

Childhood Hypertension: An Observational Study from a Tertiary Care Centre, Gujarat, India

DHARA GOSAI¹, BELA SHAH², KIRAN CHAUDHARY³, AMIT DAS⁴

ABSTRACT

Introduction: Childhood hypertension is an underestimated problem in India and other developing countries and it often reported in adults. Hypertensive children, although usually asymptomatic, already manifest evidence of target organ damage. Many of hypertensive children have left ventricular hypertrophy and increased carotid intima-media thickness, a marker of early atherosclerosis. Hypertensive children are very prone to develop target organ damage like retinopathy, renal damage, cardiac complications if remains undiagnosed and untreated for long. Other risk factors like cardiovascular disease, diabetes mellitus and hyperlipidaemia must also be looked for in hypertensive children.

Aim: To study the prevalence, clinical profile, aetiology of hypertension and to analyse various management protocol, complications, and early outcomes of hypertension in hospitalised children aged between 5-10 years.

Materials and Methods: This was a prospective, observational analytical study conducted in the Department of Paediatrics of a tertiary care centre at Ahmedabad, Gujarat, India, from 1st October 2017 to 30th September 2019. Blood pressure was measured by mercury sphygmomanometer using auscultatory method in all admitted patients in Paediatrics Department between the age of 5-10 years as a part of vital monitoring. A total of 103 patients having average systolic blood pressure and/or diastolic blood pressure greater than or equal to

95th percentile for that age, sex and height on three or more occasions were included in the study and their comprehensive details were recorded in prestructured proforma. The outcome was recorded as data in excel sheet and arranged in tables.

Results: The prevalence of hypertension was 0.96%. The mean age of the study population was 8 years, and the male:female ratio was 1.09:1. Vomiting was the most common presenting complaint followed by fever and puffiness of eyes. A higher incidence of fever on presentation was due to the associated infective pathology of Central Nervous System (CNS). Pallor was the most common finding on general examination. Neurological deficit was observed in patients with hypertensive encephalopathy and stroke. Overall, 21 (20.38%) patients were in stage 2 hypertension, accounting to hypertensive emergencies, 48 (46.6%) patients with hypertension had an underlying renal disorder, followed by CNS disorder in 47 (45.6%). Amlodipine (26.21%) was the most common drug used in hypertensive patients. Most common complication of the present study was hypertensive retinopathy seen in 14 patients (13.59%).

Conclusion: In hospitalised patients, the prevalence of hypertension was 0.96% with a male preponderance. On admission, the most prevalent complaints were vomiting and fever. Pallor and puffiness of eyes were the most common general examination findings, and ascites was the most common systemic examination result. The most common secondary cause of hypertension was renal disease, with acute glomerulonephritis as most prevalent.

Keywords: Elevated blood pressure, Glomerulonephritis, Paediatrics, Renal disorder

INTRODUCTION

Childhood hypertension is an underestimated problem in India and other developing countries and it often reported in adults [1]. A 10.2 million deaths and 208 million Disability Adjusted Life Years (DALY) was reported in hypertensive patients in a systematic analysis for the global burden of disease study 2016 [2]. A graded association between increased Blood Pressure (BP) and risk of cardiovascular disease and end-stage renal disease has also been documented both in paediatric and adult population [3-5].

Primary hypertension during childhood often tracks into adulthood. It has been shown that even a slight elevation of BP in childhood is likely to elevate the risk of hypertension by several folds in adult population [6-9]. Now-a-days there is increasing burden of obesity and hypertension not only in adult population but also in paediatric population in developing countries including India which predisposes to cardiovascular and renal complications leading to increasing mortality and morbidity [10-16]. Upto 40% of hypertensive children have left ventricular hypertrophy and increased carotid intima-media thickness, a marker of early atherosclerosis [17]. So, there is strong association between childhood hypertension and early atherosclerosis in young adults.

Primary hypertension, once considered a rare occurrence in paediatric patients, is seen more often particularly in obese patients. Other factors responsible for the increased prevalence of hypertension in children include lifestyle changes such as decreased physical activity, increased intake of high calories, high sodium and low potassium foods, use of caffeinated and alcoholic beverages, smoking, mental stress and sleep deprivation [1,18]. Different studies carried out in various countries shows large variation in prevalence of hypertension in children. Its quiet high in India compared to the developed countries. For example, In USA prevalence of childhood hypertension was reported to be 2.7-3.7% [19], while in India the same was found to be much higher (5.9-11.9%) in various studies carried out in different parts of India [Table/Fig-1] [11,20-24].

Hence, this study was carried out to observe the prevalence of childhood hypertension, as well as its aetiologies and various management protocol among the admitted patients in a Government run tertiary care centre in western part of India.

MATERIALS AND METHODS

This was a prospective, observational analytical study conducted in the Department of Paediatrics of a tertiary care centre, B.J. Medical College, Ahmedabad, Gujarat, India, from 1st October 2017 to 30th September 2019. The study protocol was approved by

Author	Place of study	Sample size	Age group (years)	Prevalence of hypertension (%)
Borah PK et al., [11]	Assam	10003	5-14	7.6
Prabhjot A et al., [20]	Amritsar	1000	6-14	7.5
Buch N et al., [21]	Surat	1249	6-18	6.48
Sharma A et al., [22]	Shimla	1085	11-17	5.9
Chadha SL et al., [23]	Delhi	10215	5-14	11.4-11.9
Patel A et al., [24]	Indore	11312	5-15	6.8-7.0

[Table/Fig-1]: Prevalence of Hypertension from various parts of India [11,20-24].

Ethical Committee of B.J. Medical College, Ahmedabad, Gujarat, India (110/2018). Detailed history of all patients enrolled were taken after obtaining informed consent from parents. American Academy of Paediatrics (AAP) Clinical Practice Guidelines for screening and management of high blood pressure in children and adolescents [25] was used as reference standard for BP [Table/Fig-2].

Classification of blood pressure	Systolic or diastolic blood pressure
Normal	<90 th percentile
Elevated blood pressure	≥90 th percentile to <95 th percentile or 120/80 mmHg (which ever is lower)
Stage 1 hypertension	≥95 th percentile to <95 th percentile+12 mmHg or 130/80 to 139/89 (which ever is lower)
Stage 2 hypertension	≥95 th percentile+12 mmHg, ≥140/90 mmHg or ≥140/90 mmHg (which ever is lower)

[Table/Fig-2]: Definition and stages of Hypertension by AAP Clinical Practice Guidelines.

Inclusion criteria: All admitted children in Paediatrics Department between the age group of 5-10 years with hypertension were included in the study.

Exclusion criteria:

- Patients in the prehypertension stage were excluded from the study.
- Patients with transient hypertension for less than 48 hours.
- Patients aged >10 years were excluded from the study as the early adolescent period starts after 10 years which leads to hormonal changes and variation in blood pressure level [26].

Study Procedure

Blood pressure was measured in all admitted patients in Paediatric Department in our institute between the age of 5-10 years as a part of vital monitoring. Patients who fulfilled the above mentioned criteria were enrolled in the study and their comprehensive details were recorded in a prestructured proforma with prior consent. A total of 103 patients were enrolled in the study. A thorough history and physical examination was done. Blood pressure was measured by mercury sphygmomanometer using auscultatory method with an appropriate sized cuff, an average of three readings were taken. Repeat BP measurement was taken in all patients whose blood pressure was on the higher side on admission, and patients with persistent high BP atleast on three occasions were enrolled in the study and staging of hypertension was done according to the percentile chart.

All anthropometric measurements were taken by trained investigators. Height and weight was measured using a slide stadiometer and a spring balance respectively. Body Mass Index (BMI) was calculated and categorised accordingly. Basic investigations like complete blood counts, fundus examination, urine analysis, serum lipid profile, renal function test, electrolytes, abdominal ultrasonography was done in all patients. Other investigations like 2D Echocardiography (2D ECHO), doppler, neuroimaging, intravenous pyelogram and other specific investigations were done as required.

Hypertensive urgency included the patients with raised blood pressure without end-organ damage, but associated with symptoms

such as severe headache, vomiting; hypertensive emergencies included the patients with elevated blood pressure with end-organ damage [27]. A target BP of less than the 95th percentile should be maintained in children with uncomplicated primary hypertension, while in children with associated co-morbidities and evidence of end organ damage, the target BP should be less than the 90th percentile [28].

Profile of the drugs used was recorded for each case. Complications and co-morbid conditions associated with hypertension were assessed in all the patients and early outcome was observed.

STATISTICAL ANALYSIS

Data was recorded in a predesigned proforma and managed on Excel spread sheet. Association of each of the categorical with hypertension (outcome variable) was assessed with Chi-square test. Variables showing statistically significant association with the outcome variables (p-value <0.05) were considered as statistically significant. Data analysis was performed using IBM Statistical Package for the Social Sciences (SPSS) Statistics version 27.0.

RESULTS

Prevalence of hypertension was 0.96% in the study. The mean age of the study population was 8 years, and the male:female ratio was 1.09:1. Vomiting was the most common presenting complaint followed by fever and puffiness of eyes found in 55 (53.3%), 52 (50.4%) and 42 (40.7%) patients, respectively [Table/Fig-3].

Clinical presentation	No. of patients (%)
Headache	30 (29.12)
Vomiting	55 (53.3)
Convulsion	30 (29.12)
Blurring of vision	2 (1.94)
Altered sensorium	32 (10.6)
Weakness	14 (13.5)
Fever	52 (50.48)
Burning micturition	26 (25.24)
Haematuria	26 (25.24)
Decreased urine output	20 (19.4)
Pedal oedema	17 (16.5)
Puffiness of eyes	42 (40.77)
Palpitation	3 (2.91)
Chest pain	2 (1.94)
Breathlessness	7 (6.7)
Distension of abdomen	16 (15.5)
Skin manifestation (rash)	1 (0.97)

[Table/Fig-3]: Clinical presentation of hypertensive children.

Of total, 21 (20.38%) patients were in stage 2 hypertension, accounting to hypertensive emergencies. Overall, 48 (46.6%) patients with hypertension had an underlying renal disorder, followed by CNS disorder 47 (45.6%). Renovascular, endocrine disorders and Cardiovascular Diseases (CVS) causes were responsible for hypertension in 3 (2.94%), 3 (2.94%) and 2 (1.94%) patients, respectively [Table/Fig-4].

Aetiology	No. of patients (%)
Renal parenchymal disease	48 (46.6)
Glomerulonephritis	26 (25.2)
Nephrotic syndrome	16 (15.5)
Dysplastic kidney	2 (1.94)
Obstructive uropathy	2 (1.94)
Reflux nephropathy	1 (0.97)

Renal cyst	1 (0.97)
Renovascular	3 (2.9)
Renal artery stenosis	2 (1.94)
Haemolytic uraemic syndrome	1 (0.97)
Central nervous system	47 (45.6)
Tuberculous meningoencephalitis	16 (15.5)
Pyogenic meningitis	6 (5.8)
Viral encephalitis	4 (3.8)
Guillian Barré syndrome	12 (11.6)
Space occupying lesions	8 (7.7)
Endocrine causes	3 (2.9)
Pheochromocytoma	1 (0.97)
Hyperthyroidism	2 (1.94)
Cardiovascular system	2 (1.94)
Aortic regurgitation	1 (0.97)
Marfan syndrome	1 (0.97)

[Table/Fig-4]: Aetiological classification.

Among the hypertensive patients of renal origin, anaemia was the most consistent finding seen in 33 (68.75%) patients, while 17 (35.41%) patients had elevated blood urea. Haematuria was found in 26 (54.1%) patients on urine analysis [Table/Fig-5].

Lab parameters	No. of patients (%)
Reduced haemoglobin (Anaemia)	33 (68.75)
Elevated blood urea	17 (35.41)
Elevated serum creatinine	15 (31.25)
Elevated serum sodium	10 (20.83)
Albuminuria	24 (50)
Haematuria	26 (54.1)

[Table/Fig-5]: Laboratory parameters in patients with renal hypertension.

Enalapril was the most common drug used in 25 (24.27%) patients and most commonly used in renal parenchymal diseases (60%) followed by CNS disorder (40%). Amlodipine was the most commonly used antihypertensive as monotherapy in 27 (26.21%) patients, out of which 55.55% were in renal parenchymal diseases, 44.45% in CNS disorders. Among the hypertensive patients who were on oral drugs, 82 (80%) patients required monotherapy to control hypertension, while 21 (20%) patients required polytherapy. Labetalol was the most common used drug in hypertensive crisis [Table/Fig-6].

Total 21 (20.4%) patients of hypertension presented with various complications, out of which 20 (95.2%) patients were in stage 2 hypertension. Chi-square statistic was 91.04 and p-value <0.001 which was highly significant. It indicates that complication was more in stage 2 than stage 1 hypertension and it was highly significant [Table/Fig-7].

The most common complication of the study was hypertensive retinopathy followed by hypertensive encephalopathy found among 14 (13.59%) and 7 (6.7%) patients, respectively [Table/Fig-8].

Out of the total 103 patients, 74 (71.84%) patients were cured and discharged, 18 (17.47%) patients died. Yate's correction Chi-square statistic was 32.96, p-value <0.001 which was highly significant. It indicates, death rate was significantly higher in patients having CNS aetiologies. It also suggests that mortality was due to disease per se and not due to hypertension. Majority of the patients with hypertension secondary to renal diseases were discharged {49 (96.07%) out of 51 patients} which explains good prognosis and outcome of renal hypertension [Table/Fig-9].

Name of drug	No. of patients (N=103) (%)	Renal parenchymal	Renovascular disease	Central nervous system	Endocrine causes	Cardiovascular system
Enalapril	25 (24.27)	15	-	10	-	-
Amlodipine	27 (26.21)	15	-	12	-	-
Nifedipine	5 (4.8)	3	-	2	-	-
Clonidine	3 (2.91)	-	-	3	-	-
Labetalol	1 (0.97)	-	-	1	-	-
Enalapril + Nifedipine	14 (13.59)	10	1	1	2	-
Enalapril + Furosemide	6 (5.82)	4	-	-	-	2
Enalapril + Labetalol	9 (8.73)	-	-	8	1	-
Nifedipine + Labetalol	10 (9.4)	-	-	10	-	-
Furosemide + Spironolactone + Torsemide	1 (0.97)	1	-	-	-	-
Enalapril + Nifedipine + Furosemide	1 (0.97)	-	1	-	-	-
Nifedipine + clonidine + Minoxidil + Prazosin + Metoprolol	1 (0.97)	-	1	-	-	-
Total	103 (100)	48	3	47	3	2

[Table/Fig-6]: Various treatment prescribed.

Stage of hypertension	Number of patients	Complications (%)	Without complications (%)
Stage 1	82	1 (4.8)	81 (98.8)
Stage 2	21	20 (95.2)	1 (1.2)
Total	103	21 (100)	82 (100)

[Table/Fig-7]: Complications and the stage of hypertension.

Complications	No. of patients (%)
Hypertensive encephalopathy	7 (6.7)
Cardiac failure	1 (0.97)
Hypertensive urgencies	6 (5.82)
Hypertensive retinopathy	14 (13.59)

[Table/Fig-8]: Complications in hypertensive children.

Aetiology	No. of patients	Outcome	
		Discharged	Died/DAMA
Renal and Renovascular	51	49	2
Central nervous system	47	20	27
Others (Endocrine and cardiovascular system)	5	5	0
Total	103	74	29

[Table/Fig-9]: Outcome of hypertension in patients.

DAMA: Discharge against medical advice

DISCUSSION

Primary hypertension, once considered a rare occurrence in paediatric patients, is seen more often particularly in obese patients [29]. The prevalence of elevated blood pressure is quite high in India compared to the developed countries. For example, in United States of America the prevalence of childhood hypertension was reported to be 2.7%-3.7% [19], while in India the same was found to be much higher (5.9-11.9%) in various surveys carried out in different parts of India [Table/Fig-1] [11,20-24]. In the present study, prevalence of hypertension was 0.96% while it was found to be much higher (5.9-11.9%) in

other studies carried out in different parts of India. In Assam, Amritsar, Surat, Shimla, Delhi, Indore prevalence of hypertension was 7.6, 7.5, 6.48, 5.9, 11.4-11.9, 6.8-7.0, respectively [Table/Fig-1]. That may be because authors excluded the patients of aged >10 years as the early adolescent period starts after 10 years which leads to hormonal changes and variation in blood pressure level [26]. Secondly, the present study was carried out among hospitalised patients which may not be the representative of actual population. After all, there is separate specialised hospitals for nephrology, cardiology, tuberculosis, and malignancy. So, many patients with risk of having childhood hypertension directly get admitted to these hospitals which authors may have missed in this study. The large variation in prevalence of hypertension seen in the above mentioned studies may be because of the different guidelines followed for considering hypertension, different age groups and different study designs.

In this study, renal parenchymal disease was found to be the most common aetiology (glomerulonephritis followed by nephrotic syndrome) of hypertension in children. Another study from India also shows it to be the most common cause [30]. Higher incidence of renal disease also explains why puffiness of face, haematuria, pedal oedema was common findings in the study population.

As with adults, initial therapy for hypertension in children and adolescents includes diet and exercise [28]. Pharmacotherapy is indicated for patients with secondary hypertension and for those who are unable to control BP through diet and exercise [28]. There are limited data related to antihypertensives used in childhood, and their adverse effects. The AAP recommends Angiotensin Converting Enzyme (ACE) inhibitors, Angiotensin Receptor Blockers (ARB), long-acting calcium channel blockers or thiazide diuretics as initial treatment [29]. In our study, authors also found Enalapril (ACE inhibitor) to be the most commonly prescribed antihypertensive and Amlodipine (Calcium channel blocker) to be used most commonly as monotherapy.

Most of the patients with stage 2 hypertension presented with complications. This calls for awareness on the part of primary clinicians to pay more attention toward patients presenting with stage 2 hypertension and initiate treatment early. We found hypertensive retinopathy to be the most common complication followed by hypertensive encephalopathy. Another study from India, Kota SK et al., shows hypertensive encephalopathy as most common complication found in 6.6% patients [30].

Limitation(s)

This was a hospital-based study, so it did not represent the actual population. A long term follow-up of patients on antihypertensives was not done. Many patients with central nervous system disorder were referred to this tertiary care centre. So, number of patients with hypertension having CNS disorder was relatively high. There is a separate government institute for renal disorders in the study campus and many patients are directly admitted there, which was not a part of the study, so the number of patients with renal disorder may have been underestimated.

CONCLUSION(S)

The prevalence of hypertension in the hospitalised patient was quiet low with male preponderance, renal diseases being the most common aetiology. The patients presented with stage 1 hypertension and had more discharge rate compared to those with stage 2 hypertension which was statistically significant. Majority of the patients who presented with stage 2 hypertension required injectable antihypertensive. Most patients without complications responded well to oral monotherapy while polytherapy was required in complicated patients only. Majority of the patients presented with stage 2 hypertension had target organ damage at the time of admission which was statistically significant. As stage 1 hypertension is usually asymptomatic, in all the patients with a risk factor for

developing secondary hypertension, regular follow-up needs to be done, aggressive blood pressure monitoring, growth and nutritional assessment, dietary modifications are required; all these can help to prevent or control hypertension at the lower stage and can prevent the target organ damage. Children with hypertension had a good prognosis; the majority were cured and discharged.

REFERENCES

- Riley M, Bluh B. High blood pressure in children and adolescents. *Am Fam Physician*. 2012;85(7):693-700.
- GBD 2016 Risk factors collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2016: A systematic analysis for the global burden of disease study 2016. *Lancet*. 2017;390:1345-422.
- Sun SS, Grave GD, Siervogel RM, Pickoff AA, Arslanian SS, Daniels SR. Systolic blood pressure in childhood predicts hypertension and metabolic syndrome later in life. *Paediatrics*. 2007;119:237-46.
- Lubrano R, Travasso E, Raggi C, Guido G, Masciangelo R, Elli M. Blood pressure load, proteinuria and renal function in pre-hypertensive children. *Paediatr Nephrol*. 2009;24:823-31.
- Theodore RF, Broadbent J, Nagin D, Ambler A, Hogan S, Ramrakha S, et al. Childhood to early-midlife systolic blood pressure trajectories: Early-life predictors, effect modifiers, and adult cardiovascular outcomes. *Hypertension*. 2015;66:1108-15.
- Chen X, Wang Y. Tracking of blood pressure from childhood to adulthood: A systematic review and meta-regression analysis. *Circulation*. 2008;117:3171-80.
- Kelly RK, Thomson R, Smith KJ, Dwyer T, Venn A, Magnusson CG, et al. Factors affecting tracking of blood pressure from childhood to adulthood: The childhood determinants of adult health study. *J Paediatr*. 2015;167:1422-800.
- Soudarssanane M, Mathanraj S, Sumanth M, Sahai A, Karthikeyan M. Tracking of blood pressure among adolescents and young adults in an urban slum of Puducherry. *Indian J Community Med*. 2008;33:107-12.
- Toschke AM, Kohl L, Mansmann U, von Kries R. Meta-analysis of blood pressure tracking from childhood to adulthood and implications for the design of intervention trials. *Acta Paediatr*. 2010;99:24-29.
- Rao S, Kanade A, Kelkar R. Blood pressure among overweight adolescents from urban school children in Pune, India. *Eur J Clin Nutr*. 2007;61:633-41.
- Borah PK, Devi U, Biswas D, Kalita HCh, Sharma M, Mahanta J, et al. Distribution of blood pressure and correlates of hypertension in school children aged 5-14 years from North East India. *Indian J Med Res*. 2015;142:293-300.
- Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J, et al. Global burden of hypertension: Analysis of worldwide data. *Lancet*. 2005;365:217-23.
- Goel M, Pal P, Agrawal A, Ashok C. Relationship of body mass index and other life style factors with hypertension in adolescents. *Ann Paediatr Cardiol*. 2016;9:29-34.
- Nur N, Cetinkaya S, Yilmaz A, Ayvaz A, Bulut MO, Sümer H, et al. Prevalence of hypertension among high school students in a middle anatolian province of Turkey. *J Health Popul Nutr*. 2008;26:88-94.
- McNiece KL, Poffenbarger TS, Turner JL, Franco KD, Sorof JM, Portman RJ, et al. Prevalence of hypertension and pre-hypertension among adolescents. *J Pediatr*. 2007;150(6):640-4, 644.e1.
- Antal M, Regöly-Mérei A, Nagy K, Greiner E, Biró L, Domonkos A, et al. Representative study for the evaluation of age- and gender-specific anthropometric parameters and blood pressure in an adolescent hungarian population. *Ann Nutr Metab*. 2004;48:307-13.
- Lande MB. Systemic hypertension. In: Robert M. Kleigman, eds. *Nelson-textbook of paediatrics*. 20th edn. Philadelphia: Elsevier Saunders Publishers; 2015:2294-303.
- Villar VAM, Liu T, Jose PA. Recent trends in paediatric hypertension research. *J Med Liban*. 2010;58(3):179-84.
- Din-Dzietham R, Liu Y, Bielo MV, Shamsa F. High blood pressure trends in children and adolescents in national surveys, 1963 to 2002. *Circulation*. 2007;116:1488-96.
- Prabhjot A, Kaur N, Kumar K, Singh S. Variation in blood pressure among school children in Amritsar (Punjab). *Anthropologist*. 2005;7:201-04.
- Buch N, Goyal JP, Kumar N, Parmar I, Shah VB, Charan J, et al. Prevalence of hypertension in school going children of Surat city, Western India. *J Cardiovasc Dis Res*. 2011;2:228-32.
- Sharma A, Grover N, Kaushik S, Bhardwaj R, Sankhyan N. Prevalence of hypertension among school children in Shimla. *Indian Paediatr*. 2010;47:873-76.
- Chadha SL, Tandon R, Shekhawat S, Gopinath N. An epidemiological study of blood pressure in school children (5-14 years) in Delhi. *Indian Heart J*. 1999;51:178-82.
- Patel A, Bharani A, Sharma M, Bhagwat A, Ganguli N, Chouhan DS. Prevalence of hypertension and prehypertension in schoolchildren from Central India. *Ann Paediatr Cardiol*. 2019;12(2):90-96. Doi: 10.4103/apc. APC_13_18. PMID: 31143032; PMCID: PMC6521652.
- Sinha R, Saha A, Samuels J. American academy of paediatrics clinical practice guidelines for screening and management of high blood pressure in children and adolescents: What is new. *Indian Paediatr*. 2019;56:317-21.
- Shankar RR, Eckert GJ, Saha C, Tu W, Pratt JH. The change in blood pressure during pubertal growth. *J Clin Endocrinol Metab*. 2005;90(1):163-67.

- [27] Pierin AM, Flório CF, Santos JD. Hypertensive crisis: Clinical characteristics of patients with hypertensive urgency, emergency and pseudocrisis at a public emergency department. *Einstein (Sao Paulo)*. 2019;17.
- [28] National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Paediatrics*. 2004;114(2 Suppl 4th Report):555-76.
- [29] Flynn J. The changing face of paediatric hypertension in the era of the childhood obesity epidemic. *Paediatr Nephrol*. 2013;28:1059-66.
- [30] Kota SK, Kota SK, Meher LK, Sruti J, Kotni G, Panda S, Tripathy PR, Modi K. Clinical analysis of hypertension in children: An urban Indian study. *Saudi Journal of Kidney Diseases and Transplantation*. 2013;24(4):844.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Paediatrics, B.J. Medical College, Ahmedabad, Gujarat, India.
2. Professor and Head, Department of Paediatrics, B.J. Medical College, Ahmedabad, Gujarat, India.
3. Consultant Paediatrician, Department of Paediatrics, B.J. Medical College, Ahmedabad, Gujarat, India.
4. Resident, Department of Paediatrics, B.J. Medical College, Ahmedabad, Gujarat, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Amit Das,
Room No. C502, Phase 1, New PG Hostel, B.J. Medical College and Civil Hospital,
Ahmedabad-380016, Gujarat, India.
E-mail: amit.das.n5p@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Sep 30, 2021
- Manual Googling: Dec 23, 2021
- iThenticate Software: Dec 28, 2021 (19%)

ETYMOLOGY: Author Origin**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Sep 29, 2021**Date of Peer Review: **Nov 18, 2021**Date of Acceptance: **Dec 29, 2021**Date of Publishing: **Feb 01, 2022**