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 as developing countries. Adolescence is a crucial period of transition exceptionally rapid rate of growth and development(2). 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 30 minutes/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 <1 hour 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.

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 (9-15) are immediate effects and complications (usually in severe obesity) are Psychosocial stress, Respiratory embarrassment, Blunts disease, Obstructive airway disease, Slipped Femoral epiphysis, Restrictive airway disease, Hepatic Steatosis, Pseudotumor cerebri, Cholelithiasis (and cholesterol) Early puberty (reduced final growth).

Co-morbidities are Dyslipidemias (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 cerebri) are rare. However obese children have substantial risks for morbidity such as hypertension and dyslipidemia even before they reach adulthood (11, 12). Type 2 diabetes is beginning to emerge in children (13). Importantly 50-80% of obese children become obese adults and all complications of adult obesity are made worse if the obesity begins in childhood (9).

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 (16). Other factors implicated include increased duration of television watching, increased consumption of beverages and calorie dense foods etc. (12, 17).

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.

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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.
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, 1st to Feb 14th, 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 patterns, Physical activity patterns).
- 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 for 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 Kuppuswamy’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 an 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) [weight(kg)/ height(mtr)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 < 85th were defined as non-overweight and non-obese and second group whose for age and sex percentile ≥85th and < 95th were categorized as overweight and ≥95th as obese respectively.

The mean height and weight and BMI ± 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 ≥ 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 ≥30mins/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

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

It can be seen 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.

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

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TABLE 2
Distribution % of overweight/obesity adolescents by amount of physical exercise.

DISTRIBUTION % OF OVERWEIGHT AND OBESITY BY DIETARY PATTERN AND LIFESTYLE

TABLE 3
Distribution (%) of overweight/obese Adolescents by TV viewing

<table>
<thead>
<tr>
<th>Category</th>
<th>Non-overweight non-obesity</th>
<th>Overweight/obese</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV viewing hrs/day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than one hour/day</td>
<td>85(82.5%)</td>
<td>18(17.5%)</td>
<td>103</td>
</tr>
<tr>
<td>More than one hour/day</td>
<td>248(81.6%)</td>
<td>56(18.4%)</td>
<td>304</td>
</tr>
<tr>
<td>Total</td>
<td>333 (82%)</td>
<td>74(18%)</td>
<td>407(100%)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>N</th>
<th>HEIGHT (Cms±SD)</th>
<th>WEIGHT (Kgs±SD)</th>
<th>N</th>
<th>HEIGHT (Cms±SD)</th>
<th>WEIGHT (Kgs±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOYS</td>
<td></td>
<td></td>
<td>GIRLS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>143.6±/5</td>
<td>36.3±9.2</td>
<td>10</td>
<td>13</td>
<td>35.2±9</td>
</tr>
<tr>
<td>59</td>
<td>146.7±/7.0</td>
<td>38.0±9.0</td>
<td>11</td>
<td>21</td>
<td>39±10.7</td>
</tr>
<tr>
<td>45</td>
<td>150.2±9.9</td>
<td>43.0±9.5</td>
<td>12</td>
<td>50</td>
<td>43.4±10.06</td>
</tr>
<tr>
<td>45</td>
<td>158.6±7.7</td>
<td>49.0±11.03</td>
<td>13</td>
<td>58</td>
<td>47.9±8.6</td>
</tr>
<tr>
<td>38</td>
<td>164.2±9.04</td>
<td>52.9±17.38</td>
<td>14</td>
<td>30</td>
<td>48.9±8.34</td>
</tr>
<tr>
<td>15</td>
<td>170±8.10</td>
<td>61.7±8.85</td>
<td>15</td>
<td>15</td>
<td>51.6±11.0</td>
</tr>
</tbody>
</table>

MEAN HEIGHT

TABLE 5
MEAN ANTHROPOMETRIC MEASUREMENTS: BOYS AND GIRLS

AGE IN YEARS

MEAN WEIGHT

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 (11, 14). It has also suggested that three stages of
growth may be critical for development of persistent obe-
sity that influences co-morbidities in adulthood, namely,
the prenatal period, the period of adiposity rebound at 4-8
years of age and adolescence (22).

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 ob-
served in the study. In the present study the age adjusted
prevalence of overweight was 18.5% among boys margin-
ally 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 (4).

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 report-
ed from Delhi Chennai (22) and Hyderabad (17). The higher
prevalence of overweight and obesity in the younger age
group can be explained by the fact that there is an asso-
ciated 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 in-
creased fat ordinarily accumulates by increasing size of the
cells already present (23).

The study also showed the prevalence of overweight/obesi-
ty was higher in the group of adolescents taking part in sed-
entary indoor games regularly and was lower in the group
taking part in regular household activities. Similarly the pre-
valence 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 (17,24). On the other hand, the prevalence of over-
weight 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 (20,24). The reasons explaining this
association include decreased physical activity and associated
snacking during TV watching (20).

Rapid urbanization in developing countries which is occur-
ring even among low income people is one critical cause of
changes in physical activity (21). 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
indoors or by seeing the television, rather than vent-
turing 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 (1). Shifts in diet leading to obesity that seems to be
occurring on a worldwide basis in lower income coun-
tries include a large increase in consumption of vegetable
oils, a shift away from coarse grains to refined ones and
more consumption of meat/eggs (21).

Amongst other dietary factors it was seen that the preva-
ience of overweight and obesity was higher among chil-
dren 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
e tc). The proportion of overweight/obesity was found to be
slightly among the children indulging in snacking as com-
pared to those not indulging. A number of studies have
reported the association of snacking with weight gain (25,26).
The variety of such foods being manufactured and ad-
vertised, compel the child (or) their parents to procure the
same, munching them anytime and anywhere thereby skip-
ning regular meals. All of which mean intake of food stuff
high on calories thereby contributing to weight gain (27).

The present study has highlighted that overweight and obe-
sity 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 limit-
eted The cross sectional nature of the study may not be
  help in establishing temporality.
- The study findings were based on questionnaire, ex-
  cept 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 chil-
dren who consumed more snacks.

Recommendations

The results generated in the study provide some insights
to the causes implicated in the increasing trend of over-
weight 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 reduc-
tion of children at the level of schools, otherwise, it could
adversely affect the equally important and far more preva-
 lent 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 imple-
mented 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.
REFERENCE
16. Laxmaiah A., Nair VN, VijayaRaghavan K. Prevalence and correlates of overweight among urban adolescent school children in Hyderabad, India (Accepted). XIV International congress of Dietetics, Chicago, USA.