SHORT ARTICLE

Overweight and Obesity and its associated factors among high school students of Dibrugarh, Assam, India

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Abstract

Background: The increasing prevalence of childhood obesity is emerging as a public health problem in urban India and also contributes to obesity and various non-communicable diseases among adult population. Hence, it is necessary to identify potential risk factors for childhood obesity and formulate early interventions to control this epidemic. **Aims & Objectives**: To assess the magnitude of overweight and obesity among high-school students of Dibrugarh and to determine factors associated with it. **Materials & Methods**: A cross-sectional study including students enrolled in 8th- 10th grades in schools of urban Dibrugarh, Assam was conducted from October 2012 to June 2013 wherein 1000 students were selected using stratified random sampling technique. Information regarding dietary intake, amount of physical activity was collected using pre-designed, pre-tested questionnaire followed by anthropometric measurements which included body mass index (BMI), waist and hip circumference was done. Statistical analysis was carried out using SPSS-16 software. **Results**: Of the 1000 students enrolled, 119 (11.9%) were overweight, 71 (7.1%) were obese and 225 (22.5%) had high waist-hip ratio. The factors significantly associated with overweight and obesity were higher socio-economic class, frequent intake of fast food items, sedentary lifestyle with less physical activity. **Conclusion**: Children belonging to higher socio-economic group, consuming fast food and involved in less physical activity were more predisposed to overweight and obesity.

Keywords

Overweight; Obesity; BMI; high school students.

Introduction

Overweight and obesity represent a rapidly growing threat to the health of population in a large proportion of countries including developing countries like India. The increasing prevalence of overweight, obesity and its consequences prompted the WHO to designate obesity as a global epidemic in 2002. (1) Childhood obesity impacts all major organ systems of the body and is well known to result in significant morbidity and mortality. (2) Data accumulated over the past indicate that atherosclerotic cardiovascular disease (CVD) processes begin early in childhood and are influenced by genetic factors as well as other potentially modifiable risk factors such as environmental exposures, including obesity. (3) An increase in childhood obesity is associated with potential medical complications in adolescence and

especially adulthood, like hypertension, coronary artery disease, diabetes mellitus, dyslipidemia, cholecystitis, pancreatitis, sleep apnea, and osteoarthritis. (4,5)

Thus, there is a need to address the growing prevalence of obesity by identifying its risk factors and controlling them at an early age. Since there is paucity of data pertaining to obesity and its risk factors among adolescents especially in Assam.

Aims & Objectives

To assess the prevalence of overweight and obesity and associated risk factors amongst school children.

Material & Methods

This was a cross-sectional study conducted in the schools of urban Dibrugarh, Assam from October 2012 to June 2013. The study universe comprised of students in 8th, 9th and 10th standards in schools of urban Dibrugarh.

Sample Size: Considering the prevalence of obesity as 17.12 % (6) with 15% of 'p' as allowable error at 95% confidence interval, the required sample size was 861. Considering 10% non-response and rounding off, the final sample size calculated was 1000. Students from schools having enrolment less than 200 in each class and students who did not give consent to participate were excluded from the study.

Sampling design: After procuring the list of schools having classes from 8th to 10th from the office of Inspector of Schools, Dibrugarh and applying the exclusion criteria, study participants were selected using two-stage stratified random sampling. In the first stage, schools were stratified into government and private categories and in the second stage; government and private schools were further categorized into boys, girls and co-educational schools. From each stratum; one school was selected using simple random sampling and 170 participants were enrolled from each school using equal allocation. A list of all students studying in class 8th – 10th was obtained for each school and required number of participants was enrolled using random numbers table.

A written consent was taken from the school administration and parents after explaining the aims and objectives of the study

Data collection tools and measurements: A pre - designed and pretested questionnaire was used for collecting data on socio-demography, dietary habits including fast food intake and physical activity. Modified Kuppuswamy's classification was used for

determining the socio -economic status of the students. (7)

Food frequency questionnaire was used to assess dietary habits and patterns. To assess the pattern of physical activity, students were asked the frequency and duration of exercises and outdoor games, hours spent in physical education classes in school and leisure time activities.

For anthropometric measurements, the tools were anthropometric rod for measuring height and a bathroom scale for measuring weight with a sensitivity of 0.1 cm and 1 kg respectively. After every 10 measurements, zero error was set. For measuring height, student was asked to stand straight without footwear with heels, buttocks, back touching the vertical rod with arms hanging freely on the side. The alignment of the head was in such a way so that the lower rim of the orbit and the auditory canal were in the horizontal plane (Frankfurt plane). The movable head piece of the measuring device was brought on the top most point on the head with sufficient pressure to compress the hair. For measuring weight, student was asked to stand on the scale without any footwear and with minimal clothing (i.e. school uniform). Using height and weight measurement, the body mass index was calculated and if the BMI was more than 85th percentile, child was labelled as overweight and if BMI was more than 95th percentile, child was labelled as obese (Indian Academy of Pediatrics, Growth Monitoring Guidelines for Children from Birth to 18 Year). (8)

Data Analysis: For statistical analysis, percentages were calculated and chi-square test done using SPSS version 16 software.

Ethical clearance was taken from Institutional Ethical Committee of Assam Medical College and Hospital prior to enrolment of cases. Permission from Inspector of Schools, Urban Dibrugarh circle was also taken.

Results

The total number of students who participated in the study was 1000 out of which 486 (48.6%) were boys and 514 (51.4%) were girls. The mean age was 14.65 ± 1.24 years. Students belonging to socio-economic class III, IV and V (73.33%) according to modified Kuppuswamy's classification were more common than class I and II (26.66%). More than 50% students' parents had education upto middle school while 5.33% were illiterate. The occupational profile of

students' parents showed that 82 (27.33%) were involved in unskilled labour, 68 (22.66%) were shop owners and clerical workers while 8 (2.66%) were unemployed.

The anthropometric parameters of study population are shown in Table 1. Prevalence of overweight and obesity was found to be 11.9% (119) and 7.1% (71) respectively.

Association of overweight and obesity with socio-demographic characteristics is shown in Table 2. Overweight and obesity was more prevalent among female sex, students belonging to higher socio-economic group and students whose parents' education was higher than matriculation and this was statistically significant (p < 0.05).

Regarding dietary factors, intake of fast food items and aerated drinks more than 3 times per week was found to be significantly associated with overweight and obesity. Also, prevalence of overweight and obesity was significantly higher among students who were engaged in physical activity for less than an hour per day and who were engaged in mainly sedentary activities during leisure time (Table 3).

Discussion

The present study tries to elicit information on the dietary practices, levels of physical activity and their impact on prevalence of overweight and obesity among high school students of Dibrugarh, Assam.

In our study, the prevalence of overweight and obesity among high school students was found to be 11.9% and 7.1% respectively. Various studies in urban India have reported prevalence of overweight and obesity ranging from 4% to 20% among school going adolescents. Chakraborty *et al* (2011) in their study reported prevalence of overweight and obesity to be 17.12% and 2.45% respectively among adolescent school children aged 13 – 18 years of Kolkata. (6) Vohra *et al* (2011) in their study found prevalence of overweight and obesity to be 4.17% and 0.73% among school children of 5th to 12th grade in Lucknow which is lower than our study findings and may be because the age group of participants was different and younger age group children are less likely to be overweight and obese. (9) The study findings from Kerela, (10) Delhi (11) and Surat (12) reported a prevalence of 18.3%, 17.5% and 20.5% respectively.

In our study, prevalence of overweight and obesity was found to be significantly higher among girls, children with higher levels of paternal and maternal education (matriculation and above), high socio-economic class, having high intake of fast food and carbonated drinks and less physical activity. Prevalence of obesity more in girls as compared to boys is similar to the findings seen by S Kumar *et al* (13) and K.N. Agarwal *et al*. (14) The significant positive association between higher level of paternal and maternal education and overweight/obesity among the students could be due to better education functioning as a proxy measure for higher socioeconomic status which affects the dietary practices and physical activity patterns among the families. Similar findings were reported from a study in the city of Wardha in central India. (15) Higher consumption of fast food items and aerated drinks and less physical activity was found to be associated with overweight and obesity in the study findings by M Anitha Rani (16), Goyal *et al*. (12) and M S Kotian *et al*. (17)

Conclusion

The study shows that higher socio-economic status, low levels of physical activity, sedentary lifestyle and consuming junk foods and aerated drinks are associated with overweight and obesity among the students. Hence, regular physical exercise, participation in household activities and healthy food intake should be emphasized upon in this age group. Since students spend most of their time in the school environment, so schools should promote positive health behaviour. As part of preventive strategies, schools must formulate policies for addressing foods and snacks consumed in the school premises as well as outside, for behavioural skill training and for promotion of sports and recreational activities with compulsory physical education classes in schools. There is an urgent need to educate the parents as well as students on healthy dietary patterns and food choices along with desired lifestyles to prevent overweight/obesity and its associated ill-effects in future. Different health promotional activities can be implemented with implementation research for better evidence generation beginning at an early age.

Limitation of the study

There were certain limitations in our study. Assessment of dietary history using Food Frequency Questionnaire Method is a qualitative assessment and also subject to recall bias. Physical activity was elicited through the oral questionnaire which may have subjective error and so, not very accurate. In

spite of these limitations, this study is an earnest attempt to determine the levels of overweight and obesity among school children of Dibrugarh, Assam.

Authors Contribution

First author was involved in conception and design of study, data collection and analysis and drafting the article while second author was involved in conception and design along with data interpretation and review of draft for final approval.

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Tables

TABLE 1 ANTHROPOMETRIC PARAMETERS OF STUDY POPULATION

Parameters	Value
Mean height (cm)	153.37 ± 8.95
Mean weight (kg)	46.08 ± 10.44
Mean BMI (kg/m2)	19.51 ± 3.69

TABLE 2 PREVALENCE OF OVERWEIGHT AND OBESITY BY SOCIO-DEMOGRAPHIC CHARACTERISTICS

Characteristics	Total	Overweight &Obese (n)	Percentage	p-value*
Sex				
Male	486	66	13.6	0.000
Female	514	124	24.1	
Father's education				

Upto 10th standard	236	38	16.1	
More than 10th standard	574	152	26.5	0.011
Mother's education				
Upto 10th standard	255	32	12.5	
More than 10th standard	555	158	28.5	0.000
Socio-economic class				
Upper (Class I)	56	23	41.1	0.000
Middle (Class II & III)	667	133	19.9	
Lower (Class IV & V)	277	34	12.2	

*using chi-square test

TABLE 3 DIETARY AND PHYSICAL ACTIVITY FACTORS FOR OVERWEIGHT AND OBESITY AMONG SCHOOL CHILDREN

Risk factors	Total	Overweight & Obese (n)	Percentage	p-value*
Fast food intake				
<3 days/wk	582	87	14.9	0.000
>3 days/wk	418	103	24.6	
Aerated drinks				
<3 times/wk	943	170	18	0.002
>3 times/wk	57	20	35.1	
Physical activity/day				
Upto 1 hour	616	143	23.2	0.000
More than 1 hour	384	47	12.2	
TV & computer use/day				
Upto 3 hours	625	123	19.7	0.479
More than 3 hours	375	67	17.9	
Leisure time activity				
Mainly sedentary	697	101	14.5	
Mild exercise	76	34	44.7	0.000
Moderate exercise	138	36	26.1	
Strenuous exercise	89	19	21.3	