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

Prosenjit Naskar¹, Sima Roy²

¹Department of Community Medicine, West Bengal Power Development Corporation Limited, Purulia, West Bengal, India. ²Department of Community Medicine, Burdwan Medical College, West Bengal, India.

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

Corresponding Author:
Dr. Sima Roy,
P - 50, New Parnasree,
Kolkata - 700060,
West Bengal, India.
E-mail: simaroy214@gmail

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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-INDIA 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.2 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.3

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 Katihar11 and Patna12 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 Bardwan district, West Bengal, India.
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). 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). 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.

### 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) 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.

### Table 1. Sociodemographic Characteristics of the Study Population

| Variables                  | Boys No. (%) | Girls No. (%) | Total No. (%) |
|----------------------------|--------------|---------------|---------------|
| 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)        | 3 (1)         | 9 (1.6)       |
| Upper Class                | 10 (3.3)     | 17 (6.4)      | 27 (4.7)      |
| Upper Middle Class         | 25 (8.2)     | 10 (3.5)      | 35 (5.9)      |
| Middle Class               | 52 (17.2)    | 51 (19.2)     | 103 (18.1)    |
| Lower Class Middle         | 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 2. Food Consumption Pattern of the Study Population

| Food Item                              | Boys No. (%) | Girls No. (%) | Total No. (%) |
|----------------------------------------|--------------|---------------|---------------|
| 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)    |
| Iodized Salt Usage                     | 304 (100)    | 266 (100)     | 570 (100)     |
| Habit of Extra Salt Intake             | 41 (13.5)    | 63 (23.7)     | 104 (18.2)    |

### 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.

### 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) | Some time (< 4 days / week) | Never |
|-----------------------|---------------------------|-----------------------------|-------|
|                       | 343 (79.6 %)              | 129 (38.5 %)                | 6 (75 %) |
|                       | 88 (20.4 %)               | 2 (1.5 %)                   | 2 (25 %) |
|                       | 431 (100 %)               | 131 (100 %)                 | 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 | No |
|-----------------------|-----|----|
|                       | 144 (75.4 %) | 47 (24.6 %) |
|                       | 191 (100 %) |    |
|                       | 378 (100 %) |    |
| Total                 | **478 (83.9 %)** | **92 (16.1 %)** |

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.

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 Mothiartown among adolescent girls found that only 39 % consume milk and milk products.

Study in Kolkata 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 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 done on physical activity patterns among school children showed that only 17.1 % students are performing the recommended activity.

Study done in Assam found that 29.7 % and 28.7 % of the students were physically active at school and outside school. Chennai study among school going adolescents found that 32 % boys and 16 % girls were adequately active. Similarly, Anand city 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 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 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 %, 11.33 % in Salem, 12.04 % in semi urban areas of West Bengal, 12.3 % in urban Sambalpur and 14.3 % in urban Surat. However study done in Katihar and Patna 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, less consumption of vegetable and fruits, consuming outside food, alcohol consumption, yoga practice and socioeconomic status.

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.
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.

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