

An Observational Study of Prevalence of Asymptomatic Hypertension in School Going Children between 5 -10 Years of Age

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Abstract

Introduction: Systemic hypertension is an important condition in childhood, with estimated population prevalence of 1-2% in the developed countries. Nutritional surveys, in the India show a significant secular increase in systolic and diastolic blood pressures. The causes for increase in blood pressure are attributed to obesity, change in dietary habits, decreased physical activity and increasing stress. Similar data is lacking from India; small surveys in school children suggest a prevalence ranging from 2-5 %.

Materials and Methods: The present cross-sectional study was a school based survey conducted from June 2018 to August 2019 at Tagore Medical College and Hospital, Rathinamangalam, Melakottaiyur, Chennai. 960 apparently normal school students in early and mid-adolescence (10 years to 16 years) were selected by systematic sampling. The sample size was calculated to be 934 (p=16%18, d=15%, C.I. =95%). Children with any cardiac disorders, renal disorders, any chronic illness or history of any drug intake known to influence blood pressure were excluded from the study. A detailed questionnaire was sent to parents, which included history of health related complaints in the child, history of drug intake in the child, family history of hypertension or other cardiovascular events, dietary history of child and physical activity of the child.

Results: A total of 960 students were included between the age group of 10 years-16 years amongst which 515(53.3%) were male and 445(46.7%) were female. Of these 695(72.3%) were in early adolescent age (10-13 yrs) and 265(27.7%) in mid adolescent age (14-16 yrs) Table no. 1. Mean age of males was 13.61 years \pm 4.6 and mean age of females was 13.57 years \pm 4.2. At the end of fourth screening, a total of 79(8.3%) had abnormal blood pressure. Of these cases, 21 cases had systolic hypertension only, 19 cases had diastolic hypertension only and 39 cases had both systolic and diastolic hypertension.

Conclusion: Multiple blood pressure recordings have to be done for accurate diagnosis of hypertension. The prevalence of essential hypertension in our study was 8.3%. The systolic and diastolic hypertensions have been documented in our study. Adolescents must be routinely screened to detect asymptomatic hypertension. Advice on risk factor modification by appropriate life style changes may prevent long term effects of hypertension on target organs.

Key Words: Systemic hypertension, obesity,

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I. Introduction

Systemic hypertension is an important condition in childhood, with estimated population prevalence of 1-2% in the developed countries. Nutritional surveys, in the India show a significant secular increase in systolic and diastolic blood pressures.¹ The causes for increase in blood pressure are attributed to obesity, change in dietary habits, decreased physical activity and increasing stress. Similar data is lacking from India; small surveys in school children suggest a prevalence ranging from 2-5 %.²

Elevated blood pressure, systolic or diastolic at any age, in either sex is a contributor for all forms of cardiovascular disease.³ Identifying and modifying risk factors reduces the incidence and complications in adolescents and adult. Prevalence of hypertension varies across countries and states.⁴ It is multifactorial disease, influenced by genetic, racial, geographic, cultural and dietary patterns. This study was conducted to observe the prevalence and risk factors for hypertension in children from Chennai.⁵

II. Materials And Methods

The present cross-sectional study was a school based survey conducted from June 2018 to August 2019 at Tagore Medical College and Hospital, Rathinamangalam, Melakottaiyur, Chennai. 960 apparently normal school students in early and mid- adolescence (10 years to 16 years) were selected by systematic sampling. The

sample size was calculated to be 934 (p=16%18, d=15%, C.I. =95%). Children with any cardiac disorders, renal disorders, any chronic illness or history of any drug intake known to influence blood pressure were excluded from the study.

A detailed questionnaire was sent to parents, which included history of health related complaints in the child, history of drug intake in the child, family history of hypertension or other cardiovascular events, dietary history of child and physical activity of the child.

Age was verified from school records and rounded off to completed years. Detailed anthropometry including Body mass index and waist -hip ratio were done in each child as per standard norms. All children aged 10 to 16 years studying in grades 6 to 10 were enrolled into the study. Systematic sampling was the sampling technique used based on their roll numbers of the class so that each children has the chance of being included in the study.

Before recording the blood pressure, the procedure was fully explained to the child and was made to sit quietly for five minutes. Blood pressure was recorded in sitting position in right arm with cubital fossa at heart level, by mercury sphygmomanometer. The appropriate sized cuff was selected with the bladder width about 40% of the arm circumference at a point midway between olecranon and acromion and the bladder length covering at least 80% to 100% of the circumference of the arm. If cuff is too small, the next larger cuff was used. The first and fifth phases of Korotkoff sounds were taken as indicative of the systolic and diastolic blood pressures respectively.

Three measurements were taken at intervals of five minutes each and systolic blood pressure and diastolic blood pressure were categorized. The percentile charts based on gender, age and height provided by NHBPEP were used for classification of blood pressure. The child was considered normotensive if the blood pressure was less than 90th percentile. If the blood pressure was > 90th percentile or > 120/80mm Hg (even if < 90th percentile) BP was rechecked at the same visit after one hour.

If BP was persistently abnormal even in the second screening, BP was rechecked twice at one week interval. If at the end of fourth screening, BP was persistently elevated to between >90th percentile to 95th percentile or >120/80mm Hg (even if <90th percentile), child was considered as having pre hypertension. If BP at the end of fourth screening was >95th percentile, child was considered as having hypertension. All children with abnormal BP were subjected to baseline investigation like urinalysis, urine culture, Blood urea Nitrogen, Serum creatinine, Serum electrolytes, renal ultrasound and complete blood count.

The collected data were entered and analyzed using Epi Info 2000 (Center for Disease Control and Prevention, Atlanta, Georgia, USA) and SPSS version 16 (SPSS 16.0 for Windows, release 16.0.0. Chicago: SPSS Inc). Frequencies of all variables were taken to check frequencies. Mean and standard deviation (SD) were calculated for continuous variables.

III. Results

A total of 960 students were included between the age group of 10 years-16 years amongst which 515(53.3%) were male and 445(46.7%) were female. Of these 695(72.3%) were in early adolescent age (10-13 yrs) and 265(27.7%) in mid adolescent age (14-16 yrs) Table no. 1. Mean age of males was 13.61 years ± 4.6 and mean age of females was 13.57 years ± 4.2. At the end of fourth screening, a total of 79(8.3%) had abnormal blood pressure. Of these cases, 21 cases had systolic hypertension only, 19 cases had diastolic hypertension only and 39 cases had both systolic and diastolic hypertension. The different grades of hypertension are shown in table no. 2. In the present study age of mother and father did not have significant association with hypertension. There was no age or sex predilection for hypertension. Family history of hypertension was present in 36% of the cases as against 27% of the control, which was not significant. Baseline investigations of the hypertension children did not reveal any cause.

		Male	Female	Total
Age (years)	10-13	384	311	695
	Percentage	74.6	69.9	72.3
	14-16	131	134	265
	Percentage	0.3	30.1	27.7
Total		515	445	960
	Percentage	100	100	100

Table 1: Age and sex distribution of school children

Blood pressure	No	Percentage
Systolic BP (≥ 90th to 95th percentile)	12	1.3
Systolic BP (≥ 95th to 99th percentile)	18	1.9
Systolic BP (≥ 99th percentile)	24	2.5
Diastolic BP (≥ 90th to 95th percentile)	15	1.6

Diastolic BP (\geq 95th to 99th percentile)	20	2.1
Diastolic BP (\geq 99th percentile)	17	1.8

Table 2: Different grades of hypertension

IV. Discussion

The distribution of hypertension across three screenings, showed significant reduction in systolic hypertension from 21.4% in first screening to 6.25.8% in the fourth screening and that of diastolic hypertension from 17.8% to 6.04%. This result confirms the need of repeated measurement in the correct diagnosis of hypertension.⁶

Other studies also showed a substantial decrease of BP in children when measures were repeated on different occasions. In a study done in 1979, among 10 641 US children in Dallas²², 8.9% children were found to have elevated BP at the first visit.⁷ At third visit some days later, only 1.2% had systolic hypertension and 0.4% had diastolic hypertension. In the Muscatine Study, out of 6662 children, 13% had elevated BP at the initial screening visit while less than 1% had persistent elevated BP based on repeated measurements taken on separate occasions.⁸

Though diastolic blood pressure is not given much significance in pediatric age group, 3.4% of our school children had diastolic hypertension compared to systolic hypertension of 2.8% after third screening. There was no age or sex predilection in our study. Some of the studies have found increased prevalence of hypertension in girls, which they attributed to hormonal changes around puberty. However, some studies have found no sex differences in the prevalence of hypertension.⁹

Family history of hypertension was present in 45.2% of hypertensives as against 31.4% of non-hypertensive, which was not statistically significant. However, family history of hypertension is a well-established risk factor. Some studies have shown association with maternal hypertension^{2, 3} while some showed association with paternal hypertension.¹⁰

However, in the present study even though there was an increased association of these cardiovascular events in families of hypertensive, it was not statistically significant. This is probably because of a small sample of hypertensive in the present study. Routine baseline investigations failed to reveal any underlying cause for hypertension in all our hypertensive. Therefore, in view of mild hypertension in apparently normal adolescents with baseline investigations being normal, a diagnosis of essential hypertension was done in the present cases.

V. Conclusion

Multiple blood pressure recordings have to be done for accurate diagnosis of hypertension. The prevalence of essential hypertension in our study was 8.3%. The systolic and diastolic hypertensions have been documented in our study. Adolescents must be routinely screened to detect asymptomatic hypertension. Advice on risk factor modification by appropriate life style changes may prevent long term effects of hypertension on target organs.

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