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Assessment of asymptomatic hypertension observed in the school going children from Bihar region

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Abstract
High BP is a major risk factor for cardiovascular and cerebrovascular diseases. The morbidity and mortality due to these diseases among adults is on the rise and more so in developing countries such as India. The long, slow, and steady course of hypertension suggests that it has its origin in childhood and adolescent. Hence the present study was planned to assess the asymptomatic hypertension in school going children and its incidence.
The present study was planned in the Patna Medical College and hospital, Patna, Bihar from duration of Jan 2018 to Dec 2018. All BP measurements on 100 children's were carried out by one physician using a standard mercury sphygmomanometer. The Study subject was seated at rest prior to measurements. Readings were taken on the right arm. A cuff of the appropriate size was selected on the basis of upper arm circumference. BP was measured three times, over a period of 10 min. The average of all three readings was used to represent the individual's BP.
Since the prevalence of asymptomatic hypertension seems to be significant among children's. It is mandatory to check the blood pressure at least once a year in school children. It will be a useful guide for early identification and evaluation of hypertension in later life. As there is enough evidence to suggest that roots of essential Hypertension extend into childhood, this emphasize routine screening particularly in adolescent age group to detect Hypertension timely as in present scenario where risk factor for Hypertension in the childhood like change in physical activity pattern, obesity, high calorie intake.

Keywords: Asymptomatic, hypertension, observed, children

Introduction
Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-term medical condition in which the blood pressure in the arteries is persistently elevated [10]. High blood pressure typically does not cause symptoms. Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral vascular disease, vision loss, chronic kidney disease, and dementia [1].
High blood pressure is classified as either primary (essential) high blood pressure or secondary high blood pressure. About 90–95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors. Lifestyle factors that increase the risk include excess salt in the diet, excess body weight, smoking, and alcohol use. The remaining 5–10% of cases are categorized as secondary high blood pressure, defined as high blood pressure due to an identifiable cause, such as chronic kidney disease, narrowing of the kidney arteries, an endocrine disorder, or the use of birth control pills [2].
Blood pressure is expressed by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures, respectively. For most adults, normal blood pressure at rest is within the range of 100–130 millimeters mercury (mmHg) systolic and 60–80 mmHg diastolic. For most adults, high blood pressure is present if the resting blood pressure is persistently at or above 130/80 or 140/90 mmHg. Different numbers apply to children. Ambulatory blood pressure monitoring over a 24-hour period appears more accurate than office-based blood pressure measurement [3].
Lifestyle changes and medications can lower blood pressure and decrease the risk of health complications. Lifestyle changes include weight loss, physical exercise, decreased salt intake, reducing alcohol intake, and a healthy diet. If lifestyle changes are not sufficient then blood pressure medications are used [4]. Up to three medications can control blood pressure in 90% of people. The treatment of moderately high arterial blood pressure (defined as >160/100 mmHg) with medications is associated with an improved life expectancy. The effect of treatment of blood pressure between 130/80 mmHg and 160/100 mmHg is less clear, with some reviews finding benefit and others finding unclear benefit. High blood pressure affects between 16 and 37% of the population globally. In 2010 hypertension was believed to have been a factor in 18% of all deaths (9.4 million globally) [5].
Hypertension occurs in around 0.2 to 3% of newborns; however, blood pressure is not measured routinely in healthy newborns. Hypertension is more common in high risk newborns. A variety of factors, such as gestational age, postconceptional age and birth weight needs to be taken into account when deciding if a blood pressure is normal in a newborn [6].
Hypertension defined as elevated blood pressure over several visits affects 1% to 5% of children and adolescents and is associated with long term risks of ill-health. Blood pressure rises with age in childhood and, in children,

hypertension is defined as an average systolic or diastolic blood pressure on three or more occasions equal or higher than the 95th percentile appropriate for the sex, age and height of the child. High blood pressure must be confirmed on repeated visits however before characterizing a child as having hypertension. Prehypertension in children has been defined as average systolic or diastolic blood pressure that is greater than or equal to the 90th percentile, but less than the 95th percentile. In adolescents, it has been proposed that hypertension and pre-hypertension are diagnosed and classified using the same criteria as in adults [7].

The value of routine screening for hypertension in children over the age of 3 years is debated. In 2004 the National High Blood Pressure Education Program recommended that children aged 3 years and older have blood pressure measurement at least once at every health care visit and the National Heart, Lung, and Blood Institute and American Academy of Paediatrics made a similar recommendation. However, the American Academy of Family Physicians supports the view of the U.S. Preventive Services Task Force that the available evidence is insufficient to determine the balance of benefits and harms of screening for hypertension in children and adolescents who do not have symptoms [7].

Blood pressure measurement in childhood and adolescence is an important clinical examination as is the recording of body temperature, pulse rate and respiratory rate. Blood pressure rises with increasing age. Both systolic and diastolic blood pressure shows a positive correlation with height and weight in both sexes. The underlying process of growth and maturation is closely linked to the BP in children and adolescents. Even after so much of improvements in the diagnostic techniques, it is often difficult to determine the arterial blood pressure with accuracy in infants and young children. The difficulty encountered is both in the technique and in the interpretation of the reading itself. Although the prevalence of clinical hypertension is of a far lesser magnitude in children than adults, there is ample evidence to support the concept that the roots of essential hypertension extend back into childhood [8].

The original orientation of physicians with regard to BP in children and adolescents was towards identification and treatment of secondary forms of hypertension, such as renal parenchymal disease and renal artery stenosis. It is now understood that hypertension detected in some children may be a sign of an underlying disease, whereas in other cases the elevated BP may represent the early onset of essential hypertension [9].

Primary prevention of one of the leading health problems like hypertension and ischemic heart disease in adults necessitates a scientific evaluation of the predictors in children and adolescents. Blood pressure studies in these younger age groups provide important epidemiological information which may help in controlling or modifying the risk factors thereby decreasing the mortality and morbidity in the future [10].

As India is undergoing a rapid epidemiological transition [11, 12], the burden of chronic diseases is over taking the burden of infectious diseases [11-13]. The awareness that essential hypertension has its origin in childhood has resulted in increased emphasis on screening asymptomatic children. The present study was conducted to evaluate the prevalence of hypertension and prehypertension among apparently healthy school children in urban and rural Mysore. In this school based cross-sectional study, 1000 children from urban schools in Mysore city and 1000 children from rural school in Suttur (Mysore district), between the age group of 10-16 years were included (with upper and lower limit of 95% CI at ± 0.02). Anthropometric measurements were taken by two medical graduates under supervision of co-investigators. Agarwal charts of BMI for age and sex were used as reference standards. Children with BMI above 95th percentile were considered obese, those between 85th and 95th percentile were considered overweight [13]. Blood pressure measurements were taken using a mercury sphygmomanometer as per recommendations of American Heart Association [14]. The blood pressure was compared to age, sex and height percentile standards given by the report of Fourth task force on hypertension control in children [14].

Hence the present study was planned to assess the asymptomatic hypertension in school going children and its incidence.

Methodology

The present study was planned in the Patna Medical College and hospital, Patna, Bihar from duration of Jan 2018 to Dec 2018. All BP measurements on 100 childrens were carried out by one physician using a standard mercury sphygmomanometer. The study subject was seated at rest prior to measurements. Readings were taken on the right arm. A cuff of the appropriate size was selected on the basis of upper arm circumference. BP was measured three times, over a period of 10 min. The average of all three readings was used to represent the individual's BP. Pre-hypertension in children was defined as average systolic blood pressure (SBP) or diastolic blood pressure (DBP) levels of 90th percentile or higher but less than 95th percentile for gender, age and height on at least three separate occasions. Hypertension was defined as average SBP or DBP of 95th percentile or higher for gender, age and height on at least three separate occasions [15].

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study

Inclusion criteria: Childrens of 5 -15 years of age.

Exclusion criteria: Childrens with Any acute illness (In last 7 days); Any chronic systemic disease; On any type of medication; Advice for bed rest for more than 7 days in last 3 months; Absent during the time of conduction of the study due to any reason; Unwilling for study; Measurement technique.

Results & Discussion

Hypertension is a potential risk factor for atherosclerosis of coronary, renal and cerebral blood vessels. It is, therefore, necessary to identify the children with hypertension. Children with BP >95 percentile for age, gender and height is consider hypertensive. Obesity, unhealthy salt rich food and family history of hypertension were found to be important influencing factors in the development of hypertension in the various studies.

Hypertension is a major risk factor for cardiovascular and cerebrovascular diseases. Studies indicate that BP increases with age [16-17]. Population base epidemiological studies

show that primary Hypertension is far more common among apparently healthy children. Although the prevalence of Hypertension is far less in children than in adults, there is enough evidence to suggest that the roots of essential Hypertension extend into childhood [17-19].

Table 1: General Characteristics of participants

Character	Boys	Girls
Number	50	50
Age (years)	6 – 14	6 – 15
BMI (Kg/M^2)	13.2 – 21.6	15.1 – 22.5
Waist Circumference (cm)	58 – 73	57 -75

Table 2: Comparison of Systolic blood pressure between boys and girls

Age in years	Systolic Pressure		Diastolic pressure	
	Boys Mean ± SD (mm Hg)	Girls Mean ± SD (mm Hg)	Boys Mean ± SD (mm Hg)	Girls Mean ± SD (mm Hg)
5-7	99 – 105	100 -104	63 – 69	64 -70
8-10	101 – 106	103 – 108	64 – 70	64 -71
11-13	102 – 108	102 – 108	68 – 71	64 – 72
14 - 15	103 – 111	103 – 109	63 – 73	64 - 72

The mean systolic and mean diastolic blood pressures increase steadily and proportionately with weight. This finding is in agreement with that of Agarwal VK *et al*. who found that both systolic and diastolic blood pressures increased with increase in weight [20]. Rakesh Agarwal, *et al*. observed that blood pressure is directly proportional to the ratio of weight/height (kg/cm) [23]. Sachdev [24] found direct correlation between blood pressure and body weight and Londe found that systolic pressure is related to weight, but not diastolic pressure in either sex. In the Bogalusa heart study, a close relationship (linear relationship) was found between the log of the body weight and blood pressure [21-22]. The mean systolic and mean diastolic blood pressures observed in the present study are lower than that of V.K. Agarwal *et al*. in the comparable weight group [20]. This difference suggests that factors other than body weight, such as height, dietary habits, physical activities, geographical locality may be playing a role in the determination of blood pressure.

A secondary etiology of hypertension is much more likely in children than in adults, with renal parenchymal disease and renovascular disease being the most common. Children with hypertension should also be screened for other risk factors for cardiovascular disease, including diabetes mellitus and hyperlipidemia, and should be evaluated for target organ damage with a retinal examination, for renal damage and echocardiography. Hypertension in children is treated with lifestyle changes, including weight loss for those who are overweight or obese; a healthy, low-sodium diet; regular physical activity; and avoidance of tobacco and alcohol. Children with symptomatic hypertension, secondary hypertension, target organ damage, diabetes, or persistent hypertension despite nonpharmacologic measures should be treated with antihypertensive medications. Thiazide diuretics, angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, beta blockers, and calcium channel blockers are safe, effective, and well tolerated in children [25].

High BP is a major risk factor for cardiovascular and cerebrovascular diseases. The morbidity and mortality due to these diseases among adults is on the rise and more so in developing countries such as India. The long, slow, and steady course of hypertension suggests that it has its origin in childhood and adolescent. It probably goes undetected during this period and manifests later in life. Information on BP on different communities has come chiefly from various cross-sectional studies, which reveals its true epidemiological picture. The present study was done to find BP pattern among adolescent schoolboys and its relation with anthropometric measurements.

Conclusion

Since the prevalence of asymptomatic hypertension seems to be significant among childrens. It is mandatory to check the blood pressure at least once a year in school children. It will be a useful guide for early identification and evaluation of hypertension in later life. As there is enough evidence to suggest that roots of essential Hypertension extend into childhood, this emphasize routine screening particularly in adolescent age group to detect Hypertension timely as in present scenario where risk factor for Hypertension in the childhood like change in physical activity pattern, obesity, high calorie intake.

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