

## Prevalence of Over-Weight, Obesity And Hypertension in School Going Children & Their Eating Habits, Chennai, Tamilnadu, India.

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**Abstract:** A cross sectional study was carried out in four schools in urban and rural areas in Chennai to find out the prevalence of childhood over-weight and obesity in the age group of 8 – 12years. The overall prevalence of overweight and obesity was 15.8% with 95% Confidence Interval of 12.6% - 19%, and this was observed to be higher in urban areas. Binging in both the rural and urban areas has a statistically high significant relationship with obesity. Similarly, fast-food eating is 86.1% among the obese and 76.74% among the overweight. Among the students with hypertension and pre hypertension, 57.14% were overweight / obese and 42.86 % was healthy / underweight. The chance of an overweight/obese student developing Hypertension / Pre - Hypertension is 11.26 times higher that of a student with normal blood pressure. The prevalence of obesity and over-weight in this study is similar to those in other studies carried out in our country indicating an increasing trend of obesity and overweight in children in both urban and rural areas. Exclusive breastfeeding, increased awareness about hazards of overweight and obesity, healthy eating practices and physical exercise, will go a long way in reducing overweight and obesity as well as the prevalence of hypertension in children.

**Keywords :** Eating habits, obesity/overweight and hypertension in children.

### I. Introduction

Childhood obesity has reached epidemic proportions. In the developed world obesity and overweight have significant long term consequences such as adulthood obesity, higher levels of cholesterol and higher future incidence of coronary heart diseases (CHD). The nutritional transition has resulted in change in dietary habits like consumption of junk food and reduced physical activities. One half of obese school children become obese adults. Obesity in childhood appears to increase the risk of subsequent morbidity<sup>1</sup>. Hence significance of estimating prevalence of childhood obesity cannot be over emphasised. Binge eating is common in children. The literal meaning of binge eating is eating food throughout the day without being able to control oneself. The relation between such binge eating with overweight and obesity is also being discussed.

Primary hypertension is detectable in children and adolescents and, as in adults, is associated with a positive family history of hypertension, obesity, and life-style factors. Owing to the well-established childhood obesity epidemic, the population prevalence of high blood pressure (BP) in the young is increasing<sup>2</sup>. Consensus guidelines define hypertension during childhood as blood pressure that is, on 3 different visits, measured and found to be at or higher than the 95th percentile for age, sex and height (>119/78). Prehypertension is defined as average blood pressure at or higher than the 90th percentile for age, sex, and height, or more than 120/80 mm Hg but less than the 95th percentile, and measured similarly at 3 or more visits (>115/74)<sup>3,4</sup>.

In southern states of India, studies on childhood obesity have been reported from Coimbatore of Tamil Nadu<sup>2</sup>, Kochi in Kerala<sup>1</sup> but researchers could not find any literature on studies carried out in Chennai where comparison has been attempted between urban and rural school going children. Therefore, this study becomes relevant.

### II. Aims and objectives

- To study the prevalence of childhood obesity with special reference to urban –rural difference.
- To assess the eating habits and lifestyle of these children in relation to overweight and obesity.
- To find the prevalence of hypertension in this study population and its association with obesity and overweight.

### III. Materials and Method -

A cross sectional study was planned keeping the objectives of the study in mind. Based on the finding of a study in Coimbatore in Tamil Nadu state<sup>2</sup>, where prevalence of 17.73 percentage of childhood overweight and obesity was reported with twenty percent margin of error, estimated sample size was

worked out to be 463. Therefore, it was decided to plan the study with a sample size of 500. Study population was randomly selected from school going children in the age group of 8-12 years.

Accordingly, a questionnaire was prepared and pretested to ensure that the desired information is obtained. The medical research and ethics committee of the medical college and hospital approved the study. All subjects gave informed consent. Required sanction to carry out the study was obtained from department of education, Government of Tamil Nadu. The authorities have been assured that information given by students will be kept confidential and it will be used only for the study purpose. The researcher filled up the Performa after personal interview. The subjects were examined and anthropometric measurements like height, weight, waist, hip measurements were taken with the help of trained medical personnel. Height was measured with the help of stadiometer. Weight was measured using a spring weight balance which was adjusted to zero before taking the reading. This was periodically checked with known weight to avoid bias. The children were made to stand with minimum clothing and barefoot to measure the Waist and Hip circumference, which were measured using steel measuring tape. Measurements for waist circumference were made midway between the lower border of the ribs and iliac fossa and for the hip circumference at the widest point over the buttocks. Blood Pressure was measured with the use of a standardized mercury sphygmomanometer. Brachial artery blood pressure (first and fifth kottokoff sounds) was measured three times consecutively on seated participants after they had rested for 5 minutes an appropriately sized cuff was placed on the right arm, pulse occlusion pressure was determined and the cuff was inflated to 20mm Hg above the pressure. The mean of the last two measurements was used for estimation of BP<sup>6</sup>.

Body Mass Index (BMI) was calculated for each participant using weight (kg)/height<sup>2</sup> (meters) formula. BMI value obtained was plotted on Centre for Disease Control (CDC) charts for either girls or boys of age 2 - 20 to obtain a percentile ranking. Similar ranking has been used in studies conducted on school going children<sup>7</sup>. Children with BMI below 5% were considered underweight, between 5th and 85th percentile were considered to be normal, those between 85th and 95th percentile were considered overweight and those above 95th percentile were considered obese.

Information collected through questionnaire was analysed using decision analysis stats 2.0 and Windows excel and presented in tabular form under Observation and results. Tests of significance and expression in percentage were applied as and when indicated.

#### IV. Figures and Tables

Table 1: The Prevalence of obesity and overweight in study population in urban and rural area

Nutritional status	Rural	Urban	Total
<b>Obese and overweight</b>	14 [5.6%]	65 [26%]	79 [15.8%]
<b>healthy and underweight</b>	236 [94.4%]	185 [74%]	421 [84.2%]
<b>Total</b>	250 [100%]	250 [100%]	500 [100%]

\*Figures in parenthesis indicate percentage

$X^2=37.584$        $DF=1$        $P<0.0001$

Odds ratio = 33.7

95% Confidence Interval - 12.6% - 19%

The overall prevalence of overweight and obesity is 15.8%. It is seen that prevalence of obese and overweight children in rural areas is 5.6% whereas in urban areas it is 26%. This difference is highly significant ( $p<0.0001$ ). The Odds ratio calculated is 33.7 indicating that those in urban areas have more chances of becoming obese than those staying in the rural areas.

Table2: Association between bingeing and obesity/overweight

Nutritional status	Binging						Total		
	Urban			Rural			Yes	No	Total
	Yes	No	Total	Yes	No	Total			
<b>Obese and overweight</b>	21 (41.18)	44 (22.11)	65 (26)	2 (12.5)	12 (5.13)	14 (5.6)	23 (34.33)	56 (12.93)	79 (15.8)
<b>healthy &amp; underweight</b>	30 (58.82)	155 (77.89)	185 (74)	14 (87.5)	222 (94.87)	236 (94.4)	44 (65.67)	377 (87.06)	421 (84.2)
<b>Total</b>	51 (100)	199 (100)	250 (100)	16 (100)	234 (100)	250 (100)	67 (100)	433 (100)	500 (100)

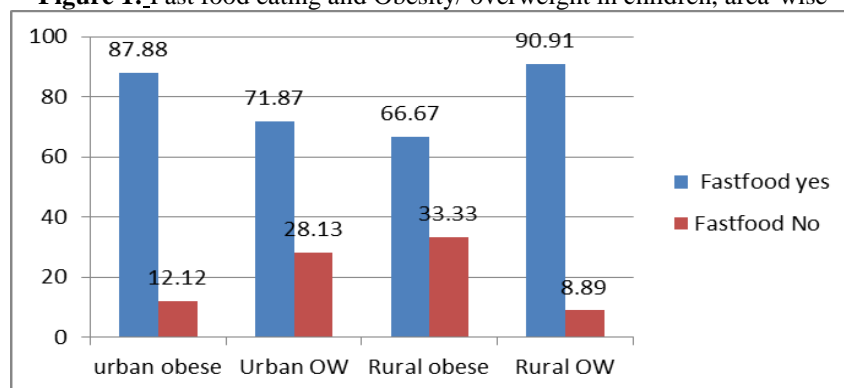
\*Figures in parenthesis indicate percentage

Urban -  $\chi^2 = 7.67$        $DF - 1$        $p < 0.05$   
 Rural -  $\chi^2 = 0.461$        $DF - 1$        $p > 0.05$

Urban and Rural- $\chi^2=19.96$  DF – 1  $p<0.001$

Amongst urban children who binge, 41.18% are either overweight or obese in comparison to the children who do not, whereas in rural areas 12.5% of the children who binge are either overweight or obese in comparison to the children who do not. On combining both rural and urban, bingeing has a statistically significant relationship with overweight/obesity.

**Figure 1:** Fast food eating and Obesity/ overweight in children, area-wise



(OW – over weight)

This shows that fast-food eating is significantly higher among obese and overweight school children in both urban and rural areas.

**Table 3:** Status of Blood Pressure in overweight, obese and other children

Nutritional status	Blood Pressure		Total
	Hypertensive/ Pre-Hypertensive	Normal Blood Pressure	
Obese and overweight	32 (57.14)	47(10.59)	79(15.8)
healthy and Underweight	24 (42.86)	397(89.41)	421(84.2)
<b>Total</b>	56(100)	444(100)	500(100)

\*figures in parenthesis indicate percentage

Odds ratio 11.26

95% Confidence Interval is 6.12 -20.72

$X^2 = 80.86$

P Value = 0.00000

Among those who were normotensive, high percentage i.e. 89.41% were either of healthy weight or underweight. Among the students with hypertension and pre hypertension, 57.14% were overweight / obese and 42.86 % was healthy / underweight. The chances of an overweight/obese student developing Hypertension/pre Hypertension is 11.26 times higher that of a student with normal blood pressure.

## V. Discussion

There has been a phenomenal rise in proportions of children having obesity in the last four decades especially in developing countries<sup>5</sup>.

In our study prevalence of obesity and overweight has been found to be 5.6% in rural area and 26% in urban area. Rural and urban difference is found to be highly significant (Table 1). In a study carried out at Thiruvananthapuram (Kerala) the prevalence of overweight and obesity was found to be 17.73% and 4.99% among school going children<sup>1</sup>.

Table 2 shows that bingeing in both rural and urban area has a highly significant relationship with obesity( $x^2= 18.38$   $p<0.001$ ). Similarly fast food eating and overweight / obesity are directly related (Figure 3). It takes between 1-2 hours of extremely rigorous activity to counteract a single large sized (i.e. $\geq 780$ k kcal) children`s meal at a fast food restaurant<sup>8</sup>. A small caloric imbalance over a long period of time is sufficient to lead to obesity. Hence we found the habit of eating fast food present in 81% of the children; the correlation is also statistically proven.

Hypertension in childhood and adolescence may contribute to premature atherosclerosis and the early development of cardiovascular disease. As a result, identifying children with Hypertension and successfully treating their Hypertension may have an important impact on long-term outcomes of cardiovascular disease<sup>9</sup>. In

our study it is seen that 18(3.6%) are hypertensive, 38(7.6%) are pre-hypertensive. This is higher than the figures found in a study carried in Surat (Gujarat) where prevalence of hypertension among school going children was found to be 6.48%<sup>7</sup>. In a Delhi based prevalence study of high systolic blood pressure (SBP) in school population was 3.8 %; it was also found that 4.4% with high Waist Circumference and Basal Metabolic Rate are more likely to have hypertension<sup>8</sup>.

There is increasing evidence that adult hypertension has its antecedence during childhood, as childhood blood pressure predicts adult hypertension. Identifying these children and tracking their blood pressure would help to control hypertension in the general population.

As seen in Table 3 blood pressure was normal in 89.41% of students who were neither obese nor overweight, whereas in the obese/overweight group only 42.86 % had normal blood pressure, indicating that obesity has a role in hypertension ; there was a strong statistical correlation between BMI and Hypertension/ pre Hypertension.

## VI. Conclusion

In this cross sectional study of 500 school children, it was found that the percentage of obese and overweight children was 15.8% among urban children and 26% among the rural children. Binging and fast food eating is common and has a highly significant relationship with obesity. Prevalence of hypertension and Pre-hypertension is higher among the obese/over-weight

In India recent economic advancement has created easy access to calorie rich foods. This coupled with lack of awareness in parents about childhood obesity and nutritive diet may be part of reason behind this trend.

Increased awareness about hazards of over-weight and obesity, promotion of healthy eating practices and physical exercise, will have a strong effect in reducing the occurrence of over-weight and obesity in children. School authorities could provide increased duration and access to physical activities by encouraging exercises, opening gyms in schools as well as creating parks for walks and games in neighbourhood. Education of mothers about exclusive breastfeeding and providing breastfeeding support services at work place will go a long way in reducing obesity and overweight in children. Screening for hypertension and obesity/ overweight should be given importance in school health services.

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