

Problem of Obesity among School Going Adolescent in Rural Practice Area of Indira Gandhi Institute of Medical Sciences, Patna

Sanjay Kumar Choudhary¹, Sanjay Kumar², D R Bharati³, Birendra Kumar Rajak⁴, Shivani Kumari⁴, Vijaya Shree⁴

¹Assistant Professor, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, ²Professor & Head, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, ³Associate Professor, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, ⁴Senior Resident, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

Abstract

Background: Obesity is one of the most prevalent nutritional problems of children and adolescent in many developed and developing countries. Overweight and obesity in adolescent are associated with hypertension, dyslipidemia, cholesterolemia, and reduce glucose metabolism that has an impact on the physical health and can lead to an increase in the risk of early illness and death in later life.

Aims and Objective: This study was conducted to determine the prevalence of overweight and obesity among school going adolescent as well as their association with different risk factors, demographic, socioeconomic status, physical activity levels, and the food consumption pattern of children.

Materials and Methods: A school-based cross-sectional study was conducted during March 2016 to February 2017 among school going adolescent students of rural practice area of Indira Gandhi Institute of Medical Sciences, Patna. A total number of 540 students aged group 12-17 years enrolled in class 8th, 9th, and 10th were included in the study. A semi-structured questionnaire such as demographic profile and other factors related with obesity was administered to the students to collect data. Body mass index was calculated as weight (in kg) divided by height (in m²). The P value ≤ 0.05 were considered statistically significant. All data were compiled, tabulated, and analyzed using SPSS 18 version software. Chi-square test was applied to find out the significance between sex and rural school adolescent students with respect to childhood obesity.

Results: A total of 540 students were included in this study. Among these, 276 (51%) were boys and 264 (49%) were girls. Overall, the prevalence of overweight and obesity was found to be 10.37% and 6.30%, respectively. The prevalence of overweight was maximum in middle adolescent (53.58%). The prevalence of overweight and obesity was found higher among female adolescent students (57.14% and 58.82%) as compared to male adolescent students (42.86% and 41.18%), respectively. The prevalence of overweight and obesity was found higher in students belonging to socioeconomic Class I (50.00% and 47.06%) followed by socioeconomic Class II (35.71% and 41.17%), respectively.

Conclusion: There is crucial need to provide awareness programs and health education to spread healthy messages on good nutrition and good health for the prevention of obesity.

Key words: Body mass index, Obesity, Overweight, School adolescent

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INTRODUCTION

Obesity is a condition of unusual or excessive fat accumulation in the adipose tissue to the extent that health may be impaired (World Health Organization [WHO], 1997).¹ Obesity is one of the most prevalent nutritional problems of children and adolescent in many developed and

Corresponding Author: Dr. Sanjay Kumar Choudhary, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna - 800 014, Bihar, India. Phone: +91-99697687/8544401940. E-mail: drsanjayigims@gmail.com

developing countries.² The WHO has declared overweight as one of the top 10 health risks in the world and one of the top five in developed nations.³ The factors associating to increasing childhood obesity are increased intake of high-calorie food that are low in vitamins, minerals, and micronutrients coupled with physical activity.⁴ The WHO predicts that by 2015 approximately 2.3 billion adults will be obese (WHO, 2004).⁵ In India, many studies have shown that the prevalence of overweight among adolescent (10-19 years) varies between 10% and 30%. The prevalence of overweight and obesity is highest in Punjab (30%), followed by Kerala (28%), and Delhi (26%). Low level of physical activity, watching TV, and consuming junk/fast foods are associated with a higher prevalence of overweight and obesity.⁶ The National Family Health Survey 3 (NFHS-3) 2005 - Rural data showed that unite prevalence of obesity was 9.3% and 12.6% among man and women aged 15-49 years, respectively.⁷ There are many studies done in India from 2002 to 2012 indicate a rising tendency in the prevalence of overweight and obesity in children and adolescents.^{8,9} This may have major complications toward high prevalence of noncommunicable disease such as diabetes mellitus, hypertension, and cardiovascular disease in early adulthood.^{9,10} Diet and lifestyle are ostensibly major contributors to weight problems and varies with different socioeconomic status (SES) especially countries like India.¹¹ Obesity is becoming a public health concern, especially among the urban population. This is attributed to the changes in lifestyle, for example, individuals have shifted from active to sedentary, changes in dietary habits; foods consumed are mostly carbohydrates and fats which provide more calories than what is expected.¹² This study was done to know the prevalence of overweight and obesity among adolescent in Bihar using the Khadikar's Asian Indian guidelines for children and adolescent which corresponds to an adult equivalent body mass index (BMI) of 23 and 28 kg/m², respectively.¹³

Aims and Objective

This study was conducted to determine the prevalence of overweight and obesity among school going adolescent as well as their association with different risk factors, demographic, socioeconomic status (SES), physical activity levels, and the food consumption pattern of children.

Inclusion Criteria

Adolescent students aged 12-17 years who gave consent/ whose parent gave consent to be a part of this study was included in the study.

Exclusion Criteria

1. Students not consenting and cooperative for anthropometry/whose parents did not give consent to be a part of the study.
2. Adolescent students with chronic major illness as well

as those on corticosteroid therapy and chromosomal disorder were excluded from the study.

MATERIALS AND METHODS

A school based cross-sectional study was conducted during March 2016 to February 2017 among school going adolescent students of rural practice area of Indira Gandhi Institute of Medical Sciences Medical College, Patna. There are totally three government schools selected randomly from a list of schools obtained from the school authorities. Possibility accordingly to size of the population technique was used to decide the number of students to be studied from each school and then subsequently from each class. A total number of 540 students aged group 12-17 years enrolled in class 8th, 9th, and 10th were included in the study. Out of them, 276 were boys and 264 were girls. The study protocol was approved by Institutional Ethical Committee. Prior informed consent was obtained from the principals of the selected schools. After obtaining the informed permission and assuring full confidentiality to the participants, a semi-structured questionnaire was administered to the students. Question was asked about sociodemographic profile and other factors related with obesity. The body weight was measured in kg using a standardized weighing machine. Weight of all student was taken using electronic weighing scale, and the students were asked to stand upright, without shoes on the weighing machine looking straight while the measurement was read. Height was to measure in cm using a portable stadiometer. Height was taken using a standard three-piece anthropometric rod at their classroom corrected up to 1 mm. Students were asked to stand upright against a wall with the heels touching the wall and chin held horizontally so that the tragus of the ear and eye are in straightway, then the stick was adjusted and the height in cm was read. BMI was calculated as weight (in kg) divided by height (in m²). For children and adolescent, after BMI was calculated for children and adolescent, the BMI number is ground plan on the CDC BMI-for-age growth charts (for either girls or boys) to obtain a percentage ranking. Percentage are the most commonly used indicator to assess the size and growth patterns of individual children in the United States. All data were compiled, tabulated in Microsoft Excel 2013 software and data were analyzed using SPSS I8 Version. The P value ≤ 0.05 were considered statistically significant. Chi-square test was applied to find out the significance between sex and rural school adolescent students with respect to childhood obesity.

RESULTS

A total of 540 students were included in this study. Among these, 276 (51%) were boys and 264 (49%) were girls (Table 1).

It shows the distribution of age, sex, and SES in this study. The overall prevalence of overweight and obesity was found to be 10.37% and 6.30%, respectively. The prevalence of overweight was maximum in middle adolescent (53.58%). The prevalence of overweight and obesity was found higher among female adolescent students (57.14% and 58.82%) as compared to male adolescent students (42.86% and 41.18%), respectively. The prevalence of overweight and obesity was found higher in students belonging to socioeconomic Class I (50.00% and 47.06%) followed by socioeconomic Class II (35.71% and 41.17%), respectively (Tables 1 and 2).

It shows that the students of illiterate father's and mother's education had the highest prevalence of overweight and obesity (42.86% and 41.18% and 35.72% and 47.06%), respectively. While the students of father's and mother's university education had the lowest incidence of overweight and obesity (10.71% and 11.76% and 17.86% and 5.88%), respectively. The relation between the level of father's and mother's education and obesity was founded to be significant ($P < 0.001$).

Table 1: Sociodemographic characteristics and prevalence of overweight and obesity among adolescent

Variables	N (%)		
	Number of students	Overweight	Obesity
Overall	540 (100)	56 (10.37)	34 (6.30)
Age			
Early adolescence	112 (20.74)	08 (14.28)	06 (17.64)
Middle adolescence	248 (45.92)	30 (53.58)	18 (52.94)
Late adolescence	180 (33.34)	18 (32.14)	10 (29.42)
Sex			
Male	276 (51.00)	24 (42.86)	14 (41.18)
Female	264 (49.00)	32 (57.14)	20 (58.82)
SES			
Class-I	54 (10.00)	28 (50.00)	16 (47.06)
Class-II	210 (38.89)	20 (35.71)	14 (41.17)
Class-III, IV, V	276 (51.11)	08 (14.29)	04 (11.77)

SES: Socioeconomic status

Table 3 it shows the prevalence of overweight/obesity in adolescent age group 12-17 years was significantly higher in girls (19.69%) in compare to males (15.94%) on the basis of BMI using the Khadikar's Asian Indian guidelines criteria.

Table 4 it shows that there was a significant association between obesity and breakfast skipping ($P = 0.44$), numbers of meals as overweight and obesity associated more with meals >3 ($P = 0.90$), who eats snacks frequently ($P = 0.01$), and who eats fast food frequently ($P = 0.00$). Furthermore, there was a relevant association between overweight and obesity and who watch TV >2 h ($P = 0.84$), who eats nonvegetarian diet ($P = 0.14$), family history of diabetes and obesity ($P = 0.00$) and who did not do exercise ($P = 0.46$) and not participated in walking ($P = 0.00$), respectively. Present study show that majority of students frequently breakfast eating, more than 3 number of meals, frequently snack and fast food consumption, more than 2 h of TV watching, more nonvegetarian diet, family history of obesity, no physical activity and not participated in walking lead to higher BMI, overweight and obesity, respectively.

DISCUSSION

Obesity is one of the most prevalent nutritional problems of children and adolescent in many developed and developing countries. Overweight and obesity in adolescent are associated with hypertension, dyslipidemia, cholesterolemia, and reduce glucose metabolism that has an impact on the physical health and can lead to an increase in the risk of early illness and death in later life. The overall prevalence of overweight and obesity was found to be 10.37% and 6.30% respectively in the present study. Almost similar finding was observed in other studies.^{14,15} Higher prevalence of overweight and obesity was also reported by Kapil *et al.*¹⁶ who found overweight 23.1% and obesity 8.3% in males and overweight 27.7% and obesity 5.5% in females in Delhi. Our study also shows higher prevalence rates of

Table 2: Distribution of overweight and obesity according to father's and mother's education in the studied sample

Level of education	Normal N=450 (%)	Overweight N=56 (%)	Obese N=34 (%)	χ^2	P value
Fathers education					
Illiterate	46 (10.23)	24 (42.86)	14 (41.18)	231.6	0.00++
Read and writing	120 (26.67)	16 (28.57)	10 (29.42)		
School (up to high school)	160 (35.55)	10 (17.86)	06 (17.64)		
University	124 (27.55)	06 (10.71)	04 (11.76)		
Mothers education					
Illiterate	132 (29.33)	20 (35.72)	16 (47.06)	9.29	0.00++
Read and writing	96 (21.34)	14 (25.00)	12 (35.30)		
School (up to high school)	124 (27.55)	12 (21.42)	04 (11.76)		
University	98 (21.78)	10 (17.86)	02 (5.88)		

+ indicate is significant P value and ++indicate is highly significant P value, significant P value (≤ 0.05) and highly significant P value (< 0.01)

overweight/obesity among girls, as did a previous study done in Chennai.¹⁷ Similarly, Kapil *et al.*¹⁶ reported higher prevalence of overweight and obesity in females students as compared to male students. Aggarwal *et al.*³ reported

the prevalence of overweight to be higher among boys than among girls in affluent adolescents from Ludhiana, Punjab. The influence of gender and adolescence on obesity can be attributed to hormonal changes at puberty and the development of secondary sexual characteristics resulting in fat accumulation and, redistribution.¹⁸ In the present study, there was a relevant association between overweight/obesity and parent's education as the highest prevalence of obesity was among students with uneducated parents as they are accountable for food selection for their children as well as their lifestyle activities. This concedes with several studies carried out in the developed countries which describe this association by the belief of uneducated parents that overweight children are healthier than normal weight children. Hence, they prefer large calories food which causes obesity their children.^{19,20} While other studies carried out in developing countries revealed that the

Table 3: School and gender-based prevalence of overweight and obesity in adolescent

Criteria used: Khadikar's Asian Indian criteria	N (%)
Adolescent of government school:	
Boys (N=276)	
BMI≥23-27.99	36 (13.04)
BMI≥28	08 (2.89)
Over all	44 (15.94)
Girls (N=264)	
BMI≥23-27.99	42 (15.90)
BMI≥28	10 (3.78)
Over all	52 (19.69)

BMI: Body mass index

Table 4: Dietary and life style factors associated with overweight and obesity in the studied school adolescent

Characteristics	Normal N=450 (%)	Overweight N=56 (%)	Obese N=34 (%)	χ ²	P value
Breakfast eating					
No	36 (8.00)	06 (10.72)	04 (11.76)	0.575	0.44+
Sometimes	284 (63.12)	22 (39.28)	12 (35.30)		
Frequent	130 (28.88)	28 (50.00)	18 (52.84)		
Number of meals					
<3	164 (36.44)	24 (42.86)	10 (29.42)	0.014	0.90+
>3	286 (63.56)	32 (57.14)	24 (70.58)		
Snacks					
No	146 (32.44)	10 (17.86)	06 (17.64)	6.45	0.01++
Sometimes	184 (40.89)	18 (32.14)	10 (29.42)		
Frequent	120 (26.67)	28 (50.00)	16 (52.94)		
Fast food consumption					
No	154 (34.22)	06 (10.72)	04 (11.76)	17.8	0.00++
Sometimes	210 (46.66)	18 (32.14)	10 (29.42)		
Frequent	86 (19.12)	32 (57.14)	20 (58.82)		
Hours of TV watching					
No	46 (10.32)	04 (07.14)	04 (11.76)	0.037	0.84+
<2 h	224 (49.78)	20 (35.72)	08 (23.52)		
>2 h	180 (40.00)	32 (57.14)	22 (64.72)		
Diet habit					
Vegetarian	180 (40.00)	18 (32.14)	10 (29.41)	2.14	0.14+
Non-vegetarian	270 (60.00)	38 (67.86)	24 (70.59)		
Family history					
Diabetes					
Yes	124 (27.56)	46 (82.15)	28 (82.36)	94.17	0.00++
No	326 (72.44)	10 (17.85)	06 (17.64)		
Obesity					
Yes	140 (31.12)	50 (89.28)	30 (88.24)	101.3	0.00++
No	310 (68.88)	06 (10.71)	04 (11.76)		
Physical activity					
Exercise					
No	64 (14.22)	32 (57.14)	21 (61.77)	85.55	0.00++
Sometimes	232 (51.56)	16 (28.58)	08 (23.53)		
Frequent	154 (34.22)	08 (14.28)	05 (14.70)		
Walking					
Not participated	248 (55.12)	30 (53.58)	24 (70.59)	0.542	0.46+
<1 h/day	142 (31.55)	16 (28.58)	07 (20.58)		
>1 h/day	60 (13.33)	10 (17.84)	03 (08.83)		

+ indicate is significant P value and ++indicate is highly significant P value

highest prevalence of obesity was among students with high educated parents due to parental style with low energy expenditure.^{21,22}

This study sheds light on the dietary behavior and lifestyle of the general government school children's. Skipping breakfast is associated with overweight/obesity in children and adolescents.^{23,24} In our study showed a significant association between skipping breakfast and overweight as well as obesity. This could be described as skipping breakfast leads to eating energy dense, less nutritious snacks and fast foods later during the school hours to compensate this lost meal. In the current study, there was also a significant association between obesity and number of meals. This agrees with Guven *et al.*¹⁹ study which revealed that the obese adolescents choose energy dense food.

This study showed an important association between obesity and snack intake due to its high fat and glucose content. This runs with several studies which found a significant relation between BMI and eating snack.^{23,25} Furthermore, we revealed a significant association between obesity and frequent fast food consumption due to its high fat and calories. This concedes with the study conducted by Jeffery *et al.*²⁶ who found a significant relation between BMI and fast food. Similar results were obtained by another investigator.

In the present study, there was a relevants association between obesity and hours of TV watching decreases energy expenditure by spending less time on performing physical activity and increases their consumption of obesogenic foods during watching. This is in consensus with the study conducted by Munakata *et al.*²⁷ who demonstrated a significant relation between BMI and TV watching in Japan. Our studies showed an important association between obesity and eating while watching TV, which is constant with many studies.^{28,29} On the other hand, Zaal *et al.*¹² did not find a significant association between obesity and eating meals while watching TV as the fat content of the foods was more important than the amount of food consumed during TV watching.

In this study, we found the prevalence of overweight and obesity are more in nonvegetarian diet children compare to vegetarian diet children. Such information in various studies in children permits individual diets to be related to subsequent health outcomes. This agrees with the study conducted by Rockett and Colditz.³⁰

The prevalence of overweight and obesity are more in children with family history of diabetes and obesity.³¹ In the present study, we found that family history of obesity was more likely to have more prevalence of obesity and

overweight than those having family history of diabetes. On the other hand, our results correlate with the previous study by King *et al.*³² which recommend that family history of obesity have more prevalence to obesity than family history of diabetes. This indicates that children having a family history of obesity are more likely to become obese or overweight.

Our study revealed a significant association between physical activity and fewer incidences of overweight and obesity as walking to the school and performing some physical exercises at the school time lead to an increased energy expenditure. This agrees with previous studies.^{33,34} On the other hand, some studies did not find a significant association between obesity and physical activity.³⁵

CONCLUSION

The prevalence of overweight and obesity among school going adolescent aged 12-17 years at RHTC, Maner was relatively high due to low level of parent education, breakfast skipping, light meal taking, fast food ingestion, nonvegetarian diet, TV watching more than 2 h/day, and finally physical inactivity showed a strong association with a higher BMI lead to overweight and obesity in children. Countrywide provide awareness programs and health education to spread healthy messages on good nutrition and good health for the prevention of obesity and its consequences need to be initiated. These shall not only encourage good health but shall also help in the prevention of noncommunicable diseases as diabetes, coronary heart disease, hypertension, and other related diseases. School authority should provide healthy school snacks, playing field appliances and promote physical activity regularly. On the long run, such program shall act to reduce the burden on economic growth of the nation.

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