



## A Study of Prevalence of Overweight and Obesity in School Children

### KEYWORDS

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**ABSTRACT** A total of 407 adolescent school children were included in the study from VII to X standards covering the age groups (10-15 yrs).The following Independent Variables (Dietary habits,Lifestyle patterns,Physical activity pattern)&Dependent Variables(Height,Weight)were studied. Prevalence of overweight and obesity among urban adolescent school children of Mahabubnagar is 18.8% of which 5.6% were frankly obese. Prevalence of overweight and obesity was higher (26.7%)in 10-13 years as compared to (10%) in 14-15 years age group.The study also showed the prevalence of overweight/obesity was higher in the group taking part in sedentary indoor games regularly and was lower(16.9%) in the group taking part in outdoor games and regular physical exercise of more than 30minutes/day compared to higher(18.8%) in children not doing/ doing less than 30 minutes exercise.It was higher among children who spent more than one hour/day(18.4%) watching TV when compared to non-TV viewers or those who spent <1hour a day(17.5%) in TV viewing.The present study has highlighted that overweight and obesity is an emerging health problem especially among the children belonging to higher socio-economic strata, leading sedentary life style and indulging in intake of fatty food.

### INTRODUCTION

There is an alarming increase in prevalence of obesity worldwide. With globalization of economics and rapid international communication these non-communicable diseases have hit India and other developing countries along with the developed countries in the last decade.

The problem of obesity is confined not only to adults but also among the children and adolescents of developed as well of developing countries. Adolescence is crucial period of transition exceptionally rapid rate of growth and development <sup>(2)</sup>. Prevalence of overweight and obesity among children and adolescents has significantly increased in developed countries during the past few decades<sup>(3)</sup>. This has happened in developing world also, though less rapidly <sup>(4,5)</sup>.

This trend is of major concern, given the consequences that are associated with adolescent obesity both during adolescence <sup>(6)</sup> and adult life <sup>(7)</sup>. Obesity is one of the most important risk factors in natural history of chronic Non-communicable Diseases (NCDS) such as coronary heart disease, hypertension, Diabetes mellitus etc,<sup>(8)</sup>. The adverse and serious consequences of childhood obesity are now proven beyond doubt<sup>(9,10)</sup>.

BMI as of now appears to be the most practical way of measuring and comparing obesity for clinical and epidemiological purpose.

As per WHO classification (for adults)  
BMI> 25= Overweight ;BMI > 30= Obesity

However as WHO criteria may underestimate obesity in Asians, the international obesity Task Force (IOTF) has proposed the standards for adult obesity in Asia and India as follows.

BMI>23 = Overweight;BMI >30 = Obesity  
In terms of Z-scores, WHO has defined  
Overweight = Z-score > 2 and Obesity = Z-score > 3.

*Consequences of Childhood obesity* <sup>(9-15)</sup> are Immediate effects and complications (usually in severe obesity) are Psychosocial stress,Respiratory embarrassment,Blounts disease,Obstructive airway disease,Slipped Femoral epiphysis,Restrictive airway disease,Hepatic Steatosis,Pseudotumor cerebrii,Cholelithiasis (and cholecystitis)Early puberty (reduced final growth).

*Co-morbidities* areDyslipidemias (with visceral fat/Central obesity),Hypertension,Insulin Resistance Syndrome (syndrome X),Childhood type 2 Diabetic Mellitus,Ovarian hyperandrogenism,Reduced bone density,

*FUTURE RISKS* are Adult obesity (increased mortality and morbidity from all obesity related disorders),Coronary Heart disease and cerebrovascular disease,Type 2 Diabetes Mellitus,Osteoporosis.Psychosocial stigmatization may not be a big problem in our country and severe complications of obesity (such as obstructive sleep apnea, and pseudotumor cerebrii) are rare. However obese children have substantial risks for morbidity such as hypertension and dyslipidemia even before they reach adulthood <sup>(11, 12)</sup>. Type 2 diabetes is beginning to emerge in children <sup>(13)</sup>. Importantly 50-80% of obese children become obese adults and all complications of adult obesity are made worse if the obesity begins in childhood <sup>(9)</sup>.

The prevalence of obesity has been on increase in world over. There are evidences that children and adolescents of affluent families are becoming overweight than in the recent past because of decreased physical activity, sedentary life, altered eating patterns and possibly increased fat content of diet <sup>(16)</sup>. Other factors implicated include increased duration of television watching, increased consumption of beverages and calorie dense foods etc. <sup>(12,17)</sup>.

As must be evident from above, overweight and obesity result basically either due to an increased intake of energy (or) decreased energy expenditure (i.e., sedentary life style) or a combination of both. Thus, the need of the hour is to identify most important correlates and modify them through a population education campaign, which may attenuate and eventually reverse the epidemic.

#### AIM:

To estimate the prevalence of overweight and obesity and its predictors amongst Affluent Adolescent school children in Mahabubnagar.

#### OBJECTIVES:

- To estimate the prevalence of overweight and obesity amongst affluent adolescent school children (10-15 years).
- To identify other associated factors of overweight and obesity amongst affluent adolescent school children.

#### Place of Study

The study was conducted in a public school catering to the affluent segment of population, Swami Narayan Gurukul High School at Mahabubnagar.

#### Study Design

Institution based cross sectional study.

#### Period of Study

The study was carried out over a period extending from Feb, 1<sup>st</sup> to Feb 14<sup>th</sup>, 2014

#### Study Population

The study was conducted amongst the above mentioned school children of the age group 10-15 years belonging to affluent families.

#### Sample Size

Based on available data and peer group discussion it was assumed that the prevalence of the overweight and obesity amongst urban affluent school children likely to be around 18%. Thus, keeping the estimated parameter of interest as 18% the sample size was calculated as 407 at 95% confidence interval and 20% precision.

#### Variables

The following predictor (independent) and outcome (dependent) were studied. Independent Variables (Dietary habits, Lifestyle pattern, Physical activity pattern). Dependent Variables (Height, Weight).

#### Instruments used

The following instruments were used in the survey to collect data.

- Pre-tested questionnaires in English to collect personal particulars, socio-economic particulars, life style patterns, socio-cultural aspects and dietary habits.
- Portable anthropometric rod to measure heights (in cms,) upto 0.1 cm accuracy.
- SECA Electronic Weighing Scale to measure weight (kgs) upto 100 gms accuracy.

#### Procedures used for each measurement

##### Anthropometric Measurements

In each selected class, the height and weight were measured using standard equipment and procedure<sup>(16)</sup> in all the students except handicapped. The measurement was carried out in their respective classrooms.

#### Socio-Economic Data

A Pre-tested questionnaire was used to collect information on demographic project (age, sex, socio-economic status). The exact age of the children was verified from school records. Socio-economic status of the children in study was class 1 (Upper) according to modified Kuppaswamy's Scale

#### Physical Activity

Information on physical activity that is, time spent on outdoor games and sports (hours per week) was collected, other information related to physical exercise like jogging, cycling, running and walking in hours per day were collected similarly, number of hours of sleep in the day and night and time spent on sedentary activities like TV or video/Computer were also recorded.

#### Life Style Patterns

Information was also collected using the questionnaire about amount of pocket money they are getting and its expenditure pattern.

#### Dietary Habits:

Information on dietary habits i.e; type of diet, intake of fatty foods, pocket money, intake of snacks was also collected using the questionnaire.

#### Analysis

The data was scrutinized before it was entered into the computer and analysis was done using SPSS window, Version 11.5 for univariate, bivariate and multivariate analysis.

For assessment of overweight and obesity Body Mass index (BMI) was calculated and BMI for age percentile was used to define overweight and obesity amongst adolescent children in the present study.

BMI (Body Mass Index)  $[\text{weight}(\text{kg}) / \text{height}(\text{mtrs})^2]$  for age and sex percentile using the reference values based on the CDC charts from USA, the subjects were categorized into three groups whose BMI for age and sex percentile was < 85<sup>th</sup> were defined as non-overweight and non-obese and second group whose for age and sex percentile  $\geq 85^{\text{th}}$  and < 95<sup>th</sup> were categorized as overweight and  $\geq 95^{\text{th}}$  as obese respectively.

The mean height and weight and BMI  $\pm$  Standard deviations (SD) were also calculated for each age group.

In case of TV viewing the respondents were categorized into two groups.

Non-viewers and TV watching < 1 hr/day.  
TV watching  $\geq 1$  hr/day.

Similarly participation in household activities was also categorized into two groups i.e; non-participating group and those participating in household activities.

The physical exercises like jogging, walking, cycling, etc., were also categorized into two groups such as non-participating groups and those participated <30mins/day and  $\geq 30$ mins/day. Similarly, participation in the games and sports were also categorized into two groups i.e; non-participation group and those taking part.

The dietary variables analyzed were type of diet, intake of fatty foods and snacks which were then correlated with prevalence of overweight and obesity.

**RESULTS**

The details of the sample are presented in the table below

**Sample Characteristics**

A total of 407 adolescent children were included in the survey studying VII to X standards covering the age groups (10-15 years). The exact age group was verified from school records.

**Obesity and overweight and intake of fatty food**

**TABLE 1**

Intake of food	Non overweight non-obesity	Overweight/obesity	Total
Consuming fatty food	181(80.8%)	43(19.2%)	224(100%)
Consuming fatty food	152(83.1%)	31(16.9%)	183(100%)
Total	333(82%)	74(18%)	407(100%)

It can be seen that from Table 1 that overweight and obesity prevalence was higher in the group of adolescents consuming fatty foods (19.2%) as compared to group that were not consuming (16.9%).

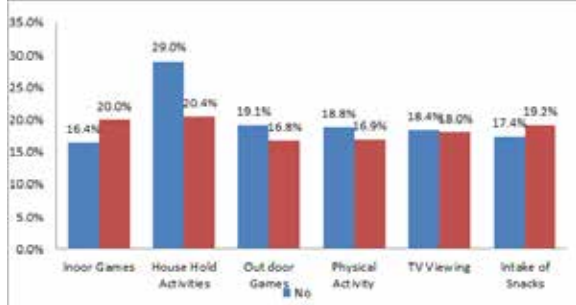
**TABLE 2**

**Distribution % of overweight/obesity adolescents by amount of physical exercise.**

Category	Non-overweight non-obesity	Overweight/Obesity	Total
Less than 30 min/day	220 (81.2%)	51(18.8%)	136 (100%)
More than 30 min/day	113(83.1%)	23 (16.9%)	136(100%)
Total	333(82%)	74(18%)	407 (100%)

It can be seen than from Table-2that the prevalence of overweight/obesity among adolescent children was higher (18.8%) in the group not doing any/doing less than 30 minutes physical exercise daily like walking, running, jogging, cycling etc. the prevalence in the group doing more than 30 minutes of physical exercise regularly was lower (16.9%). However, the difference was not significant.

**DISTRIBUTION % OF OVERWEIGHT AND OBESITY BY DIETARY PATTERN AND LIFESTYLE**



**TABLE 3**

**Distribution (%) of overweight/obese Adolescents by TV viewing**

Category	Non-over-weight/non obesity	Overweight/obese	Total	
TV viewing (hrs/day)	Less than one hour/day	85(82.5%)	18(17.5%)	103
	More than one hour/day	248(81.6%)	56(18.4%)	304
Total	333 (82%)	74(18%)	407 (100%)	

It is seen from table that prevalence of overweight/obese children was higher in the groups watching TV regularly for more than one hour/day.

**MEAN WEIGHT AND HEIGHT**

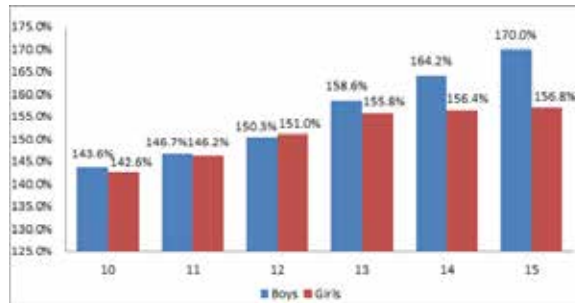
The mean height and weight of boys and girls are depicted in Table 2. The mean weight of girls in the age group of 11 and 12 years was high as compared to the boys of the same age groups. While the mean weight of boys was higher in 10,13, 14,and 15 years age group

The mean height of the boys was higher than the girls in all age groups except in the age group of 12 years. The above difference could be due to the difference in onset of growth spurt among adolescent boys and girls.

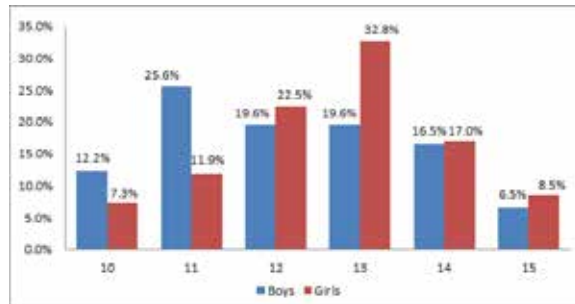
**TABLE 4**

MEAN ANTHROPOMETRIC MEASUREMENTS:BOYS AND GIRLS						
N	BOYS		AGE (YEARS)	N	GIRLS	
	HEIGHT (Cms+/-SD)	WEIGHT (Kgs±SD)			WEIGHT (kgs+/-SD)	HEIGHT (Cms±SD)
28	143.6+/-5	36.3±9.2	10	13	35.2±9	142.6±5.3
59	146.7+/-7.0	38.0±9.0	11	21	39±10.7	146.2±7.7
45	150.3±9.95	43.02±9.5	12	50	43.47±10.06	151±8.14
45	158.6±7.74	49.02±11.03	13	58	47.9±8.6	155.8±6.46
38	164.2±9.04	52.9±17.38	14	30	48.9±8.34	156.4±7.15
15	170±8.10	61.7±8.85	15	15	51.6±11.0	156.8±4.7

**MEAN HEIGHT**



**AGE IN YEARS MEAN WEIGHT**



**AGE IN YEARS**

**DISCUSSION**

Obesity levels among adults and adolescents continue to grow to epidemic proportions worldwide (21). Some of the factors implicated in this trend of increasing prevalence of overweight/obesity in many populations include demographic, nutrition and lifestyle transition and economic development (1,16). It has also suggested that three stages of

growth may be critical for development of persistent obesity that influences co-morbidities in adulthood, namely, the prenatal period, the period of adiposity rebound at 4-8 years of age and adolescence <sup>(22)</sup>.

The prevalence of overweight and obesity among urban adolescent school children of Mahabubnagar is 18.8% of which 5.6% were frankly obese. This prevalence is less than with studies carried out earlier i.e., Delhi and Chennai whose prevalence was reported as 22% and 31% in affluent schools respectively.

Some other large study by Ramachandran et al on urban Indian adolescent school children where the age adjusted prevalence of overweight reported was 17.8% for boys and 15.8% for girls. The proportion of overweight was slightly higher among the boys as compared to the girls as was observed in the study. In the present study the age adjusted prevalence of overweight was 18.5% among boys marginally higher than that of girls (18%) consistent with the above study. The prevalence of obesity was at par with prevalence reported from other developing countries like Thailand <sup>(4)</sup>.

In the case of prevalence among different age groups, the proportion of overweight and obesity was marginally higher 10-13 years as compared to 14-15 years age group. The findings were consistent with earlier studies reported from Delhi Chennai <sup>(22)</sup> and Hyderabad <sup>(17)</sup>. The higher prevalence of overweight and obesity in the younger age group can be explained by the fact that there is an associated increase in adipose tissue and over all weight gain during the pubertal growth spurt. Previous works also show that the number of fat cells multiply during periods of rapid growth i.e., pubertal growth spurt following which increased fat ordinarily accumulates by increasing size of the cells already present <sup>(23)</sup>.

The study also showed the prevalence of overweight/obesity was higher in the group of adolescents taking part in sedentary indoor games regularly and was lower in the group taking part in regular household activities. Similarly the prevalence was lower in the group taking part in outdoor games and regular physical exercise of more than 30minutes/day. The above findings of increasing prevalence of overweight/obesity among sedentary group is consistent with previous studies <sup>(17,24)</sup>. On the other hand, the prevalence of overweight and obesity was higher among children who spent more than one hour/day watching TV when compared to non-TV viewers or those who spent <1hour a day in TV viewing. A number of studies have shown the association between increasing hours of TV watching and prevalence of overweight and obesity <sup>(20,24)</sup>. The reasons explaining this association include decreased physical activity and associated snacking during TV watching <sup>(20)</sup>.

Rapid urbanization in developing countries which is occurring even among low income people is one critical cause of changes in physical activity <sup>(21)</sup>. Lack of playing spaces due to urbanization, difficulty in playing on streets in residential areas because of traffic, all lead to restriction in physical activity. Parents feel more comfortable if their children play indoor games or by seeing the television, rather than venturing out playing sports and games in unsafe environment.

The prevalence of overweight and obesity amongst the children consuming fatty food regularly was observed to be higher as compared to group not consuming fatty food. An increase in consumption of higher fat or energy dense foods are likely to be the major factors in this epidemic of

obesity <sup>(1)</sup>. Shifts in diet leading to obesity that seems to be occurring on a worldwide basis in lower income countries include a large increase in consumption of vegetable oils, a shift away from coarse grains to refined ones and more consumption of meat/eggs <sup>(21)</sup>.

Amongst other dietary factors it was seen that the prevalence of overweight and obesity was higher among children receiving pocket money. This can be explained that the children who were in receipt of pocket money were spending the pocket money in part or full on snacking (i.e., high energy foods like puffs, chips, chocolate, cold drinks etc). The proportion of overweight/obesity was found to be slightly among the children indulging in snacking as compared to those not indulging. A number of studies have reported the association of snacking with weight gain <sup>(25,26)</sup>. The variety of such foods being manufactured and advertised, compel the child (or) their parents to procure the same, munching them anytime and anywhere thereby skipping regular meals. All of which mean intake of food stuff high on calories thereby contributing to weight gain <sup>(27)</sup>.

The present study has highlighted that overweight and obesity is an emerging health problem especially among the children belonging to higher socio-economic strata, leading sedentary life style and indulging in intake of fatty food.

#### Limitation of the study

- The sample selected for the present study is of limited population based and may not be representative of the community.
- The sample selected for the present study is of limited. The cross sectional nature of the study may not be help in establishing temporality.
- The study findings were based on questionnaire, except measurement of height and weight, which were prone to reporting and recording bias.

#### Conclusion

The overall prevalence of overweight and obesity among affluent adolescent school children was found to be 18.18% which was marginally more among male children than female children. The proportion of overweight and obesity was slightly higher in children whose lifestyles are sedentary, taking fatty food regularly and also among children who consumed more snacks.

#### Recommendations

The results generated in the study provide some insights to the causes implicated in the increasing trend of overweight and obesity observed among children. There is need to encourage physical activity, modify food habits, regulate TV viewing, change life styles practices and educate children how to spend pocket money. All these changes could go a long way in preventing development of obesity and overweight. Anyhow one has to be careful in recommending drastic measures aimed at weight reduction of children at the level of schools, otherwise, it could adversely affect the equally important and far more prevalent section of underweight children. Facilities at school to serially monitor the BMI of children, encouraging physical activity, including compulsory hours of sports and games and health education on proper foods and food habits are some of the possible measures that need to be implemented to address the issue of malnutrition among this age group which includes the rising public health problem of overweight and obesity. Both school and community based interventions will have to be instituted to reverse the trend.

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