ORIGINAL RESEARCH

Evaluation of Prevalence of High Blood Pressure Among School Going Children in Central India

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Received: 11 February, 2024 Accepted: 27 March, 2024

ABSTRACT
Background: Even a slight elevation of blood pressure (BP) in childhood is likely to elevate the risk of hypertension by several folds in adult population. This study was conducted to assess the prevalence of high blood pressure among school children. **Materials and Methods**: This study was conducted to assess the prevalence of high blood pressure among school children. This study comprised overall 100 school-going children. The children aged from 8-15 years with mean age of 11.3 years. A thorough physical examination of all the children was carried out. Vitals of all the children had been noted. The study excluded those who were on antihypertensive medication. Statistical analysis was conducted using SPSS software. **Results**: In this study, out of 100 subjects, 65 were males and 35 were females. Hypertension was found in 23 (23%) subjects and was absent in 77 (77%) subjects. Hence, the prevalence of hypertension among school-going children in this study was 23%. **Conclusion**: The prevalence of hypertension among school-going children in this study was 23%.
Keywords:Hypertension, School, Children.

INTRODUCTION
It has been shown that even a slight elevation of blood pressure (BP) in childhood is likely to elevate the risk of hypertension by several folds in adult population.[1-4] Epidemiological transition with increasing burden of cardiovascular risk factors such as obesity and hypertension is already evident not only in adult population but also in pediatric population in developing countries including India.[5] The survey data show large variation in the prevalence of prehypertension and hypertension among the children from various part of India.[6,7] Further, large studies on the prevalence of pediatric hypertension from Central India are lacking.With the rapid development of social economy and changing of people's lifestyle, hypertension has become the most common chronic non-communicable disease globally. According to a WHO report, of the estimated 1.13 billion people with hypertension, less than 1 in 5 has it under control.[8] Increased blood pressure is a leading risk for death and disability globally. Hypertension is also a major cause of premature death worldwide, with upwards of 1 in 4 men and 1 in 5 women, over a billion people, having the condition.[9]In recent years, hypertension has shown a trend of prevalence at younger age.[10] Hypertension was once rare in children and adolescents. But it has raised a serious public health challenge to us.[11]
The prevalence of hypertension in Chinese children and adolescents has increased from 7.1% in 1991 to 13.8% in 2009, with an average annual rate of 0.47%.[12]This study was conducted to assess the prevalence of high blood pressure among school children.

MATERIALS AND METHODS
This study was conducted to assess the prevalence of high blood pressure among school children. This study comprised overall 100 school-going children. The children aged from 8-15 years with mean age of 11.3 years.
A thorough physical examination of all the children was carried out. Vitals of all the children had been noted. The study excluded those who were on

antihypertensive medication. Statistical analysis was conducted using SPSS software.

RESULTS

Mean age of the patients was 13.8 years. In this study, out of 100 subjects, 65 were males and 35 were females. Hypertension was found in 23 (23%) subjects and was absent in 77 (77%) subjects.

Presence of obesity, positive family history of HTN and positive family history of IHD were found to be significant risk factors for occurrence of childhood hypertension.

Table 1: Gender-wise distribution of subjects

Gender	Number of subjects	Percentage
Males	65	65%
Females	35	35%
Total	100	100%

Table 2: Prevalence of hypertension

Prevalence	Number of subjects	Percentage
Absent	77	77%
Present	23	23%
Total	100	100%

Table 3: Relationship between different variables and childhood hypertension

Variables	HTN present (n=23)	HTN absent (n=77)
Obesity	15	19
Positive family history of HTN	10	15
Positive family history of IHD	9	19

DISCUSSION

Pediatric hypertension (HTN) is defined as having three elevated systolic or diastolic blood pressure (BP) readings for the subject's age, height, and sex. The 2017 Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents provided updated recommendations for the workup and diagnosis of pediatric HTN. In this report, the percentile values for blood pressure staging have been revised, as the previous reference tables included many obese subjects. Because BP measurements can vary across visits, it is recommended that measurements are obtained over the course of multiple visits to classify a patient's blood pressure.[13]Measurements are typically taken by auscultation in the right arm while the child is resting comfortably in the sitting position using the correct size BP cuff. The inflatable cuff should cover 80% of the arm circumference and 40% of the arm length.[14]Oscillometric measurements are widely used in the clinical setting but are known to overestimate the patient's BP.[15] Due to this, elevated BP readings obtained by oscillometric machines should be confirmed by an auscultatory BP measurement. Accurate diagnosis of HTN is essential as studies have shown that it is often missed in children and is a major risk factor for cardiovascular and renal morbidity in children and adults and can be associated with cardiovascular morbidity during childhood.[16]In this study, out of 100 subjects, 65 were males and 35 were females. Hypertension was found in 23 (23%) subjects and was absent in 77 (77%) subjects. Hence, the prevalence of hypertension among school-going children in this study was 23%. Presence of obesity, positive family history of HTN and positive family history of IHD were found to be significant risk factors for occurrence of childhood hypertension. Patel A et al (2019)[17] conducted a large cross-sectional study in Indore to determine the distribution of blood pressure (BP) and the prevalence of hypertension and prehypertension among schoolchildren. A total of 11,312 children (5305 girls, 6007 boys) aged 5–15 years, drawn from 80 government and private schools in equal proportion, were evaluated. Anthropometric measurements were obtained, and BPs were measured using The Fourth Report on The Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents as reference standard. BP $\geq 90^{th}$ to $<95^{th}$ percentile for given percentile of height was considered as prehypertension, whereas any BP $\geq 95^{th}$ percentile was defined as hypertension. Multiple linear regression analysis was used to find out the determinants of hypertension in these children. Prehypertension was detected in 6.9% and 6.5% and hypertension was found in 6.8% and 7.0% of boys and girls, respectively. Height and weight were found to be a significant predictor of systolic and diastolic BP among both boys and girls. Their results show a high prevalence of prehypertension and hypertension in Indore schoolchildren with age and height being significant determinants. This highlights the need for routine BP measurements in children by paediatricians when they treat them for intercurrent illnesses or vaccinate them. It should also be mandatory as a part of school health checkup programs to detect childhood hypertension for further counselling and therapy.Meena J et al (2021)[18] conducted a systematic review to provide pooled estimates of the prevalence of hypertension among children aged less than 18 y in India. Three electronic databases (PubMed,

EMBASE, and Web of Science) were searched from inception to August 2020 by using terms related to hypertension, children, prevalence, and India. Studies reporting the prevalence of hypertension, defined based on at least three measurements, were included. Two investigators independently performed the literature search, study selection, and data extraction for this review. Random effect meta-analysis was used to provide pooled estimates of hypertension. A total of 64 studies were included in this systematic review. The pooled prevalence was 7% (95% CI: 6%-8%) for hypertension, 4% (95% CI: 3%-4.1%) for sustained hypertension and 10% (95% CI: 8%-13%) for prehypertension. While there was no significant difference in hypertension across five different regions of the country, an upward rising trend was observed after the year 2005. Urban children had a higher prevalence of hypertension as compared to their rural counterparts. Children with obesity had a significantly high prevalence of hypertension (29%) than normal-weight children (7%). In this review, it was observed that considerable proportions (7%) of school going children are hypertensive in India. Prevalence was higher in urban and overweight children. This study highlights that hypertension is a public health problem in India; hence, there is a need to implement public health measures to prevent hypertension.

CONCLUSION

The prevalence of hypertension among school-going children in this study was 23%.

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