



OVERWEIGHT/ OBESITY AMONG SCHOOL GOING ADOLESCENTS AND ITS ASSOCIATED FACTORS - A CROSS SECTIONAL STUDY IN AN URBAN LOCALITY OF EASTERN INDIA

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ABSTRACT

Overweight and obesity are an increasingly prevalent nutritional disorder among adolescents and its prevention is a public health priority. The study aims to know the prevalence of obesity among school going adolescents and to assess the associated factors. The present study was a cross sectional study conducted in 12 schools of Bhubaneswar from July 2013 to December 2013. 1800 adolescents of 10-16 years (Class VI to X) were included in the study. The overall prevalence of overweight and obesity among school going adolescents was found to be 27.8% (overweight-16.4% and obesity-11.4%). Overweight/ Obesity was significantly higher in adolescents with working mothers, joint family, having less than 2 siblings, not doing regular exercise, watching television more than 2 hours/day, playing computer games, consuming junk food regularly and not playing of outdoor games. There is a need for periodic screening for overweight in schools followed by counselling of parents of overweight adolescents.

KEY WORDS: overweight, obesity, adolescents, nutritional status



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INTRODUCTION

Obesity and overweight are an increasingly prevalent nutritional disorder among children and adolescents in the world.^{1,2} Obesity has become a major epidemic causing serious public health concern and contributes to 2.6 million deaths worldwide every year.³ The proportion of children in the general population who are overweight and obese has doubled over the past two decades in developed and developing countries including India.^{4,5} It is observed that 30% of obesity begins in childhood and out of that 50% to 80% become obese adults.⁶ Obesity in childhood and adolescence has adverse consequences on premature mortality and physical morbidity in adulthood.⁷ Numerous health risks have been associated with adolescent overweight, including hypertension, respiratory disease, several orthopaedic disorders, diabetes mellitus and elevated serum lipid concentrations.⁸ In addition to the nutritional and socio-economic transitions, the behavioural transition of children is also possibly contributing significantly to the rapidly rising prevalence of obesity. Unhealthy eating habits and physical inactivity are the major culprits. Rising income and urbanization leads to substitution of servants or appliances for physical household work and motor vehicles for short distance travelling, instead of walking or cycling.⁹ The causes of childhood obesity are multifactorial. Childhood obesity is an important public health problem which needs appropriate prevention strategies. 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.¹⁰ Considering the problem of obesity and limited data available from Odisha regarding the distribution and profile of adolescent obesity, an attempt has been made to know the prevalence of obesity among school going adolescents and to assess the associated factors.

MATERIALS AND METHODS

Ethical clearance from the Institutional ethical committee was obtained. Written permission from school authorities was collected along

with informed verbal assent obtained from the students. In a cross sectional study during July to December 2013, 12 schools were chosen randomly from 112 high schools (6th to 10th class) of Bhubaneswar city that included six government and six private schools. 1800 adolescents of 10-16 years were included in the study. The sample size was estimated by using the formula $4pq/d^2$, where estimated prevalence of overweight and obesity among school going adolescent children was taken as 20%.¹¹ Using the above-mentioned formula, with an allowable error of 10% the sample size was estimated to be 1600. Presuming a non-response rate of 10%, an additional 160 subjects were included. Thus, 1760 rounded off to 1800 students were included for this study. Students from both government and private schools were included so as to cover the adolescents of all socio economic strata. From each school 150 students were selected to reach the desired sample size of 1800. Thirty students from each class were selected by systematic random sampling following the students list in the attendance register. In case of a selected roll number absent on the day of survey, the next roll number was included. At the beginning of the study, this instrument was pre-tested on 20 school going adolescents to test the feasibility of the questions while eliciting the required information. Accordingly the questionnaire/ schedule was modified and finalized for data collection. Collection of data was done in a friendly atmosphere. Informal discussions were done in the beginning for gaining confidence of the students. Risk factors were assessed using a pre tested structured questionnaire after narrating the verbal explanation for the same. Information regarding life style, family history of obesity, level of physical activity, dietary/eating habit was obtained. The students were interviewed regarding their habits related to playing outdoor games, doing regular exercise, watching television (TV) or computer in hours per day frequency of consuming junk food and dietary habits. All anthropometric measurements and data collection by questionnaire were done by trained medico-social workers. Assessment of nutritional status was done by Body mass index (BMI) which was calculated by weight in kg per

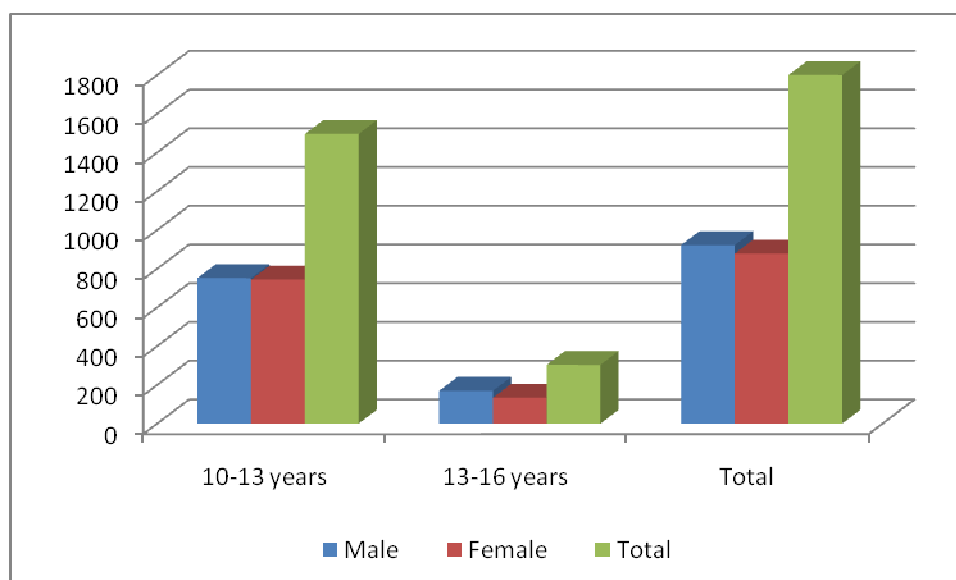
height in meter square. As per recommendation of Khadilkar VV et al¹² children were categorized according to their BMI using BMI percentile curves for Indian boys and girls from 5-17 years with 3rd, 10th, 25th, 50th, 85th and 95th percentiles, along with two additional percentiles corresponding to a BMI of 23 and 28 kg/m² at 18 years. They were classified as: underweight (BMI < 3rd percentile), normal (BMI 3rd percentile to adult equivalent of BMI < 23), overweight (Adult equivalent of BMI 23 to adult equivalent of BMI 27.99) or obese (adult equivalent of BMI ≥ 28). The information thus collected was processed and analyzed in the department of Community Medicine by using SPSS version 20 software. Results are presented in the form

of number, proportions and percentages. Chi-square test was done to identify the possible risk factors associated with overweight and obesity.

RESULTS

In the present study, the age of school going adolescents included in the study varied from 10-16 years. The mean age was 13.03 ± 1.436 years. Out of 1800 adolescents, 83.1% were in early adolescent group (10-13 years) and 16.9% were in late adolescent group (>13 years). Among them, 51.7% were boys and 48.3% were girls.

Figure 1
Age and sex distribution of school going adolescents



Out of 1800 study subjects, majority (94.9%) were Hindu, 68.94% belonged to general category and 17.33% belonged to SC/ST category. In the present study, 72.6% of study subjects belonged to nuclear families and 26.6% belonged to joint families. Majority (37.6%) of fathers were semiskilled workers followed by 26.3% clerk or similar service holders. Fathers with professional, semi-professional and clerical jobs were more in private school students. Occupation of mothers revealed that 81.5% mothers were

housewives followed by 4.2% doing clerical job. Regarding education of parents, 3.3% fathers were illiterate. 35.6% were having graduate or higher education. 23.5% students didn't know the educational status of their fathers. 20.4% mothers were educated up to secondary level. 31.6% students were unaware of the educational status of their mothers. Out of 1800 adolescents, 27.8% of school going adolescents were overweight / obese. The prevalence of overweight was 16.4% and obesity was 11.4%.

Figure 2
Distribution of adolescents as per nutritional status

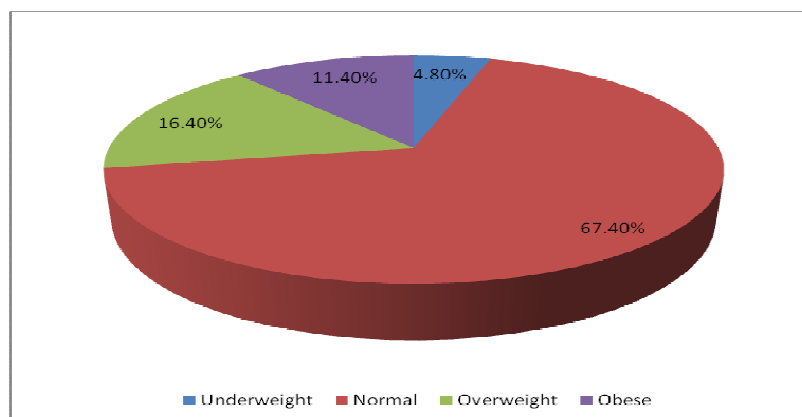


Table 1
Prevalence of overweight and obesity and Socio-demographic factors

Factors	Total Children	Prevalence Obese	Overweight/	Remarks
Age				
10-14years (Early adolescent)	1496	409 (27.3%)		$X^2= 1.075$
15-19 years (Late adolescent)	304	92 (30.3%)		$P= 0.300$
Sex				
Boys	922	250 (27.11%)		$X^2=0.486$
Girls	878	251 (28.59%)		$P=0.486$
Religion				
Hindu	1708	481 (28.2%)		$X^2=1.793$
Others	92	20 (21.7%)		$P=0.181$
Caste				
General	1241	404 (32.6%)		$X^2=44.341$
SC,ST and SEBC	559	97 (17.4%)		$P = 0.000^*$
Education of Father (n=1377)				
Secondary and less	598	84 (14.0%)		$X^2=125.056$
Higher sec. and above	789	326 (41.8%)		$P =0.000^*$
Education of Mother (n=1231)				
Secondary and less	1079	270 (25%)		$X^2=9.559$
Higher sec. and above	152	56 (36.8%)		$P=0.002^*$
Occupation of Father				
Professional, semi-prof. and Clerical	666	272 (40.8%)		$X^2=89.047$
Skilled worker & others	1134	229 (20.2%)		$P=0.000^*$
Occupation of Mother				
Working Women	333	110 (33.0%)		$X^2=5.500$
House wife	1467	391 (26.7%)		$P=0.019^*$
Type of Family				
Nuclear (including Broken)	1321	350 (26.5%)		$X^2=4.426$
Joint	479	151 (31.5%)		$P =0.035^*$
No. of Siblings				
No sibling or 1 sibling	1168	401 (34.3%)		$X^2=69.947$
2 or more siblings	632	100 (15.8%)		$P =0.000^*$

* Statistically significant at 0.05 level

There was no significant difference across the gender and early / late adolescence period. Higher prevalence was found among hindu students, though the difference was statistically not significant ($P=0.181$). Prevalence of overweight/obesity was significantly higher in adolescent students of general caste, fathers educated up to higher

secondary or above ($P=0.000$), mothers educated up to higher secondary or above ($P=0.000$), fathers with professional, semiprofessional and clerical occupation ($P=0.000$), working mothers ($P=0.019$), with joint family ($P= 0.035$) and with less than 2 siblings ($P= 0.000$).

Table 2
Factors associated with overweight / obesity among adolescents

Factors	Total No. of Children	Prevalence Overweight/ Obese	Remarks
Family history of obesity			
Present (Father/Mother/Both)	680	255 (37.5%)	$X^2=50.841$
No family history	1120	246 (22.0%)	$P=0.000^*$
Outdoor games			
Not playing	339	111 (32.7%)	$X^2=5.013$
Playing	1461	390 (26.7%)	$P = 0.025^*$
Regular exercise			
Not doing	1588	476 (30.0)	$X^2= 30.783$
Doing	212	25 (11.8)	$P =0.000^*$
Diet			
Mixed	1589	433 (27.4%)	$X^2=1.081$
Veg.	221	68 (30.8%)	$P =0.298$
Consuming junk food			
regularly	1592	476 (29.9%)	$X^2= 29.281$
occasionally	208	25 (12%)	$P = 0.000^*$
Watching TV			
2 hours or more	1671	477 (28.5%)	$X^2=5.892$
Less than 2 hours	129	24 (18.6%)	$P =0.015^*$
Playing games in Computer			
Yes	662	254 (38.4)	$X^2=57.860$
No	1138	247 (21.7)	$P =0.000^*$

* Statistically significant at 0.05 level

Overweight/ Obesity was found significantly higher in adolescents with family history of obesity (37.5%, $P=0.000$), not doing regular exercise (40%, $P=0.000$), watching TV for more than 2 hours per day (28.5%, $P=0.015$), playing computer games (38.4%, $P=0.000$), consuming junk food more than 3 times per week (29.9%, $P=0.000$) and not playing of outdoor games (32.7%, $p = 0.000$).

DISCUSSION

The overall prevalence of overweight and obesity among school going adolescents (10-16 years) was found to be 27.8% (overweight – 16.4% and obesity – 11.4%). In a study by Kotian M et al, the overall prevalence of overweight among adolescents was 9.9% and obesity was 4.8%.¹³ Krutarth RB et al reported 13.3% overweight and 5.4% obese adolescents in Ahmadabad city¹⁴ and as per the study by Gupta R et al in Delhi, the prevalence of overweight and obesity was 15.1% and 7.2% respectively.¹⁵ The difference in prevalence may be due to the differences in cut-off criteria used in different studies or may be attributed to local changes in the diet and life style factors. In the present study, there was no significant difference of prevalence between early and late adolescents and also no significant difference among boys and girls.

Different studies demonstrated conflicting results. Valen C et al, 2009 reported similar results that males registered a higher prevalence of obesity than females ($P < 0.0001$)¹⁶ but Kumar S et al, 2007 reported higher prevalence among girls (8.82%) than boys (4.1%), ($P<0.001$).¹⁷ Higher prevalence was found among students of Hindu religion but the difference was not statistically significant ($P=0.181$). Prevalence of overweight/obesity was significantly higher among adolescents of general caste, higher educated fathers ($P=0.000$), higher educated mothers ($P=0.000$), fathers with professional/semiprofessional/clerical occupation ($P=0.000$), working mothers ($P=0.019$), with joint family ($P= 0.035$) and with less than 2 siblings ($P= 0.000$). Studies by Kotian MS et al and Ramachandran A et al observed that overweight/obesity among adolescents was higher in high socioeconomic group.^{13,11} Higher education of parents, professional/ semiprofessional/clerical jobs indicates higher socioeconomic group and overweight/obesity was higher among these group. As overweight/obesity was significantly higher among joint families and with one or no siblings in the family, this may be due to by over caring family members and parents. Working mothers may not have time and their children were overweight/ obese may be due

to eating of junk foods and processed foods. Overweight/ Obesity was found significantly higher in adolescents with family history of obesity (37.5%, $P=0.000$), not doing regular exercise (40%, $P=0.000$), watching TV for more than 2 hours daily (28.5%, $P=0.015$), playing games in computer (38.4%, $P=0.000$), consuming junk food regularly (29.9%, $P=0.000$) and not playing of outdoor games (32.7%, $P = 0.000$). No significant difference was found in adolescents taking veg. or mixed diet. In the study by Jain S *et al*, 2010 they found overweight and obesity in adolescents was significantly associated with TV watching ≥ 2 hours, not playing outdoor games daily and frequently eating junk foods.¹⁸ Kotian MS *et al*, 2010 in their study among school children of 12-15 years, reported higher prevalence obese children with physical activity of < 1 hour and watching TV, computer ≥ 2 hours daily.¹⁹ Amin TT *et al*, 2008 in their study reported a significant difference between obese and overweight children and the lean children with regard to the frequency of consumption of fast food.²⁰ In the study by Kumar S *et al*, 2007 they found significant association between overweight and obesity with family history of obesity, lack of physical activity and snacking of high energy foods ($P<0.001$). They had not found significant difference between veg. and mixed diet which is comparable to the present study.¹⁶ As per the discussion in the article by Behera M *et al*,

strategies at school should aim at encouraging healthy dietary habits, such as increasing fibre intake, reducing consumption of junk foods and increase levels of physical activity starting in childhood may help in reducing childhood overweight and obesity and increase the health quality.²¹

CONCLUSION

The prevalence of overweight & obesity among school going adolescent children in this locality is alarmingly high. The various factors that are associated with overweight & obesity are as follows higher educated parents, working mothers, joint family, 1 or no sibling family history of obesity, not doing regular exercise, not playing of outdoor games, watching TV more than 2 hours per day, playing computer games and consuming junk food more than 3 times per week. There is a need for periodic screening for overweight should be done in schools followed by counselling of parents of overweight children. Lifestyle modification education along with more number of game periods in schools and yoga classes should be emphasized. School health programmes with special focus on educating students and teachers regarding possible adverse effect of overweight and obesity should be carried out.

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