

Original Research Article

Study of occurrence of childhood hypertension in school going children attending pediatrics OPD in Moradabad city

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ABSTRACT

Background: In developed countries, childhood hypertension is a proven indicator of adult hypertension and organ damage and is estimated to be great concern. This study was conducted to assess the occurrence of childhood hypertension in school going children attending pediatrics OPD.

Methods: An observational study was performed at TMMC and RC among 500 school going children attending pediatrics OPD in TMMC and RC over a period of 1 year. Socio-demographic variables including age, gender, family history of hypertension, parental smoking habits were recorded in a proforma. Dietary habits including consumption of junk food, fruits and daily calorie intake was evaluated utilizing number of times diet intake questionnaire and 24 hour recall method. Height was measured by stadiometer with candidate posing in bare feet. Weight assessment was done with bare footed and candidate clad in light clothing with weighing instrument of electronic type rounded to nearest unit.

Results: Elevated blood pressure and hypertension was reported among 9.4% and 6.8% of the subjects respectively. High blood pressure was significantly associated with presence of family history, stress and lack daily physical activity. Chances of elevated blood pressure and hypertension increase along with the increase in subject height, weight and BMI.

Conclusions: Performing the BP measurements in routine consultations becomes essential for diagnosis and early intervention.

Keywords: Blood pressure, Diet, Exercise, BMI

INTRODUCTION

Measurement of blood pressure (BP) in adults have proved to be essential in cardiovascular health assessment, and have been a regular aspect of physical examination since the research of Stephen Hales in the 18th century.¹ It wasn't until 1977, though, that the Task Force on Blood Pressure Management in pediatric population carried out a proper evaluation of hypertension in children.² In childhood, systemic hypertension is a significant disease with an approximate

population incidence in developing countries of 1-2%.³ Earlier it has been considered that chronic hypertension is related to the adult population, but now rises in the number of children are also affected. In developed countries, childhood hypertension is a proven indicator of adult hypertension and organ damage and is estimated to be great concern.⁴ Children are categorized according to percentile distribution beginning during preschool age which they seem to trace path during their lifetime, lending strength to the hypothesis that critical BP starts in childhood. Pediatrics with secondary hypertension

exhibits a particular, probably modifiable, elevated blood pressure irregularity, whereas cases having primary or essential hypertension will not.⁵ Primary HTN, once considered an uncommon phenomenon in paediatric patients, are most frequently found in obese patients in particular. Life-style shifts such as reduced physical exercise, elevated ingestion of excess calories, high sodium and low potassium diets, use of caffeinated and alcoholic drinks, obesity, emotional distress, and sleep loss are also reasons attributing to the increased incidence of hypertension in adolescents.⁶ In children, the secondary aetiology of hypertension is very much probable than in adult individuals with renal parenchymal pathology, the most common was renovascular disease. In the USA, clinical studies indicate a major secular surge in SBP and DBP due to obesity, adversely change in eating patterns, reduced physical activity and elevated stress are the reasons for high blood pressure. Similar study done in India in school going children indicate a prevalence of 2-5 percent.⁷ Occurrence of identified pediatric hypertension in children has a range of values 2% to 4% dependent on earlier protocol which is still not known about the prevalence which falls under this new guideline. Hence this study was conducted to assess the occurrence of childhood hypertension in school going children attending pediatrics OPD.⁸⁻¹⁰

METHODS

An observational study was performed at TMMC and RC among All school going children attending pediatrics OPDS. Written Informed consent was obtained for clinical examination. The study was conducted over a period of 1 year among 500 subjects. The subjects were selected according to the following inclusion and exclusion criteria:

Inclusion criteria

Inclusion criteria for current study were; all school going children of age group 6-12 years attending pediatrics OPD and those guardians who do not give consent were excluded

Exclusion Criteria

Exclusion criteria for current study were; patients needing IPD admission, child or parents not giving consent for study, chronic kidney disease, nephrotic syndrome/nephritis, pheochromocytoma, heart diseases, cardiac failure, vascular diseases-SLE, other collagen vascular diseases, cushing's syndrome and hypothyroidism.

Method of collection of data

Detailed history and examination of all the patients who visit OPD in Teerthanker Mahaveer medical college and research centre in Moradabad, written informed consent was obtained from mother/father/legally acceptable

caregiver, socio-demographic variables including age, gender, family history of hypertension, parental smoking habits were recorded in a proforma, dietary habits including consumption of junk food, fruits and daily calorie intake was evaluated utilizing number of times diet intake questionnaire and 24 hour recall method, height was measured by stadiometer with candidate posing in bare feet, weight assessment was done with bare footed and candidate clad in light clothing with weighing instrument of electronic type rounded to nearest unit, after obtaining height and weight, body mass index (BMI) was quantified utilizing the equation, $BMI = \text{Weight (kg)} / \text{height (m}^2\text{)}$, blood pressure was assessed by sphygmomanometer by auscultation method and BP cuff appropriate for size of child was used, BP was recorded with child in sitting position after rest of 5 mins, children was considered to have hypertension only if they have elevated readings on 3 occasions.

Blood pressure

Blood pressure readings were obtained by employing cuff of appropriate size and with a standard sphygmomanometer (diamond deluxe BP apparatus), with patient seated. Children were put at ease and explanation regarding procedure was done to combat anxiety. BP measured on the right side arm. Appropriately sized cut off was chosen dependence of circumference of upper arm for every individual, BP was taken thrice. Resting for 30 minutes interval in between every measurement and mean blood pressure was quantified. Systolic BP was regarded by the initiation of the Korotkoff-1 sound and the diastolic BP disappearing (Korotkoff-5). Mean systolic blood pressure (SBP) or diastolic blood pressure (DBP) grades of 90th percentile or greater yet lesser than 95th percentile for gender, age-range and height on a minimum of three different situations is delineated as pre-hypertension (raised). Hypertension was regarded while an average SBP or DBP of 95th percentile or greater for gender, age-range and height on a minimum of three different occasions.

Statistical analysis

Data so collected was tabulated in an excel sheet, under the guidance of statistician. The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA). For every measurement scale, measurements were statistically analyzed utilising one way ANOVA. Difference between two groups was determined using chi square test and the level of significance was set at $p < 0.05$.

RESULTS

Out of 500 subjects, 204 (40.8%) were males and 296 (59.2%) were females. Subjects having age group of 6-10 and >10-12 years were 73.6% and 26.4% respectively (Figure 1).

The categorization of blood pressure among the study subjects is shown in (Table 1).

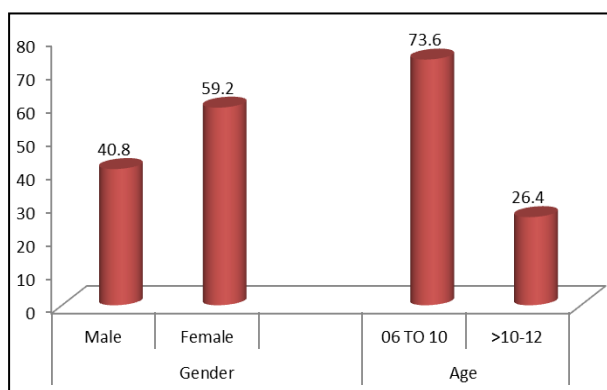


Figure1: Age and gender distribution among the study subjects.

Table 1: Categorization of blood pressure among the study subjects.

Blood Pressure	N	%	Age	SD
Normal	419	83.8	9.74	2.035
Elevated	47	9.4	9.21	1.922
Hypertension	34	6.8	8.72	1.991
ANOVA test				5.06
P value				0.007*

Normal blood pressure was found among 83.8% of the subjects. Elevated blood pressure and hypertension was reported among 9.4% and 6.8% of the subjects respectively. It can be well appreciated from the table 2 that chances of hypertension are more with increase in the age. ANOVA test revealed statistically significant difference between the groups according to age as $p < 0.05$. In our study, hypertension was reported among 3.18%, 23.40%, 20.59% and 36.4% of the subjects who were having negative family history, positive father history, positive mother history and both (positive father+mother history) respectively. Chi square test revealed statistically significant difference between the groups as $p < 0.05$. Hypertension was found among 26.2% of the subjects having stress due to any reason. Hypertension and elevated blood pressure was revealed more among subjects having less than 1 hour of daily physical activity as compared to subjects who do daily physical activity of >1 hour. When blood pressure categories were compared according to family history, presence and absence of stress, daily physical activity using chi square test, it was found to be statistically significant as $p < 0.05$ (Table 2).

Hypertension and elevated blood pressure was revealed more among subjects consuming junk food >2 times per week as compared to subjects who consume of <2 times per week with statistically significant difference as $p < 0.05$ as reported by chi square test. In our study,

hypertension was reported among 2.4%, 4.2%, 22.2% and 36.4% of the subjects who watch TV for 1, 2, 3 and 4 or more than 4 hour respectively with statistically significant difference as $p < 0.05$ as revealed by chi square test. Elevated blood pressure and hypertension was reported among 10.3%, 10.3% and 8.3%, 1.5% of the subjects who sleep for ≤ 6 and >6 hour daily respectively (Table 3). In current study, chances of elevated blood pressure and hypertension increase along with the increase in subject height, weight and BMI. When blood pressure categories were compared according to height, weight and BMI using ANOVA test, it was found to be statistically significant as $p < 0.05$ in this study (Table 4).

DISCUSSION

Hypertension in child and young adult population is a growing issue owing not just to its increasing occurrence, but even for proof recommending that increased BP paths from younger to older age. Around 50% of adult population exhibiting raised BP in their child-hood period. Additionally, various studies suggest that increased BP amongst child population is associated with carotid intima medium denseness, atherosclerosis, left ventricular hypertrophy & renal failure. Subsequently, initial judgment and regulation of this situation in childhood is more prone to have a significant influence on longer term effect of hypertension associated cardio-vascular complications.¹¹⁻¹² The current study was conducted to evaluate the occurrence of childhood hypertension in school going children attending pediatrics Opd in TMMC and RC. Normal blood pressure was found among 83.8% of the subjects. Elevated blood pressure and hypertension was reported among 9.4% and 6.8% of the subjects respectively in the present study. Various literature done across the world showed a great range in occurrence of raised hypertension in children revealing as higher as 22 % to as lower as 0.6 %.³ Buch et al in their study reported that prevalence of hypertension was 8.24% in private school children while it was 5.4% in children from government school.¹³ Naha et al in their study found that total prevalence of hypertension was 4.5% and pre-hypertension was 5.8 %.¹⁴ In Hakim study, it was calculated to be 3.1% (63/2011 students).¹⁵ As their study was confined to municipal schools of Delhi, most of the students were from poor socio-economic background. As per the study of Chadha, et al occurrence of hypertension amongst school children, in Delhi is 11.7 %.¹⁶ They explored school children from urban areas wherein dietary practices, insufficient physical workout and peer pressure might attribute to these higher incident cases. In this study, subjects having age group of 6-10 and $>10-12$ years were 73.6% and 26.4% respectively. Mean age among hypertensive subjects was 9.74 ± 2.04 years which is higher as compared to subjects with normal blood pressure with statistically significant difference as $p < 0.05$. Therefore chances of hypertension are more with increase in the age. Such increase in mean BP and prevalence due to increase in age may be due to increase in body mass.

Table 2: Categorization of blood pressure among the study subjects according to family history, stress and physical activity.

Family History		BP			Total
		Elevated	Hypertension	Normal	
None	N	21	12	345	378
	%	5.56	3.18	91.27	100.0
Father	N	14	11	22	47
	%	29.87	23.40	46.81	100.0
Mother	N	11	7	16	34
	%	32.35	20.59	47.06	100.0
Both	N	1	4	6	11
	%	9.1	36.4	54.5	100.0
Chi Square and p value		23.07 and <0.01			
Stressors					
No	N	25	7	365	397
	%	6.3	1.8	91.9	100.0
Yes	N	22	27	54	103
	%	21.4	26.2	52.4	100.0
Chi Square and p value		106.87 and <0.01			
Physical activity (per day)					
>1hr	N	15	2	245	262
	%	5.7	0.8	93.5	100.0
<1hr	N	32	32	174	238
	%	13.4	13.4	73.1	100.0
Chi Square and p value		43.59 and <0.01			

Table 3: Categorization of blood pressure among the study subjects according to frequent junk food.

Frequent junk food (times per week)		BP			Total
		Elevated	Hypertension	Normal	
<2	N	6	7	265	278
	%	2.2	2.5	95.3	100.0
>2	N	41	27	154	222
	%	18.5	12.2	69.4	100.0
Chi Square and p value		61.74 and <0.01			
Hours of TV watching					
1	N	10	5	197	212
	%	4.7	2.4	92.9	100.0
2	N	11	7	148	166
	%	6.6	4.2	89.2	100.0
3	N	25	18	38	81
	%	30.9	22.2	46.9	100.0
4	N	1	4	6	11
	%	9.1	36.4	54.5	100.0
Not applicable	N	0	0	30	30
	%	0.0	0.0	100.0	100.0
Chi Square and p value		119.003 and <0.01			
Hours of sleep					
≤ 6	N	23	24	126	173
	%	10.3	10.3	79.3	100.0
>6	N	24	10	293	327
	%	8.3	1.5	90.2	100.0
Chi Square and p value		63.15 and <0.01			

Table 4: Categorization of blood pressure among the study subjects according to mean height (cm), weight (KG) and BMI.

BP		Height (cm)	Weight (Kg)	BMI
Normal	Mean	128.19	25.73	15.34
	SD	11.16	6.72	1.56
Elevated	Mean	136.29	31.95	17.14
	SD	9.12	5.83	1.52
Hypertension	Mean	145.08	38.31	18.13
	SD	5.68	5.65	1.72
Total	Mean	130.11	27.17	15.69
	SD	11.66	7.44	1.76
ANOVA test		47.79	71.32	72.69
P value		<0.01	<0.01	<0.01

Studies conducted in Turkey and Zambia on school going children demonstrated increase of BP with growing age.^{17,18} Soundarssanane et al did an Indian study and also had similar opinion for raise in hypertensive situation with increased age.¹⁹

In our study, hypertension was reported among 3.18%, 23.40%, 20.59% and 36.4% of the subjects who were having negative family history, positive father history, positive mother history and both (positive father+mother history) respectively with statistically significant difference. Hence hypertension in children was related to positive family history. Familial record of hypertensive situation was an important risk variable for hypertension as seen in various studies of Zambian study¹⁸ that demonstrated about parental history prior to 60 years associate to their children getting hypertension. Indian studies such as, Soundarssanane et al and Gupta too has demonstrated same result.²⁰ In this study, hypertension was found among 26.2% of the subjects having stress due to any reason with statistically significant difference as $p < 0.05$. Physical work out too shows a remarkable effect on Blood pressure. In the present study, hypertension and elevated blood pressure was revealed more among subjects having less than 1 hour of daily physical activity as compared to subjects who do daily physical activity of >1 hour with statistically significant difference as $p < 0.05$. Similarly Naha et al in their study revealed that greater than 60% of individuals having hypertension and pre hypertensive situation cohort played fewer hours even lesser than an hour. The reduced physical range in child and adolescent population is equated principally, computer gaming, video gaming, internet browsing, TV and film watching overemphasising on academic performance, non - scientific urban planning and raising automated transport.¹⁴

Hypertension and elevated blood pressure was revealed more among subjects consuming junk food >2 times per week as compared to subjects who consume of <2 times per week with statistically significant difference as $p < 0.05$ in the present study. Similarly Naha et al in their

study revealed that a relative greater uptake of foods that are fried observed in both hypertensive and pre-hypertensive group, because of their frequent consumption seemed to be on a daily basis.¹⁴ In our study, chances of raised BP and hypertension increase along with the increase in subject height, weight and BMI. When blood pressure categories were compared according to height, weight and BMI, it was found to be statistically significant as $p < 0.05$ in this study. The said correlation even was seen in plenty of other studies such as those conducted in Norwegian and Taiwan.^{21,22} Even the Framingham study demonstrated raised occurrence of obesity amongst individuals having hypertension and also raise in BP in predetermined obese situations. Andriska et al²³ reported about 41% of hypertensive child population was in obese group, hence they concluded that obesity has a key role in childhood hypertensive progression. Buch et al in their study reported remarkable increase of hypertension with obeseness in both genders, with approximately 30% of obese child population having hypertension.¹³

Limitations

Some of the limitations of the study could be that this study may not show the true hypertension occurrence of society. Students above 12 years were excluded from the study. Inclusion of those students could have increased the prevalence of hypertension. Use of ambulatory blood pressure monitoring on suspicious students could have given a more correct value. Due to low prevalence of childhood hypertension, a larger number of student populations could give a more true value.

CONCLUSION

The study showed that elevated blood pressure and hypertension was reported among 9.4% and 6.8% of the subjects respectively. There were a higher proportion of male hypertensive. Factors like age, family history of hypertension, physical activity, watching TV, junk food consumption and obesity were significantly associated with high blood pressure among the school children.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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