthood. Children who are epidemiologically at risk must be identified.

Keywords: childhood hypertension, Hypertension, hypertension risk factors, children and adolescents, KSA

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INTRODUCTION:

Children and adolescents with hypertension are a growing health concern that should be handled carefully and diagnosed early [1]. Pediatric hypertension (HTN) is a developing worldwide concern that can be ascribed to a variety of risk factors, including an increase in obesity and bad lifestyle choices. Childhood hypertension will eventually progress to adult hypertension and cardiovascular disease [2, 3].

The global prevalence of paediatric hypertension is unknown due to geographic variances in the definition of high blood pressure, the dissemination of reference blood pressure data, and the BP measuring methods. Based on the usage of the 95th percentile to define hypertension, the rate of hypertension is estimated to be around 5% [4]. Using the most recent definition of hypertension in children, studies have indicated a prevalence ranging from 4.7 to 19.4% depending on age, gender, ethnicity, body mass index (BMI), parental hypertensive status, and other characteristics [4, 5].

BMI was closely related to hypertension and pre-hypertensive state [4]. Hispanics (25%) had the highest prevalence of hypertension, whereas Asians (14%) had the lowest [5]. From the 1960s to the 1990s, there was a 5 to 11% increase in childhood obesity, which resulted in a substantial increase in childhood hypertension [6]. According to studies, more than 20% of obese children develop primary hypertension. This trend of rising juvenile obesity will continue to have a significant influence on the cardiovascular health of American children, and doctors must be cognizant of it [7].

Adolescents are more likely to develop primary or essential hypertension, which involves a number of risk factors, including obesity and a family familial history of hypertension. Secondary hypertension seems to be more prevalent in preadolescent adolescents, with renal illness accounting for the majority of cases. A comprehensive history and physical examination, laboratory tests, and specialist research are all part of the evaluation process [8].

Previously, paediatric HTN was assumed to be mostly caused by a secondary cause that could be discovered and treated. However, during the last few decades, it has been clear that primary, or essential, HTN is not just seen in adults, but is also growing more common in paediatrics. This observation has paralleled the obesity epidemic in children, adolescents, and even pre-teen youngsters [9].

Management has several facets. Weight loss, exercise, and dietary changes are nonpharmacologic therapy. Pharmacologic treatment is recommended for symptomatic hypertension, evidence of endorgan damage, stage 2 hypertension, stage 1 hypertension refractory to lifestyle changes, and hypertension associated with diabetes mellitus [10].

It is critical to detect and treat hypertension in children and adolescents as early as possible to avoid the progression of hypertensive end organ disease[11].

Study Rationale:

Because of its rising incidence in recent decades, juvenile hypertension has become an important public health issue. High blood pressure increases childhood mortality and morbidity, precedes adult hypertension, and increases cardiovascular events in age.

Study Objective:

This study aims to summarize current evidences regarding prevalence, risk factors and consequences of hypertension in children and adolescents in Saudi Arabia.

METHODS AND MATERIALS:**SAMPLE & STUDY GROUPS**

Exploratory research employing a qualitative approach is included in this Integrative Literature Review (ILR). ILR is a strategy used in the health sciences to find health-care approaches and determine innovations, allowing the deployment of evidence-based services, ensuring quality, and enhancing patient safety. It consists of six phases that must be completed in the following order: The problem of the study is stated, the inclusion and exclusion criteria are listed, the sample is detailed, the included studies are evaluated, the results are interpreted, and the ILR synthesis is presented.

PubMed and EBSCO Information Services was used as search databases for the papers used in the study due to their reputation as trustworthy sources. PubMed, one of the largest online digital libraries, was founded by the National Center for Biotechnology Information (NCBI), a part of the United States National Library of Medicine. Topics relevant to childhood hypertension was used in the writing of the paper. The titles and abstracts of the established papers were reviewed.

The papers was chosen based on their relevance to the project, which should involve one of the following topics: childhood hypertension in Saudi Arabia,

Hypertension in Saudi children, hypertension risk factors in children and adolescents

Exclusion criteria: all other articles which do not have one of these topics as their primary end, or repeated studies, and reviews studies was excluded.

STATISTICAL ANALYSIS

The data was analysed without the use of any programme. The data was extracted using a specified form that includes (article title, author's name, objective, summary, results, and outcomes). To confirm the validity and minimise errors, each member's results were double-revised.

During the article selection process, studies and their results were double-reviewed to ensure that enrolled research related to the purpose of our study and to avoid or reduce inaccuracies in the results.

RESULTS:

Figure 1 shows the selection and identification of studies. The search of the mentioned databases returned a total of 209 studies that were included for title screening. 181 of them were included for abstract screening, which lead to the exclusion of 137 articles. The remaining 44 publications full-texts were reviewed. The full-text revision led to the exclusion of 37 studies due to difference in study objectives, and 7 were enrolled for final data extraction (**Table 1**).

Literature shows a prevalence of pre-hypertension ranging from 5.2%- 6.5% while hypertension had prevalence of 3.8%- 17.2% in Saudi children [12- 18]. Overweight and obesity were found to be a significant risk factors for development of hypertension in children in 4 studies [12, 13, 15, 17]. Systolic blood pressure was reported with a 17.2%- 30% and 9.0%- 22% diastolic blood pressure [17, 18]. Secondary HTN was prevalent (77.0%) in a hospital sample [14]. The most commonly reported consequences are renal affection, cerebral infarction, hemorrhage, left ventricular hypertrophy, and valvular lesion [14].

The included studies had different study designs.

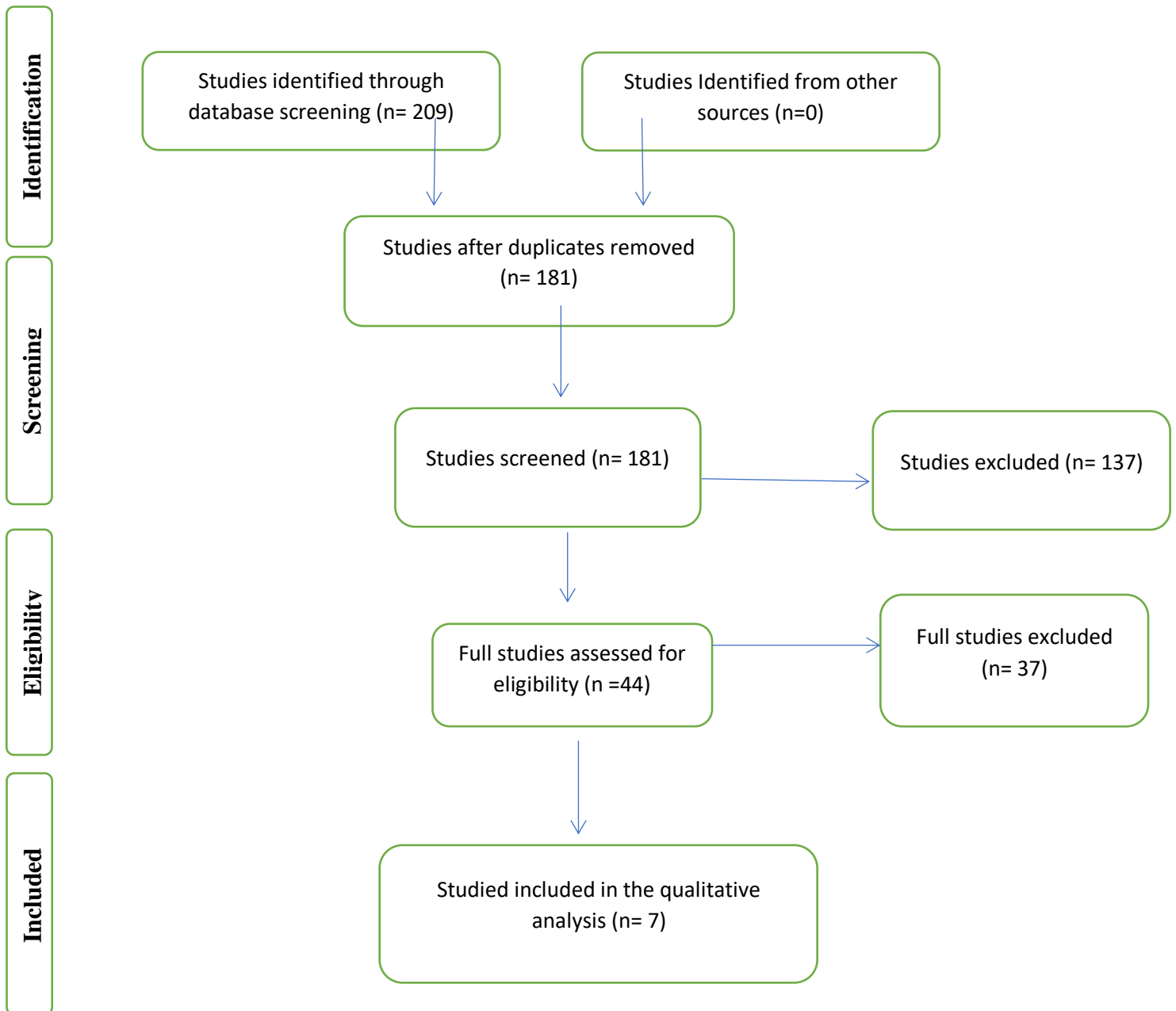


Table 1: Author, country, year of publication, methodology and outcome:

| Author, Publishing Year | Study region | Methodology | Outcome |
|---|---|--|---|
| Wagdy, Reham, et al. "(2021) [12] | Jeddah | The cross-sectional study comprised 107 students with BMIs greater than 18.5 and 192 students with BMIs less than 18.5 who acted as controls and were matched in age and gender. | Overweight and obese children are at least twice as likely as normal weight students to develop hypertension. |
| Al Salloum, Abdullah A et al. (2020) [13] | The samples represented Saudi children from the whole country | Multi-stage random sampling of the Saudi population yielded a total of 2553 preschool children aged 2 to 6 years. Data were gathered by a house-to-house survey of all selected households across the country's 13 regions. The BP was measured using oscillometric equipment. | SBP and DBP levels were substantially higher in Saudi youngsters than in North American children. This research provides to the evidence for BP variations amongst groups due to influences such as environmental and genetic factors. |
| Safdar, Osama et al. (2020) [14] | Jeddah | A retrospective analysis was conducted on 3,640 children patients aged 0 to 18 years who were admitted to the pediatric nephrology unit at King Abdulaziz University Hospital. | Secondary HTN owing to renal disease was prevalent (77.0%). Secondary HTN is related with a number of renal disorders, the most of which are due to renal malformation. Furthermore, the most commonly reported consequences are renal affection, cerebral infarction, hemorrhage, left ventricular hypertrophy, and valvular lesion. |
| Ghamri, Ranya A et al. (2019) [15] | Jeddah | A cross-sectional study was done among 6-15-year-old children attending the paediatric clinic at King Abdulaziz University Hospital. Children were chosen using a systematic random sample technique. The data was gathered through organised questionnaire interviews with the parents. | Males had a prevalence of hypertension and prehypertension of 14.4% and 6.5%, respectively, whereas females had a prevalence of 16.3% and 5.2%, respectively. The age range of 6-10 years, overweight and obese children, children with a family history of hypertension, and children with low birth weight were all common risk factors for hypertension. |
| Almayouf, Furat Abdulrahman, and Noha Dekhail Aldekhail (2018) [16] | Riyadh | During the academic year 2016-2017, a cross-sectional survey was undertaken among a cluster sample of dolescent preparatory and secondary school females. To acquire the relevant data, a predesigned and pretested questionnaire was used. | Hypertension was found in 3.8% of the study subjects. |
| Bandy, A., et al. (2019) [17] | Sakaka City, Aljouf Region | A cross-sectional study conducted at 400 male teenagers between the ages of 15 and 17. Blood pressure was measured using an electronic instrument. For defining overweight and obesity, the CDC's body mass index tool was used. | Adolescents with systolic prehypertension, systolic hypertension, diastolic prehypertension, and diastolic hypertension were found in 6.5%, 17.2%, 5.8%, and 9.0% of the cases, respectively. Overweight and obesity, no or once-weekly physical activity, a positive family history of hypertension, and smoking were all found to be predictors of systolic prehypertension and had a strong link with systolic hypertension. |
| Alkahtani, Shaea A. (2015) [18] | Eastern Province | A cross-sectional study was undertaken with 146 intermediate and secondary school boys and girls from two locations. Between April and May 2014, a team of health educators collected weight, random blood glucose, and blood pressure in the morning of the school day. | 30% had systolic blood pressure (SBP) of ≥ 140 mm Hg and 22% had diastolic blood pressure of ≥ 90 mm Hg. |

DISCUSSION:

Worldwide, the prevalence of hypertension is increasing, and more than 1 billion individuals are hypertensive, with the trend being more pronounced in low- and middle-income nations [19]. Saudi studies show a prevalence of pre-hypertension ranging from 5.2%- 6.5% while hypertension had prevalence of 3.8%- 17.2% in Saudi children. HTN has climbed to 5% in teenagers in the United States over the previous decade, while high blood pressure (a mix of prehypertension and HTN) has increased to 12.6% in girls and 19.2% in boys [20]. A multicenter study in India discovered a 23% prevalence of systolic and/or diastolic hypertension among healthy school-aged children aged 5 to 15 [21]. In one of China's major studies, the total prevalence of raised blood pressure (95th percentile) among school-aged children (6-13 years) was 18.4%; 20.2% for boys and 16.3% for girls, with children aged 10-11 years having the highest prevalence [22]. A prevalence of 7% of paediatric hypertension was found in a cross-sectional study comprising 794 children aged 6-13 years in Brazil [23], whereas in Japan, a prevalence of 15.9% in 4th-grade males and 15.8% in 4th-grade girls was noted [24].

Obesity, sleep apnea syndrome, chronic renal illness, and preterm all raise the likelihood of hypertension [25]. According to World Health Organization (WHO) estimates, there were 42 million obese or overweight children under the age of five worldwide in 2013 [26]. Hypertension affects 4-14% of overweight children and 11-23% of obese children. Excessive salt consumption through diet is also a risk factor, particularly in obese and overweight youngsters. Furthermore, the coexistence of hypertension and obesity raises risks for cardiovascular disease [25].

Children and adolescents with type 1 diabetes have a hypertension prevalence of 4-16%, while children and adolescents with type 2 diabetes have a prevalence of 12-31%, which is greater than in the general population [27, 28]. Because type 2 diabetes is related with obesity, people with the disease are at a higher risk of end-organ damage. The prevalence of high blood pressure ranges between 3.6% and 14% in sleep apnea syndrome, another risk factor [29]. Hypertension affects 6.1% of children with neurofibromatosis-1, which is greater than the overall population [30].

Secondary hypertension is much more common in childhood than in adults. As a result, all children diagnosed with hypertension should be investigated for secondary reasons. The most prevalent causes of

hypertension are renal and renovascular disorders [31]. 50% of children and adolescents with chronic renal illness are hypertensive, and 20-70% of these individuals have uncontrolled hypertension. In teenagers with end-stage renal illness, the prevalence ranges between 48% and 70% [31, 32]. Renal illnesses account for 34-79% of secondary causes, while renovascular diseases account for 12-13%. Secondary hypertension should be considered in children under the age of six, as well as in situations of severe hypertension accompanied by end-organ damage. With a rate of 0.05-6%, endocrine factors are involved in the genesis of hypertension. They are less common than other causes, but diagnosis is critical because hypertension can be reversed with treatment of the underlying cause [33].

There is a scarcity of evidence on severe acute hypertension in adolescents and children. Life-threatening hypertensive circumstances are known as hypertensive emergencies when blood pressure is over the 95th percentile+30 mm Hg. End-organ damage is most commonly associated with the neurological system (headache, upset stomach, convulsions, disorientation, visual problems, and facial nerve palsy), heart (LVH, heart failure, cardiomyopathy), or kidney (acute renal injury, proteinuria) [34].

Family history of hypertension, overweight and obesity, high-sodium diets, intake of unhealthy foods, decreased intake of fruits and vegetables a sedentary lifestyle, as well as other risk factors must be taken into account. Even though the family history cannot be changed, it is possible to enhance physical activity and begin a DASH-type diet (For example, a diet high in vegetables and fruits, foods high in whole grains and low-fat meat and dairy products, a diet low in sugar and saturated fat. Exercising every day is essential for controlling blood pressure. Sleep hours should be restricted, and smoking should be discouraged. Salt intake should be kept to fewer than 3 g per day. These preventative measures should be the first step in combating children and adolescent hypertension [35, 33].

CONCLUSION:

Literature shows a prevalence of pre-hypertension ranging from 5.2%- 6.5% while hypertension had prevalence of 3.8%- 17.2% in Saudi children which is comparable to figures reported worldwide. It is well recognized that hypertension in childhood and adolescent persists into adulthood. Children who are epidemiologically at risk must be identified.

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