BMI and Lifestyle Pattern - A Cross Sectional Study among Adolescent School Students in an Urban Area of West Bengal, India

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ABSTRACT

BACKGROUND

Obesity is one of the serious public health challenges of the 21st century. Studies in urban India showed that overweight / obesity among adolescents varied from 10.45 % to 21 %. Obesity / overweight is a major risk factor for no communicable disease and some cancers. We wanted to determine the prevalence of obesity and related lifestyle behaviour among the adolescent students.

METHODS

A descriptive study was carried out among adolescent students in an urban area of West Bengal. BMI was assessed according to WHO growth reference for school children (5 - 19 years). Food frequency data and pattern of physical activity was recorded based on GSHS. Adequacy of physical activity was assessed based on set WHO criteria. Data was collected with a self-administered structured schedule. Anthropometric measurements and record review were done.

RESULTS

3.5 % were obese. 12.6 % were overweight, 75.3 % were of normal weight, 8.6 % were thin. Daily consumption of vegetables, milk and fruits were 58.1 %, 31.1 % and 9.3 % respectively. Consumption of carbonated soft drink and fast food was low. All consumed iodised salt and 18.2 % consumed extra salt. 23.9 % of the students performed the recommended physical activity. 46 % student used computer, 53.2 % used mobile. Most watched TV. Overweight / obesity was significantly related to type of family, vegetable consumption and history of chronic diseases in the family.

CONCLUSIONS

About 16.1 % of the students were overweight / obese. Physical activity and dietary pattern were not satisfactory. A substantial number of students used computer, mobile and watched TV. Thus, promotion for intake of healthy diet, adequate physical activity, and regular health check-up is recommended.

KEYWORDS

Adolescent Students, Lifestyle, Obesity, Urban

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DOI: 10.18410/jebmh/2020/559

How to Cite This Article:
Naskar P, Roy S. BMI and lifestyle pattern: a cross sectional study among adolescent school students in an urban area of west Bengal, India. J Evid Based Med Healthc 2020; 7(46), 2719-2723. DOI: 10.18410/jebmh/2020/559

Submission 29-06-2020,
Peer Review 15-07-2020,
Acceptance 19-09-2020,
Published 16-11-2020.

BACKGROUND

Overweight and obesity are public health problems of global significance. Worldwide obesity has nearly tripled since 1975. According to 2016 report of WHO, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 650 million were obese. Thus about 39 % of adults were overweight and 13 % were obese. 41 million children under the age of 5 were overweight or obese in 2016.[1]

According to ICMR-INDIAB study 2015, prevalence rate of obesity and central obesity among adults in India varied from 11.8 % to 31.3 % and 16.9 % to 36.3 % respectively.[2] Childhood obesity is one of the serious public health challenges of the 21st century. Obesity is twice as common among adolescents as it was 30 years ago. The problem is global and is steadily affecting many low and middle-income countries, particularly in urban settings.[3] About 5.74 percent to 8.82 percent of schoolchildren in India are obese.[4] Age adjusted prevalence of overweight was found to be 14.3 % among boys and 9.2 % among girls whereas the prevalence of obesity was 2.9 % in boys and 1.5 % in girls.[5]

Study done in different cities found that the prevalence of overweight / obesity was 10.45 % in Bikaner city,[6] 11.33 % in Salem.[7] 12.04 % in semi urban areas of West Bengal,[8] 12.3 % in urban Sambalpur,[9] 14.3 % in urban Surat.[10] However, study done in Katihar[11] and Patna[12] showed that 21 % were overweight or obese.

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Although genetics and some disorders cause obesity, most adolescent obesity results from a lack of physical activity and consuming more calories than needed for activity level. Globally, there has been an increased intake of energy-dense food that are high in fat and a decrease in physical activity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization.[1]

Obesity / overweight is a major risk factor for communicable diseases such as cardiovascular diseases (mainly heart disease and stroke), diabetes, musculoskeletal disorders (especially osteoarthritis) and some cancers (including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney, and colon). The risk for these non-communicable diseases increases with increase in BMI. Childhood obesity is associated with a higher chance of adult obesity, premature death and disability. But in addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension, early markers of cardiovascular disease, insulin resistance and psychological effects.[1] Obese adolescents are more likely than their peers to have high blood pressure and type 2 diabetes. Because of society's stigma against obesity, many obese adolescents have a poor self-image and may become increasingly socially isolated.

So the study was done to find out the prevalence of obesity and related lifestyle behaviour among adolescent school children in an urban area of Purba Burdwan district, West Bengal, India.

METHODS

This is a descriptive observational cross-sectional study conducted among students (both boys and girls) of class VIII to XII (approximate age range of 13 to 18 years) of the three selected schools in the Purba Bardhaman District of West Bengal, India. The district has 31 blocks, 9 municipal areas and 2 corporation areas. Burdwan Municipality (urban area) area of Purba Bardhaman district is the urban field training area of Burdwan Medical College. Three Bengali medium co-education high schools in Burdwan municipality were chosen for this study.

Sample Size

Considering prevalence of obesity for urban area to be 14.6 %[10] sample size was calculated to be 562 at 95 % confidence interval and 20 % relative error.

Sampling

A multistage sampling technique was applied. In stage 1 all Co-education Bengali medium schools of Burdwan municipality area were enumerated. A simple random sampling was done to select three schools from them. In stage 2 the study participants were chosen. The calculated sample size was 562. From each school and from each class equal number of students were selected. Thus, from each school 188 students were selected. Again 38 students were selected from each class (VIII-XII) by systematic random sampling. In total 570 students were studied.

Inclusion Criteria

1. Students, both boys and girls, studying in class VIII to XII and present on the day of survey
2. Students who gave written consent

Exclusion Criteria

1. Those who were absent on the day of data collection
2. Students aged more than 19 year.

Variables

Socioeconomic characteristics, BMI, food frequency assessment, daily physical activity pattern. Data on socioeconomic characteristics, dietary behaviour and physical activity was collected with a self-administered structured schedule. Anthropometric measurements were done by the investigators. School register book was used to confirm age.

Obesity was interpreted according to WHO growth reference for school aged children (5 - 19) year.[13]

Obese: BMI > 2SD above the WHO growth standard median.

Overweight: BMI > 1 SD above the WHO growth standard median.

Thinness: BMI < - 2 SD below the WHO growth standard median.

Severe Thinness: BMI < - 3 SD below the WHO growth standard median.

Diet survey was done by a set of questions based on the guideline provided by Global School Based Student Health Survey (GSHS).[14] For dietary behaviour assessment, students were asked regarding the frequency of intake of fruits, vegetables, milk and milk-based food, fast food and carbonated soft drink in a week. Physical activity pattern was assessed by a set of questions based on the guideline provided by Global School Based Student Health Survey (GSHS)[14] Students were enquired regarding the type of physical activities performed throughout the day and the duration of such activity. This included occupational activity, travelling, leisure time activity and physical exercise. The activities were then categorized according to intensity.

Interpretation of adequacy of physical activity was done based on WHO criteria which recommended for at least 60 minutes of moderate- to vigorous-intensity physical activity daily for children aged 5 - 17 years.[15]

Data Source / Measurements

Data was collected through survey by the authors. Study tools included predesigned & pretested structured schedule, digital weighing scale, portable stadiometer and school record book. After ethical clearance permission was taken from appropriate school authority. All the selected schools were initially visited for rapport building with the teachers and students. Consent was taken from the study subjects after explaining the purpose of the study. After briefing, a structured schedule was administered to the students. Anthropometric measurements were taken by the authors as per standard guideline. School register book was referred to assess age.

Statistical Methods

Data was coded and entered into MS-Excel sheet. Statistical analysis was done using SPSS 20. Descriptive and inferential statistics were used. Categorical data were presented in percentages. Continuous data were presented in mean. Chi square test was used for test of significance. P value < 0.05 was taken as significant.

RESULTS

Table I showed that out of 570 students observed 53 % were boys and 47 % were girls. Most of them (70.4 %) were from late adolescent age group. About 90.2 % were Hindu, 67.9 % belonged to lower middle or lower class as per Modified BG Prasad scale (July 2015)[16] and 82.8 % belonged to nuclear family. There was a history of chronic disease in the family in 33.5 % of adolescents.

Table II showed that 58.1 % of the students consumed vegetable for 5 - 7 days a week, 31.1 % consumed milk for 5 - 7 days a week but only 9.3 % consumed fruits for 5 - 7 days a week. Consumption of carbonated soft drink and fast food was found to be low among the students. Mustard oil was the main cooking oil used at their homes. All consumed iodised salt and 18.2 % consumed extra salt with meal.

Variables	Boys No. (%) 304 (100)	Girls No. (%) 266 (100)	Total No. (%) 570(100)
10 - 14 yrs.	90 (29.7)	79 (29.7)	169 (29.6)
15 - 19 yrs.	214 (70.6)	187 (69.19)	401 (70.4)
Hindu	263 (86.5)	251 (92.87)	514 (90.2)
Muslim	35 (11.5)	7 (2.6)	42 (7.4)
Christian	6 (2)	8 (3)	14 (2.5)
Upper Class	10 (3.3)	17 (6.4)	27 (4.7)
Upper Middle Class	25 (8.2)	28 (10.5)	53 (9.3)
Middle Class	52 (17.2)	51 (19.2)	103 (18.1)
Lower Middle Class	124 (40.9)	97 (36.5)	221 (38.8)
Lower Class	93 (30.7)	73 (27.4)	166 (29.1)
Nuclear	247 (81.2)	225 (84.6)	472 (82.8)
Joint	57 (18.8)	41 (15.4)	98 (17.2)
H / O Chronic disease in the family - Present	110 (36)	81 (30.4)	191 (33.5)
H / O Chronic disease in the family - Absent	194 (64)	185 (69.6)	379 (66.5)

Table 1. Sociodemographic Characteristics of the Study Population

Food Item	Boys No. (%) 304 (100)	Girls No. (%) 266 (100)	Total No. (%) 570(100)
Vegetable - 5 - 7 days / week	181 (59.5)	150 (56.4)	331 (58.1)
Milk - 5 -7 days / week	116 (38.2)	61 (22.9)	177 (31.1)
Fruit - 5 - 7 days / week	28 (9.2)	25 (9.4)	53 (9.3)
Carbonated Soft Drinks - 5 - 7 days / week	7 (2.3)	11 (4.1)	18 (3.2)
Fast Food - 5 – 7 / weekdays	17 (5.6)	36 (13.5)	53 (9.3)
Mustard Oil Usage	302 (99.3)	262 (98.5)	564 (98.9)
Iodised Salt Usage	304 (100)	266 (100)	570 (100)
Habit of Extra Salt Intake	41 (13.5)	63 (23.7)	104 (18.2)

Table 2. Food Consumption Pattern of the Study Population

Duration of Physical Activity / Day	Boys No. (%) 304 (100)	Girls No. (%) 266 (100)	Total No. (%) 570 (100)
≥ 60 min / day (Adequate)	111 (36.5 %)	25 (9.4 %)	136 (23.9 %)
< 60 min / day (Inadequate)	193 (63.5 %)	241 (90.6 %)	434 (76.1 %)
Total	**304 (100 %)**	**266 (100 %)**	**570 (100 %)**

Table 3. Duration of Moderate to Vigorous Physical Activity / Day of the Study Population

Table III showed that 23.9 % of the students performed the recommended physical activity and it is more for the boys.

Assessment	Boys No. (%)	Girl No. (%)	Total No. (%)
Obesity	7 (2.3)	13 (4.9)	20 (3.5)
Overweight	37 (12.2)	35 (13.2)	72 (12.6)
Normal Weight for Age	218 (71.7)	211 (79.3)	429 (75.3)
Thinness	32 (10.5)	6 (2.3)	38 (6.7)
Severe Thinness	10 (3.3)	1 (0.4)	11 (1.9)
Total	**304 (100)**	**266 (100)**	**570 (100)**

Table 4. BMI of the Study Population

Other than occupational activity common physical activities performed by the students were yoga, free hand exercise, weightlifting, playing cricket, football, jogging, running and different household chores. Their mean duration of sleep was 7.6 hours. Mean duration of sleep was higher in early adolescents. 46 % student used computer and 53.2 % used mobile. Most of the students watched TV.

Table IV is related to BMI of the students and it was found that 3.5 % were obese 12.6 % were overweight (16.1 % were overweight or obese), 75.3 % had normal BMI and 6.7 % were thin and 1.9 % were severely thin.

Variables	Overweight / Obesity		
	Absent	Present	Total
Type of Family			
Nuclear Family	406 (86 %)	66 (14 %)	472 (100 %)
Joint Family	72 (73.5 %)	26 (26.5 %)	98 (100 %)
Total	**478 (83.9 %)**	**92 (16.1 %)**	**570 (100 %)**
Chi-square value = 9.439, df = 1, p = .002(Statistically significant)			
Consumption of vegetables			
Regular (≥ 4 days / week)	343 (79.6 %)	88 (20.4 %)	431 (100 %)
Sometime (< 4 day / week)	129 (98.5 %)	2 (1.5 %)	131 (100 %)
Never	6 (75 %)	2 (25 %)	8 (100 %)
Total	**478 (83.9 %)**	**92 (16.1 %)**	**570 (100 %)**
Chi-Square (yates corrected) = 26.959 (25.072), df = 2, p = .000 (Statistically significant)			
History of chronic disease in the family			
Yes	144 (75.4 %)	47 (24.6 %)	191 (100 %)
No	334 (88.1 %)	45 (11.9 %)	379 (100 %)
Total	**478 (83.9 %)**	**92 (16.1 %)**	**570 (100 %)**
Table 5. Association of Overweight / Obesity with Different Socioeconomic Factors and Lifestyle Behaviours			
Chi-square = 15.215, df = 1, p = 0.000, (Statistically significant)			

Table V showed that a statistically significant association existed between overweight / obesity and type of family, vegetable consumption and history of chronic diseases in the family

DISCUSSION

Dietary Pattern

In the present study 58.1 % of the students consumed vegetable for 5 - 7 days a week, 31.1 % consumed milk or milk products for 5 - 7 days a week but only 9.3 % consumed fruits for 5 - 7 days a week. Consumption of carbonated soft drink and fast food was found to be low among the students. Mustard oil was the main cooking oil used at their homes. All consumed iodised salt and 18.2 % consumed extra salt with meal.

A study in Motiharitown[17] among adolescent girls found that only 39 % consume milk and milk products.

Study in Kolkata[18] found that 30 % of the adolescents did not consume vegetables, 45 % did not consume fruits and a high rate (47 – 70 %) of consumption of energy dense food daily. In general, girls had more nutritious dietary intakes than boys. Dietary survey by 24-hour recall method among adolescent school going children in urban Baroda[19] showed that 80 % adolescents consumed regular food, like dal, rice, chapati, and vegetables including green leafy vegetables. Nearly 50 % of them had however consumed chocolates and soft drinks and one-third had taken fast foods.

Physical Activity Pattern

In our study about 24 % of the students performed the recommended physical activity and it is more among the boys.

Other than occupational activity common physical activities performed by the students were yoga, free hand exercise, weightlifting, playing cricket, football, jogging, running and different household chores.

India wide study[20] done on physical activity patterns among school children showed that only 17.1 % students are performing the recommended activity.

Study done in Imphal[21] found that 29.7 % and 28.7 % of the students were physically active at school and outside school. Chennai [22] study among school going adolescents found that 32 % boys and 16 % girls were adequately active. Similarly, Anand city [23] study found 30 % adolescents were adequately active.

Other Lifestyle Patterns

The present study found that 46 % of students used computer and 53.2 % used mobile. Most of the students watched TV. Their mean duration of sleep was 7.6 hours. Mean duration of sleep was higher in early adolescents.

Study done by Singh et al in North India[24] revealed a greater prevalence of the use of electronic media and telecommunication gadgets, reflecting a larger engagement in sedentary activities than in cultural, community and physically demanding leisure activities. Guntur study[25] on similar study population showed internet usage was appreciable among the urban adolescent population, more among boys.

Distribution of Obesity / Overweight

This study found 3.5 % of the students were obese and 12.6 % were overweight (16.1 % were overweight or obese).
Study done in different cities found that the prevalence of overweight / obesity was 10.45 % in Bikaner city[6,] 11.33 % in Salem,[7] 12.04 % in semi urban areas of West Bengal[8,] 12.3 % in urban Sambalpur[9,] 14.3 % in urban Surat.[10] However study done in Katihar[11] and Patna[12] showed that 21 % were overweight or obese.

Association of Overweight / Obesity with Different Socio-Economic Characteristics and Lifestyle Patterns

In the present study a statistically significant association existed between overweight / obesity and type of family, vegetable consumption and history of chronic diseases in the family.

Different studies found that overweight / obesity had a statistically significant relation with family history of obesity, intake of high calorie foods, physical inactivity, television or computer viewing for more than 3 hours per day,[6,9] less consumption of vegetable and fruits, consuming outside food, alcohol consumption, yoga practice and socioeconomic status.[11,12,26]

CONCLUSIONS

About 16.1 % of the students were overweight / obese, only 23.9 % of the students performed the recommended physical activity, 58.1 % of the students consumed vegetables, 31.1 % consumed milk, and only 9.3 %

consumed fruits for 5 - 7 days a week. A substantial number of students used computer, mobile and watched TV.

Thus, promotion for intake of healthy diet, adequate physical activity and regular health check-up is recommended. Parents should encourage their children to take home made food and engage in regular physical activities.

Schools should have classes on nutrition and healthy lifestyle. There must be time allotted for physical activities in schools and all students must be encouraged to take part in it. School canteen should refrain from selling high fat containing items and soft drinks. Government should take proactive initiative to promote healthy lifestyle.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
Financial or other competing interests: None.
Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

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