

## PREVALENCE OF OBESITY & HYPERTENSION IN ADOLESCENT SCHOOL GOING CHILDREN OF BERHAMPUR, ODISHA, INDIA.

Satyajit Bagudai <sup>\*1</sup>, Pranati Nanda <sup>2</sup>, Satyanath Reddy Kodidala <sup>3</sup>.

<sup>\*1</sup> Tutor, Dept. Of Physiology, M.K.C.G. Medical College, Berhampur, Orissa, India.

<sup>2</sup> Associate Professor, Dept. Of Physiology, M.K.C.G. Medical College, Berhampur, Orissa, India.

<sup>3</sup> Tutor, Dept. Of Physiology, Santhiram Medical College, Andhra Pradesh, India.

### ABSTRACT

**Background:** In the prevailing era of adult hypertension, limited data are available regarding the profile of childhood obesity & hypertension from India. We examined & studied the prevalence of childhood obesity & hypertension in a representative sample of school children from Berhampur, Odisha & tried to find out if any relationship is there or not between obesity & hypertension in those study population.

**Methods:** In a cross sectional study we select the children from different schools of Berhampur, Odisha during 2009-11. In this, 5155 student of 10-16 Yrs. of age group were taken. Blood pressure & anthropometrics data were collected. Overweight & obesity were defined by body mass index for gender & age. Gender, age & height were considered for determining hypertension. The hypertensive children were followed up at 6 monthly intervals, 3 times, to look for persistent hypertension.

**Results:** out of 5155 students, 10.4% students were over weight & 3.6% were obese (3.68%). 190(3.68%) students were found to have sustained hypertension. The number of girls students having hypertension (4.47%) was more than boys (3.2%). There was a significant association of hypertension in obese group in comparison to overweight & normal blood pressure group.

**Conclusion:** Prevalence of sustained hypertension overweight & obesity is on rise in adolescent age groups in this part of world. Possible related factors for this current trend may be the increasing sedentary life style, altered eating habits, and increased fat content of diet. The result suggests the need for more public awareness & prevention programs for childhood obesity & hypertension.

**KEYWORDS:** Obesity, Hypertension, Adolescent, Standards of life, Weight, Blood Pressure.

**Address for correspondence:** Dr. Satyajit Bagudai, Tutor, Dept Of Physiology, M.K.C.G. Medical College, Berhampur, Orissa. **E-Mail:** sbagudai@gmail.com

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### INTRODUCTION

Increased arterial blood pressure is a major risk factor for cardiovascular, cerebrovascular & renal disease. Indeed high blood pressure or hypertension may be considered as a major cause of morbidity & mortality in many populations. The insidious & steady history of hypertension in adults indicates that essential hypertension in adults is a result of process, that starts early in childhood and adolescent life, but

probably goes unnoticed<sup>1</sup>. Most of the studies of blood pressure carried out in different population have shown a rise of blood pressure with age and obesity<sup>2</sup>. Prevalence of hypertension in children have shown an upward trend from a low <1% to a high of 16.2% in different studies<sup>3,4</sup> of recent times. Investigation of blood pressure in children can contribute not only to the knowledge of etiology of the condition, but also have an important advantage that they may

lead to the prevention of high blood pressure before its harmful sequel can occur<sup>5</sup>. Obesity is one of the most important parameter consistently shown to be associated with hypertension. Recently there have been frequent reports of increased prevalence of overweight & obesity in childhood<sup>6,7,8</sup>. Early childhood obesity is associated with increased risk of subsequent morbidity whether or not obesity persists into adulthood. The rapid increase in the prevalence of overweight and obesity and its potential effect on morbidity & mortality in childhood & adulthood, emphasizes the importance of identifying critical periods for prevention of overweight in the vulnerable population and of understanding the factors that causes excess weight gain. So an attempt was undertaken with the objective of assessing the prevalence of hypertension, over weight & obesity in adolescent school going children & to find out if any association is present between them, in this part of the world, from where there is no reported data till date.

## MATERIALS AND METHODS

This cross sectional study was conducted among 5155 normal school children of 10-16 Yrs. age group, (3255 boys & 1900 girls) in the different Oriya Medium & English Medium schools of Berhampur i.e. MKCG Medical School, KC High School and St. Xavier's School in period from Aug. 2009 to Feb. 2011. The schools were selected by stratified random sampling method. Prior permission was obtained from all concerned.

1. The purpose & process of the study was explained to all the children & teacher.

Age was verified from the school records & various measurements (height, weight & blood pressure) were taken using standard techniques.

2. 5 minutes of rest was given to the students before measurement of blood pressure. Blood pressure was measured on right arm for constancy and comparison of standard tables. First tapping sound & disappearance of Kortkoff sound were taken as systolic & diastolic blood pressure. SBP & DBP above the 95<sup>th</sup> percentile for the age, sex and height, were taken as hypertension. 3 readings were taken maintaining an interval of 2 minutes between the readings.

Mean 3 readings were reported. Three six monthly interval examination were done upon the hypertensive children to conform the persistent hypertension.

3. BMI was taken as the parameter to clarify the overweight & obesity category & >95<sup>th</sup> percentile of the age & sex match value was taken as obese. 85<sup>th</sup> – 95<sup>th</sup> taken as overweight & less than 85<sup>th</sup> percentile taken as normal<sup>9</sup>. The reference data used to identify the cut off points were taken from the CKC 2000 dataset for BMI<sup>10</sup>.

## RESULTS AND DISCUSSION

Out of 5155 students 63.1% were boys & 36.8% were girls. 3.68% of the study population was hypertensive. Higher prevalence of hypertension was found in girls (4.47%) in comparison to the boys (3.2%). 10.4% of the study population were overweight & 3.6% were obese. Among all the overweight adolescents, 14% were hypertensive. Among all the obese adolescents, 44.7% were hypertensive.

**Table 1:** Prevalence of obesity in study population.

According to BMI in percentile	Number (n)	Percentage (%)
Non-obese (< 85 <sup>th</sup> )	4430	86
Overweight (85 <sup>th</sup> - 95 <sup>th</sup> )	535	10.4
Obese (> 95 <sup>th</sup> )	190	3.6
<b>Total</b>	<b>5155</b>	<b>100</b>

**Table 2:** Prevalence of hypertension in study population.

Sex	Normotensive		Hypertensive		Total
	n	%	n	%	
Boys	3150	96.8 (H) / 63.4 (V)	105	3.20 (H) / 55.26 (V)	3255 (63.14%)
Girls	1815	95.5 (H) / 36.5 (V)	85	4.47 (H) / 44.7 (V)	1900 (36.85%)
<b>Total</b>	<b>4965</b>	<b>96.3</b>	<b>190</b>	<b>3.68</b>	<b>5155 (100%)</b>

**Table 3:** Prevalence of hypertension in study population.

Category according to BMI in percentile	Normotensive		Hypertensive		Total	P value
	n	%	n	%		
Normal weight	4400	99.3 (H) / 88.6 (V)	30	0.67 (H) / 15.78 (V)	4430	P<0.001
Over weight	460	85.98 (H) / 9.26 (V)	75	14.1 (H) / 39.47 (V)	535	
Obese	105	55.26 (H) / 2.11 (V)	85	44.7 (H) / 44.7 (V)	190	
<b>Total</b>	<b>4965</b>	<b>96.31</b>	<b>190</b>	<b>3.68</b>	<b>5155</b>	

(χ<sup>2</sup> = 235.165, df = 2, p < 0.001)

The prevalence of overweight & obesity in children aged between 6 to 17 Yrs in all ethnic groups is reported to be between 5% - 30%. In our study by BMI criteria, the prevalence value

of adolescent overweight & obesity was 10.4% & 3.6% respectively. The prevalence value of overweight found by us was lower than the studies done by Bishav Mohan et al<sup>11</sup> (overweight 11.63%) & by Kapil et al<sup>6</sup> (overweight – 23.1%). Similarly our prevalence value for obesity was also lower than Kapil et al (7.4%) & Gupta & Ahmed<sup>12</sup> (7.5%). The United States National Centre for Health Statistics suggests that nearly 15% adolescents are overweight & obese.

Rapid economic growth has improved the nutritional, socio-economic & health status of many countries. With this nutritional & socio-economic evolution, overweight & obesity have increased also in most Asian countries. Our finding shows the similar nutritional transition, showing the effect in this part of India like the other parts of the India & Asia. In addition to the nutritional & socio-economic transition, life style & behavioural alteration is also possibly contributing significantly to the rapidly rising prevalence of obesity. Unhealthy eating habits & physical inactivity are the major culprits. The sedentary life style habits of children & adolescent of school going age like spending more time in television viewing, computer games, internet, overemphasis on academic excellence, are mostly the factors responsible. Unscientific urban planning & ever increasing automated transports are the other contributing additional factors.

In our present study the prevalence of sustained hypertension in adolescent children between the age group of 10-16 Yrs. combined boys and girls was 3.68%, which is high in comparison to 0.5% - 2% found in other studies<sup>12,13,14</sup> but it is low in comparison to the study done by Bishav Mohan et al<sup>11</sup> (6.69%).

The relationship of obesity & hypertension was examined in our study. The prevalence of sustained hypertension increases gradually from overweight to obese category (14.01% v 44.7%). In this relationship, we found a highly significant association between the hypertension with overweight and obese category. Overweight was associated 49 times with hypertension and obese was associated 250 times with hypertension when compared with normal weight category. This relationship

has also been reported by other studies<sup>15, 16</sup> as well. Rosner et al<sup>17</sup> compiled the data from 8 large epidemiological studies, irrespective of race, gender & age. He reported that the risk of elevated blood pressure was significantly higher for children in upper compared with lower docile BMI, with an odds ratio of systolic hypertension ranging from 2.5 to 3.7. Freedman et al<sup>18</sup> have shown that overweight children in the Bogalusa heart study were 4.5 & 2.4 times as likely to have elevated systolic & diastolic BP respectively. Studies from India have also reported this type of trend<sup>11</sup>. Results of the different prospective studies in Asia have repeatedly pointed out a direct relation of obesity with hypertension, type 2 diabetes & hypercholesterolemia<sup>19</sup> in adult population. According to WHO chronic disease like cardiovascular diseases will be the major cause of mortality in South Asian population. This fact is due to South Asian appearing to have worse cardiovascular risk profiles when compared with Caucasian population with similar BMI levels. Small increases of BMI in South Asians may translate into a substantial increase in the burden of cardiovascular disease. For this reason, even though the prevalence of the overall percentage of obesity & overweight in children is lower than reported in some other studies, it is giving an ominous message for future. At the same time the message is providing an excellent opportunity to target specifically at an initial childhood & adolescent population, thereby trying to decrease the morbidity & mortality of cardiovascular disease in adult life.

#### **Limitation of the Study:**

1. Our study didn't include waist hip ratio, skin fold thickness or body fat percentage as a parameter for assessment of overweight & obesity.
2. Follow-up of the study population of regular periodic annual or 2 Yrs interval would have given more accurate conclusion.
3. As blood pressure was measured in the field, an element of anxiety & apprehension might have affected a subset of children.

#### **SUMMARY AND CONCLUSION**

The increasing trend of adolescent obesity and hypertension is prevalent in our study in this part

of world though not as highly as other parts of India. Hypertension was seen in high percentage in adolescents with overweight and obesity when compared with who were neither overweight nor obese. Since adult hypertension starts early in life, if these trends continue further, the cardiovascular morbidity & mortality will be enormous in future. Therefore an effective interventions & preventive strategy is needed at local & national level, targeting the children & adolescent to improve their life style.

**Conflicts of interest:** None

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