STUDY OF CLINICO-AETIOLOGICAL FACTORS OF PAEDIATRIC HYPERTENSION IN A TERTIARY CARE CENTRE

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ABSTRACT

BACKGROUND

Hypertension is a public health challenge for societies, not only in adults, but also in children in socioeconomic and epidemiological transition and one of the most important risk factors for cardiovascular death accounting for 20-50% of all deaths. This study was done to screen all hospitalised children and outpatient clinic children in the age group of 1-14 years and find out those who were hypertensive and establish the aetiology and clinical features.

MATERIALS AND METHODS

Blood pressure was measured in children making 2 study groups. Study group 1 (3754 hospitalised children) and study group 2(820 outpatient clinic children) in the age group of 1-14 years. Children who were detected to be having hypertension were evaluated by proper history, clinical examination and necessary investigations. Children below 1 year were excluded from the study.

RESULTS

Secondary hypertension (80 (98.76%)) was common in children. Among the causes of secondary hypertension, renal parenchymal disease (64 (79.01%)) was the predominant aetiology. Prevalence of hypertension in our study 2.7%, prevalence of essential hypertension is 1% and prevalence of secondary hypertension is 1.7%.

CONCLUSION

Systemic hypertension is uncommon in infancy and childhood, but whenever present is usually indicative of an underlying process (secondary hypertension). In contrast, adolescents develop primary or essential hypertension with no underlying cause. Accurate blood pressure measurement should be a part of routine physical examination of all children and at least of that more than 1 year of age.

KEYWORDS

Secondary Hypertension, Essential Hypertension, Aetiology of Renal Hypertension.

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BACKGROUND

Hypertension is a persistent elevation of arterial Blood Pressure (BP) above levels defined as normal.[1]It is a public health challenge for societies, not only in adults, but also in children in socioeconomic and epidemiological transition and one of the most important risk factors for cardiovascular death accounting for 20-50% of all deaths.[2]Primary (essential) hypertension occurs more commonly in adults, and if untreated, is a major risk factor for myocardial infarction, stroke and renal failure. Hypertensive children although usually asymptomatic already manifest evidence of target organ damage. Up to 40% of hypertensive children have left ventricular hypertrophy or features of early atherosclerosis. Primary hypertension often tracks into adulthood. Children with blood pressure >90th percentile have 2-4 fold greater risk of having hypertension as adults. Similarly, nearly half of hypertensive adults had a BP of >90th percentile as children.[3]In infants and young children, systemic hypertension is uncommon with a prevalence of <1%, but when present, is often indicative of an underlying disease process. Severe and symptomatic hypertension in children is usually secondary. In contrast, the prevalence of primary essential hypertension mostly in older school age children and adolescents has increased in prevalence in parallel with obesity. Prevalence of prehypertension in school going children is approximately 10% and prevalence of hypertension is around 2.5% in U.S.[3]Similardata is lacking in India; small surveys in school children shows a prevalence of 2-5%.[4]

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Definition of Hypertension

The national high blood pressure education program working group on high blood pressure in children and adolescents published the fourth report on the diagnosis, evaluation and treatment of high blood pressure in children and adolescents (fourth report) 2004.This report established normal values for the 50th, 90th, 95th, 99th percentile by age, sex and height percentile. The fourth report defined hypertension in children as systolic or diastolic blood pressure or both exceeding the 95th percentile for age, sex, and height, on at least three occasions, 1-3 weeks apart.[5]

Prehypertension is defined as systolic or diastolic blood pressure or both between the 90th and 95th percentile. Adolescents having blood pressure ≥120/80 mm of Hg, but below the 95th percentile are also included in this category.[5] Hypertension is classified as essential (primary) or secondary to any underlying disease, e.g. a renal parenchymal, renovascular or an endocrine disorder. According to severity of hypertension it is classified into stage 1 and stage 2 hypertension. Stage1 hypertension is defined as systolic or diastolic blood pressure values exceeding the 95th percentile and up to 5 mm of Hg higher than 99th percentile. Stage 2 hypertension is defined as systolic or diastolic blood pressure values 5 mm of Hg higher than 99th percentile.[5]

AIMS AND OBJECTIVES

In view of the concerns regarding hypertension in childhood in relation to its acute and chronic long-term sequences and paucity of data in this region, it was proposed to carry out a study in S.C.B. Medical College and Hospital, the aim of which is to screen all hospitalised children and outpatient clinic children in the age group of 1-14 years and find out those who were hypertensive and establish the aetiology and clinical features.

MATERIALS AND METHODS

The present study is a prospective hospital-based study undertaken in the Department of Paediatrics of S.C.B Medical College and Hospital, Cuttack, during the period extending from January 2016 to December 2016.

A study population of 4000 patients of age group 1-14years was taken comprising 2392 males and 1362 female child in hospitalised patients. Out of 4000 children, 246 were excluded who either did not give consent or investigations were incomplete or left the hospital against medical advice.

Another study population of 1000 patients visiting outpatient clinic between age group of 1-14 years with stable vitals were chosen. 180 cases were excluded out of 1000 due to loss of follow up.

The blood pressure of all children in the age group of 1-14 years who were hospitalised and on outpatient basis was measured and children who were detected to be having hypertension were evaluated by proper history, clinical examination and necessary investigations were carried out to detect the cause of hypertension. Children below 1 year were excluded from the study.

All the investigations were carried out in Pathology, Microbiology and Radiodiagnosis Department of S.C.B Medical College and Hospital, Cuttack.

Consent of parents was obtained after explaining the details of the procedure. The systolic and diastolic blood pressure over the right arm while the child is in sitting position was recorded and compared with a standard curve. In hospitalised patients, children with an increase in systolic, diastolic or both blood pressure reading above the 95thpercentile of the standard were further examined for two more times at different settings. In our patients, a detailed history was taken and systemic examination was done in all cases. Before recording blood pressure, procedure was fully explained and made to sit quietly for five minutes.

Those with elevated blood pressure above the 95th percentile were diagnosed as having hypertension and further evaluated. If percentiles of systolic and diastolic pressures were different, the higher percentile was used for defining and staging hypertension. Assessments of both systolic and diastolic pressures were interpreted in relation to age and height percentiles as described by the fourth US task force report on hypertension. Percentile of height was referred from CDC growth chart.

Inclusion and Exclusion Criteria

(a) Measurement of Blood Pressure

Blood pressure was measured by the following method-The child was placed in a comfortable sitting position with right arm fully exposed with the cubital fossa supported at heart level. Centre scale of the mercury manometer was placed at the level of the eye to avoid the effect of parallax. Appropriate size cuff was selected and applied snugly around the right arm, so that its lower edge was above the antecubital fossa. Care was taken so that the bladder covered approximately 40% of the arm circumference and was midway between the olecranon and acromion. The inflatable portion was centered over the brachial artery. The sphygmomanometer cuff was inflated until the radial pulse was not palpable. Pressure was released slowly at a rate of about 2 to 3 mmHg per second until the pulse was palpable. In the auscultatory method, the cuff was briskly inflated about 20 mmHg above the point at which the radial pulse disappeared.

The pressure within the cuff was then released slowly as before while auscultating over the brachial artery in the cubital fossa. The onset of a clear tapping sound (Korotkoff phase I) was taken as the systolic blood pressure. The last phase (Korotkoff phase V) characterised by disappearance of all sounds was taken as the diastolic blood pressure. The blood pressure was measured in all other extremities in a similar manner. For blood pressure measurement in lower extremity, the child was placed in the prone position and cuff of proper size was snugly wrapped around the thigh with the lower edge about 1 inch above the popliteal fossa. The leg was slightly flexed and the bell of the stethoscope was placed over the popliteal artery. The subsequent procedure is similar to that taken in the upper arm.

(b) Adequate History Taking

Details of history were taken including age, sex, socioeconomic status, sibling history and family history. The presenting complaint along with the duration was carefully noted. Due attention was given to past history suggestive of cardiovascular, renal, neurological disorders or ingestion of any offending drug. Family history of hypertension, stroke and ischaemic heart disease was noted.

(c) Clinical Examination

After adequate history taking, patients underwent a detailed clinical examination including height, weight and these patients were further assessed by determining their renal, endocrinal, cardiovascular and CNS status. Fundoscopy examination was done in all the cases. In those children where no cause was found, all the members of the family were examined to rule out familial essential hypertension.

(d) Laboratory Investigations

The patients underwent the following investigations-

Phase 1-

(Following investigations were done in all the patients having hypertension).

Haematological evaluation.

Complete blood count (Hb%, DC, TLC, TPC, comment on peripheral smear).

Blood glucose.

Blood urea and serum creatinine.

Serum cholesterol.

Serum sodium, potassium, calcium.

Urine-

- Routine andmicroscopic examination.
- Culture and sensitivity.
- Spot urine protein-creatinine ratio.

X-ray chest.

USG of abdomen.

ECG recording, echocardiography.

Phase 2- (done in selected cases of hypertension).

ASOtitre (poststreptococcal glomerulonephritis).

Serum C3, ANA, renal biopsy (post streptococcal glomerulonephritis, SLE nephritis, steroid resistant or dependent nephrotic syndrome).

Thyroid Profile-

MCUG (micturating cystourethrogram) (obstructive uropathy).

VCUG (voiding cystourethrogram) (suffering from pyelonephritis).

CT scan and CSF analysis (CNS disorders).

Doppler study-

DTPA/DMSA scan (done in suspected renovascular disease).

Plasma renin level and plasma aldosterone level (done in those cases suspected to be hypertensive due to mineralocorticoid excess).

Angiography (done in cases suspected to be case of vascular malformation).

RESULTS

Total Number Cases in Our Study	Number of Cases of Essential Hypertension	Number of Cases of Secondary Hypertension	Total Number of Children with Systemic Hypertension
4574	46	80	126
Prevalence (100%)	1%	1.7%	2.7%

Table 1. Prevalence of Hypertension in Our Study

Sl. No.	Aetiology	Number	Percentage
1.	Renal	64	79.01%
2.	Cardiovascular	05	6.1%
3.	Neurological	07	8.64%
4.	Endocrinal	02	2.46%
5.	Miscellaneous	02	2.46%
6.	Essential	01	1.23%
	Total	**81**	**100.00%**

Table 2. Aetiological Analysis of Hypertension (n=81)

Sl. No.	Cause	Number	Percentage
1.	Acute glomerulonephritis	23	35.9%
2.	Nephrotic syndrome	23	35.9%
3.	Chronic renal failure	06	9.3%
4.	Haemolytic uraemic syndrome	05	7.8%
5.	Obstructive uropathy	03	4.7%
6.	SLE nephritis	02	3.1%
7.	Wilmstumour	01	1.6%
8.	Chronic pyelonephritis	01	1.6%
	Total	**64**	**100.00%**

Table 3. Renal Causes of Hypertension (n=64)

Systems Involved	Aetiology	Number	Percentage
Cardiovascular	RHD (MR,AR)	3	17.64%
	Coarctation of aorta	2	11.76%
Nervous	Encephalitis	3	17.64%
	GBS	1	5.88%
	ICSOL	3	17.64%
Endocrinal	Neuroblastoma	1	5.88%
	NS with Cushingoid feature	1	5.88%
Miscellaneous	Malaria with AKI	1	5.88%
	Scorpion sting	1	5.88%
Essential		1	5.88%
	Total	**17**	**100.00%**

Table 4. Non-Renal Causes of Hypertension (n=17)

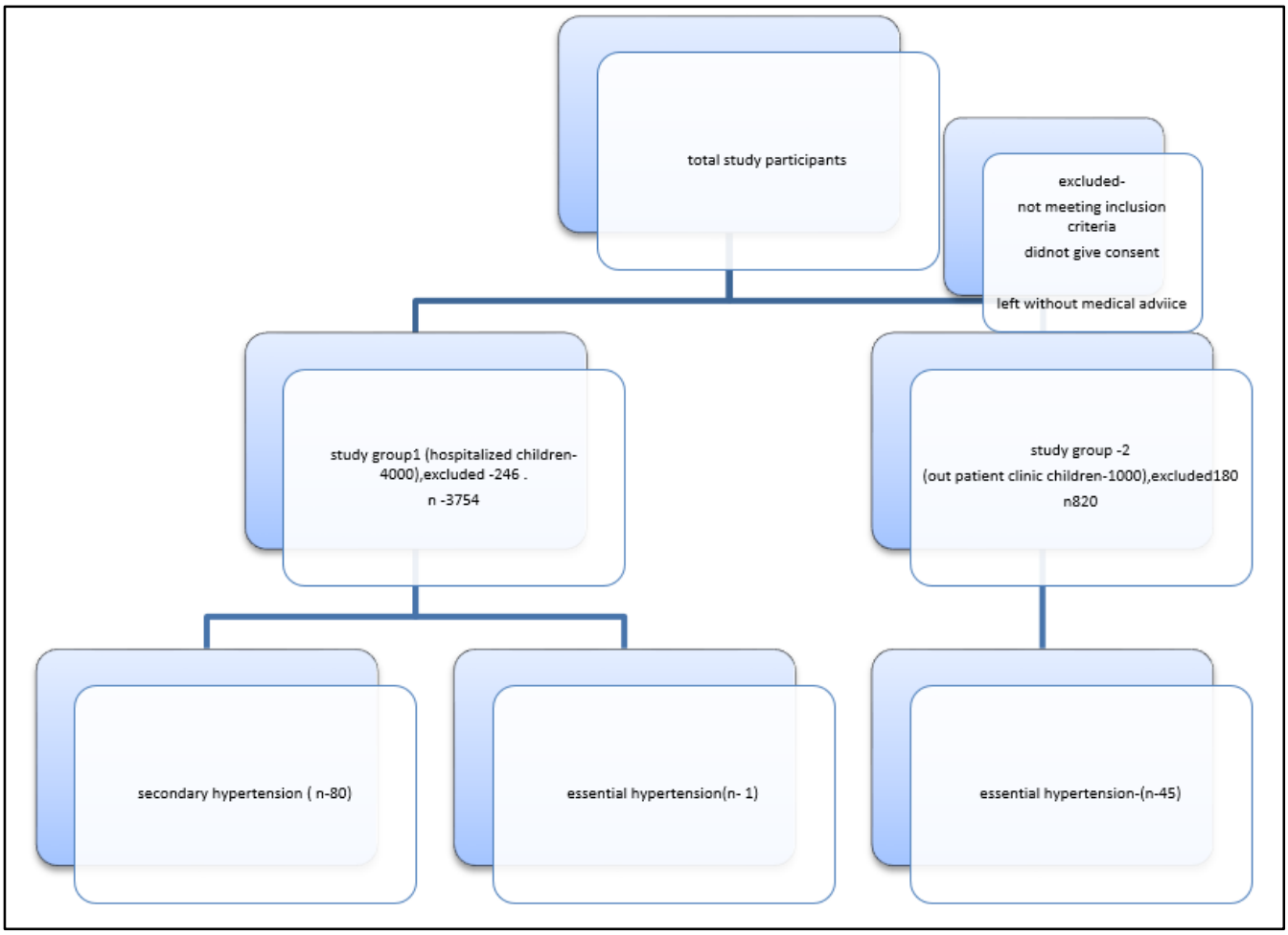

Figure 1. Flow of Study Participants

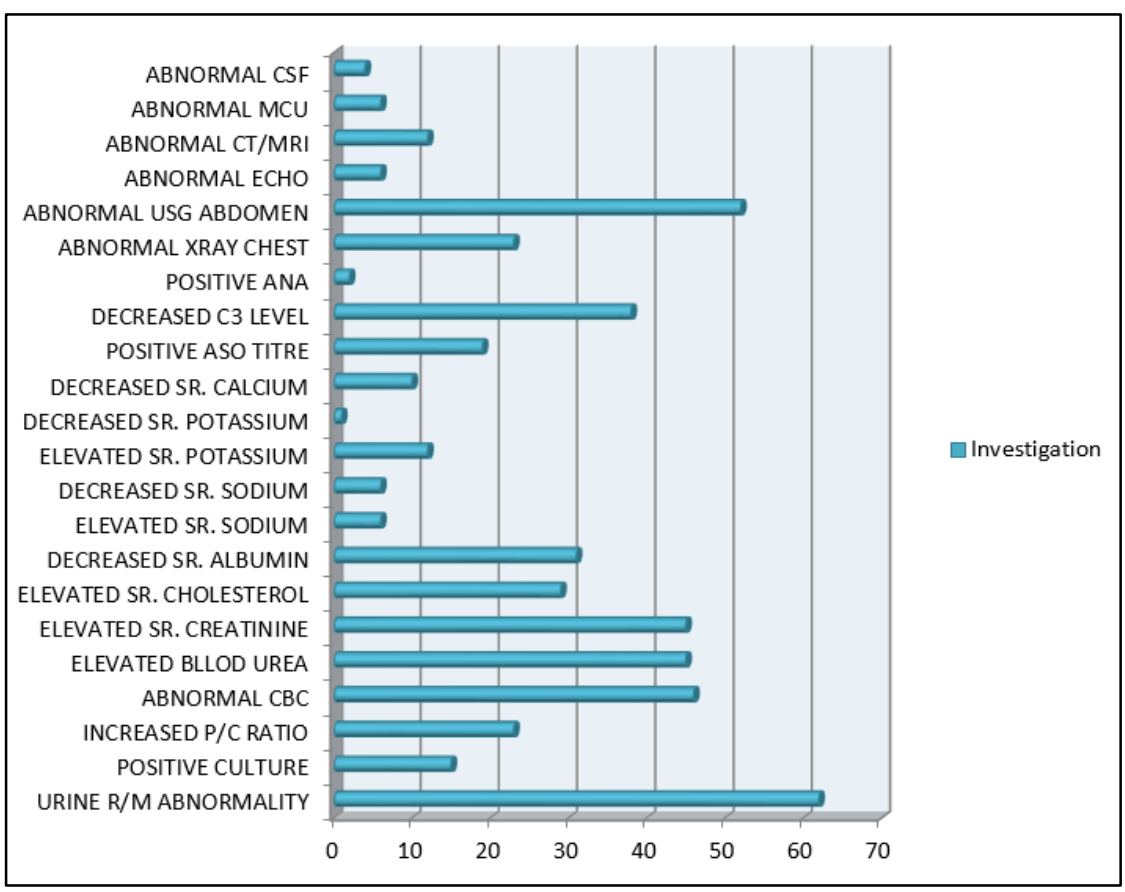

Figure 2. Investigations in Hypertensive Children

Findings	Diagnosis	Number	Percentage
• Bilateral contracted kidney. • Increased echotexture. • Loss of corticomedullarydifferentiation.	Chronic renal failure	5	6.17%
• Enlarged kidney. • Loss of corticomedullary differentiation. • Medical renal disease.	Acute glomerulonephritis	25	30.86%
• Bilateral atrophic kidneys. • Hyper echoic areas suggestive of scars in cortex.	Chronic pyelonephritis	1	1.23%
• Dilated renal pelvis. • Hypo echoic area in cortex. • Associated PUV.	Hydronephrosis	3	3.7%
• Solid mass with calcification.	Neuroblastoma	1	1.23%
• Free fluid in abdomen.	Ascites	12	14.81%

Table 5. USG Findings Related to Hypertension

Body Mass Index(Percentile)	Number of Cases	Percentage
<85th	08	17.77%
85th-≤95th (overweight)	17	37.77%
>95th (obese)	20	44.44%
Total	**45**	**100.00%**

Table 6. Distribution of Hypertension Cases According to BMI

The above table shows a significant proportion of cases of essential hypertension had BMI above 95th percentile as per age, i.e. 44.44% and 37.77% had BMI between 85th-95thpercentile.

Majority of the hypertensives in hospitalised group (64.1%) has severe degree of hypertension with blood pressure above the 99th percentile for age and sex. But, in essential hypertension, only 8.9% had severe hypertension. Secondary hypertension (80 (98.76%)) was common in children. Among the causes of secondary hypertension, renal parenchymal disease (64(79.01%)) was the predominant aetiology. Prevalence of hypertension in our study 2.7%, prevalence of essential hypertension is 1% and prevalence of secondary hypertension is 1.7%.Cardiovascular cause of hypertension included coarctation of aorta and rheumatic heart disease with aortic regurgitation. There were 8.64% cases comprising neurological causes of secondary hypertension comprising of encephalitis, GBS and ICSOL in children. In this study, only 2.46% cases represented the endocrinal cause of secondary hypertension in children. We had another single case of nephrotic syndrome with cushingoid features secondary to drug intake (prolonged duration steroid). Among the renal causes, poststreptococcal glomerulonephritis (23 (35.9%)) and nephrotic syndrome (23(35.9%)) accounted for the majority of renal diseases, which was followed by chronic renal failure (6 (9.3%)) and haemolytic uraemic syndrome (5 (7.8%)).There were two (2.46%) cases of SLE nephritis. Headache (35.8%) was also a prominent symptom in many cases. Complications of hypertension was found in 9 cases (11.11%) in the form of congestive cardiac failure, hypertensive encephalopathy and acute renal failure each in three cases. Among the cases of hypertension secondary to nephrotic syndrome, 43.47% were steroid resistant, 21.7% were frequent relapse cases and 17.3% were steroid dependent. The single case of essential hypertension had obesity as the only associated physical finding.

All the cases of renal parenchymal diseases had abnormal urine findings like RBCs, pus cell, granular cast and albumin. The patients with renal parenchymal diseases had elevated blood urea and serum creatinine. Elevated cholesterol was detected in cases of nephrotic syndrome and essential hypertension. Hypocalcaemia was a consistent feature in children with chronic renal failure and with nephrotic syndrome on long-term steroid therapy. Abnormal x-ray chest was found in 23 (28.39%) cases in form of cardiomegaly, signs of LVF.52 cases (64.1%) showed abnormal USG out of which 30.8% cases showed enlarged kidney, loss of corticomedullary differentiation (medical renal disease). 6.17% cases showed granular contracted kidneys consistent with chronic renal failure. There were 3 (3.7%) cases of hydronephrosis, single case of chronic pyelonephritis and neuroblastoma. There was presence of positive family history of hypertension in 17 (37.77%) cases of essential hypertension.

Among the cases of essential hypertension, 20 (44.44%) were obese and 17 (37.77%) cases were overweight.

DISCUSSION

In the present study, out of 3754 hospitalised children, 81 children were detected to be having blood pressure above the 95th percentile for age and sex with an incidence of 2.16%.A recent study by Kamath V et al in 2010 has shown a prevalence of 2.2% in coastal south India.[6] The peak age incidence in the hospitalised study group has been noted in the age group of 5-10 years (51.8%). Next most common age group was from 10-15 years (24.69%) followed by 1-5 years (23.4%). Age incidence in this study is attributed to the underlying aetiology. Poststreptococcal glomerulonephritis, which was found to be the most common cause in this study is most prevalent in 5-12 yrs. age group, which is why the common age group in the present study is the same range. Secondary hypertension was the major cause of paediatric hypertension (98.7%) cases. Essential hypertension was found only in single case among hospitalised patients. In 52 (64.2%) cases, the

hypertension was severe (BP more than 99th percentile +≥5mm of Hg for age and sex) and in 29 cases (35.8%) hypertension was mild-to-moderate or stage 1 (i.e., BP between 95th and 99th+<5mmof Hg percentile for age and sex), which might be due to the secondary causes of hypertension and severe hypertension is generally considered as the characteristic feature of secondary hypertension. This was also similar to the study result on prevalence of hypertension in central India by Deshpande A V (2014).[7] Secondary hypertension was more common (98.7%) in children in this study. Among the secondary causes of hypertension, 79.01% (64) cases were due to renal parenchymal diseases.[3]This finding is almost similar to the study conducted by Mehta KP (2000), which states that 75-80% of secondary hypertension in children are due to renal causes.[8]Endocrinal causes are not very common cause of secondary hypertension being present in only 2.46% of cases (Table7). Mehta KP (2000) has documented that 3% of hypertension are of endocrine origin. Cardiovascular causes accounted for 6.1% of hypertension out of which two patients had coarctation and the other three were cases of rheumatic heart disease with aortic regurgitation. Among the different cardiac causes of hypertension, coarctation of aorta was responsible for2.46% of cases. Similar observation was also made by Deal et al (1990) who found coarctation of aorta as the cause of hypertension in 2% ofcases.[9] Neurological causes were responsible for hypertension in 8.64% of cases in our study. Mehta KP (2000) reported 2% cases of neurological condition responsible for paediatric hypertension.[8]The neurological causes included encephalitis, intracranial space occupying lesion and a single case of GBS. The incidence of neurological causes being higher can be explained by the fact that more number of cases were admitted because of the availability of ventilator and ICU facilities. The miscellaneous causes of hypertension included 1 case of scorpion sting and one case of malaria with AKI (Table 9), which signifies that scorpion sting is an imported cause of transient hypertension in paediatric age group in our locality, which belongs to a tropical climate. Among the renal causes, acute poststreptococcal glomerulonephritis and nephrotic syndrome were the leading causes of hypertension in our study. The reason might be because of overcrowding and lack of personal hygiene. Most of the children are predisposed to throat and skin infection resulting in glomerulonephritis, which accounted for one of the cause of maximum number of renal causes of hypertension in this series. Blyth WB et al (1985) also documented high incidence of hypertension in poststreptococcal glomerulonephritis.[10] Majority of cases of nephrotic syndrome associated with hypertension were steroid resistant, which is often associated with hypertension. This is also supported by study by Gulati S in SGPGI, Lucknow, in 2004.[11] Intake of prednisolone for long periods might be responsible for hypertension. This can be said by presence of past history of steroid intake in 21 cases out of total 23 cases of nephrotic syndrome with hypertension for more than 1 month in dose >7.5mg/day. The second common renal cause of hypertension detected was chronic renal failure, which accounted for 9.3% (6) of the total renal causes.

In this study, oedema (swelling) was the most frequent symptom (63 cases-77.77%) followed by oliguria (53.08%) and facial puffiness(44.44%), headache(35.8%), dizziness and seizure at the admission to the hospital. As most of the cases are secondary to renal diseases as acute poststreptococcal glomerulonephritis and nephrotic syndrome those present mostly with oedema at multiple parts, facial puffiness and oliguria, these symptoms manifested as most common symptoms. Dizziness was another common symptom found in 11 cases (13.58%), which was similar to that found by Fieg D et al (2005) who found this symptom in 26% cases.[12] According to underlying aetiology, which was renal in most cases, the presenting symptom of childhood hypertension was generalised swelling of the body (58.02%) followed by suppression of urine (53.08%), then swelling of face (44.44%). High-colouredurine was found in (23 cases-28.39%) (Table 10). As most of the causes of hypertension in this study were renal parenchymal disease, the features related to the underlying disease were the common presenting symptom.

Mass in the abdomen was found in two cases including one case of neuroblastoma and other one was detected as Wilmstumour.

As renal parenchymal diseases were the frequent cause of hypertension, generalised oedema and facial puffiness were the predominant clinical findings in this study.

Ophthalmoscopic abnormalities like papilloedema and retinal haemorrhages were seen in 11.11% (9) of cases. The importance of fundoscopy examination as a routine procedure while evaluating a child with hypertension was emphasised by KherKKet al.[13] All 64 cases of renal parenchymal disease had abnormal urine routine and microscopic findings (Table12), which suggests that urine analysis is a valuable and inexpensive tool while evaluating a child with hypertension. Kher KK et al (1992) and Mehta KP (2000) are also of similar opinion and have suggested that urine analysis should be done in all children detected to be having hypertension. All the patients of hypertension due to non-renal causes showed normal urine analysis reports, which emphasises the importance of routine urine examination as a first line investigation in diagnosing as well as differentiating renal and non-renal causes of hypertension.[13]

Blood urea and serum creatinine were raised in 35 cases (55.55%), which were the most common abnormal serum biochemistry obtained. This reflects the majority of cases of childhood hypertension being of renal origin. Buchi KF et al (1986) have also documented that blood urea nitrogen and serum creatinine are very helpful for diagnosis of secondary hypertension due to renal cause.[14] The patients of non-renal causes of hypertension showed normal renal function tests. Elevated cholesterol was found in 29 (35.8%) cases, most of them were cases of hypertension secondary to nephrotic syndrome and a single

case of essential hypertension that was obese. Relationship among obesity, elevated cholesterol and increased blood pressure has been shown in many epidemiological studies. Lauer R.M. et al (1983) documented that individuals who are overweight are much more likely to have elevated total cholesterol and increased blood pressure.[15] Features suggestive of chronic pyelonephritis, acute glomerulonephritis, chronic renal failure, hydronephrosis as a complication of obstructive uropathy and neuroblastoma were found in USG examination of children with hypertension in 35(43.2%) cases. Around 14.8% of case had USG finding of ascites. Hence, ultrasound is a valuable, noninvasive and easily available tool for screening of children with hypertension. This view is also well established by Siegel MJ et al (1991).[16]

VCUG was done in patients suspected to be suffering from obstructive uropathy due to posterior urethral valve and chronic pyelonephritis and abnormal VCUG in the form of vesicoureteral reflux of different grades was detected in 6(7.4%) cases. Kher KK et al (1992) has well supported this view.[17] After excluding secondary causes in outpatient clinic out of 820 cases, 45 children were detected to be hypertensive with prevalence of 5.48%. This result is almost similar to study result of Savitha MR et al in 2007 in Mysore in children and adolescents, which showed prevalence of 6.1%.[18] Prevalence of essential hypertension was maximum in age group 10-14 years, i.e.71.11%.28.88% cases were in the age group 5-10 years, which was the next common group. No case was found primary in the age group 1-5 years. Essential hypertension is more common in adolescent age group. Many other studies on paediatric hypertension by Luma GB and Spiotta RT in 2006,[19] Baracco R et al in 2012[20] indicate the same. In the present study, 37.77% hypertensive cases have positive family history of hypertension in any one member, which is well correlated with various previous studies. There have been many studies regarding relation of family history of hypertension with development of hypertension in paediatric age group. Srinivasa HA et al studied prevalence of hypertension in any one family member in 24.3% of cases of hypertension.[21] According to the study by Savitha MR,[18] familial hypertension was found in 45% of cases. In this study, obesity and overweight were found to be major factors in essential hypertension, which was measured by body mass index. Body mass index 85th to 95th percentile as per age is considered overweight and >95th percentile is considered as obesity. In this study, 44.44% hypertensives were obese (body mass index more than 95th percentile), 37.77% cases were overweight. Relation between obesity and hypertension has been studied by many researchers. Veena Kamath study[6] says prevalence of hypertension increases with increase in BMI. In this study, 13.33% (6) children were found having serum cholesterol and triglyceride level above normal. Previous studies also showed similar results. Study by Wieson J et al showed elevated serum cholesterol levels above 200mg/dL in 19% cases.[22]

CONCLUSION

Hypertension though rare in children as compared to adults is a significant problem, if not diagnosed timely can lead to devastating consequences. Systemic hypertension is uncommon in infancy and childhood, but whenever present is usually indicative of an underlying process (secondary hypertension). In contrast, adolescents develop primary or essential hypertension with no underlying cause. Accurate blood pressure measurement should be a part of routine physical examination of all children and at least of those more than 3yrs. of age. A complete family history of hypertension should be elicited. Blood pressure should be recorded by any of the available methods (manual, oscillometric Doppler, etc.), but repeated measurements should be done at least on separate occasions to avoid false detection of hypertension due to presence of confounding factors like anxiety and other causes, which can transiently affect blood pressure. Standard nomograms are necessary for interpretation of blood pressure values. Any patient having blood pressure consistently above 95th percentile for age, sex and height percentile should be admitted and evaluated. Evaluation should begin with complete blood count, urine analysis, renal function tests, lipid profile, chest x-ray and ultrasonography of abdomen in the initial phase by which many causes of hypertension can be established. The patients should then be subjected to next phase of specific investigations to confirm the aetiology. Many of the essential hypertension cases are asymptomatic and are detected incidentally on routine examination. So, there should be proper evaluation of blood pressure in outpatient department. Proper history regarding diet, family history, lifestyle and data such as body mass index should be calculated to screen patients having essential hypertension. Since secondary hypertension continues to be the most common cause of hypertension and most cases present with severe degree of hypertension, they should be properly evaluated as mentioned above so that several end-organ complications like acute left ventricular failure, acute renal failure, encephalopathy, etc. can be prevented.

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