



PREVALENCE AND RISK FACTORS ASSOCIATED WITH HYPERTENSION AMONG CHILDREN AND ADOLESCENTS

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ABSTRACT

Background: Primary hypertension is detectable in children and adolescents as in adults. It is associated with a positive family history of hypertension, obesity, and life-style factors. Hypertension has been increasing among children and adolescents since 1990s.

Objective: The objective of the study is to determine the prevalence of childhood and adolescent hypertension and its risk factors.

Materials and methods: This is an observational study carried out among children and adolescents at a selected private clinic in Chennai, India. Convenient sampling technique was used to select the participants. The questionnaire consists of demographic profile, questionnaire related to risk factors and blood pressure readings.

Results: The results of this study show that the mean systolic BP for boys and girls are normal between all the age groups. The mean diastolic pressure for both boys and girls are also found to be normal. Though the mean blood pressure readings of boys and girls for both systolic and diastolic are found to be normal among the ages between 5-19 years, there are still few risk factors found to be present in the history.

Conclusion: There are more than half of them 25 (55.6%) who had family history of hypertension (both maternal and paternal). Children with family history of hypertension should therefore, be targeted for primary prevention in vigorous manner along with dietary and lifestyle modification.

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INTRODUCTION

Hypertension has been identified as the leading risk factor for mortality, and is ranked third as a cause of disability-adjusted life-years [1]. According to WHO (2002), the number of people worldwide afflicted with hypertension was about 600 million [2]. The hospitalization rate for children and adolescents with a diagnosis of hypertension during 1997-2006, doubled from approximately 18 cases per 100,000 paediatric hospital discharges in 1997 to approximately 35 cases per 100,000 in 2006. Among children and adolescents with hypertension, as many as one in three has target organ damage, especially left ventricular hypertrophy [3]. Various factors might have attributed to this rising trend like changing life style, diet and urbanization. Blood pressure normally changes with growth and development. So, it becomes increasingly important to detect and interrupt development of

childhood and adolescent hypertension to reduce long term ill effect of the disease [4]. Owing to the well-established childhood obesity epidemic, the population prevalence of high blood pressure (BP) in the young is increasing. Hypertension in childhood is commonly associated with other cardiovascular risk factors as well as obesity. Although death and cardiovascular disability do not occur in hypertensive children, intermediate markers of target organ damage, such as left ventricular hypertrophy, thickening of the carotid vessel wall, retinal vascular changes, and even subtle cognitive changes, are detectable in children and adolescents with high blood pressure [5]. Thus this study aims to determine the prevalence of hypertension and risk factors among children and adolescents.

A study conducted by in Italy by Menghetti *et al*, (2015) shows that the prevalence of hypertension has increased in the past years and hypertensive children are more prevalent in north Italy. An excess use of salt could explain the greater rate of hypertension among children living in the north Italy [6]. The findings of the study conducted in Bangladesh on 'Hypertension and associated risk factors in some selected

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rural areas' shows that the prevalence of systolic hypertension among the respondents is 15.6% and that of diastolic pressure are 12.3%. Systolic pressure was found in an increasing manner with the increase of age and BMI. Tendency of increase systolic pressure was observed among those who took extra salt [7]. A study conducted in Kerala, India (2009) shows that the overall prevalence of hypertension was 47%. Among all the participants, 21.6% had stage-I hypertension, 9.34% had stage-II hypertension. Only 11.4% individuals had normal BP, while 41.7% were prehypertensives. Only 16.8% hypertensive patients were aware of their disease. High salt diet had a significant association with hypertensive state [8].

MATERIALS AND METHODS

This is a descriptive observational study carried out among children and adolescents in a selected clinic at Chennai, India.

food items in their diet. Junk food includes food items like potato chips, samosa, cold drinks, etc. Descriptive statistics was used for data analysis. The results were analysed and presented in tables and figures. The study was approved by the Institutional Review Board. Informed consent was obtained from the parents and participants before the data collection.

RESULTS

The demographic data results are shown in Figure 1 and 2. There were 25(55.6%) participants who belonged to the age group of 15-19 years, 11 (24.4%) of them between 5-10 years and 9(20%) belonged to the age group between 10-15 years. There were 30 (66.7%) female participants and 15(33.3%)

Table 1 Distribution of mean systolic BP for boys and girls at different age group

Age group	Males (n)	Male Mean SBP (mm Hg)	SD	Females (n)	Female Mean SBP (mm Hg)	SD
5-10 Years	5	107.6	8.87	6	110	5.38
10-15 Years	3	108.3	7.63	6	113.5	3.78
15-19 Years	7	117.8	8.07	18	108.7	12.04
Total	15			30		

Table 2 Distribution of mean diastolic BP for boys and girls at different age group

Age group	Males (n)	Male Mean SBP (mm Hg)	SD	Females (n)	Female Mean SBP (mm Hg)	SD
5-10 Years	5	64.4	5.17	6	68	6.57
10-15 Years	3	70	10	6	72	4.19
15-19 Years	7	78.4	7.27	18	73	8.28
Total	15			30		

Table 3 Risk Factors of hypertension among children and adolescents (n=45)

Risk Factors	Yes (%)	No (%)
Family history of Hypertension (both paternal and maternal)	25 (55.6%)	20(44.4%)
Maternal history of hypertension	6 (13.3%)	39(86.7%)
Paternal history of hypertension	11(24.4%)	34(75.6%)
Type of diet		
a. Vegetarian	12(26.7%)	---
b. Non- vegetarian	33(73.3%)	---
Additional salt intake	23(51.1%)	22(48.9%)
Intake of junk food		
a. Daily	12(26.7%)	---
b. Weekly	12(26.7%)	---
c. Monthly	14 (31.1%)	---
d. None	7(15.6%)	---

All children and adolescents aged 5 to 19 years along with their parents who attended the clinic were included in the study. The total number of samples who participated in this study was 45. Convenient sampling technique was used to select the participants. Blood pressure (BP) was measured in the seated position using a digital sphygmomanometer. Data was collected using a questionnaire completed by parents for children below 10 years. The questionnaire consists of Part A: demographic profile (Age and gender), Part B: questionnaire related to risk factors and blood pressure readings. According to dietary history, subjects were categorized vegetarians if they never consumed non-vegetarian food at any time in their life and non-vegetarians if they consumed non-vegetarian

male participants in this study. Table 1 shows the results of the mean systolic BP for boys and girls at different age group. Male systolic mean BP was found to be between 107.6 to 117.8 mmHg and the male diastolic mean BP was found to be between 64.4 and 78.4 mm Hg among all the age groups. These values of both systolic and diastolic mean BP for boys are normal according to the PALS (Paediatric Advanced Life Support) guidelines, 2015 [9].

Table 2 shows the mean diastolic BP for boys and girls at different age group. The female systolic BP was found to be 108.7 to 113.5 mm Hg and the female diastolic mean BP was found to be between 68 and 73 mm Hg among all the age

groups. These values of both systolic and diastolic mean BP for girls are normal (PALS guidelines, 2015).

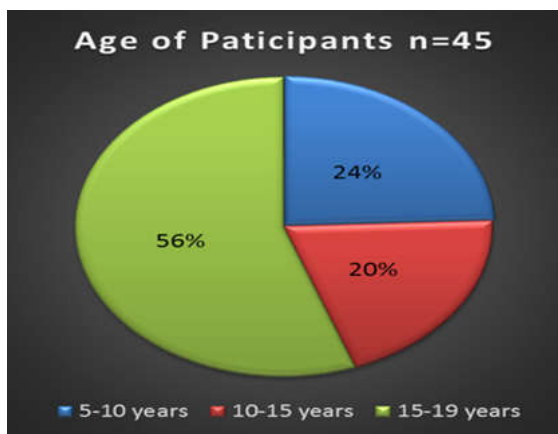


Figure 1 Age of participants (n=45)

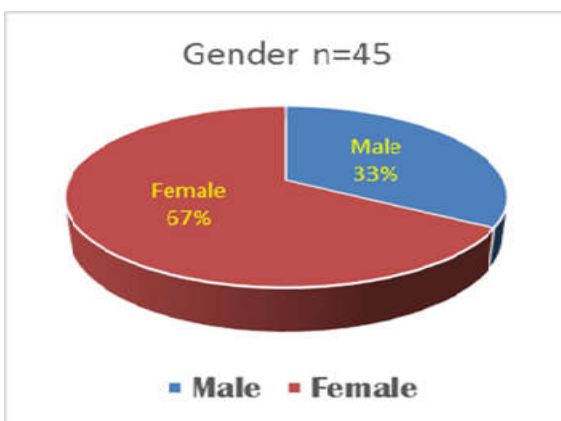


Figure 2 Gender of participants (n=45)

Table 3 shows the results for the questionnaire on the risk factors of hypertension among children and adolescents. More than half of them 25 (55.6%) had family history of hypertension (both maternal and paternal) and 20(44.4%) did not have any family history of hypertension. Only 6(13.3%) had history of maternal history and 11(24.4%) had paternal history of hypertension. Among the 45 participants, 12(26.7%) were vegetarians and 33(73.3%) were non-vegetarians. About half of the participants 23(51.1%) take additional salt intake in their diet and 22(48.9%) of them do not consume additional salt. With regards to the intake of junk food, 12(26.7%) of them take junk food daily and weekly, 14 (31.1%) of them take monthly and only 7(15.6%) of them do not take junk food at all.

DISCUSSION

The results of this study show that the mean systolic BP for boys and girls are normal between all the age groups. The mean diastolic pressure for both boys and girls are also found to be normal. The values are found to be normal according to the PALS Guidelines (2015). About 33(73.3%) were non-vegetarians and half of the participants 23(51.1%) take additional salt intake in their diet, which is a high risk factor for developing hypertension in the future. There is a gradual increase of BP over age in this study, which is similar to the study conducted in Bihar, India by Kumar A *et al* (2015).

A study conducted in Uttar Pradesh by Agarwal *et al*, India shows that there is a significant association found between hypertension and additional salt intake [10]. The other risk factor is the intake of junk food, in which 12(26.7%) of them take junk food daily and weekly. There are more than half of them 25 (55.6%) who had family history of hypertension (both maternal and paternal). The study finding is similar to the study done by Mijinyawa *et al* in Nigeria shows that the prevalence rate of hypertension raised from 4.3% (among the younger participants) to 11.8% among the oldest students. Of the 70, a majority (88.5%) had grade 1 hypertension, 10.0% had Grade 2 hypertension and 1.5% had Grade 3 hypertension. The hypertensives were about twice more likely to have a family history of hypertension compared to their normotensive counterparts. Adolescent hypertensives in Kano, Nigeria were twice more likely to have family history of hypertension than their normotensive counterparts [11]. A study conducted in Karnataka, India among the first year medical students showed that young normotensives with a positive family history of hypertension had significantly higher blood pressure ($p < 0.005$) and also increased resting heart rate ($p < 0.05$) than young normotensives with a negative family history of hypertension[12]. Though, in this study, the mean blood pressure readings of boys and girls for both systolic and diastolic are found to be normal among the ages between 5-19 years, there are still few risk factors found to be present in the history.

CONCLUSION

Children with family history of hypertension should therefore, be targeted for primary prevention in vigorous manner along with dietary and lifestyle modification. Knowledge about prevalence, early and appropriate diagnosis is important since even a small change in blood pressure can have substantial effect on cardiovascular health (Kumar A *et al*, 2015). Routine blood pressure measurements should be taken in school children to improve the detection, prevention and treatment of hypertension. Although the study results shows that the children and adolescents have normal systolic and diastolic blood pressure readings, significant interventions to promote awareness in the prevention of the hypertension and associated risk factors is essential.

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