Section: Pediatrics

Original Research Article

PREVALENCE OF HYPERTENSION IN CHILDREN IN AGE GROUP 6-14 YEARS: A DESCRIPTIVE OBSERVATIONAL STUDY FROM HYDERABAD

Pavan Reddy[1], Mondreti Srilakshmi[2], Saulah Maryam[3]

[1]*Assistant professor, Department of Pediatrics, Deccan college of medical sciences, Hyderabad, Telangana, India.*
[2]*Professor, Department of Pediatrics, Malla Reddy Institute of Medical Sciences, Hyderabad, Telangana, India.*
[3]*Intern, Deccan college of Medical Sciences, Hyderabad, Telangana, India.*

Received *: 10/09/2025*
Received in revised form *: 26/10/2025*
Accepted *: 15/11/2025*

Corresponding Author:
Dr. Pavan Reddy,
Assistant professor, Department of Pediatrics, Deccan college of medical sciences, Hyderabad, Telangana, India.
Email: pavanry@gmail.com

DOI: 10.70034/ijmedph.2025.4.368

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (4); 2046-2050

ABSTRACT

Background: Blood pressure is considerably lower in children than adults but almost always increases steadily throughout the first two decades of life. Hypertension is one of the commonest diseases with an estimated worldwide prevalence of 1 billion. The prevalence of hypertension in children is reported to be 1-3%. Elevated blood pressure in children and adolescents may be an early expression of essential hypertension in adulthood. The objective is to determine the prevalence of hypertension in children in age group 6-14 years.

Materials and Methods: This prospective observational cross-sectional study was carried out in Children aged between 6 – 14 years attending Owaisi Hospital and research centre (DCMS) for routine immunisation and their siblings during the study period May 2024 to April 2025.

Results: In males Prevalence of Hypertension was 8.52% and in females Prevalence of Hypertension was 8.72%. Overall Prevalence of Hypertension was 8.61 %. In males, among 28 children with positive family H/o of hypertension, 4 (14.29%) were hypertensive. In females, among 25 children with positive family H/o of hypertension, 5 (20.00%) were hypertensive.

Conclusion: Prevalence of Hypertension was 8.61%. In males Prevalence of Hypertension was 8.52% and in females Prevalence of Hypertension was 8.72%.

Keywords: prevalence, hypertension, children, age group 6-14 years.

INTRODUCTION

Hypertension is a major health problem in developed and developing countries associated with high mortality and morbidity affecting approximately one billion individuals worldwide. Hypertension has its origin in childhood but goes undetected unless specifically looked for during this period.[1] Various studies have observed that although blood pressure normally increases with growth and development, the children with higher levels of blood pressure tend either to maintain that position as they mature or track into higher levels of blood pressure in adulthood in comparisons to their peer group.[2]

The measurement of blood pressure is firmly established as an important component of routine paediatric physical examination. Blood pressure should be measured yearly after the age of three years.[3] Accurate measurement of blood pressure may be difficult in children because the readings vary significantly with cuff size, patient positioning, clinical setting, equipment used (mercury sphygmomanometer versus oscillometric methods) and training of the observer.

Blood pressure is considerably lower in children than adults but almost always increases steadily throughout the first two decades of life. Hypertension is one of the commonest diseases with an estimated worldwide prevalence of 1 billion. The prevalence of hypertension in children is reported to be 1-3%.[4] Elevated blood pressure in children and adolescents may be an early expression of essential hypertension in adulthood.[5]

The blood pressure profiles in childhood varies with age, sex, weight, height, body mass index (obesity), family history of hypertension, socioeconomic status and dietary habits.[6]

Studies have concluded that both systolic and diastolic blood pressure have a direct correlation with weight and with height (independent of age).[7] Few studies have also shown that obese children (↑ BMI) have an increased systolic and diastolic blood pressure levels.

Reference norms developed for one particular population may not be applicable to other because of racial, ethnical and cultural difference across the world.[8] There are number of studies conducted in different parts of the world regarding paediatric blood pressure profiles and its correlation with weight, height and body mass index, but there is paucity of studies in Indian context. The local reference data is essential to evaluate any observed blood pressure values.

Hence the present research attempts to study the prevalence of Hypertension in children and correlation of age, gender, weight, height and BMI with blood pressure in normal children in metropolitan city of Hyderabad.

Objective: To determine the prevalence of hypertension in children in age group 6-14 years.

MATERIALS AND METHODS

Study area: Children attending Owaisi Hospital and research centre (DCMS) for routine immunisation and their siblings.

Study population: Children aged between 6 – 14 years studying in metropolitan city of Hyderabad.

Inclusion criteria

- Children between age group 6 to 14 years

Exclusion criteria

- Children on prolonged drugs affecting blood pressure.
- Children with disease affecting blood pressure (congenital heart disease, Rheumatic heart disease, renal disorders, liver diseases, acute bacterial infection)

Sample size: With the reference to previous studies, expected prevalence of Hypertension in school children is 5 %. For confidence level of 95% with margin of error of around 5 %, sample size taken for the study was calculated using following formula (76):

$n = (Z2 \times P (1- P)) / e 2$

P is proportion

Z is Value from standard normal distribution corresponding to desired confidence level

e is desired precision

By applying following values,

P = 0.05

Z = 1.96 (for Confidence Interval of 95 %)

e = 0.05

We have arrived at sample size of 380. Taking attrition of 10%, the sample size calculated was 418.

Study design: A prospective observational cross-sectional study

Study duration: May 2024 to April 2025

Method of measurement of outcome of interest

Outcome Variable:

- Prevalence of hypertension

Methodology

Data was collected in a pre-structured proforma. Informed consent was obtained from the parents or school authority. Blood pressure was measured in sitting position after 10 minutes of rest. BP was measured after applying an appropriately sized cuff on the right arm encircling 2/3rd circumference of the arm with lower edge 2.5 cm above the cubital fossa, as per guidelines suggested by WHO guidelines.

The measurement of BP was carried out in quite atmosphere using BP monitor (Philips) by oscillatory method. Oscillatory devices produce a digital readout and work on the principle that blood flowing through an artery between systolic and diastolic pressures causes vibrations in the arterial wall which can be detected and transduced into electrical signals.

With an oscillatory device, a cuff is inflated over the upper arm or wrist. The new models use “fuzzy logic” to decide how much the cuff should be inflated to reach a pressure about 20 mm Hg above systolic pressure for any individual. When the cuff is fully inflated to this pressure, no blood flow occurs through the artery. As the cuff is deflated below the systolic pressure, the reducing pressure exerted on the artery allows blood to flow through it and sets up a detectable vibration in the arterial wall. When the cuff pressure falls below the patient's diastolic pressure, blood flows smoothly through the artery in the usual pulses, without any vibration being set up in the wall. Vibrations occur at any point where the cuff pressure is sufficiently high that the blood has to push the arterial wall open in order to flow through the artery. The vibrations are transferred from the arterial wall, through the air inside the cuff, into a transducer in the monitor that converts the measurements into electrical signals.

These digital devices deflate at about 4 mm Hg per second, making them sometimes seem slower to use than auscultatory aneroid devices, but they are more accurate. Three readings were taken with interval of 5 min between the successive measure and the mean of these readings were recorded. Reference chart of blood pressure as per the height was taken to confirm the presence of hypertension.

Blood pressure values were compared to the values given by the update of 1987 task force report of the National high blood pressure Education Programme Co- coordinating committee.

Children were classified into 3 groups as per guidelines of the above committee

- If BP > 95th percentile - Hypertension (HTN)
- 90 – 95th percentile - Pre-hypertension (PHTN)
- < 90th percentile - Normal (N)

Blood pressure was compared in relation to age, sex and height percentile in each age group. In those children whose systolic and diastolic Blood Pressure values was found to be more than 95th percentile for age, sex and height. Two sets of Blood Pressure reading were taken.

RESULTS

Table 1: Systolic Blood Pressure according to Age and Sex

Age (yrs)	Males			Females		
	No of cases	Mean	SD	No of cases	Mean	SD
6+	24	99.69	3.62	22	96.55	2.86
7+	26	99.46	3.07	21	98.53	2.17
8+	23	100.41	2.56	23	99.08	2.38
9+	25	102.31	1.84	22	100.86	2.16
10+	25	102.20	2.16	21	101.16	2.12
11+	26	104.20	1.93	21	104.04	2.38
12+	26	105.84	1.88	20	105.07	1.93
13+	26	107.75	1.33	21	108.32	1.32
14+	22	109.90	1.92	24	107.87	1.33

Mean SBP of males ranged from 99.69±3.62 mmHg at age of 6 years to 109.9±1.92 mmHg at age of 14 years and Mean SBP of females ranged from 96.55 ± 2.86 mmHg at age of 6 years to 107.87±1.33 mmHg at age of 14 years respectively.

Table 2: Diastolic blood pressure according to age and sex

Age (yrs)	Males			Females		
	No of cases	Mean	SD	No of cases	Mean	SD
6+	24	60.11	3.64	22	57.97	2.62
7+	26	62.13	1.61	21	59.46	1.39
8+	23	62.37	1.45	23	61.18	1.69
9+	25	63.30	1.11	22	61.59	1.08
10+	25	64.59	1.00	21	62.56	1.13
11+	26	65.03	0.86	21	63.34	1.55
12+	26	66.18	0.87	20	64.01	1.64
13+	26	68.12	0.86	21	65.24	1.63
14+	22	69.27	0.86	24	66.07	1.35

Mean DBP of males ranged from 60.11±3.64 mmHg at age of 6 years to 69.27±0.86 mmHg at age of 14 years and Mean DBP of females ranged from 57.97 ± 2.62 mmHg at age of 6 years to 65.24±1.63 mmHg at age of 14 years respectively.

Table 3: MAP Blood Pressure according to Age and Sex

Age (yrs)	Males			Females		
	No of cases	Mean	SD	No of cases	Mean	SD
6+	24	73.30	3.63	22	70.83	2.70
7+	26	74.57	2.10	21	72.48	1.65
8+	23	75.05	1.82	23	73.81	1.92
9+	25	76.30	1.35	22	74.68	1.44
10+	25	77.13	1.39	21	75.43	1.46
11+	26	78.09	1.22	21	76.91	1.83
12+	26	79.40	1.21	20	77.70	1.74
13+	26	81.33	1.02	21	79.60	1.53
14+	22	82.81	1.21	24	80.00	1.34

Mean MAP of males ranged from 73.3±3.63 mmHg at age of 6 years to 82.81±1.21 mmHg at age of 14 years and Mean MAP of females ranged from 70.83 ± 2.7 mmHg at age of 6 years to 80±1.34 mmHg at age of 14 years respectively.

Table 4: Prevalence of Hypertension

Sex	Present	Absent	Total
Males	19 (8.52%)	192 (91.48%)	211
females	17 (8.72%)	198 (91.28%)	207
Total	36 (8.61 %)	390 (91.39%)	418

In males Prevalence of Hypertension was 8.52% and in females Prevalence of Hypertension was 8.72%. Overall Prevalence of Hypertension was 8.61 %.

Table 5: Children with positive family H/o of hypertension

Sex	Family H/o of HTN (n=54)		No Family H/o of HTN (m=364)		Total
	Hypertension Present	Normotension	Hypertension Present	Normotension	
Males	4 (14.29%)	24 (85.71%)	15 (7.69%)	180 (92.31%)	223
females	5 (20.00%)	20 (80.00%)	12(7.06%)	158 (92.94%)	195
Total	9 (16.98%)	44(83.02%)	27(7.4%)	338 (92.6%)	418

In males, among 28 children with positive family H/o of hypertension, 4 (14.29%) were hypertensive. In females, among 25 children with positive family H/o of hypertension, 5 (20.00%) were hypertensive. Whereas, among 195 male children with positive no family H/o of hypertension, 15 (7.69%) were hypertensive. In females, among 170 children with no positive family H/o of hypertension, 12(7.06%) were hypertensive. Overall, among 54 children with positive family H/o of hypertension, 9 (16.98%) were hypertensive.

Table 6: Children with positive family of Obesity

Sex	H/o of Obesity(n=60)		No H/o of Obesity (m=358)		Total
	Hypertension Present	Normotension	Hypertension Present	Normotension	
Males	4(12.1%)	29(87.9%)	15(7.8%)	175(92.1%)	223
females	3(11.11%)	24(88.89%)	14(8.33%)	154(91.67%)	195
Total	7(13.2%)	53(86.80%)	29(8.81%)	329(91.09%)	418

In males, among 33 children with positive family H/o of Obesity, 3(12.1%) had Hypertension. In females, among 27 children with positive family H/o of Obesity, 3(11.11%) had Hypertension. Whereas, among 194 male children with positive no family H/o of Obesity, 16(8.76%) had Hypertension. In females, among 170 children with no positive family H/o of Obesity, 13 (7.64%) had Hypertension. Overall, among 53 children with positive family H/o of Obesity, 12.68% had Hypertension.

Table 7: Children with positive family of Smoking

Sex	Family H/o of Smoking (n=53)		No Family H/o of Smoking(m=362)		Total
	Hypertension Present	Normotension	Hypertension Present	Normotension	
Males	2 (6.1%)	31(93.9%)	17(8.95%)	173(91.05%)	223
females	2 (7.7%)	24 (92.3%)	15(8.88%)	154(91.12%)	195
Total	4 (6.78%)	55(93.22%)	32(9.79%)	327(90.21%	418

In males, among 33 children with positive family H/o of Smoking, 2 (6.1%) had Hypertension. In females, among 26 children with positive family H/o of Smoking, 2 (7.7%) had Hypertension. Whereas, among 190 male children with positive no family H/o of Smoking, 17(8.95%) had Hypertension. In females, among 169 children with no positive family H/o of Smoking, 15(8.88%) had Hypertension. Overall, among 53 children with positive family H/o of Smoking, 4 (6.78%) had Hypertension.

DISCUSSION

Blood pressure and Age: The systolic and diastolic blood pressure measurements in our study according to age & sex, are obtained by oscillatory method using the Oscillatory device.

In present study, both systolic and diastolic blood pressure showed a positive correlation with increase in age, consistent with the findings reported by several studies. Study by Luo JS et al,[9] (2014) observed increasing trend with age for both systolic blood pressure and diastolic blood pressure observed (56). Kamatham Madhusudhan et al,[10] (2017) observed that there was a linear increase of mean blood pressure with increasing age. (57).[10]

In a study by Banker Chirag et al (2013),[11] they observed mean systolic blood pressure and mean diastolic blood pressure increase with age from 5+ to 12+ years of age.

Male students had 1-2 mm of Hg of higher blood pressure when compared with their female counterparts at all ages. This is similar to the average annual increase of 2 mm of Hg in boys and about 1 mm of Hg in girls reported by world health organisation study group.[12]

Thus it can be concluded that the males had slightly higher values of blood pressure (1-2 mm of Hg) when compared to the females for that age. This could be explained that boys are heavier and taller when compared to females for that age which resulted in this observation.

It was also observed from the readings of mean SBP for different ages (both sexes) that there is not much increase (1-2 mm of Hg/year) in the SBP between age groups 6-10 years. But the rise was steeper (2-3 mm of Hg/year) during adolescence (>11 years) when compared with the rise during ages 6-10 years.

In the present study, there is a mere increase of 4-5 mm of Hg in diastolic BP from age 6 years to 10 years in both sexes. But diastolic BP showed a spurt from 11 years (adolescence) and it increased for 8-10 mmHg.

Similar results were obtained in the study done by Sharma BK et al.[13] The spurt in systolic and Diastolic blood pressure may be possibly due to age related hormonal, physical and psychological changes occurring in the body during puberty (> 11 years).

For diastolic blood pressure a rising trend with age was also present, although the rise was much less marked than the systolic BP. Similar trends was observed in other studies.

Prevalence of hypertension

Hypertension in childhood is defined as systolic and/or diastolic BP that is ≥95th percentile for age, gender, and height. In our study, 8.61 % of children were classified as hypertensive with prevalence in male children 8.52% and female children 8.72%. Pre-

hypertension is defined as systolic and/or diastolic BP that is >90th percentile (for age, gender, and height) but <95th percentile.

Study by Luo JS et al,[9] (2014) observed prevalence of hypertension as 6.58%. Study by Kamatham Madhusudhan et al,[10] observed Prevalence of high blood pressure as 13.1% (pre hypertension: 6.44% and hypertension: 6.64%).

In a study by Violet Kankane Moselakgomo et al,[14] (2012), the prevalence of hypertension observed was 4.1 and 2.8% for boys and girls, respectively.

In a study by NA Kajale et al,[15] hypertension was observed in 5.

CONCLUSION

Overall Prevalence of Hypertension was 8.61 %. In males, prevalence of hypertension was 8.52% and in female, prevalence of hypertension was 8.72%. Risk factors for Hypertension were family H/o of Hypertension, Obesity and Diabetes mellites.

REFERENCES

1. Aglony M, Acevedo M, Ambrosio G. Hypertension in adolescents. Expert Rev Cardiovas Therapy. 2009;7: 1595-603.
2. Schiel R, Beltschikow W, Kramer G, Stein G. Overweight, obesity and elevated blood pressure in children and adolescents. European J Med Res. 2006; 11:97-101.
3. Houtman PN, Dillon MJ. Routine measurement of blood pressure in school children. Arch Dis Child 1991; 66: 567-575.
4. Ostchega Y, Carroll M, Prineas RJ, McDowell MA, Louis T, Tilert T. Trends of elevated blood pressure among children and adolescents: data from the National Health and Nutrition Examination Survey 1988–2006. Am J Hypertension; 2009; 22:59–67.
5. Acosta AA, Samuels JA, Portman RJ, Redwine KM. Prevalence of persistent prehypertension in adolescents. J Pediatr. 2012; 160:757-61.
6. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: Analysis of worldwide data. Lancet 2005; 365:217-23
7. Krishna P, PrasannaKumar KM, Desai N, Thennarasu K. Blood pressure reference tables for children and adolescents of Karnataka. Indian Pediatr 2006; 43:491-501.
8. Kuriyan R, Thomas T, Lokesh DP, Sheth NR, Mahendra A, Joy R. Waist circumference and waist for height percentiles in urban South Indian children aged 3-16 years. Indian Pediatr 2011; 48:765-71.
9. Luo JS, Chen SK, Fan X, Tang Q, Feng Y. Zhongguo Dang. Prevalence of hypertension and relationship between hypertension and obesity in children and adolescents in Nanning of Guangxi Province.2014;16(10):1040-4.
10. Kamatham Madhusudhan, Rajendra Betham, Venkateswara Rao Jampana. Study of blood pressure profile and correlation of hypertension with age, sex, anthropometric measurements (weight, height, body mass index), socio economic status and hereditary factors in school going children.2017;4(1):12-17
11. Banker Chirag A, Jitesh Chavda, Khyati M. Kakkad, Panchsilla Damor. A Study of Prevalence of Hypertension in School Children. Gujarat medical Journal.2013;68(2)
12. Odutola Odetunde, Emeka E Neboh, Josephat M Chinawa, Henrietta U Okafor, Oluwatoyin A Odetunde. Elevated arterial blood pressure and body mass index among Nigerian preschool children population BMC Pediatrics.2014;14:64
13. Sharma BK, Sagar S, Wahi PL, Talwar KK, Singh S, Kumar L. Blood pressure in school children in northwest India. Am J Epidemiol. 1991;134(12):1417–26.
14. Violet Kankane Moselakgomo , Abel Lamina Toriola, Brandon Stuwart Shaw, Daniel Ter Goon, Oluwadare Akinyemi. Body mass index, overweight, and blood pressure among adolescent schoolchildren in Limpopo province, South Africa Rev Paul Pediatr. 2012;30(4):562-9.
15. NA Kajale, AV Khadilkar, SA Chiplonkar and VV Khadilka. Body Fat Indices for Identifying Risk of Hypertension in Indian Children. Indian Pediatr 2014;51: 555-560.