

Obesity and related lifestyle behaviour of adolescent school students in a rural area of West Bengal, India

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Abstract:

Background: Worldwide obesity has nearly tripled since 1975. Childhood obesity is one of the serious public health challenges of the 21st century. About 5.74 percent to 8.82 percent of schoolchildren in India are obese. Studies in rural India showed that prevalence of overweight/obese adolescent varied from 7.44% to 13.16%. Globally, there has been an increased intake of energy-dense foods and a decrease in physical activity. Obesity/overweight is a major risk factor for noncommunicable diseases and some cancers. So the study was planned to find out the prevalence of obesity and related lifestyle behaviour among the adolescents.

Materials and Methods: A descriptive type of observational study was carried out among adolescent school students (both boys and girls) studying in class VIII to XII in a rural area of Purba Bardhaman District of West Bengal. BMI was assessed according to WHO growth reference for school children (5-19 years). Food frequency data was recorded based on GSHS. Adequacy of physical activity was assessed based on set WHO criteria. Data on socioeconomic characteristics, dietary behaviour and physical activity pattern was collected with a self administered structured schedule. Anthropometric measurements and record review were done by the investigators.

Results: 1.5% were obese. 12.4% were overweight, 83% had normal BMI and 3% were in thinness category. 53.6% of the students consumed vegetable, 59.1% consumed milk, 4.7% consumed fruits for 5-7 days a week. Consumption of carbonated soft drink and fast food was low. Mustard oil was the main cooking oil used at their home. All consumed iodised salt and 13.3% consumed extra salt. 40.5% of the students did adequate physical activity. Their mean duration of sleep was 7.98 hours. 73% students used computer and 42.4% used mobile. Most of the students spent some time watching TV. About 3.2% of the students had the habit of substance use. Statistically significant association was found between overweight/obesity and gender, milk consumption, carbonated soft drink consumption, physical activity, computer use and TV watching.

Conclusion: About 14% of the students were overweight or obese, 40.5% did adequate physical activity, around 60% consumed vegetables and milk in most of the days of the week. A substantial number used computer, mobile and watched TV. Thus promotion for intake of healthy diet, adequate physical activity and regular health check up is recommended.

Key Word: Obesity, lifestyle, adolescent students, rural

Date of Submission: 20-01-2020

Date of Acceptance: 10-02-2020

I. Introduction

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. 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 where as the prevalence of obesity was 2.9% in boys and 1.5% in girls.⁵ Studies^{6,7,8} in rural India showed that prevalence of overweight/obese adolescent varied from 7.44% to 12.8% to 13.16%.

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. 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 noncommunicable diseases such as cardiovascular diseases (mainly heart disease and stroke), diabetes, musculoskeletal disorders (especially osteoarthritis), some cancers (including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney, and colon). The risk for these noncommunicable 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

With this background a study had been planned to find out the prevalence of obesity and related lifestyle behaviour among adolescent school children in a rural area of Purba Bardwan district, West Bengal, India

II. Material And Methods

A descriptive type of observational study, cross-sectional in design was carried in Bhatar block of Purba Bardhaman District of West Bengal among adolescent school students (both boys and girls) studying in class VIII to XII (approximate age range of 13 to 18 years) during the period May 2015-April 2016

Study Design: A descriptive type of observational study, cross-sectional in design

Study Location: Three coeducation schools of Bhatar block of Purba Bardhaman District, which is the rural field training area of Burdwan Medical College, Purba Bardhaman, West Bengal.

Study Duration: May 2015-April 2016

Sample size: 660 adolescent school students.

Sample size calculation: Considering prevalence of obesity for rural area to be 12.8%⁷ the sample size was calculated to be 655 at 95% confidence interval and 20% relative error.

Subjects & selection method: The study subjects consisted of adolescent school students (both boys and girls) studying in class VIII to XII (approximate age range of 13 to 18 years). As per feasibility the study was carried out in three coeducation schools which were selected by simple random sampling from among all coeducation schools of the block. From each school equal number of students were studied. Thus from each school 219 students were selected. Again from each class equal number of students were chosen i.e. 44 students were selected from each class (VIII-XII) by systematic random sampling. In total 660 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.

Procedure methodology

Ethical clearance was taken from The Institute Ethics Committee and permission was taken from the school authorities. Consent was taken from study subjects after explaining the purpose of the study.

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 measured according to WHO growth reference for school aged children (5-19 year).⁹ For dietary behaviour assessment, students were asked regarding the frequency of intake of different food items during a week.¹⁰ For assessment of physical activities 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.¹⁰ 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.¹¹

Statistical analysis

Data were coded and entered into MS-Excel sheet and analysed 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.

III. Result

Table no 1 showed that out of 660 students observed 53% were girls and 47% were boys. Most of them (65%) were from late adolescent age group. About 98% were Hindu, 70.8% belonged to nuclear family and 81.6% belonged to lower middle or lower class as per Modified BG Prasad scale (July 2015)¹²

Table no 1: Sociodemographic characteristics of the study population

| Variables | Girls No. (%) 353 (100%) | Boys No. (%) 307 (100%) | Total No. (%) 660 (100%) |
|--------------------|--------------------------------|-------------------------------|--------------------------------|
| 10-14 yrs | 130(36.8%) | 101(32.9%) | 231(35%) |
| 15-19 yrs | 223(63.2%) | 206 (67.1%) | 429 (65%) |
| Hindu | 347(98.3%) | 299(97.4%) | 646 (97.9%) |
| Muslim | 5(1.4%) | 8(2.6%) | 13(2%) |
| Christian | 1(0.3%) | 0 (0%) | 1(0.2%) |
| Upper class | 8(2.3%) | 22(7.2%) | 30(4.5%) |
| Upper middle class | 16(4.5%) | 16(5.2%) | 32(4.8%) |
| Middle class | 31(8.8%) | 28(9.1%) | 59(8.9%) |
| Lower middleclass | 133(37.7%) | 116(37.8%) | 249(37.7%) |
| Lower class | 165(46.7%) | 125(40.7%) | 290(43.9%) |
| Joint | 119(33.7%) | 74(24.1%) | 193(29.2%) |
| Nuclear | 234(66.3%) | 233(75.9%) | 467(70.8%) |

Table no 2 showed that 53.6% of the students consumed vegetable for 5-7 days a week, 59.1% consumed milk for 5-7 days a week but only 4.7% 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 13.3% consumed extra salt with meal. Majority consumed puffed rice for breakfast and rice for lunch and dinner. Breakfast was skipped by only 0.9% of students.

Table no 2: Food consumption pattern of the study population

| Food item | Girls No. (%) 353 (100) | Boys No. (%) 307 (100%) | Total No. (%) 660 (100%) |
|--------------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Vegetable - 5-7 days/week | 171(48.4%) | 183(59.6%) | 354(53.6%) |
| Milk - 5-7 days/week | 220(62.3%) | 170(55.4%) | 390(59.1%) |
| Fruit - 5-7 days/week | 9(2.5%) | 22(7.2%) | 31(4.7%) |
| Carbonated soft drinks-5-7 days/week | 9(2.5%) | 15(4.9%) | 24(3.6%) |
| Fast food - 5-7/week days | 12(3.4%) | - | 12(1.8%) |
| Mustard oil usage | 345(97.7%) | 305(99.3%) | 650(98.5%) |
| Iodised salt usage | 353(100%) | 307(100%) | 660(100%) |
| Habit of Extra salt intake | 29 (8.2) | 59 (19.2) | 88 (13.3) |

Table no 3 showed that 40.5% of the students performed the recommended physical activity¹¹ and it is more for the boys (57%)

Table no 3: Duration of moderate to vigorous physical activity/day of the study population (10)

| Duration of physical activity/day | Girls No. (%) 353 (100) | Boys No. (%) 307 (100) | Total No. (%) 660 (100) |
|-----------------------------------|-------------------------------|------------------------------|-------------------------------|
| ≥60 min/day(Adequate) | 91(25.8%) | 176(57.3%) | 267(40.5%) |
| <60 min/day(Inadequate) | 262(74.2%) | 131(42.7%) | 393(59.5%) |
| Total | 353(100%) | 307(100%) | 660(100%) |

Other than occupational activity common physical activities performed by the students were yoga, free hand exercise, weight lifting, playing cricket, football, jogging, running and different household chores. Their mean duration of sleep was 7.98 hours. Mean duration of sleep was higher in early adolescents.73% student used computer and 42.4% used mobile . Most of the students watched TV. About 3.2% of the students had the habit of substance use.

Table no 4 is related to BMI of the students and it was found that 1.5% were obese 12.4% were overweight (13.9% were overweight or obese), 83% had normal BMI and 3% were in thinness category .

Table no 4: BMI of the study population

| Assessment | Girl No. (%) 353 (100) | Boys No. (%) 307 (100) | Total No. (%) .660 (100) |
|-----------------------|------------------------------|------------------------------|--------------------------------|
| Obesity | 9 (2.5%) | 1(0.3%) | 10(1.5%) |
| Overweight | 16(4.5%) | 66(21.5%) | 82(12.4%) |
| Normal weight for age | 317(89.8%) | 231(75.2%) | 548(83%) |
| Thinness | 11(3.1%) | 9(2.9%) | 20(3%) |
| Total | 353(100%) | 307(100%) | 660(100%) |

Table no 5: A statistically significant association was found between overweight/obesity and gender, milk consumption, soft drink consumption, physical activity, computer use and TV watching.

Table no 5: Association of overweight /obesity with different socioeconomic factors and lifestyle behavior

| Variables | Overweight/Obesity | | |
|---|--------------------|------------|------------|
| | Absent | Present | Total |
| Gender | | | |
| Boys (%) | 240 (78.2%) | 67 (21.8%) | 307 (100%) |
| Girls(%) | 328 (92.9%) | 25 (7.1%) | 353 (100%) |
| Total(%) | 568 (86.1%) | 92 (13.9%) | 660 (100%) |
| Chi-square value=29.7, df=1, p= <.05 (Statistically significant) | | | |
| Milk | | | |
| Regular(≥4 days) | 337(82.4%) | 72(17.6%) | 409(100%) |
| Sometime(<4 day) | 146(95.4%) | 7 (4.6%) | 153(100%) |
| Never | 85(86.7%) | 13(13.3%) | 98(100%) |
| Total | 568 (86.1%) | 92 (13.9%) | 660(100%) |
| Chi-Square=15.8, df=2, p <.05 (Statistically significant) | | | |
| Carbonated soft drink | | | |
| Regular(≥4 days) | 18(75%) | 6(25%) | 24(100%) |
| Sometime(<4 day) | 253(76.4%) | 78(23.6%) | 331(100%) |
| Never | 297(97.4%) | 8(2.6%) | 305(100%) |
| Total | 568 (86.1%) | 92 (13.9%) | 660(100%) |
| Chi-Square (yates corrected)= 58.2, df=2, p= <.05 (Statistically significant) | | | |
| Physical activity | | | |
| ADEQUATE | 46 | 355 | 401 |
| INADEQUATE | 46 | 213 | 259 |
| TOTAL | 92 | 568 | 660 |
| Chi-square = 5.2, df=1, p= <.05 (statistically significant) | | | |
| Computer usa | | | |
| Regular(4-7 days/week) | 12(60%) | 8(40%) | 20(100%) |
| Sometime(<4 days/week) | 383(82.9%) | 79(17.1%) | 462(100%) |
| Never | 173(97.2%) | 5(2.8%) | 178(100%) |
| Total | 568 (86.1%) | 92 (13.9%) | 660(100%) |
| Chi-square(yates corrected)= 30.2, df=2, p= <.05 (statistically significant) | | | |
| TV watching | | | |
| Regular(4-7 days/week) | 391 | 49 | 440 |
| Sometime(<4 days/week) | 117 | 28 | 145 |
| Never | 60 | 15 | 75 |
| Total | 568 | 92 | 660 |
| Chi-square= 8.7, df=2, p= <.05 (statistically significant) | | | |

III. Discussion

Socio demographic characteristics:

In this study 53% were girls and 47% were boys. Maximum (65%) were in the late adolescent (15-19 years) age group. Most of the students (97.9%) were Hindu followed by Muslim (2%) and Christian. Majority (81.6%) of them belonged to Lower middle or Lower socio-economic class. 70.8% of them belongs to nuclear family. Boy population was less than girls due to absence on the day of survey. School non attendance is a phenomenon common in rural schools. In a study done in rural schools of Mangalore it was found that of all the study population 53.3% were boys and 46.6 % were girls.¹³

Dietary pattern:

The present study found that vegetables were consumed in most of the days of the week by 53.6% of the students. About 59% students consumed milk for 5-7 days/week while 14.8% students never consumed milk. But only 4.7% consumed fruits for 5-7 days a week. Consumption of carbonated soft drink and fast food was

still low in the community, probably because of economic cause. Almost all the family (98.5%) used mustard oil as the main type of cooking oil. Majority consumed puffed rice for breakfast and rice for lunch and dinner. All used iodised salt but 13.3% students were in the habit of taking extra salt, a common practice in Bengali families.

Less vegetable consumption and more fast food consumption is however reported by Lahiri et al⁶ in a study done in Howrah District of West Bengal probably because of geographical reason as Howrah District is closest to Kolkata City and indicates an urbanisation effect.

Study done in rural South India observed that 93.2% of the subjects consumed readymade food items apart from homemade ones, 28.8% had the habit of eating in between the regular meals, and 59.6% had the habit of consuming carbonated beverages regularly.¹⁴

Physical activity pattern:

This study observed that only 40.5% of the students performed the recommended physical activity and it is more for the boys (57%). So about 60% are not adequately active.

The overall prevalence of inadequate physical activity was reported to be 48.68% among rural adolescents of Howrah, West Bengal.⁶ Roy S et al in their study in Hoogly District of West Bengal however observed that 78% were sufficiently active. Younger adolescents and school attendees were more active and the finding was statistically significant.¹⁵

Other than occupational activity common physical activities performed by the students were yoga, free hand exercise, weight lifting, playing cricket, football, jogging, running and different household chores similar to what was observed by Roy S et al.¹⁵ Running, jogging, cycling were commonly practiced by adolescents as observed in a study done in rural Mangalore.¹³

Others life style pattern:

The mean duration of sleep among the students of the present study was 7.97 hours. Mean duration of sleep was higher in the early adolescent age group and among girls. The Hoogly district study also reported 8 hrs sleep duration.¹⁵ Majority of the students (73%) used computer but only 42.4% used mobile phone. Among all the students 56.4% of boys and 51.6% of girls watched TV regularly. Only 3.2% had the habit of substances use.

Study done by Archana Y et al in Guntur, AP, found that internet usage was common among the adolescent population, more among boys and older adolescents.¹⁶ Study done by AP Singh et al in rural UP found that the rural adolescents had greater engagement with watching television, listening to fast music and religious leisure than physically demanding activities.¹⁷

Obesity/overweight distribution:

In this study 13.9% prevalence of overweight/obesity was observed among the adolescent students. (Overweight-12.4% & obesity-1.5%). Overweight is much higher (21.5%) among boys than girls (4.5%) but obesity was higher in girls students (2.5%) than boys (0.3%).

Prevalence of obesity was reported to be 12.8% in a rural area of Surat⁷ and 13.6% in a rural area of Salem,¹⁸ very much similar to what was observed in the present study.

Association of overweight/obesity with different socio-economic characteristics and lifestyle pattern:

A statistically significant association was found between overweight/obesity and gender, milk consumption, soft drink consumption, physical activity, computer use and TV watching.

Study done in rural Vadodara found that a statistically significant association of obesity with gender, annual income of family, frequency of physical training sessions conducted in schools, frequency of restaurant & school canteen food.¹⁹ Another study in rural South India found that obesity was higher among those adolescents belonging to higher socio-economic status and those using motorized transport.¹⁴

IV. Conclusion

About 14% of the students were overweight or obese, 40.5% did adequate physical activity and around 60% consumed vegetables and milk in most of the days of the week. A substantial number used computer, mobile and watched TV.

Thus promotion for intake of healthy diet, adequate physical activity and regular health checkup is recommended. Parents should make available healthy food items within their means and encourage for adequate physical activities. In schools health education class and games class should be made compulsory for all students. Government and School authority should arrange for an enabling environment in communities and schools respectively.

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Naskar P, Roy S .“Obesity and related lifestyle behaviour of adolescent school students in a rural area of West Bengal, India.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(2), 2020, pp. 44-49.