

Hypertension in children in Kirkuk city

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Abstract:

The predominant type of hypertension in pediatric age group is the secondary hypertension, with chronic kidney disease being the most common cause, but, nowadays, there is a rising incidence of primary hypertension due to the rising incidence of obesity in children. 260 patients (from 1-14 years old) were collected from pediatric hospital in Kirkuk city and Baghdad road polyclinic at Kirkuk city, BMI was measured, renal function test, serum electrolyte and lipid profile are done for all the patients, serum cortisol done for the hypertensive patients, hypertension was found in 13 (5%) of our patients; 5 patients (2%) were complaining from primary hypertension and their BMI was $> 30 \text{ kg/m}^2$, and 8 (3%) patients were complaining from secondary hypertension, renal impairment was the commonest cause. Secondary hypertension has found to be more common than the primary with the renal cause being the commonest one, all the cases were complaining from dyslipidemia.

Key words: hypertension, children, BMI

Introduction

Hypertension is a significant risk factor for cardiovascular morbidity and mortality, not only in adults but pediatric hypertension is now commonly observed. Hypertension is known to be a major cause of morbidity and mortality in many countries, and the long-term health risks to children with hypertension may be substantial.¹

Hypertension is defined as average systolic blood pressure (SBP) and/or diastolic blood pressure (DBP) that is ≥ 95 th percentile for age, sex, and height, **elevated blood pressure** was defined as average SBP or DBP that are ≥ 90 th percentile but < 95 th percentile. In adolescents beginning at age 12 yr, prehypertension (ELEVATED BP.) is defined as BP between 120/80 mm Hg and the 95th percentile. A child with BP levels ≥ 95 th percentile in a medical setting but normal BP outside of the office has white coat hypertension.²

Stage I hypertension is diagnosed if a child's BP is greater than the 95th percentile but less than or equal to the 99th percentile plus 5 mm Hg. Stage II hypertension is diagnosed if a child's BP is greater than the 99th percentile plus 5 mm Hg.³

If the systolic and diastolic pressures give rise to a discrepancy with respect to classification, the child's condition should be categorized by using the higher value.⁴

In infants and young children, systemic hypertension is uncommon, with a prevalence of $< 1\%$, but when present, it is often indicative of an underlying disease process (**secondary hypertension**). *Severe and symptomatic hypertension in children is usually due to secondary hypertension.* In contrast, the prevalence of primary essential hypertension, mostly in older school age children and adolescents, has increased in prevalence in parallel with the obesity epidemic. The influence of obesity on elevated BP is evident in children as young as (2-5) years old. Obesity, chronic kidney diseases, renovascular diseases, congenital cardiovascular diseases and different endocrine diseases are the main causes of secondary hypertension in pediatrics, at the same time cardiovascular and kidney can be seriously affected by the complications of hypertension.⁵

From the public health perspective, reliable estimates of the prevalence of childhood hypertension serve as the basis for adequate prevention and treatment, as well as evidence based health resource allocation and policy making. Despite the existence of a large volume of studies that have assessed the prevalence of hypertension in children and adolescents, to our knowledge, the prevalence estimates of childhood hypertension have rarely been synthesized at the global level.⁶

Materials and methods :

This is a community –based descriptive cross sectional study done in 260 children presented to paediatric hospital in Kirkuk city and Baghdad road polyclinic from the period 1/1/2021 to 1/1/2022. Patients were collecting using a questionnaire that contains important questions about age of children ,weight, height and other previous medical and family history.

The method of checking had been done via sphygmomanometer and a BP cuff appropriate for the size of the child's arm. The BP been measured with the child in the sitting position after a period of quiet for at least 5 min. Careful attention to cuff size is necessary to avoid over diagnosis, as a cuff that is too short or narrow artificially increases BP readings. An appropriate sized cuff has an inflatable bladder that is at least 40% of the arm circumference at a point midway along the upper arm. The inflatable bladder should cover at least two thirds of the upper arm length and 80-100% of its circumference. Other methods are:

1. Use the standard height charts to determine the height percentile.
2. Measure and record the child's SBP and DBP.
3. Use the correct gender table for SBP and DBP.
4. Find the child's age on the left side of the table. Follow the age row horizontally across the table to the intersection of the line for the height percentile (vertical column).
5. There, find the 50th, 90th, 95th, and 99th percentiles for SBP in the left columns and for DBP in the right columns.

BP less than the 90th percentile is normal.

BP between the 90th and 95th percentile is prehypertension. In adolescents, BP equal to or exceeding 120/80 mmHg is prehypertension, even if this figure is less than the 90th percentile.

BP greater than the 95th percentile may be hypertension.

6. If the BP is greater than the 90th percentile, the BP should be repeated twice at the same office visit, and an average SBP and DBP should be used.
7. If the BP is greater than the 95th percentile, BP should be staged. If Stage 1 (95th percentile to the 99th percentile plus 5 mmHg), BP measurements should be repeated on two more occasions. If hyper-tension is confirmed, evaluation should proceed as described in table 7. If BP is Stage 2 (>99th percentile plus 5 mmHg), prompt referral should be made for evaluation and therapy. If the patient is symptomatic, immediate referral and treatment are indicated. Those patients with a

compelling indication, as noted in table 6, would be treated as the next higher category of hypertension.

Conditions Under Which Children <3 Years old Should Have Blood Pressure Measured:

1. History of prematurity, very low birth weight, or other neonatal complication

requiring intensive care

2. Congenital heart disease (repaired or non-repaired)

3. Recurrent urinary tract infections, hematuria, or proteinuria

or

Known renal disease or urologic malformations

4. Family history of congenital renal disease

5. Solid organ transplant

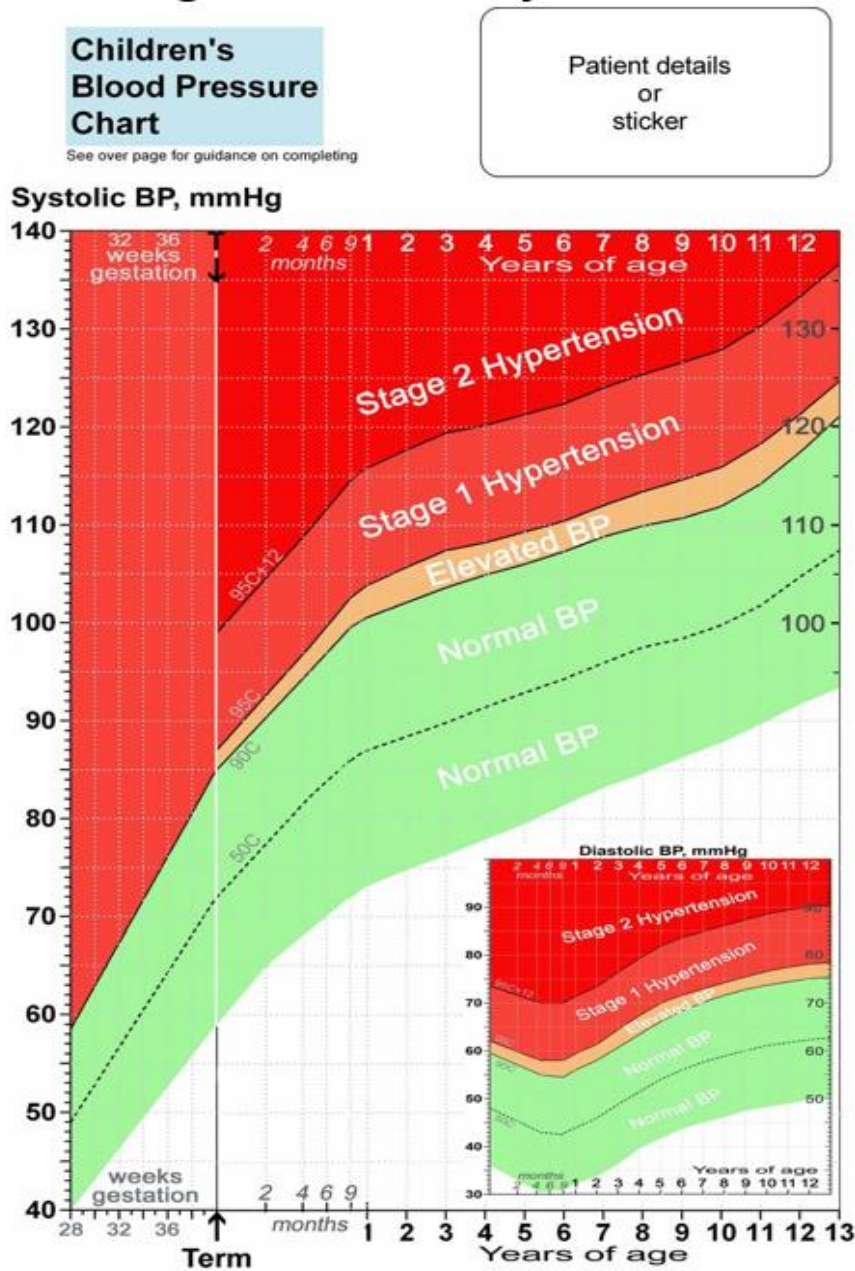
6. Malignancy or bone marrow transplant

7. Treatment with drugs known to raise BP

8. Other systemic illnesses associated with hypertension (neurofibromatosis, tuberous sclerosis, etc.)

9. Evidence of elevated intracranial pressure

Children's BP chart from 28 weeks' gestation to 13 years.



"Reproduced from Single blood pressure chart for children up to 13 years to improve the recognition of hypertension based on existing normative data, Coulthard, M.G, Epub ahead of print, 2020, with permission from BMJ Publishing Group Ltd."

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Figure 1: blood pressure chart

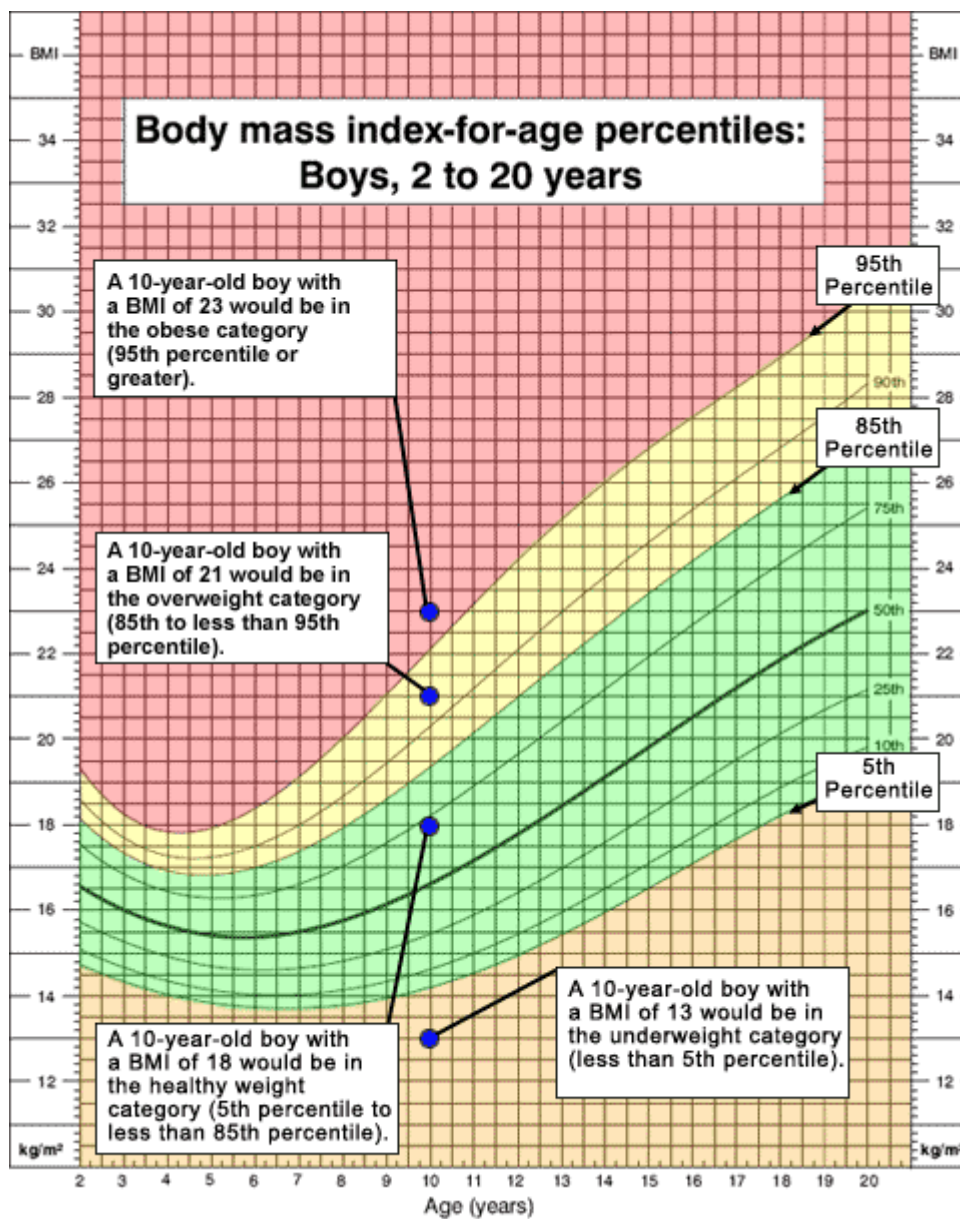


Figure 2: growth chart, used to assess the BMI of the male children

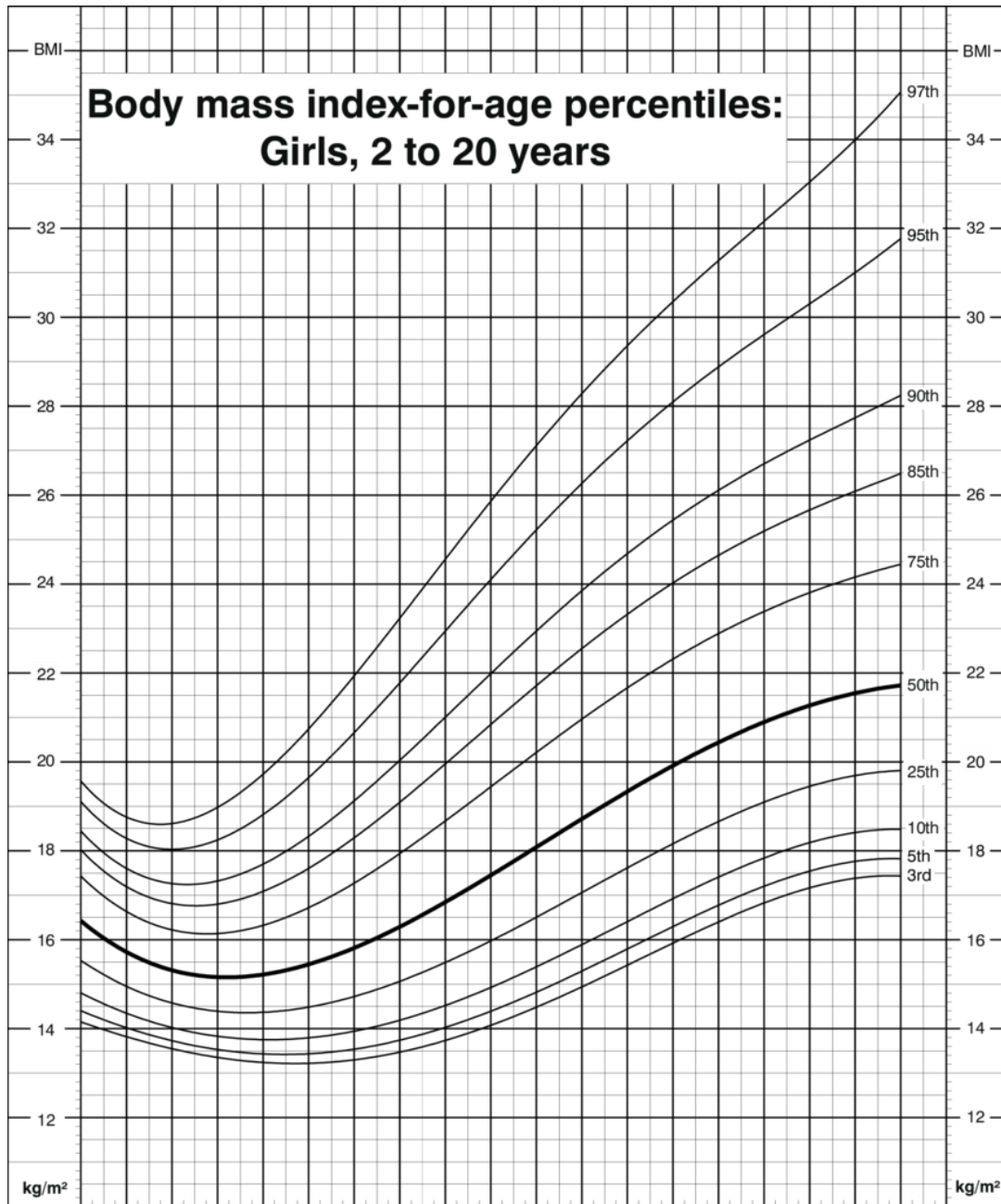


Figure 3: growth chart, used to assess the BMI of the female children

Results:

Demographic data of the study is shown in table 1: sample size, 250 patients, 155 female (60%) and 105 male (40%).

Table 1: Demographic data

This table shows sample size distribution 250, female patients 60%, male patients 40%.

Socio-demographic parameter		STUDY SAMPLE N-250	
		NUMBER	%
SEX	FEMALE	155	60%
	MALE	105	40%

Table 2: shows distribution of the sample according to their age, 22 (8%) patients from (1-3) years, 43 (17%) patients from (4-6) years, 96 (37%) patients from (7-10) years and 99 (38%) patients from (11-14).

Table 2: shows distribution of the sample according to their age.

Age group	Total	Percentage %
1-3 years	22	8%
4-6 years	43	17%
7-10 years	96	37%
11-14 years	99	38%

Table 3 show incidence of hypertension in the study sample, in which 13 (5%) patients were hypertensive, this finding was statistically significant (p -value $<0.05\%$)

Table 3: hypertension incidence in the sample

Hypertension	Number of patients	%
Yes	13	5
NO	247	95
Total	260	100

p-value <0.05%

Table 4 shows that 5 (38%) patients had primary hypertension and 8 (62%) had secondary from the total 13 hypertensive patients and this finding was statistically significant (*p-value <0.05%*).

Table 4: shows the types of hypertension

Hypertension type	Number of hypertensive patients	Percentage
Primary	5	38
Secondary	8	62
Total	13	100

p-value <0.05%

Table 5 shows the stage of hypertension, 7 (54%) patients had stage 1 hypertension and 6 (46%) had stage 2.

Table 5: stage of hypertension

Stage of hypertension	TOTAL	%
Elevated blood pressures	13	54
Stage 1 HT	7	46
Stage 2 HT	6	100

Table 6 shows the relationship between BMI and hypertension and found that: 2 patients (15%) were underweight, 1 patient (7.5%) with healthy weight, 2 patients (15%) over weight, 8 patients (61.5%) were obese, this finding was statistically significant (*p-value <0.05%*).

Table 6: the relationship between BMI and hypertension

	TOTAL	%
UNDERWEIGHT	2	15
HEALTHY WEIGHT	1	7.5
OVER WEIGHT	2	15
OBEISE	8	61.5

p-value <0.05%

Table 7 shows the causes of secondary hypertension, 6 patients (75% Of the total 13 hypertensive patients) were complaining from renal impairment, 7 patients (87.5%) has dyslipidemia, 1 patient (12.5%) had high serum cortisol (diagnosed as Cushing syndrome), and 1 patient (12.5%) had renal artery stenosis, this finding was statistically significant (p-value <0.05%).

Table 7: causes of secondary hypertension.

Causes of hypertension	Number of patients	Percentage
Renal impairment	6	75
Dyslipidemia	7	87.5
Serum cortisol	1	12.5
Renal artery stenosis	1	12.5

p-value <0.05%

Discussion:

Hypertension is sustained elevation of resting systolic blood pressure, diastolic blood pressure, or both; the pressures considered abnormal in children vary based on age up to age 13. Hypertension with no known cause (primary) is most common as with adults. Hypertension with an identified cause (secondary hypertension) is relatively uncommon in children. Usually, children have no symptoms or complications of hypertension during childhood, although these may develop later. Diagnosis is by sphygmomanometry. Tests may be done to look for causes of secondary hypertension. Treatment involves lifestyle changes, drugs, and management of treatable causes.^{7,8}

High blood pressure in children and adolescents is a growing health problem that is often overlooked. Children should be screened for elevated blood pressure annually beginning at three years of age or at every visit if risk factors are present. In children younger than 13 years, elevated blood pressure is defined as blood pressure in the 90th percentile or higher for age, height, and sex, and hypertension is defined as blood pressure in the 95th percentile or higher. In adolescents 13 years and older, elevated blood pressure is defined as blood pressure of 120 to 129 mm Hg systolic and less than 80 mm Hg diastolic, and hypertension is defined as blood pressure of 130/80 mm Hg or higher.¹ The incidence of hypertension was 5% (p -value <0.05), which is close to other studies ^{2,3} Hypertension is found to be more common in (7-10) and (11-14) years old children (p -value <0.05), this finding agrees with a study done by Cynthia S. Bell et al at USA in which the hypertension was common in these age groups. Obesity is an important cause of hypertension, growth chart used to assess the BMI of the children and significant relationship was found between the obesity and hypertension, obesity can increase the risk of hypertension 3 times and cause a major morbidity by increasing the risk of diabetes and dyslipidemia, in which all these factors cause cardiovascular complications, a combination of factors including overactivity of the sympathetic nervous system (SNS), insulin resistance, and abnormalities in vascular structure and function may contribute to obesity-related hypertension in children.^{9,10,11}

Secondary hypertension is more common in children than in adults. It can present in adolescents, especially if they have physical findings not typically seen with essential hypertension. Renal disease is the most common cause of secondary hypertension in children.^{23–25} Other causes include endocrine disease (e.g., pheochromocytoma, hyperthyroidism) and pharmaceuticals (e.g., oral contraceptives, sympathomimetics, some over-the-counter preparations, dietary supplements), post-streptococcal nephritis, hemolytic uremic syndrome, polycystic kidney disease, being the commonest cause.^{12,13}

Hypertension in children and adolescents is an important pathology, of, guarded prognosis, associated with modifiable and non-modifiable factors. Screening, diagnosing and detecting the underlying cause, as secondary hypertension is common in pediatrics, is paramount to control the blood pressure and prevent the possible complications that can be caused by hypertension.^{14,15}

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