



## OBESITY AND ITS PREVALENCE AMONG SCHOOL GOING ADOLESCENTS

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### ABSTRACT

**Background:** The obesity is defined as a non communicable medical condition of abnormal or excessive fat accumulation in adipose tissue, creating an enormous socioeconomic and public health burden. Nutritional status of the Indian population varies significantly across the region. Certain regions are associated with extremely high rates of childhood under nutrition, where as others have a high prevalence of childhood over nutrition. Evaluation of obesity in children is important as it provides an opportunity to identify the problem and prevent disease progression into adulthood. Childhood obesity is associated with several risk factors for later heart disease and chronic diseases such as hypertension, dyslipidemia, type 2 diabetes mellitus etc. The present study is conducted to determine the prevalence of overweight and obesity in school going adolescent children.

**Materials and Methods:** The present cross-sectional study is carried out in Madre and Sindkhed area near Solapur among school children's between 10-16 years age group, during the period of June 2017. List of children is prepared according to their age and sex from the selected schools. From this list, total 647 children were selected for study by systematic random sampling method. Anthropometric data (BMI) was analyzed using CDC growth charts. Data was analyzed using SPSS, BMI (CDC) calculator, CI calculator and OR calculator

**Results:** Overall Prevalence of overweight and obesity was 4.45% and 1.27% respectively. Which is more significant in the age group if 13-16 years (4.9% & 1.4%), and with individuals who were good with socioeconomically status (16.51% & 5.50). In both gender the prevalence of overweight and obesity was more or less same, but girls tend to be slightly overweight & obese than boys (i.e. 1.01% & 0.93%).

**Conclusion:** The study revealed that obesity is an important public health issue not only in the adults but also most prevailed disease among children's of rural habitat. Factors such as, food habits (preference to non-vegetarian / fried food, aerated drinks), lifestyle and a family history of Type-2 diabetes mellitus are significantly associated with the development of obesity.

**KEYWORDS :** Obesity, Body Mass Index, Diabetes, Rural.

### Introduction

The prevalence of obesity is increasing rapidly worldwide both in developing and developed countries[1]. According to the Global Burden of Disease Study, Obesity in India has increased more than doubled in children and tripled in adults between 1980 and 2015 i.e. from 1.3% in 1980 to 3% with second highest no. of obese children in world with 14.4 million victims which is quite alarming as it means we will be faced with a large number of obese adults in the future.

It is associated with several risk factors for later heart diseases and other chronic heart disease including Hyperlipidemia, Hypertension and early Atherosclerosis [2-4]. India is in the midst of rapidly escalating epidemic of type II Diabetes mellitus and Coronary Heart Disease. Indians as an ethnic group are particularly at high risk for insulin resistance (syndromex) and central obesity both forerunners for C.H.D. and life style disorder[5].

There is no single cause to explain obesity and overweight, but most studies implicate that, it is the imbalance in the amounts of calories consumed and to that of calories expended.

Prevalence varies within the country because of differences in the lifestyle, mainly in the dietary patterns, and physical activity. In addition to this urbanization and industrialization are the main culprits for the increase in the prevalence of childhood obesity. Some researchers also attribute obesity and overweight to obesogenic environments where people are frequently exposed to and consume savory foods with hidden fats and sugars that can impair metabolism and lead to obesity [6]. Some public health experts also associate the development of obesity and overweight with socioeconomic status, urban lifestyle, family size, physical inactivity, educational status, cultural factors, and poor eating habits [7-9]. Persons who spend their leisure time inactively, such as in prolonged watching of television and playing of video games have been said to be at risk of obesity [10]. With recent rise in number of diabetics and hypertension cases, it is necessary to have the accurate data on prevalence of childhood obesity and therefore an attempt was made to assess the prevalence of overweight and obesity among school children aged between 6 and 12 yrs. It was

also decided to study any differences in prevalence based on age group, gender, place of residence and place of study (school).

### Material and Method

The study was carried out as an institute-based (schools) cross-sectional study among adolescents (aged 10-16 years). The source of data was carried out with prior consent from school authority during the period from June to Aug 2017 in Five different schools from in and around regions. The heights of the students was measured by a STADIOMETER by a single observer to the nearest 0.1cm with subject standing straight with head held in FRANKFURT HORIZONTAL PLANE. Weight recorded without shoes and with light clothes rounded off to nearest 0.1 kg (100gm) using ELECTRONIC WEIGHING SCALE. Age and gender specific body mass index (BMI) was calculated using WHO Anthroplus software. [11] The students were classified as "overweight" or "obese" based on the Indian Academy of Pediatrics (IAP) age- and gender-specific BMI guidelines. [12]

**INCLUSION CRITERIA :** School children of both the sexes studying in class I-X were included.

**EXCLUSION CRITERIA :** Children having obesity due to medical disorders and with very low socio-economy condition were excluded.

### Results

**Table 1: Age and sex distribution of children's**

Sno	AGE	GENDER	Boys		GENDER	Girls	
			count	%		count	%
1	10	BOYS	63	15	GIRLS	24	11
2	11	BOYS	63	15	GIRLS	19	9
3	12	BOYS	59	14	GIRLS	32	15
4	13	BOYS	41	10	GIRLS	45	21
5	14	BOYS	52	13	GIRLS	37	17
6	15	BOYS	68	16	GIRLS	27	13
7	16	BOYS	68	16	GIRLS	31	14
Total			414	65.8		215	34.2

**The Table: 1** Show the Age and gender-wise distribution of the students who participated in the study based on their height and weight are found to follow standard normal growth curves in adolescents.

Total number of male children's exceeded the female children's constituting about 65.8% and 34.2% respectively.

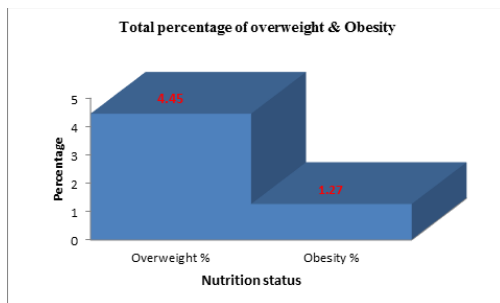
**Table 2: Distribution of children with overweight/ obesity based on age and gender (N=629)**

AGE	Gender	Count	Over Weight		Obesity	
			Count	%	Count	%
10	Boys	63	2	3	0	0
	Girls	24	1	4.2	0	0
11	Boys	63	2	3.2	1	1.6
	Girls	19	0	0	0	0
12	Boys	59	3	5.1	1	2
	Girls	32	2	6.3	1	3.1
13	Boys	41	1	2.4	0	0
	Girls	45	0	0	2	4.4
14	Boys	52	3	5.8	1	2
	Girls	37	3	8.1	0	0
15	Boys	68	3	4.4	1	1.5
	Girls	27	2	7.4	0	0
16	Boys	68	3	4.4	0	0
	Girls	31	3	9.7	1	3.2
<b>Total</b>		<b>629</b>	<b>28</b>	<b>4.45</b>	<b>8</b>	<b>1.27</b>

The overall prevalence of overweight was 4.45% (28) and obesity was 1.27% (8) among our study population.

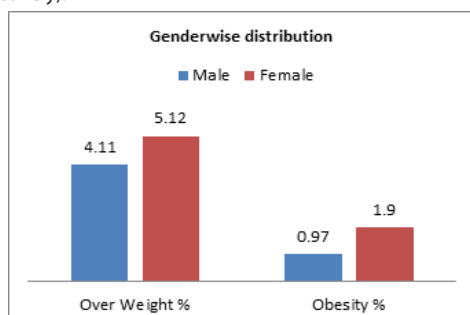
There was no significant difference in prevalence of overweight/ obesity among males and females (i.e 1.01% and 0.93% respectively). In both males and females, the prevalence was high among those who are in the age group of 13-16(4.9% & 1.4% respectively) years when compared to the adolescents in the age group of 10-12(3.8% & 1.2% respectively) years.

**Figure 1: Prevalence of Overweight and Obesity among total no. of children's**



**Figure 2: Distribution of overweight/obesity prevalence among students based on Gender**

There was no significant difference in prevalence of overweight/ obesity among males and females (i.e. 1.01% and 0.93% respectively).



**Table 3: Distribution of children with overweight/ obesity based on age (N=629)**

The overall prevalence of overweight and obesity among early adolescents (aged 10-12 years) was observed to be 3.8% and 1.2% respectively.

The maximum prevalence of overweight and obesity was observed in the late adolescent (aged 13-16 years) was observed to be 4.9% and 1.4% respectively.

AGE	Total	Over Weight		Obesity	
		Count	%	Count	%
10ys- 12yrs	260	10	3.8	3	1.2
13yrs- 16yrs	369	18	4.9	5	1.4

**Table 4: prevalence of overweight and obesity according to socio-economic status**

The prevalence of overweight and obesity were high among student who belonged to the upper middle- class and middle- class, when compared to the students of the schools with lower & upper-Middle class economic status respectively.

Socio-economic status	Total	Over weight (%)		Obesity (%)	
		Count	%	Count	%
Lower Middle class (grade III)	379	1	0.26	0	0.00
Upper middle class (grade II)	141	9	6.38	2	1.42
Upper class (grade I)	109	18	16.51	6	5.50
<b>Total</b>	<b>629</b>	<b>28</b>	<b>4.45</b>	<b>8</b>	<b>1.27</b>

## DISCUSSION

Malnutrition and obesity are the nutritional disorders of which malnutrition is more common than obesity. But of late obesity is emerging as the major public health problem throughout the world, not only in developed countries but also in developing countries due to the fast growing economy.

Our study was a prospective cross sectional study to know the prevalence of obesity in school going children aged between 10-16 years old adolescents.

Our study shows a increasing age wise trend of the mean BMI in both sexes which is similar to the study done by Agarwal KN<sup>[13]</sup>, et al among children aged between 5-18 years in 23 public schools from different cities of India and also in study done by Raman KM<sup>[17]</sup>, et al in Delhi school children aged between 5-18 years. Though both these studies had urban based affluent school children, still they were comparable to our rural based low income group children suggesting that BMI increases with age irrespective of place and social class.

The prevalence of overweight and obesity in our study were 4.45% and 1.27% respectively of which 4.11% males and 5.12% females were overweight showing a slight difference of 1.01%, Whereas obese male & female are 0.97%, 1.09% respectively is identified with almost equal percentage of difference i.e. 0.93%.

A study by Kapil U<sup>[14]</sup>, et al in 2002 showed a prevalence of overweight and obesity of 24.7% and 7.4% respectively in children of both sexes aged between 10-15 years. A cross sectional study by Khadilkar VV and Khadilkar AV<sup>[15]</sup> among boys showed a prevalence of overweight and obesity of 25.1% and 8.1% respectively in the age group between 10-15 years. A Study done by Subramanyam<sup>[16]</sup>, et al in 1998 showed a prevalence of 9.67% of overweight and 6.23% of obesity in school girls aged between 10-15 years in Chennai. Though there are many such studies in literature none of them could be compared with our study as all the above studies were done in urban places with affluent school children.

Gender	Our Study		Raman KM etal <sup>[17]</sup>	
	Over Weight %	Obesity %	Over Weight %	Obesity %
Male	4.11	0.97	2.66	0.42
Female	5.12	1.9	2.14	0.28

The study by Raman KM <sup>[17]</sup> et al compares the prevalence of overweight and obesity among lower and higher socioeconomic group in an urban school children. Since most of our rural school children belong to lower socioeconomic group and the above study also involved such children, the overweight and obesity prevalence values are comparable and similar to the above study.

Prevalence of overweight and obesity is statistically similar between the sexes in our study, though more percentage of girls appears overweight. Study done by Raman KM <sup>[17]</sup> et al study had more girls with overweight and obesity than the boys. A higher prevalence of overweight has also been reported in girls from studies done by Ramachandran A <sup>[18]</sup>, et al in Chennai and Kapil U <sup>[14]</sup>, et al in Delhi. Most of Our children belonged to lower social class where prevalence of overweight and obesity is low, but however few children who constituted upper middle class had high prevalence of overweight (16.51%) and obesity (5.50%), which was statistically significant. Our prevalence of overweight and obesity is low even in affluent group when compared to the other studies, because we had meager children in this group and the overall prevalence of obesity and overweight in each age group is very low in our study and also the number of boys and girls in each age group enrolled in our study were lower when compared to other studies. We have many studies that show overweight and obesity is more common in affluent group.

Upper socio economic group	Overweight (%)	Obesity (%)
Our study	16.51	5.50
Raman KM et al <sup>[17]</sup>	17.8	5.31
Kapil U et al <sup>[14]</sup>	24.7	7.4
KhadilkarVV and KhadilkarAV <sup>[15]</sup>	25.1	8.1
Subramanyam, et al <sup>[16]</sup>	9.67	6.23

## CONCLUSION

The prevalence rate of overweight and obesity were 4.45% and 1.27%, respectively, in our study population. The study results show that overweight and obesity is predominant among adolescent students belonging to the middle and upper middle class society especially among 13-16 yrs age group schools going children's.

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