www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v6i2.56

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Prevalence of Overweight, Obesity and Diet Related Factors among High School Children in Urban and Rural areas of Medchal Mandal, Rangareddy District

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Abstract

Background: *Obesity is the leading cause of preventable illness and deaths globally. Obesity is on the increase among adolescents and these adolescents tend to carry the obesity into their adulthood. Obesity is associated with many conditions such as High blood pressure, Heart disease, Stroke and Diabetes.*

Methodology: *This cross-sectional study was carried out in Medchal district. A Sample size of 1100 was calculated. A Systematic random sampling with Probability Proportion to Size (PPS) was used in each school. Data was collected using a pre-tested, semi-structured and self-administered questionnaire method. Analysis was done by using SPSS 20.0 version.*

Results: *In the present study the overall prevalence of overweight was 9.5% and obesity was 2.5%.The overall prevalence of overweight and obesity was significantly ($p<0.05$) high in (13%) urban area than (10.8%) in rural area children. obesity was found to be positively associated with high socio-economic status, literacy status of parents, consumption of soft drinks/cool drinks, snacks in between meals, high calorie junk foods.*

Conclusion: *From the present study it can be concluded that the prevalence of overweight/ obesity was higher among girls than boys. The study demonstrated that reduced frequency of breakfast, increased frequency of snacks lead to obesity among children.*

Keywords: *Overweight, Obesity, High School Children, Diet Related Factors.*

Introduction

Childhood obesity is becoming a threat to public health worldwide affecting both developed and developing countries[1]. NCDs were responsible for 38 million deaths (68%) of the world's 56 million deaths in 2012. More than 40% of them (16

million) were premature deaths under the age of 70 years[3]. Worldwide, Years of Life Lost (YLL) due to NCD's for the year 2014 was estimated at 13,343 per 100,000 population[2]. Globally, in 2013 the prevalence of overweight and obesity among children in developed countries was 23·8% for boys and 22·6% for girls. However in developing countries the prevalence was 12.9% and 13.4% for boys and girls respectively[4].

For many developing countries, obesity and its consequences have become a challenge, similar to hunger and under nutrition[6]. Developing country like India, is facing a challenge of nutritional transition as Indians are moving away from traditional diets which were high in cereals, pulses and fibre to more western diets such as diets with high sugars, fat, and animal source (fast food culture) that are associated with different non communicable diseases (NCDs)[5]. Industrialization and urbanization have also been influencing the prevalence of overweight and obesity among adolescents[7]. The higher prevalence in urban area could be due to higher socio-economic status of urban population which allows the children to buy calorie dense fast foods and reduced participation in physical activity and increased duration of screen time[8].

Current evidence from different studies conducted in India indicates that obesity is influenced by many factors including genetic, demographic, lifestyle factors[8]. The aim of this study is to estimate the prevalence of overweight and obesity among high school children and to study the socio-demographic and diet related risk factors. This study can give an insight into the status of overweight and obesity in Medchal mandal and help to compare the status with those of regional and national studies.

Methodology

An institutional based, cross-sectional study was carried out in urban and rural areas of Medchal mandal, Rangareddy district, Telangana from Jan 2015 to July 2016.A study population of 1100 school children from high schools in Medchal mandal were recruited. The sample size was calculated using the formula= Z^2 p*q / L^2**,** Where **Z** (the level of confidence measure) =1.96**,** P=11.6[9], q=88.4, L (absolute error) at 95% confidence interval =2%**,** allowing for 15% non-response rate the total sample size was calculated as 1131.

Sampling Method: There were 54 schools in Medchal mandal. Sampling of schools was done in two stages. In first stage, a total of 9 (5 urban schools and 4 rural schools) schools were included by simple random method. The total strength of the high school children from class VIII to X was obtained from the school authorities in each school. In the second stage, probability proportion to size (PPS) sampling technique was used to fix the sample size for each school (Table 1).

Table.1. Sample calculation as per Probability Proportion to Size (PPS)

School name	Population of high school children	**Proportion**	**Sample by PPS**
Sadhana high school, Medchal	290	9.02%	99
Sri Prathibhahigh school, Medchal	292	9.08%	100
St. Claret high school, Medchal	786	24.44%	269
St Ann's high school, Medchal	223	6.93%	76
New little lilly high school, Medchal	160	4.97%	55
ZPHS ,Girmapur	521	16.20%	178
ZPHS ,G.P.Pally	411	12.78%	141
ZPHS, Athvelly	289	8.98%	99
ZPHS, Srirangavaram	243	7.55%	83
Total	3215	100%	1100

A systematic random sampling technique was used to select the students. After calculating a sampling interval of 3, every 3rd Student from the list of school attendance register was included in the study till the sample proportion from that

school is achieved in each school. All high school children who were present and were willing to participate in 8th, 9th and 10th classes from the selected schools at the time of data collection. Students below the age of 13 years and who had any chronic disorders were excluded from the study**.** An ethical clearance from MediCiti ethical committee was taken for this study. After explaining the nature and scope of the study, written informed consent was obtained from all the Principals and students who were willing to participate in the study.

Data Collection and Analysis

Data was collected by a self-administered questionnaire which was developed based on the WHO STEPS[10] and the Global School Health Survey (GSHS) questionnaire[11].The questionnaire was divided into 3 parts consisting details about socio-demographic, Breakfast, snacks, cool drinks, and junk food consumption. BMI for age was calculated to classify overweight/obesity.BMI is considered best for community based studies owing to the ease of its use, without much expenditure[13]. The height and weight of students was measured by using Shark‘s scale and adopting standard procedures recommended by WHO Technical research group. Height was measured without any footwear. The standing body height was measured to the nearest 0.1cm.The weight was measured with an accuracy of ±100 gm[12].The raw data was exported to SPSS version 20.0.In the data analysis, Categorical variables were expressed in Percentages and frequencies. Chi-square test was used to see the effect of factors on obesity for categorical variables.

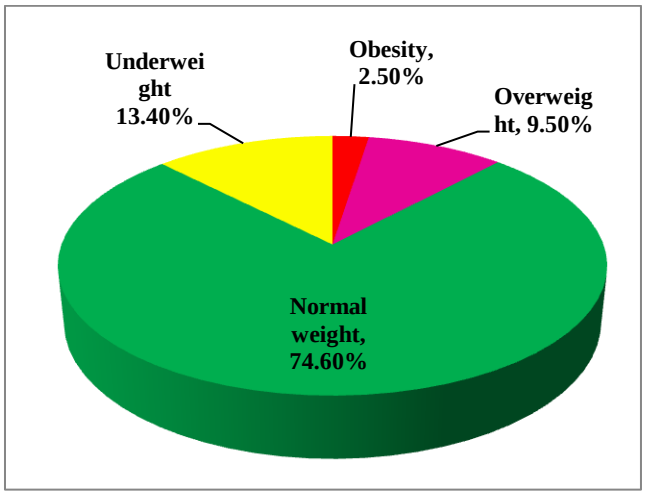
Results

Those questionnaire which were not filled completely, were excluded from the data analysis. A total of 1100 school children were included in data analysis, where in 528 were (48%) Boys and 572 were (52%) girls and 565 (51.4%) students were from rural area and 535 (48.6%) students were from urban area.Theoverall mean age of the students was 14.2±3.7 years. Majority (37%) of the children were in 14 years of age where as only 0.8% was in 17 years of age.

Table 2: Distribution of school children based on K.N. Agarwal BMI (Kg/m^2) classification[13]

Classification of school children based on BMI	Number of students (n=1100)
Obesity (>95th percentile)	28
Overweight (>85thpercentile)	105
Normal weight (5th percentile - <85th percentile)	820
Underweight (<5th percentile)	147

Figure I: Frequency distribution of overweight and obesity



As shown in table 2, among all participants, according to K.N. Agarwal[13] BMI classification 105 (9.5%) were overweight and 28(2.5%) were obese (Table 1). The prevalence of overweight and obesity among girls was 10.8% and 2.9%.The prevalence of overweight and obesity among boys was 8.1% and 2.1%.

In the present study, the prevalence of overweight and obesity was higher in urban area than rural area (Fig. II). The difference of prevalence of overweight and obesity among rural and urban children was not found to be statistically significant (p>0.05).This could be due to inclusion of equal proportion of study participants from urban and rural areas.

Figure II: Frequency distribution of overweight/ obesity in urban and rural areas

Figure III: Bar diagram showing Socio-economic status of children based on BMI

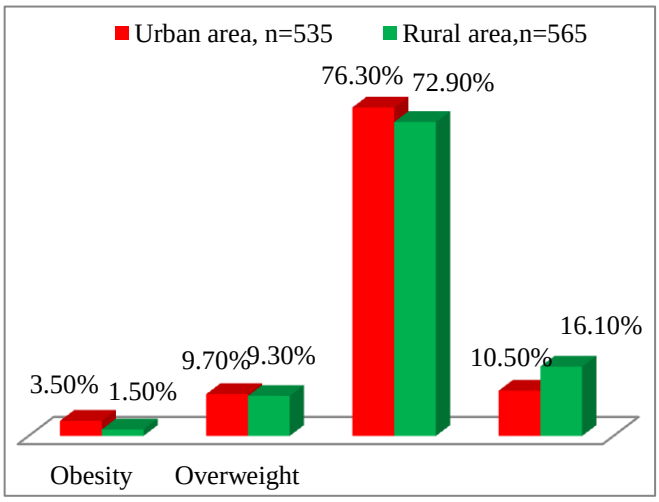


Figure II

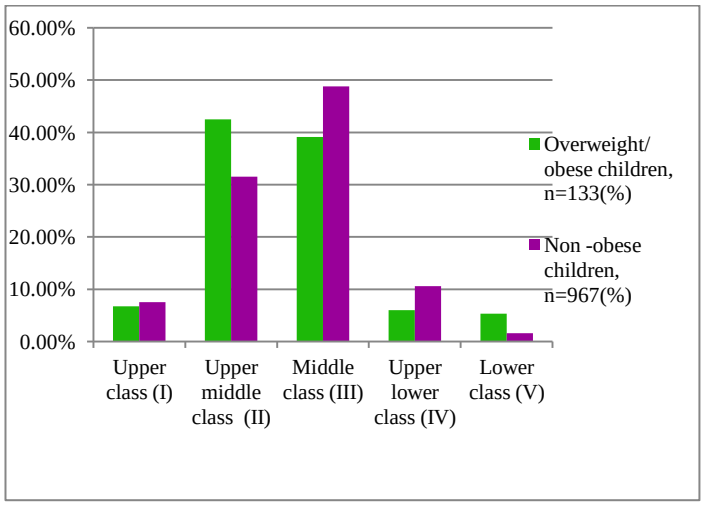


Figure III

Table 3: Educational and occupational status of parents

		Overweight/obese children (n=133)	Non-obese children (n=967)	P value*
Educational status of fathers	Literate (%)	130 (92.9)	928 (87.7)	0.6
	Illiterate (%)	3 (7.1)	29 (12.3)	
Occupational status of fathers	Employed (%)	125 (94.0)	949 (98.8)	**0.001**
	Unemployed (%)	8 (6.0)	12 (1.2)	
Educational status of mothers	Literate (%)	109 (68.4)	915 (89.4)	**0.001**
	Illiterate (%)	24 (31.6)	52 (10.6)	
Occupational status of mothers	Employed (%)	42 (31.6)	214 (22.1)	**0.01**
	Unemployed (%)	91 (68.4)	753 (77.8)	

*Chi-square test was used

Majority (61.2%) of the school children were from nuclear families (n=566) and about 38.8% of children were from joint families.The prevalence of obesity was found to be significantly ($p<0.01$) higher among children whose parents were literate (Table 3) and was higher($p<0.05$) among children whose mothers were housewives. The prevalence of obesity was found to be significantly ($p<0.01$) higher among children belonging to upper middle class (II) according to BG Prasad's SES Classification[14] (Fig.III)

Table 4: Distribution of consumption of cooking items per family per month

Consumption of food items	Food items per Family per month	Overweight/obese children, n=133 (%)	Non-obese children, n=967 (%)	Chi-square value(X^2)&P Value
Salt	≤ 1kg >1kg	100 (75.2) 33 (24.8)	670 (69.2) 298 (30.8)	X^2 =1.98, **0.16**
Oil	≤ 5 Litres >5 Litres	108 (81.2) 25 (18.8)	851 (88.0) 117 (12.1)	X^2 =4.68, **<0.05**
Ghee	≤1kg >1kg	51 (38.3) 82 (61.7)	922 (95.3) 45 (4.7)	X^2 =371.9, **<0.01**
Butter	≤1kg >1kg	78 (58.6) 55 (41.4)	956 (98.8) 12 (1.2)	X^2 =329, **<0.01**

The prevalence of obesity was found to be higher among obese children whose families were eating more than twice per week in restaurants ($p<0.01$). The prevalence of obesity was significantly higher

(<0.05) among obese children whose families were consuming more than 1 kg salt, butter, ghee and 5 litres of cooking oil per month than the families of non-obese children (Table 4).Among the families of obese children, the salt consumption was not significantly (p=0.16) related to the prevalence of overweight/obesity.

As per the NIN, *Junk or unhealthy foods*[15] are those which contain little or no proteins, vitamins or minerals. But are rich in salt, sugar, fats and high in energy (calories) like chocolates, artificially flavoured aerated drinks, potato chips, ice-creams, French fries etc.

Table 5: Frequency Distribution of dietary behaviours among school children

Dietary factors	Frequency distribution	**Overweight/obese children, n=133 (%)**	**Non-obese children, n=967(%)**	Chi-square & P value
Type of food	Vegetarian Non vegetarian	49 (36.8) 84 (63.2)	535 (55.3) 432 (44.7)	X^2=16.0 **<0.001**
Frequency of families eating food from outside	< Twice /week ≥Twice/week	56 (42.1) 77 (57.9)	938 (97.0) 29 (3.0)	X^2=404.6 **<0.01**
Breakfast consumption	≤ Twice /week >Twice /week	93 (69.9) 40 (30.1)	775 (80.1) 192 (19.9)	X^2= 7.3 **<0.01**
Eating snacks in between the meals	≤ Twice/ day >Twice /day	61(45.8) 72 (54.2)	612 (63.2) 355 (36.8)	X^2= 14.9 **<0.001**
Junk food consumption	< Twice /week ≥Twice /week	91 (68.5) 42 (31.5)	567 (58.6) 400 (41.4)	X^2= 4.6 **<0.05**
Cool drinks consumption	≤ Twice /week >Twice /week	47 (35.3) 86 (64.7)	585 (60.5) 382 (39.5)	X^2= 30.2 **<0001**
Quantity of cool drink consumption	<500ml /week ≥500ml /week	50 (37.6) 83 (62.4)	685 (70.8) 282 (29.2)	X^2= 56.2 **<0.01**

The families of obese children, showed an increased (57.9%) frequency of food consumption from outside than their non-obese counterparts. A significantly higher frequency (69.9%) of obese children were not eating breakfast regularly which was found to have a negative relationship with prevalence of obesity (Table 5). It was also found that,54.2% of obese children were eating snacks in between the meals like biscuits, chocolates, cakes, puffs, potato chips, samosa and other items more than twice per day. A significantly (<0.05) higher proportion of(68.5%) obese children were eating junk foods like fried rice, noodles, Manchuria, burgers and chat food more than twice per week. Further it was observed that the prevalence of obesity was higher (64.7%) among obese children who were consuming cool drinks more than twice per week. It was also found that the prevalence of obesity was more (62.4%)among obese children who were consuming ≥500 ml of cool drinks per week.

Discussion

The present study was carried out in the urban and rural areas of Medchal mandal. In the present study the highest (3.6%) prevalence of overweight /obese was seen at 14 years of age among boys and at 13 years of age among girls (7.7%). The prevalence of obesity was found to be decreased as the age of students increased in both gender.Similar results were reported by Anil P Kumar et al[16]and by Arpita Mandal et al[17].The reason behind the decreased prevalence of obesity with increasing age could be due to increased adipose tissue and overall bodyweight in children during pubertal age i.e.13-15 years. The prevalence of obesity was marginally less in the post-pubertal period (16–17 years).But Jalaja Kumari et al[19] reporteda contrast results.

The study also found that, girls were showing higher prevalence (13.7%) of obesity than boys(10.2%) which could be due to differences in physical activity or body fat composition[18]. A similar results were reported by Laxmaiah et al[20], Jalajakumari et al[19], Vishnu Prasad R et al[21]and a

Meta-analysis done by Midha T et al[22]. It was also found that the prevalence of overweight and obesity was higher (13%) in urban area than 10.8% in rural area which could be due to its close proximity to the metropolis Hyderabad and also due to rapidly undergoing urbanisation and epidemiological transition.Lack of open spaces and playgrounds in schools and communities along with increasing pressure on children to perform in academics and reduced emphasis on sports, contribute to childhood obesity. Similar results were reported by Adinateshkatta et al[23]. Unemployment status and literacy status of parents have a significant ($p<0.05$) positive relation with prevalence of obesity. These results corresponds to studies done by Bharthi et al[24] and Anil P Kumar et al[16].it can also be seen that higher socio-economic status among children have a positive relation with increasing prevalence of obesity.A similar findings were reported by Adinateshkatta et al[23], Laxmaiah et al[20], Bharthi et al[24] and Ramesh K Goyal et al[25].

The present study also revealed that there was a positive relation between prevalence of obesity and frequency of families eating food from outside and eating non-vegetarian food. A similar results were reported by Ramesh k Goyal et al[25] and Shirpagupta et al[26], Niranjan et al[27] and Gulati S et al[28]. In contrast to the present study Ramesh K goyal et al[25] reported a higher prevalence of obesity in Vegetarian children.

This study showed that the prevalence was high among children who were not eating breakfast regularly. A meta-analysis study carried out by Horikawa C et al[31], in Asian and Pacific regions suggested that a positive association between skipping breakfast and overweight and obesity is globally observed regardless of cultural diversity among countries. Similar findings were reported by Giacomo Lazzeri et al[29] and Monika Arora et al[30]. It was also found that, most of obese children were eating snacks in between the meals like biscuits, chocolates, cakes, ice creams, potato chips, samosa etc. Similar results were reported by Niranjan N et al[27].

A significantly higher prevalence of obesity was seen in children who were eating junk foods like fried rice, noodles, Manchuria, burgers and chat food.Similar results were reported by Sen Sucharita et al[32]. Further it was observed that the prevalence of obesity was higher (64.7%) among the obese children who were consuming $\geq$500 ml of cool drinks/week.Similar results were reported by Forshee et al[33] and Gillis Bar-Or et al[34].

Conclusion:

Limitations of the study include that this study was a cross-sectional study and describes the situation of a small sample which may not reflect the whole population and also the associations between risk factors and prevalence of obesity can be reported but causal effects cannot be established. Hence, it can be concluded that the prevalence of obesity was higher in urban school children when compared to rural school children. Obesity was found to be positively associated with mother‘s employment status, high socio-economic status, eating non-vegetarian food, consumption of cool drinks, snacks in between meals, high calorie junk foods.

Acknowledgement

We acknowledge the school principals for their cooperation and the school children for their participation and sharing necessary information.

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