

Prevalence of Obesity and Hypertension in Adolescent School Children of Guntur Town, Andhra Pradesh

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ABSTRACT

Introduction: Obesity and hypertension in children are serious health problems, as they appear to increase the risk of subsequent morbidity and mortality. This study was done to find out the prevalence of obesity and hypertension in adolescent school children in Guntur town, Andhra Pradesh.

Material and Methods: This is a cross sectional study undertaken between July 2018 & Oct 2019 in five randomly selected schools (three local body schools and two corporate schools). 1965 children of age group 11 to 15 years were included in the study. Anthropometric data and blood pressure were measured and body mass index was derived from weight and height. Overweight and obesity were defined by body mass index for age and gender. Blood pressure centile charts were used to determine pre hypertension and hypertension.

Results: Of the 1965 school children 1027 (52.3%) were girls and 938 (47.7%) were boys. In the study population 33 (1.65%) were obese and 86 (4.3%) were overweight. 26 (1.3%) were hypertensive and 26 (1.3%) were pre hypertensive. There was a significant difference in the prevalence of obesity and hypertension between local body schools and corporate schools.

Conclusion: Obesity and hypertension in adolescent children are serious health problems requiring a much needed effort from the medical fraternity to increase public awareness.

Keywords: BMI, Obesity, Overweight, Hypertension, School Children.

INTRODUCTION

As standards of living continue to rise, weight gain and obesity in children are posing a growing threat to the health of the world. Hypertension in children is commonly associated with obesity and is generally missed by the physicians. These are serious public health challenges of the 21st century as they appear to increase the risk of subsequent morbidity and mortality.¹

Various cross sectional studies conducted in different parts of India have shown combined prevalence of obesity and overweight in the range of 6 to 25%^{2,3,4,5}. Hypertension in school aged children appears to be increasing, perhaps as a result of increased prevalence of obesity. Many studies have found an association between obesity and hypertension⁶.

Overweight and obesity are mainly due to "caloric imbalance" and are affected by multiple factors including genetic, behavioural, environmental and endocrinal factors^{7,8,9}.

Obese children are at high risk of developing hyperlipidemia, abnormal glucose tolerance, hypertension, coronary artery disease, obstructive sleep apnoea, infertility, orthopaedic problems etc^{10,11}. High blood pressure in

childhood commonly leads to hypertension in adulthood, and adult hypertension is the leading cause of premature death around the world¹².

The present study was undertaken to determine the prevalence of obesity and hypertension among adolescent school children of Guntur town, in the state of Andhra Pradesh.

MATERIAL AND METHODS

The present study was a cross sectional study undertaken in five schools (three local body schools and two corporate schools), which were selected randomly, in Guntur town between July 2018 and October 2019. 1965 school children of age group 11 to 15 years were included in the study. Children with chronic diseases like epilepsy, congenital heart disease, chronic kidney disease etc were excluded from the study.

The study has been approved by the Institutional Ethics Committee. Necessary permission from the concerned authority (School Head Master / Principal) and parental consent was obtained. A structured questionnaire was used to obtain information including - age, sex, parents occupation, parents education, family history of hypertension, history of chronic illnesses and medication history.

Anthropometric data including weight and height were measured using standard techniques and BMI was calculated from height and weight. Body mass index (BMI) value more than 85 centile but less than 95 centile for age and sex was considered overweight and BMI value more than 95 centile for age and sex was considered as obese in the study population. Age and sex specific IAP charts for BMI were used for this purpose.

Blood pressure (BP) was recorded using mercury sphygmomanometer with appropriate sized cuff. Blood pressure was recorded thrice in children who showed high blood pressure (more than 90 centile) in the first screening. Those children with high blood pressure (more than 95

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centile) after three readings were considered hypertensive. Those children who showed blood pressure above 90 centile but below 95 centile were considered pre-hypertensive. For statistical analysis IBM SPSS software was used. Categorical data was represented as frequencies and percentages. Continuous data was presented as mean and SD. ANOVA was used for comparison of means of multiple groups. Chi square test was done for statistical significance of categorical data. Pearson correlation was done between two continuous variables. In all instances, a P value of <0.05 was considered statistically significant.

RESULTS

Of the 1965 school children 993 (50.5%) were from corporate schools and 972 (49.5%) were from local body schools. 1027 (52.3%) were girls and 938 (47.7%) were boys (Table-1). The mean values of height of the study population ranged from 135.18cm ± 6.99 (11 years) to 154.65cm ± 7.98 (15 years) with an average of 147.02cm ± 11.15. The height of children among study group increased significantly with age (p<0.0001). The mean values of weight of the study population ranged from 29.46 ± 5.89 (11 years) to 43.44 kg ± 7.86 (15 years) with an average of 37.96 ± 9.10. The increase in weight is significant with age group (p<0.0001). Among the 1965 children 33 (1.68%) students were obese,

86 (4.37%) students were overweight, 406 (20.66%) students were underweight and 1440 (73.28%) students were in normal BMI range. The prevalence of obesity and overweight was high in girls compared to boys in the study population (figure-1).

Out of the 33 obese children 22 (2.21%) and 11 (1.13%) were from corporate and local body schools respectively. Out of the 86 overweight children 60 (6.04%) and 26 (2.67%) were from corporate and local body schools respectively. There was a significant difference between corporate and local body schools (p<0.005) (table-2).

Of the 1965 children, 26(1.3%) & 26(1.3%) were hypertensive and pre-hypertensive respectively. There was no significant variation in mean SBP among boys and girls. The prevalence of hypertension (HTN) and pre hypertension (Pre HTN) was 19 (1.9%) & 20 (2.0%) in corporate school children compared to 7 (0.7%) & 6 (0.6%) in local body school children respectively. There was a significant

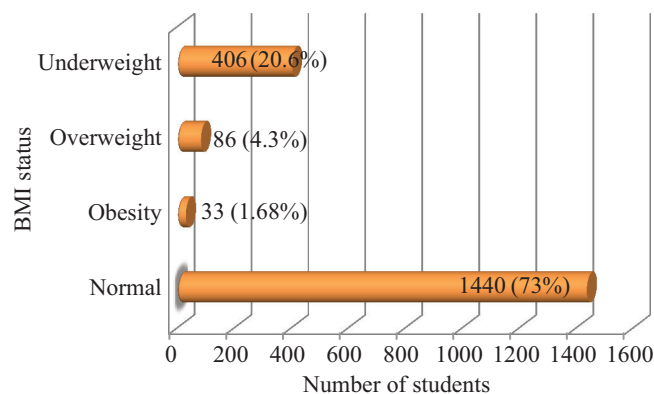


Figure-1: Prevalence of Obesity & Overweight among the study population

Sex	Type of School		Total
	Corporate	Local Body	
Female	400 (40.28%)	627 (64.50%)	1027 (52.3%)
Male	593 (59.72%)	345 (35.50%)	938 (47.7%)
Total	993 (100%)	972 (100%)	1965 (100%)

Table-1: Gender wise distribution of children among corporate and local body schools

Type of School	BMI Category				Total
	Normal	Obesity	Over weight	Under weight	
Corporate	828(83.4%)	22 (2.21%)	60 (6.05%)	83 (8.36%)	993(100%)
Local body	737(75.8%)	11 (1.13%)	26 (2.67%)	198(20.37%)	972(100%)
Total	1565(79.6%)	33 (1.68%)	86 (4.37%)	281(14.30%)	1965(100%)

Table-2: Prevalence of Obesity/Overweight in corporate and local body schools

Type of School	Blood Pressure			Total
	HTN	Pre HTN	Normal	
Corporate	19 (1.92%)	20 (2.01%)	954 (96.07%)	993 (100%)
Local body	07 (0.73%)	06 (0.61%)	959 (98.66%)	972 (100%)
Total	26 (1.33%)	26 (1.33%)	1913 (97.3%)	1965(100%)

Table-3: Prevalence of HTN and Pre HTN in children in corporate and local body schools

BMI Category	Blood Pressure			Total
	HTN	Normal	Pre HTN	
Normal	17 (1.08%)	1534(98.01%)	14 (0.91%)	1565 (100%)
Obesity	02 (6.06%)	28 (84.85%)	03 (9.09%)	33 (100%)
Overweight	07 (8.14%)	71 (82.55%)	08 (8.15%)	86 (100%)
Underweight	00	280 (99.64%)	01 (0.36%)	281 (100%)
Total	26 (1.32%)	1913(97.36%)	26 (1.32%)	1965 (100%)

Table-4: Association between obesity/overweight and HTN/Pre HTN in the study population

difference between corporate and local body schools ($p < 0.005$) (table-3).

There was a positive co-relation between BMI and SBP ($r = 0.24$) and between BMI & DBP ($r = 0.17$). The association between obesity/overweight and hypertension among study population was highly significant ($p < 0.01$) (table-4).

DISCUSSION

Obesity and hypertension in children are common health problems in rapidly growing economies throughout the world and India is not an exception. Cross sectional studies from different parts of India showed different prevalence rates.

The present study comprised of a total of 1965 students in the age group 11 to 15 years from two corporate schools and three local body schools. Amongst 1965 children, 938 (47.7%) and 1027 (52.3%) were male and female respectively, where female students outnumbered male students.

There was an increase in BMI of the children with respect to age group in this study. This might be due to significant increase in weight and height of children with respect to age group. Similar findings were reported by Parekh Alok et al¹³, V Subrahmanyam et al¹⁴, Ramachandran et al¹⁵, V Kumaravel et al¹⁶ & Satyagit Bagudai et al⁶.

The combined prevalence of obesity and overweight was 6.05% in this study. Nazeem I Siddiqui and S Bose et al¹⁷ have reported a prevalence of 14.97% which was higher than this study and this may be due to difference in the geographical location (predominantly rural) and socio economic status of the study groups.

The prevalence of overweight and obesity was more in females (7.5%) compared to males (4.5%) but no significant difference was found with respect to gender. These findings were in agreement with studies conducted by Supreet Kaur et al¹⁸, Satyagit Bagudai et al⁶ who reported high prevalence of obesity and overweight in females.

The prevalence of obesity and overweight was higher among children from corporate schools compared to local body schools. Marwaha RK et al¹⁹, Adinatesh et al²⁰, Premnath M et al²¹ reported similar findings.

The prevalence of HTN in this study was 1.3% whilst Chadha SL et al²² reported a prevalence of 11.7%, and this may be due to difference in the geographical location, eating habits and socio economic status of the study groups.

There was a significant difference in the prevalence of HTN and Pre-HTN among children of corporate and local body schools. The high prevalence in corporate schools could be due to better income status of families; so easy access to fast foods and also sedentary life style. Similar findings were found by M Shashidhar Kotian et al²³, S Kumar et al²⁴, Shardha Sidhu et al²⁵ & Bose K et al²⁶.

There was a significant association between obesity/overweight and hypertension in this study. This could in part be due to metabolic syndrome X as seen in adults. The results were in harmony with the findings of Chadha SL et al²², Varma et al²⁷ & N K Anand et al²⁸. This study concluded

that obese children were more prone to develop hypertension compared to normal weight children.

CONCLUSION

A healthy society is a wealthy society and children are an important component of the society. Compared to other Indian studies the burden of overweight/obesity seems to be less in Guntur town. The data available on childhood overweight/obesity is patchy in India and sometimes it is difficult to compare the results as food habits and other life style habits vary greatly across the country. The present study found positive correlation between BMI and blood pressure in adolescent school children, therefore explaining the higher prevalence of hypertension among obese children.

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