

Original article

Assessment of Obesity in School Children

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Abstract

Introduction:

The WHO refers obesity as a global epidemic because of rapid increase in the number of overweight and obese individuals in last 20 years. The onset of obesity may occur at any age and it maybe triggered by factors such as early weaning, inadequate food intake, eating disorders and problems related to disturbed family relationships.

Objectives:

1. Assessment of nutritional status of school children
2. To analyze the relationship between obesity with physical activity and sleeping hours.
3. To analyze the relationship between obesity and correlation between waist hip ratio and body mass index.

Materials and methods:

We measured the weight, height, body mass index and mid arm circumference of children. The children were classified as normal, underweight, overweight or obese, according to body mass index per age. 54 children were assessed at a school near Bhavnagar Medical College

Results:

Out of 54 students, there were 32 girls and 22 boys. Out of 32 girls 11 were normal, 3 were overweight and 18 were under weight and out of 22 boys 6 were normal, 1 overweight and 15 were under weight.

Discussion:

The prevalence of overweight and obesity in school-aged children in our study counter the results obtained from other studies. Present data was analyzed statistically and we had tried to correlate it with sleeping hours, time spent in front of TV and computer as well as physical activity. We have also tried to find out the association of parents occupation with their weight status.

Conclusion:

We observed an association between excess weight and obesity and inactivity in children. The time spent in sleeping was a positive factor for maintaining a balance between weight and height. There was also an association between underweight children and working mothers.

Key Words : *childhood obesity, BMI , sleep, physical activity*

Introduction :

Childhood obesity was considered a problem of affluent countries. Today this problem is appearing even in developing countries¹. Globally, the prevalence of childhood obesity varies from over 30% in USA to less than 2% in sub-Saharan Africa. The prevalence of obesity in school children is 20% in U K and Australia, 15.8% in Saudi Arabia, 15.6% in Thailand, 10% in Japan and 7.8% in Iran^{2,3}.

In developing countries such as India, especially in urban populations, childhood obesity is emerging as a major health problem⁴. Studies from metropolitan cities in India have reported a high prevalence of obesity among affluent school children^{5,-11}. On the other hand some studies reported a high prevalence of under nutrition among rural school children and children in urban slums^{12,13}. Available studies from Chennai and Delhi have shown the prevalence of obesity as 6.2% and 7.4% respectively^{14,15}.

50-80% of obese children will grow up to become obese adults¹⁶ and it is harder to treat obesity in adults than in children¹⁷. Effective prevention of adult obesity will require the prevention and management of childhood obesity¹⁸. In children, the development of obesity is associated with the simultaneous deterioration in chronic diseases risk profiles.^{19,-24} Excess weight in childhood is the leading cause of pediatric hypertension, and overweight children are at a high risk for developing long-term chronic conditions, including adult-onset diabetes mellitus, coronary heart disease, orthopedic disorders and respiratory diseases.^{19,-26} In fact, there is substantial evidence suggesting that obesity in childhood lays the metabolic groundwork for adult cardiovascular disease.^{20,23} Also, many studies demonstrate that overweight children tend to become overweight

adults.^{27,28,29,30} Overall, obesity in childhood appears to increase the risk of subsequent morbidity, whether or not obesity persists into adulthood.^{26,31}

Under nutrition is also a major public health problem worldwide, particularly in developing countries³². Even in countries like India, which are typically known for high prevalence of under nutrition, significant proportion of overweight and obese children now coexist with the under nourished. One-third of the children under 5 years old worldwide are moderately or severely undernourished. Under nutrition impairs physical, mental and behavioral development of millions of children and is a major cause of child death^{33,34}.

The children in developing countries presently suffer from double jeopardy of malnutrition- urban children are afflicted with problems of over-nutrition while rural and slum children suffer from effects of undernutrition³⁵. Changing trends in body weights in children is important for public health policy. This can be either evaluated using a prospective-study design or by sequential multiple cross sectional studies. We performed cross section evaluations in a single school in Bhavnagar in Gujarat in Western part of India to determine changing trends in body-mass index and obesity in school children in classes 7th. The study was conducted with the following objectives:

Objectives:

1. Assessment of nutritional status of school children
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Materials and methods

Study design and sampling method

The Study is a cross sectional randomized epidemiological study among school children in Bhavnagar regarding assessment of obesity and factors affecting it. We conducted a cross-sectional survey among junior high school students in Bhavnagar. 54 junior high schools student from one class of 7th standard was selected for this study.

Data collection

Data was collected in the form of general information. All participants completed a questionnaire on their usual physical activity, habit of watching TV and time spent with computer and for sleeping as well as the pattern of dietary intake was recorded. Socio-demographic data were collected in the form of: family income, parents' educational status, number of family members and working status of the parents.

Anthropometric measurement. We have recorded body weight to the nearest 0.1 kg using a standard balance scale with subjects barefoot and wearing light indoor clothing. Body Height was measured to 0.1 cm with a free standing Magnimeter stadiometer, waist circumference, hip circumference, mid arm circumference was recorded to the nearest 0.5 cm. Body mass index (BMI) was defined as the ratio of body weight to body height squared, expressed as kg/m^2 . BMI was classified using K.N. Agarwal³⁶ percentiles, children's with 95th Percentile of BMI were taken as cut-off point. Children with BMI more than this cut-off point with respect to

age and sex were considered as obese, between 95% to 85% were considered overweight and less than 75% was considered as child with under nutrition 95th Cut-off point of boys and girls is tabulated as below.³⁶

95th Percentile of BMI for Boys and girls for 12 year of age:

	100	95 th
Boys	25.05	23.8
Girls	27.05	25.7

BMI may be appropriate for population-level assessments of chronic under nutrition. In 1988, researchers proposed the use of BMI to define and diagnose chronic undernutrition. This classification provides a useful framework for the analysis of height and weight data from chronically undernourished adult populations.

Waist – hip ratio was calculated waist – hip ratio was calculated by ratio of waist circumference and hip circumference. We have also measure Mid arm circumference.

Statistical analysis :

Means (\bar{x}), standard deviation (SD) and frequency (%) were calculated for the statistical analysis. Student's t test was used to compare the mean results of the analyzed variables and χ^2 was used for comparison of frequencies. A p value below or equal to 0.05 was considered to be statistically significant for a 95%CI. The data were analyzed through SPSS 10.0 (SPSS Inc.) Trial statistical package.

Results

In the present study, we have assessed 54 students (12 year old). Out of 54 there were 24 boys (44.44%) and 30 girls (55.66%).

Table 1 shows the frequency of healthy, underweight, overweight and obese children according to BMI.

	BOY	GIRL	TOTAL
NORMAL	4 (16.66%)	4 (13.33%)	8 (14.81%)
UNDERWEIGHT	17(70.83%)	21(70.00%)	38 (70.37%)
OVERWEIGHT	1(4.16%)	4 (13.33%)	5 (9.25%)
OBESE	2 (8.32%)	1(3.33%)	3 (5.55%)
TOTAL	24	30	54

There is not a statistically significant difference ($P = 0.686$)

Out of 38 under weight student 8 (4boys and 4 girls) fall in sever under nutrition stage. Mean BMI of student from all four group is shown in Table 4 and WHR of all four group is shown in Table 5

Table 2 shows mean BMI in all four groups with SD

	BOY	GIRL	P value
NORMAL	20.23 + 0.83	21.87 + 1.01	significant
UNDERWEIGHT	16.79 + 1.20	17.37 + 1. 87	Not significant
OVERWEIGHT	22.54 + 0.00	24.64 + 0.9	Not significant
OBESE	25.41 + 1.16	26.94 + 0.00	Not significant
TOTAL	18.31 + 2.98	19.26 + 3.48	Not significant

Table 3 Waist hip ratio in all four groups with SD

	BOY	GIRL	P value
NORMAL	0.93 + 0.19	0.82 + 0.04	Not significant
UNDERWEIGHT	0.95 + 0.17	0.87 + 0.03	Not significant
OVERWEIGHT	0.82 + 0.00	0.87 + 0.00	Not significant
OBESE	0.89 + 0.1	0.87 + 0.00	Not significant
TOTAL	0.89 + 0.16	0.86 + 0.03	Not significant

Table 4 shows proportion of student at risk for health hazard due to obesity according to WHR.

	Boys	Girls	Total
At risk	8 (33.33)	29 (96.66)	37
No risk	16(66.66)	1 (3.33)	17

Table 5 shows hours of physical activity, time spend with TV and computer as well as sleeping time in hour in all four group with SD.

	NORMAL	UNDERWEIGHT	OVERWEIGHT	OBESE
PHYSICAL ACTIVITY	0.75 + 0.46	0.45 + 0.5	0.60 + 0.54	1.00 + .00
TV/COMPUTAR	1.50 + 0.86	1.76 + 0.78	1.14 + 0.63	2.33 + 1.15
SLEEPING	7.87 + 0.64	8.10 + 1.07	7.60 + 1.67	8.00 + 1.00

Table 6 Distribution of study population according to working status of mother and study group with physical activity and inactivity.

	NORMAL	UNDER WEIGHT	OVER WEIGHT	OBESE	P value
WORKING MOTHER	1(12.5%)	12(31.57%)	0	1(33.33)	P = 0.124
HOUSE WIFE	7(87.5%)	26(68.42%)	5 (100%)	2(66.66)	
PHYSICAL ACTIVITY	6	17	3	3	P = 0.267
NO ACTIVITY	2	21	2	0	

Daily sports were practiced by boys (66.66%) more often than by girls (43.33%), The sports most widely practiced by boys were cricket, judo and indoor game, whereas girls preferred swimming and dancing.

Discussion:

The present study shows that in a private school catering to children of high socioeconomic status, there is a low prevalence of overweight and obesity while the prevalence of under-nutrition is high among girls. In recent years many studies have reported on prevalence of obesity in school children in various parts of India (Sachdeva, 2003). Using same criteria, the prevalence of obesity in the present study is 5.55% and it is comparable with studies conducted at Chennai (6.2%) and Delhi (7.4%) respectively. Present study shows that the BMI of students from high socioeconomic status at 12 years of age is 18.31 + 2.98 and 19.26 + 3.48 for boys and girls respectively. The prevalence of

combined overweight and obesity is more in girls (16.66%) than in boys (12.48%) observed by us is similar to the observation of Agarwal K.N. et al.³⁶

Among the factors studied, family history of obesity and lack of physical activity were the important influencing factors, which is similar to the observation of Sheetal Monga³⁷. The present study highlights childhood obesity is an emerging health problem which need to be confirmed by large scale studies and effective preventive strategies should be developed to halt this epidemic at its beginning. Our study showed that the prevalence of underweight is very high 70.37%. This is much higher than prevalence seen in Punjab³⁸(20.5%) and Mumbai³⁹,(40.2 %) . The studies of Nebigil

et al⁴⁰. and Ivanovic et al⁴¹ showed that children from a low socio-economic environment had significantly higher percentages of undernutrition. In our study, the rate of underweight was significantly higher even in children with a high socio-economical class, but there was no significant relationship between under nutrition and family income.

As present study group consisted of students with 12 year of age, onset of puberty may be one of the factors for this underweight status. Mother's working status and the presence of under weight were not significantly associated. Most interesting part of study is prevalence of cardiovascular risk according to WHR is extremely high (66.66 % in boys and 96.66 % in girls) in comparison to BMI. Which correlate with the study of Visscher et al⁴². This also suggests that both tools can not be used in exchange of others as the result from both parameters differs very much. We had also measured MUAC (mid upper arm circumference), according to which 2 boys and 2 girls is in obese group but as is only recommended for use with children between one and five years of age we have taken in to consideration for obesity or under nutrition of study group of age 12.

Prevention of obesity and under nutrition in children is easier than the adults. Based on the findings of this study it is recommended that consumption of high fat and high energy

and snacking in between the meals should be avoided by children. Sedentary life style should be discouraged. Increase physical activity like playing outdoor games, walking; cycling should be encouraged in children. Health education should be given to parents, teachers and children regarding dietary habit and sedentary life style.

Conclusion:

In conclusion, the present study shows a high occurrence of under nutrition in contrast to other study and we found only a low occurrence of overweight and obese in upper-middle class students in Bhavnagar. The classification used, was based on the Indian BMI for age standard. Factors which may be responsible for obesity was present in only 5.55% of the study population. Spending more time on TV and Computer may be considered as predisposing factor for overweight. For low weight children, no definite cause could be found out except that comparatively high percentage of working mothers were in that group. This might have affected the food habits of those children which in turn may be responsible for their under weight situation. It should be noted that the results of our study were obtained from a relatively small sample of upper middle-class students in Bhavnagar, and should therefore be further investigated before they are extended to schoolchildren of other regions in Gujarat or the rest of the country.

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