Prevalence of Obesity among School Going Adolescents in Urban and Rural Areas of District Meerut, Uttar Pradesh, India

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A**bstract:**

Introduction : The present century had noticed a rapid transition from undernourished to overweight and obesity. This transition was initially reported in developed countries but now this phenomenon has been noticed in developing countries. **Objective:** The study was conducted to assess the knowledge about the obesity among school going adolescents and to find out the sex wise and area wise relationship about the knowledge of obesity among the studied adolescents. **Method:** A cross-sectional study was conducted among 640 school going adolescents in Meerut, Uttar Pradesh, India from January 2019 to February 2019. Multistage sampling technique was used for enrolment of the study subjects. A pre-designed and pre-tested questionnaire was used. Body weight and height were recorded for calculating Body Mass Index (BMI). The WHO BMI-for-age cut off classification of adolescents was used for the assessment of overweight and obesity. **Results:** A total of 640 adolescents participated in the study. Overweight and obese were more prevalent among male adolescents from urban area schools. In the present study, the overall prevalence of obese in rural area is 3.9% and overall prevalence of obese in urban area is 11.8%. The knowledge about hazards of obesity is statistically significant (p<0.05) sex wise and area wise. Majority of the participants were aware about the obesity causing foods, preventive measures related to obesity and activities related to obesity in both rural and urban area schools. **Conclusion:** The present study pointed towards the rise in prevalence of overweight and obesity especially in male adolescents belonging to urban area schools thereby indicating the need to provide comprehensive targeted interventions for adolescents.

Key Words : Adolescents, Obesity, Overweight, Rural, Urban

Introduction:

In India, paediatric obesity is an emerging public health problem. The prevalence of paediatric obesity and overweight ranges from 9.9% to 18.5%.[1] Increasing rates of overweight and obesity has reached epidemic proportions in developed countries and is rapidly increasing in many middle-income and less-developed countries. [2, 3] Obesity and overweight are an increasingly prevalent nutritional disorder among children and adolescents in the world. [4, 5] Due to the difficulty of curing obesity and over weight in adults and the many long-term adverse effects of childhood obesity, the prevention of child obesity has been recognized as a public health priority.[6] Increasing evidence shows that childhood obesity and overweight have a profound influence on morbidity and mortality in adult life.[7,8] Studies have shown that there had been significant gender difference in the prevalence of obesity with more prevalence of obesity and overweight among male children compared to female children. [9]

So, the present study is designed with the objectives to assess the knowledge about the obesity among school going adolescents in urban and rural area of Meerut district and to find out the prevalence of overweight and obesity among male and female adolescents attending urban and rural area schools and also the relationship between their knowledge about obesity and the actual BMI of the school going adolescents.

Method:

The present study was a cross sectional study carried out for a period of two months from January to February 2019. Simple Random sampling method was used in the present study. A total of four schools (two schools from urban area and two schools from

rural area) were selected randomly from the list of schools obtained from the school authorities (District Education Office). Probability proportionate to size of the population technique was used to include adolescent students from both government and private institutions. At first, Meerut district was divided into urban and rural areas. Secondly, list of government/government-aided schools and private schools of Meerut urban and rural areas were prepared. Then, one government/government-aided school and one private school were randomly selected from the urban area. Two schools were randomly selected from the rural area. Prior permission was obtained from the principals of the selected schools for conducting the study. At last from each of the selected schools; list of all students from classes VIth to XIIth standard were obtained. Within school, all the students present on the selected day of interview were taken for the study. The studied adolescents belonged to age group 10 to 19 years. They were further classified into early adolescence (10-14 years) and late adolescence (15 to 19 years) according to UNICEF 2011 guideline.[10] A day for the examination and interview was fixed for each school. The days were communicated to all the school authorities and their students. They were asked to be present on that day. On the basis of their presence on the day of interview and consent a total of 640 participants were selected for the study. A pretested structured questionnaire was used for the data collection. The questionnaire was divided into two parts namely anthropometric measurement and assessment of knowledge in relation to obesity.

In anthropometric measurement height and weight of the studied students were measured and subsequently Body Mass Index (BMI) was calculated using the formula BMI= Weight (Kg)/height (m2). Weight was collected with minimum accepted cloths using a bathroom scale weighing machine with accuracy up to 100 gms. The participants were categorized into underweight, normal, overweight and obese using WHO growth standards 2007.[11] The participants having the BMI 5th percentile and below of WHO Growth standards were considered as underweight, BMI value between 6th to 85th percentile were considered as normal. The values between 85th percentile and 97th percentile were classified as

overweight and a value above 97th percentile were classified as obese. Height was recorded with a standiometer of maximum length of 5 meters. The participants were asked to stand bare foot on a standiometer with the back facing the measuring scale. With a head straight a marked was made on the scale and the student was asked to move away from the standiometer. For assessment of knowledge participants were presented with an open ended question on the foods related to obesity, activities preventing obesity, hazards of obesity and prevention of obesity. Data analysis was done by SPSS version 17 software. The association was established by using chi-square test and odds ratio.

Results:

A total of 640 participants were interviewed from both rural and urban area schools. Out of them there were 256 participants from rural area schools and 384 participants from urban area schools. Out of the 256 participants studied of rural area schools, 102 (39.8%) were male among which 60 (58.8%) were of early adolescence and 42 (41.2%) were of late adolescence (According to UNICEF 2011 guideline.[10] Out of the 256 participants studied, 154 (60.2%) were female among which 102 (66.2%) were of early adolescence and 52 (33.8%) were of late adolescence. Out of the 384 participants studied of urban area schools, 202 (52.6%) were male among which 94(46.5%) were of early adolescence and 108(53.5%) were of late adolescence. Out of the 384 participants studied, 182 (47.4%) were female among which 110 (60.4%) were of early adolescence and 72 (39.6%) were of late adolescence. (Table 1)

Of the 640 participants studied they were classified into normal, overweight and obese using WHO growth standards 2007. In the present study the sex wise prevalence of overweight in male is 54(8.4%) and in female are 30(4.6%). Prevalence of obese in males is 10(1.5%) and in females 8(1.3%) and (x^2=0.483, p>0.05).In the present study the school wise prevalence of overweight in the rural area schools is 20(3%) and in urban area schools is 64(10%). Prevalence of obese in rural area schools is 6(0.9%) and in urban area schools is 12(1.8%) and (x^2=0.708, p>0.05). (Table 2)

Table 1: Age-wise and Sex-wise distribution of studied adolescents among Rural & Urban area Schools (N=640)

Age(years)	Rural area School (n=256)		Urban area School (n=384)		Total (N=640)	
	Male (n=102) %	Female (n=154) %	Male (n=202) %	Female (n=182) %	Male (n=304) %	Female (n=336) %
Early adolescence (10-14)	60 (58.8)	102 (66.2)	94 (46.5)	110 (60.4)	154 (50.7)	212 (63.1)
Late adolescence (15-19)	42 (41.2)	52 (33.8)	108 (53.5)	72(39.6)	150 (49.3)	124 (36.9)
Total	**102 (100)**	**154 (100)**	**202(100)**	**182 (100)**	**304 (100)**	**336 (100)**

Table 2: Prevalence of studied adolescents on the basis of Overweight & Obesity (N=640)

Determinants	Overweight (85TH – 95TH Percentile) (n=84)		Obese (>95TH Percentile) (n=18)	
Sex-wise				
	Male (n=54)	Female (n=30)	Male (n=10)	Female (n=08)
Prevalence (%)	8.4	4.6	1.6	1.3
Chi-square-test=0.483 with d.f.=1, p>0.05 (not significant)				
School-wise				
	Rural area schools (n=20)	Urban area schools (n=64)	Rural area schools (n=06)	Urban area schools (n=12)
Prevalence (%)	03	10	0.9	1.8
Chi-square-test=0.708 with d.f.=1, p>0.05 (not significant)				

To determine the sex wise and area wise relationship between the knowledge about the obesity, the Odds ratio and p value using chi-square test was calculated. For males, overweight and obese were grouped into one group (54+10=64) and normal and underweight into another group (240). Similarly for females, overweight and obese were grouped into one group (30+08=38) and normal and underweight into another group (298). (Table 3)

Percentage of overweight (7.8% in rural area and 16.7% in urban area), obese (2.3% in rural area and 3.1% in urban area) and normal (89.9% in rural area and 80.2% in urban area) among studied participants were reflected in the Figure 1.
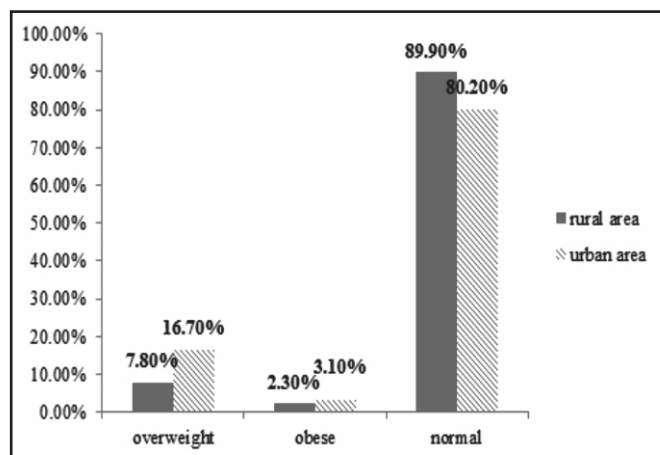
Discussion:

In the present study, 640 school going adolescents were studied from both urban and rural area schools. Among studied adolescents, 10.1% to 19.8% were reported as overweight or obese from rural to urban area respectively. This is somewhat similar to the result obtained by other researchers like, Jagadesan S et al.[12], Kar S et al.[14] and Kotian MS et al.[15] However, it is different from the rates reported by Kaur S et al.[16] and Jacob SK et al.[13] This difference in the percentage of overweight and obese among urban and rural area studied adolescents may be due to the difference in the criteria we have adopted for the classification of the obesity. It may also be due to

Table 3: Sex- wise and area-wise relationship between the studied adolescents about the knowledge of obesity (N=640)

Knowledge	Correct response (%)	Incorrect response (%)	Odds ratio (At 95% Confidence Interval)	Chi-square -value*
1. Obesity related foods				
Male (n=304)				
a. Overweight and obese(n=64)	56(87.5)	08(12.5)	0.5714 (0.2553 1.2788)	0.169 (p>0.05)
b. Normal and underweight(n=240)	192(80.0)	48(20.0)		
Female (n=336)				
a. Overweight and obese(n=38)	30(78.9)	08(21.1)	1.1034 (0.4807-2.533)	0.816 (p>0.05)
b. Normal and underweight(n=298)	240(80.5)	58(19.5)		
2. Hazards related to overweight and obesity				
Male (n=152)				
a. Overweight and obese(n=64)	28(43.8)	36(56.2)	3.101 (1.7037-5.2826)	0.00009 (p<0.05)
b. Normal and underweight(n=240)	168(70.0)	72(30.0)		
Female (n=168)				
a. Overweight and obese(n=38)	36(94.7)	02(5.3)	0.1068 (0.0252-0.4523)	0.0003 (p<0.05)
b. Normal and underweight(n=298)	196(65.8)	102(34.2)		
3. Preventive measures related to overweight and obesity				
Male (n=152)				
a. Overweight and obese(n=64)	20(31.3)	44(68.7)	1.4667 (0.8144-2.6413)	0.201 (p>0.05)
b. Normal and underweight(n=240)	96(40.0)	144(60.0)		
Female (n=168)				
a. Overweight and obese(n=38)	22(57.9)	16(42.1)	1.1094 (0.5595-2.1998)	0.766 (p>0.05)
b. Normal and underweight(n=298)	180(60.4)	118(39.6)		
4. Activities related to overweight and obesity				
Male (n=152)				
a. Overweight and obese(n=64)	26 (40.6)	38(59.4)	0.9744 (0.5556-1.7087)	0.928 (p>0.05)
b. Normal and underweight(n=240)	96(40.0)	144(60.0)		
Female (n=168)				
a. Overweight and obese(n=38)	24(63.2)	14(36.8)	0.8653 (0.4303-1.741)	0.685 (p>0.05)
b. Normal and underweight(n=298)	178(59.8)	120(40.2)		

*(p>0.05) =Not significant and (p<0.05) = Significant.

Figure 1: Percentage of overweight, obese and normal / underweight adolescents in Rural and Urban area schools (N=640)

the fact that there is urban and rural area variation in the obesity.

On school wise evaluation, it was found that there is higher prevalence of obesity among the adolescents of urban area schools (3.1%) as compared to the adolescents of rural area schools (2.3%). This difference indicates the combined effect of various associated factors contributing to obesity as lifestyle, eating habits, socio economic status of the urban area schools etc. However in the present study this difference is not significant and this could be due to the small sample size of the study. Other researchers with larger sample size have reported such differences in their study. [13,14,16-18]

On sex wise evaluation, it was noted that overweight and obesity was more prevalent in the male adolescents (10.0%) of both urban and rural area compared to female adolescents (5.9%) of both urban and rural area. This is again in line with the findings of other researchers like kar S et al. [14]

On evaluation of questions related to the assessment of their knowledge related to obesity, it was found that the majority of the studied adolescents, 81.6% among male adolescents and about 80.4% among female adolescents in both urban and rural areas were aware about the foods that cause obesity. This is against the findings of Cherian AT et al [19] in Chennai. However it is similar to the findings of Njelekela MA et al [20] and Srivastava DK et al. [9].

On evaluation of questions related to the hazards of obesity, it was found that 35.5% of male adolescents and 30.9% of female adolescents belonging to both urban and rural area schools were unaware or gave incorrect response to questions related to hazards of obesity. This is important as unawareness about the hazards of obesity can make children careless about their eating and exercising habits. This is in contrast to the finding as noted by Srivastava DK et al.[9] in relation to sex wise adolescents.

It was found in the present study that 61.8% of male and 39.9% of female were unaware about how to prevent obesity. This is in line with the above finding that large numbers of students were unaware about the hazards of obesity and therefore unaware about how to prevent obesity. Similar finding were noted by Srivastava DK et al. [9] in relation to sex wise adolescents.

Regarding the evaluation of questions related to the activities that cause obesity, it was found that only 59.9% of the male adolescents and 39.8% of female adolescents were aware about the activities that promote obesity. These finding are important as various nutrition related programmes are directed towards creating awareness among school going adolescents regarding obesity, its hazards and how to prevent it plays a pivotal role in control of certain future diseases. This is similar to the findings of other researcher like Njelekela MA et al [20] and Triches RM et al [21]. These finding in relation to sex of adolescents are in contrast to the finding as noted by Srivastava DK et al. [9]

In the present study on applying univariate analysis between the knowledge and obesity status, it was found that the adolescents of both rural and urban areas, who were unaware about the hazards of obesity were more obese than those who were aware (OR =3.101(CI 1.7037 to 5.2826) for male adolescents and OR=0.1068 (CI0.0252 to 0.4523) for female adolescents) Triches RM et al.[21], Kelishadi R et al.[22] and Srivastava DK et al.[9] has also noted similar strong association (p<0.00001) in their study.

In the present study it was found that knowledge of foods causing obesity, the prevention of obesity

and the activities that causes obesity were not significantly associated with obesity status. This difference could be due to the fact that the present study was carried out with a small sample size.

Conclusion and Recommendations:

In short, the present study showed that there is an increasing trend of the obesity among adolescents studying in urban area schools. The study also concludes that obesity is more common and showing an increasing trend among male adolescents compared to female adolescents in both urban and rural area schools. This calls for immediate action in both urban and rural area schools to reduce the prevalence of obesity through appropriate nutritional interventions involving various programmes including school teachers, school authorities and their parents.

Declaration:

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Conflict of Interest: Nil

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