



Association of Prevalence Of Obesity, Overweight And Underweight In Adolescent Girls Of Katihar Urban With Dietary And Physical-Activity

¹Dr. Md Habibul, ²Dr. Ashit Kumar, ³Dr. Ashish Kumar Bharti, ⁴Dr. Shreshy Singh, ⁵Dr. (Prof) Ghazi, ⁵Sharique Ahmad

¹Post Graduate Trainee, ^{2,3}Assistant Professor, ⁴Tutor, ⁵HOD,
^{1,2,3,5}Department of Pediatrics, ⁴Department of Microbiology
Katihar Medical College, Katihar, Bihar

***Corresponding Author:
Dr.ASHIT KUMAR**

Assistant Professor, Department of Pediatrics, Katihar Medical College, Katihar, Bihar

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Inadequate nutrition has got a long-lasting effect on the health of adolescent girl. During adolescence, the body of girl is undergoing various morphological changes and many hormones have crucial role to play and prepare the body for future roles. Proper nutrition is needed during this period.

With aim to access nutritional status in adolescent girls, a cross-sectional observational study was done over the adolescent school going girls to determine the prevalence of obesity, overweight and underweight and find its association with lifestyle.

Keywords: Adolescence, obesity, overweight, underweight, lifestyle

Introduction

Rising rates of overweight and obesity has reached epidemic proportions in developed countries and is increasing rapidly in many middle-income and developing countries.(1)Worldwide including India, overweight and obese population has nearly doubled over the past two decades. (2,3)

Under nutrition causes poor health, impaired immunity making people prone to infectious diseases, weakness and reduction in physical labour capability

Obesity and overweight are conditions in which an abnormal or excessive amount of fat accumulates in the body, posing a health risk. Prevention of obesity in children is now considered a public health priority especially in developed countries. (1,3) Recent studies suggest that obesity and overweight in childhood and adolescence have a significant impact on morbidity and mortality in adulthood. (4) Adolescence is a "high-risk age" for weight gain, characterised by significant changes in body composition, insulin sensitivity, eating and exercise habits, as well as psychological changes. An adolescent girl who gains a lot of weight during this critical transitional phase is more likely to maintain unhealthy body fat throughout her reproductive years. Promoting healthy eating and physical exercise throughout puberty, in particular, may reduce the risk of adult obesity.

In light of the above scenario, this community-based study was conducted in Katihar, to determine the prevalence of obesity, overweight and underweight in adolescent females and its correlation with dietary and physical activity factors.

Aims and Objective:

1. To determine prevalence of obesity, overweight, and underweight in adolescent girls of Katihar urban.
2. Association of lifestyle (dietary and physical-activity factors) with obesity, overweight and underweight.

Materials and method:

Study design: Cross- Sectional study.

Study setting: Government and Private schools of Katihar Urban area.

Study population: Adolescent girls of 10-19 year of age.

Duration of study: The study was conducted over a period of one and a half year from August 2019 to February 2021.

Sampling technique: Two government and two private schools were randomly selected by lottery randomisation. The students were selected from each school and from each class based on probability proportionate to the size of population method. Total sample size was 310. (170 from government and 140 from private school)

Data collection: Prior permission was obtained from the principals of the schools before conducting the study. The study subjects were informed about the study and were also assured of full confidentiality. Students willing to participate were only considered, consent was taken from the students.

A predesigned, pretested, self-administered questionnaire was prepared in Hindi and English and given to the students according to their medium of instruction. Each and every question was elaborated by the investigators and the students were asked to fill in their responses. The questionnaire includes questions related to their biosocial profile and various factor related to dietary habit and physical activity of the students.

The age of each student was re-verified from the school records. Anthropometric measurement was done in presence of female teacher or female staff with help of our female nursing staff.

INCLUSION CRITERIA:

1. Adolescent girls (10-19 years).
2. Unmarried adolescent females.
3. Non pregnant adolescent girls.

EXCLUSION CRITERIA:

1. The students who were absent on the day of interview.
2. Students unwilling to participate in the study.

Operational criteria for assessment of underweight, overweight, and obesity:

For the assessment of obesity, overweight and underweight, the WHO BMI cut-off classification of girls was used, with the criteria: overweight: $>+1$ SD (equivalent to BMI 25 kg/m² at 19 years), obesity $>+2$ SD (equivalent to BMI 30kg/m² at 19 years), and underweight <-2 SD.

Assessment of socioeconomic status: Kuppuswamy socioeconomic status scale was used.

STUDY ANALYSIS:

The data was entered using Epidata, Version 3.1 and analyzed using the Statistical Package for Social Sciences (SPSS), Version 19. Descriptive statistics like percentages and proportions were applied. A p-value of <0.05 was considered to be the criteria for statistical significance.

DISCUSSION

The study was conducted to determine the prevalence of obesity, overweight and underweight in adolescent girls of Katihar urban along with dietary and physical-activity factors associated with them. For the evaluation of obesity overweight and underweight WHO BMI cut-off classification for girls was used. The study was conducted in the department of Paediatrics among adolescent girls 10-19 year of age, two government and two private schools were randomly selected by lottery randomisation. Total sample size was 310. (170 adolescent girls from govt schools and 140 from private schools.) There are numerous studies indicating that the prevalence of overweight and obesity among children and adolescents is rising.[5,6].

Age Distribution:

No significant correlation was found between BMI and age. With mean age of study participant, 13.89 ± 2.68 years in government school and 14.5 ± 2.6 years in private school. The overall prevalence of obesity was more in 11 years of age group (9%), underweight (42.1%) in 10 years of age group.

Similar study done in Surendranagar by Shashwat N. et al, (2016) demonstrated that in the private school, maximum children were from age group 10-12 years followed by 12-14 years of age whereas in government school, majority of the children were in the age group of 14-16 years followed by 12-14 years of age.[7]

Correlation between income and BMI

In this study the adolescent girls from government schools were 170 in which majority 27.6% were under family income of Rs.2391-Rs.7101 (47 girls) and only 01 girl was under family income of Rs.47347 and above. In private schools' majority (25%) were under family income of Rs.23674-Rs.47347 (35 girls), there were no girls present in family income <Rs.2390 (00). P value is <0.0001. We found significant correlation between BMI & income, we found that there was no obesity and overweight in income group below RS 2390 in both the government and private schools, all 7 obese adolescent girls were found in higher income group (> RS 17756) and prevalence of underweight was higher among low-income group, p value was 0.0001.

A study conducted by Supreet Kaur, et al.(2008) in the National Capital Territory of Delhi to observe the prevalence of obesity and overweight amongst children of age group 5-18 years and found prevalence of overweight and obesity in low income group 0.1% and 2.7% respectively, among middle income group 0.6% and 6.5% respectively and in high income group it was 6.8% and 15.3% respectively[8]. This is in support with other studies where the prevalence was high in children belonging to high socioeconomic status[9]. In a multi centric study done by Wang Y, the relationship between obesity and SES varied across countries. Higher SES individuals were more likely to be obese in China and Russia, but in the USA low-SES groups were at a higher risk. Obesity was more common in urban areas in China but in rural areas in Russia.[10]

Study subjects according to father's educational status:

In this study, father's educational status was divided into post graduate, graduate, higher secondary, matric, middle, primary and illiterate. Majority were under Higher secondary (45 fathers) in government schools. In private school majority were under graduate (59 fathers) and overall majority were graduates 81 (26.6%). And the statistical analysis was significant-p value was <0.0001. As per our evaluation, we have found significant correlation between BMI and father's education. Overall prevalence of obesity and overweight was high 18.2% and 63.6% respectively among the adolescent girls whose fathers were post graduated, on the other hand prevalence of underweight was high (38.2%) in those girls whose fathers were illiterate. All 7 cases of obesity were found in those adolescent girls whose fathers were educated (matric or above) and in low literacy group no students were found to be obese. P value was 0.0001.

Results of educational status of fathers were found to be positively correlated with obesity and this finding was similar with previous studies of Muthuri SK et al. done in Kenya (2015).[11]

A study conducted in Wardha by Bharati DR et al, has mentioned that parent's educational status has an effect on children's obesity. It was noticed that the prevalence of overweight and obesity was high in children whose father and/or mother had education > 6th standard.[12]

In a study done in Canada by Chaput JP, et al (2006) higher parental educational status was significantly associated with childhood overweight/obesity (36%).[13]

Mode of travel to school

In our study the mode of transport was divided into four categories, those are traveling by bus, bicycle, walking and others. Majority of girls 126 (40.6%) out of 310 students were in walking to school. Majority of girls (87) in government schools reach school by walking, and 65 girls from private schools were using buses to reach school. The statistical analysis was significant for mode of travel to schools and p value was <0.0001. We have also found significant correlation between BMI & mode of transport to school. The study subjects reaching school by buses had higher prevalence of obesity 8.2% out of 73 adolescent girls, prevalence of overweight was also high 30.1% in those using buses. And prevalence of underweight was slightly high 27.3% in those were using bicycle to reach the school. Majority were normal weight 55.5% in those reaching school by bicycle. The p value was 0.0001. Table 2, fig 1.

Outdoor physical activity

Based on outdoor physical activities in our study we found significant correlation between BMI & physical activities. Out of 310 adolescent girls all obese girls (total 7) were found to be not involved in daily physical activities and none of those involved in physical activities were found to be obese. Similarly higher prevalence of overweight 25.6% was found in those not involved in physical activities in comparison to those that were involved in physical activities (2.6%). Majority of adolescent girls were found to be normal weight 72.7% in those that were involved in physical activities. Prevalence of underweight was slightly higher 24.7% in those involved in physical activities in comparison to those not involved in physical activities 15.6%. P value was – 0.0001. Table 3.

Mahshid D et al (2005) reported there are supporting facts that increased sugar intake through soft drinks and gradual decrease in physical activity have been playing great role in increasing rate of obesity worldwide.[14]

A study conducted in Chennai by Ranjani H et al (2013) showed that only 25% of the girls played outdoors for ≥1 hour/day.[15]

A study done in Mangalore by Kotian et al (2007) explains that steady physical activities had an important role in decreasing the prevalence of overweight and obesity among the adolescents.[16]

Frequent Carbonated soft drinks intake

In our study we found that out of 310 girls' majority (225) were not taking carbonated soft drinks (>3times a week) rest 85 were taking. In government schools only 7.6% (13 girls among 170) were taking carbonated soft drinks where as in private schools majority 51.4% (72 girls among 140) were taking carbonated soft drinks. We have found significant correlation between BMI & carbonated soft drinks intake (>3times in a week), prevalence of obesity was higher 5.8% in girls who were taking carbonated soft drinks in comparison to those that were not taking carbonated soft drinks 0.9%. Prevalence of overweight was also higher 18.9% in those taking carbonated soft drinks in comparison to not taking carbonated soft drinks group (12.8%). Higher prevalence of underweight 24.6% was found in those not taking carbonated soft drinks. And the statistical analysis was significant, p value – 0.0001. Table 4.

Mohanty B in Puducherry (2007-8) conducted a study where the prevalence of overweight and obesity was found higher in vegetarians.[17] Studies have shown that intake of fast food, sugar sweetened beverages [18] and snacking has positive correlation with overweight and obesity.[19]

BMI and intake of locally available sold-out street food items

As per our study, we found significant correlation between BMI & intake of locally available sold-out street food items (>5 times a week). As per the evaluation 125 (40.3%) students out of 310 were taking street foods > 5 times a week. In government schools 24 (14.1%) girls out of 170. And in private schools 101 (72.1%) girls out of 140 were taking outside street food.

Prevalence of obesity and overweight was high 4.8% and 26.4% respectively in those girls that were taking outside street food. On the other hand, prevalence of underweight was high 27.5% in those who were not taking street food. The statistical analysis was significant, p value was 0.0001. Table 5, fig 2.

Reilly AJ et al (2005) showed that prevalence of obesity and overweight increased in adolescents with frequent snacking and consumption of junk foods.[20]

Adeleya A A et al (2021) conducted a study in Nigeria and showed that percentage of students eating unhealthy foods was 40.6% which is almost similar to our study (40.3%).[21]

Result

Obesity among the adolescent girls is increasingly observed in India owing to the changing lifestyle of the families and decreased physical activity.

In our study the overall prevalence of obesity, overweight and underweight was 2.3%, 14.5% and 20% respectively.

The prevalence of obesity, overweight and underweight in government schools was found to be 1.2%, 9.4% and 25.9% respectively while in private schools it was observed to be 3.5%, 20.7% and 12.9% respectively. We inferred that the students in private schools had higher prevalence of obesity & overweight as compared to those in government schools.

Factors such as higher parental education and income, intake of soft drinks and fast food were found to be significant factors leading to obesity and weight gain. This could be attributed to unhealthy life style in family and increased ability to buy junk foods. Also, decreased physical activities due to replacement of outdoor games and other social activities by television and video games were found to be significant factors. Contrarily, lower income and lower literacy in parents had a correlation with their children being underweight.

Parents should be encouraged to adapt healthy life style with their children and participate in activities and programmes that emphasize on the behavioural changes and psychological development in teenagers.

Our effort should be directed to preventive strategies for obesity in girls by focusing on healthy life style in parents and their children. Further study is needed to evaluate the relationship between life style of parents and obesity in children.

Table 1:

BMI	Government school (N=170)		Private school (N=140)		Total (N=310)	
Under weight (<-2SD)	44	25.9%	18	12.9%	62	20%
Normal weight (-2SD TO +1SD)	108	63.5%	88	62.9%	196	63.2%
Over	16	9.4%	29	20.7%	45	14.5%

weight (>1SD)						
Obesity (>2SD)	02	1.2%	05	3.5%	07	2.3%
Total	170	100	140	100	310	100
Statistical analysis	p value -0.0016					

Table 2

Mode of travel	Government school				Private school				Total			
	Under Weight (n=44)	Normal weight (n=108)	Over weight (n=16)	Obesity (1&II) (n=02)	Under Weight (n=18)	Normal weight (n=88)	Over weight (n=29)	Obesity (1&II) (n=05)	Under Weight (n=62)	Normal weight (n=196)	Over weight (n=45)	Obesity (1&II) (n=07)
By Bus	1(12.5)	3(37.5)	2(25)	2(25)	3(4.6)	38(58.5)	20(30.8)	4(6.1)	4(5.5)	41(56.2)	22(30.1)	6(8.2)
By Bicycle	19(26.8)	50(70.4)	2(2.8)	0(00)	2(33.4)	4(66.6)	0(00)	0(00)	21(27.3)	64(83.1)	2(2.6)	0(00)
By walking	24(27.6)	53(60.9)	10(11.5)	0(00)	6(15.4)	27(69.2)	6(15.4)	0(00)	30(23.8)	70(55.5)	16(12.7)	0(00)
Others	0(00)	2(50)	2(50)	0(00)	7(23.4)	19(63.3)	3(10)	1(3.3)	7(20.6)	21(61.8)	5(14.7)	1(2.9)
Total	44	108	16	2	18	88	29	5	62	196	45	7
Statistical	p value- 0.0001											

Table 3:

Physical activity	Government School (n=170)	Private School (n=140)	Total (n=310)
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	Under Wight (n=44)	Normal weight (n=108)	Over weight (n=16)	Obesity (n=02)	Under Wight (n=18)	Normal weight (n=88)	Over weight (n=29)	Obesity (n=05)	Under Wight (n=62)	Normal weight (n=196)	Over weight (n=45)	Obesity (n=07)
Yes	33 (26.4)	90 (72)	2 (1.6)	0(00)	4 (16)	19 (76)	2 (8)	(00)	37 (24.7)	109 (72.7)	4 (2.6)	0(00)
No	11 (24.5)	18 (40)	14 (31.1)	2(4.4)	14 (12.2)	69 (60)	27 (23.5)	5(4.3)	25 (15.6)	87 (54.4)	41 (25.6)	7 (4.4)
Total	44	108	16	2	18	88	29	5	62	196	45	7
Statistical Analysis	p value- 0.0001											

Fig 1:

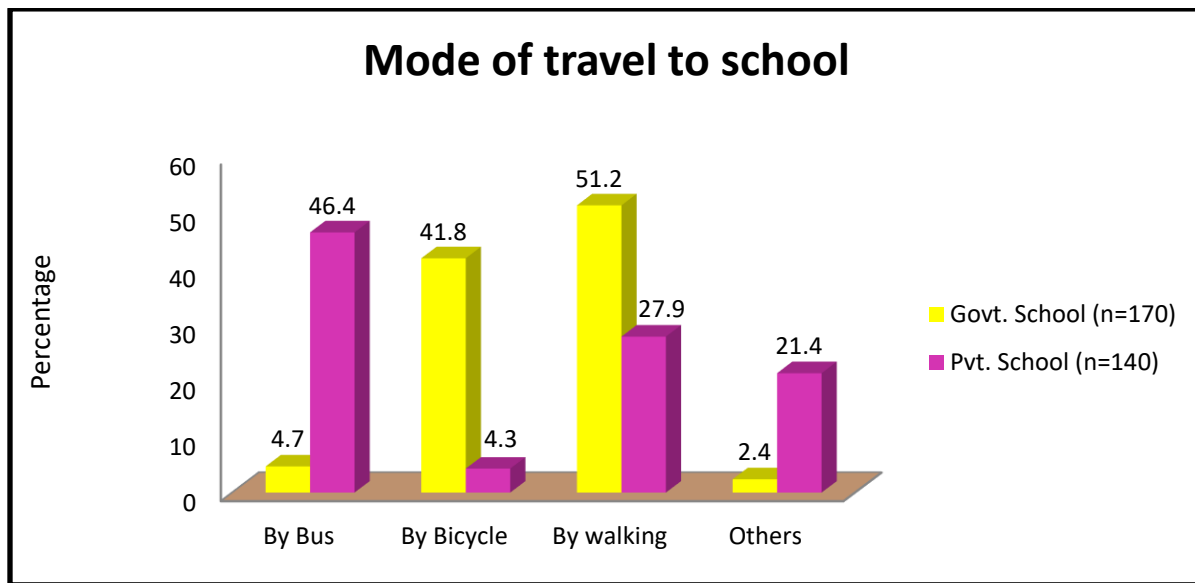


Table 4:

Soft drink	Government school				Private school				Total			
	Under Wight	Normal weight	Over weight	Obesity	Under Wight	Normal weight	Over weight	Obesity	Under Wight	Normal weight	Over weight	Obesity

	(n=44)	(n=108)	(n=16)		(n=18)	(n=88)	(n=29)		(n=62)	(n=196)	(n=45)	
				(n=02)				(n=05)				(n=07)
Yes	2(15.4)	7(53.8)	3(23.1)	1(7.7)	05(6.9)	50(69.5)	13(18.1)	4(5.5)	7(8.4)	57(66.9)	16(18.9)	5(5.8)
No	42(26.6)	101(64.4)	13(8.3)	1(0.7)	13(19.2)	38(55.8)	16(23.5)	1(1.5)	55(24.6)	139(61.7)	29(12.8)	2(0.9)
Total	44	108	16	2	18	88	29	5	62	196	45	7
Statistical analysis	p- value- 0.0001											

Table – 5

Intake of street food	Government school		Private school		Total	
	(N=170)		(N=140)		(N=310)	
Yes	Number	%	Number	%	Number	%
No	24	14.1	101	72.1	125	40.3
Total	146	85.9	39	27.9	185	59.7
Statistical analysis	170	100	140	100	310	100
	p value – 0.002					

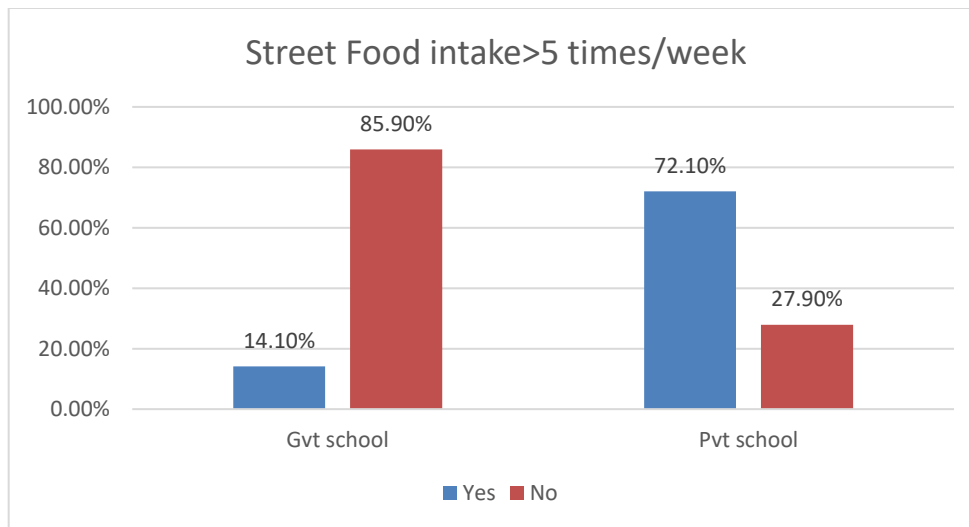


Fig 2

Summary:

In India, over the past few years obesity among the adolescent girls is increasingly observed with the changing lifestyle of families owing to increased purchasing power and decreased physical activity. The successful interventions to deal with the problem will be to shift the adolescent behaviour toward steeping a healthy life style, counselling for optimal physical activities and increasing the understanding regarding the need for a proper balanced diet.

After obtaining clearance from the Institutional Ethics Committee, a cross sectional study was conducted from August 2019 to February 2021 in the Department of Paediatrics, KMC, Katihar. A sample size of 310 adolescent girls aged between 10-19 years, studying in classes V to XII were taken for the study from the both government(n=170) and private schools(n=140). We have found that maximum number of the students were present in class IX, 54 students (17.4%).

•In the present study the average height and weight were found to be 148.78 ± 10.74 cms and 44.73 ± 8.95 kgs respectively, mean BMI was estimated as 20.15 ± 3.29 kg/m² and mean waist circumference was 71.92 ± 8.55 cms.

•In our study the prevalence of obesity, overweight and underweight was 2.3%, 14.5% and 20% respectively. Majority of the adolescent girls were normal weight (63.2%). We found that prevalence of obesity and overweight was higher in private school

girls 3.5% and 20.7% respectively. On the other hand, prevalence of underweight was higher among girls in government schools 25.9%.

•We also found that prevalence of obesity and overweight was more among high income group and prevalence of underweight was higher in low-income group.

•Prevalence of obesity and overweight was high in those girls whose fathers were educated till matric or above and prevalence of underweight was high among girls whose fathers were illiterate.

•Prevalence of obesity and overweight was found to be high 8.2% and 30.1% respectively in study subjects reaching school by buses and prevalence of underweight (27.3%) was slightly high in those using bicycle. The statistical analysis was significant (p value 0.0001).

•In our study we found significant correlation between BMI & physical activities. Out of 310 adolescent girls, all obese girls (7) were found to be not involved in daily physical activities. Similarly higher prevalence of overweight (25.6%) was found in those not involved in physical activities in comparison to those involved in physical activities (2.6%). Majority of the adolescent girls who were found to be normal weight (72.7%) were involved in physical activities. Lack of physical activities was found to be associated with overweight and obesity (p value– 0.0001).

•We found significant correlation between BMI & intake of carbonated soft drinks (>3times in a week). Prevalence of obesity and overweight (5.8% and 18.9% respectively) was high in girls taking carbonated soft drinks, while higher prevalence of underweight (24.6%) was found in girls not taking carbonated soft drinks. Prevalence of obesity and overweight (4.8% and 26.4%) was found to be higher in those were taking street foods.

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