Original Article

Prevalence of Overweight and Obesity in Indian adolescent school going children: a cross sectional study done in an urban area of Rohtas, Bihar

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ABSTRACT

Background: Obesity is a major public health problem. It causes a significant morbidity and mortality. The objective of the study was to assess the prevalence of overweight and obesity among adolescents aged (10-19 years) and to describe certain socio-economic, demographic characteristics related to overweight and obesity among adolescents. **Methods:** A Community Based Cross Sectional Study conducted at the Field Practice Area of Urban Health Training Centre. A total of 900 adolescents between 10-19 years were enrolled. Parameters of height, weight and waist circumference and hip circumference were measured and recorded. Following the completion of the questionnaire, the results were compared against the body mass index (BMI). Questions from the GSHS (Global School- based student health survey) Questionnaire were also applied. **Results:** The present study showed that out of 900 participants, 167 (18.5%) were overweight while 51 (5.8%) were obese. So, the total prevalence of overweight and obesity was 24.3% (95% CI= 21.4 – 27.5). It was found that the prevalence of overweight and obesity was more in boys compared to girls. The present study found a positive association of overweight and obesity with age, SES. **Conclusion:** The prevalence of overweight and obesity were high among boys and need to be addressed by primary and secondary methods of levels of prevention.

Keywords: Overweight, Obesity, School children, adolescents, Urban, Rohtas.

INTRODUCTION

Obesity has become a global epidemic. It is now becoming a worldwide phenomenon and a major public health problem. The prevalence of obesity is increasing in developing countries like India in recent years.[1] The prevalence varies within a country from region to region. This variation is due to differences in the lifestyle, dietary habits, and differences in physical activities. There are several other factors too that affect obesity prevalence like urbanization and industrialization. These are mainly responsible for increase in prevalence of childhood obesity.[2]

The prevalence of childhood obesity varies from as high as over 30% in USA and as low as 2% in Sub-Saharan Africa. There is a need to identify simple tools like anthropometry measurements that can be used to assess and identify children who are at risk of becoming obese.[4] By doing so, we can decrease the prevalence of complications of childhood obesity which can disturb his/her adolescence and can affect

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adulthood too.[5] India is going through an economic and nutrition transition which is associated with a change in dietary habits, decreased physical activity thus rising prevalence of overweight and obesity.[6]

There is a paucity of data related to childhood obesity in Bihar as searched through different literature. Keeping this in mind, a study was designed to estimate the prevalence of overweight and obesity among adolescents aged 10-19 years in an urban area of Rohtas, Bihar, India.

MATERIALS AND METHODS

The present study is a cross sectional study. All the adolescents aged between 10-19 years in the field practice area of urban health training centre during January, 2018 to December, 2018 were included. All the participants who refused to participate were excluded from the study population. The study tool comprised of a personal data questionnaire that depicts information about participant's socio-economic, demographic profile and Global School Based Student Health Survey (GSHS).

The sample size was calculated considering prevalence of obesity to be 10% as many studies in India have shown that the prevalence of overweight among adolescents varies between 10% and 30%.[7]

We took minimum percentage into consideration for estimation of sample size. Hence p= prevalence= 10%; q= 1-p= 90%; L= allowable error= 20%; So, sample size=n=4pq/L2 ; n=900.

The sampling method used was Probability Proportional to size (PPS), a type of random sampling technique. PPS is used to decide the number of adolescents to be included from each ward and simple random sampling was applied to select the household from each ward.

The study was approved by institutional ethical committee. The study subjects were selected by visiting each and every house. Adolescents of each house were interviewed. The timing of interview was in second half from two to four p.m. as most of the participants go to school in morning hours. Informed consent was taken from either parent or guardian. A pre-designed, pre-tested questionnaire proforma along with GSHS was administered to each adolescent to collect data on socio-economic demographic profile (age, sex, religion, education, dietary pattern, physical activity level, TV watching, intake of different food items e.t.c.). Anthropometric measurements like height and weight were measured and recorded following the completion of questionnaire. Weight (kg) was recorded with the help of bathroom weighing scale measuring the weight in the unit "kg" with an error of 0.1kg without shoes and heavy clothing. The weighing scale was regularly calibrated with known standard weights. Portable anthropometric rod was used to measure height (cm), with an error nearest to 0.1 cm; the participants were instructed to stand in erect position with their feet not wide apart and eyes looking straight in the Frankfurt plane.

As per recommendation of Khadilkar, et al.[8] children were categorized according to their BMI using BMI percentile curves for Indian boys and girls from 5- 17 years. They were classified as: underweight (BMI <3rd percentile), normal (BMI 3rd percentile to adult equivalent of BMI <23), overweight (Adult equivalent of BMI 23 to adult equivalent of BMI 27.99) or obese (adult equivalent of BMI ≥ 28).

Data was entered in MS-Excel spreadsheet and analyzed using SPSS version 16.0. The statistical tests were applied and chi-square test was used to measure association. A 'p' value of less than 0.05 was considered to be statistically significant.

RESULTS

The present study was carried out among participants in the urban area of Rohtas district in Bihar. Table 1 shows the socio-demographic data of the study population. A majority 433 (48.1%) belonged to the age group of 10-13 years and 424 (47.1%) were in the age group of 14-16 years. Very little 43 (4.8%) belonged to a higher age group i.e. 17-19 years. Gender-wise, the distribution of male and female were 474 (52.7%) and 426 (47.3%)

respectively. Nearly 3/4th (639) of the study participants were studying in Government school with only a little 40 (4.4%) from college. With regards to the socio-economic status, it was found that the majority 433 (48.1%) belong to the Upper Middle Class with 213 (23.7%) belonged to lower Middle Class. The dietary habits of the study population showed that more than 2/3rd i.e. 739 (82.1%) were mixed diet consumers.

On assessing the life style habits of the participants, it was found that 369 (41.0%) took carbonated drinks once a week, 211 (23.4%) drank twice a week, 101 (11.2% drank thrice weekly while 160 (17.8%) had never consumed a drink. As far as consumption of junk food is concerned, it was found that more than half 575 (63.9%) had consumed junk food at least once a week, followed by 120 (13.3%) twice a week and 40 (4.4%) consumed on all days of the week. Rest 165 (18.3%) did not consumed junk food at all.

Table 1: Socio-demographic variables of the study participants

Variables		Frequency	Percent
Age	10-13 years	433	48.1
	14-16 years	424	47.1
	17-19 years	43	4.8
Gender	Male	474	52.7
	Female	426	47.3
Religion	Hindu	703	78.1
	Muslim	138	15.3
	Christian	59	6.6
Place of education	Government School	639	71.0
	Private School	221	24.6
	College	40	4.4
Socio-economic status	Class 1	125	13.9
	Class 2	490	54.4
	Class 3	178	19.8
	Class 4	107	11.9
Total		900	100

Table 2: Life style habits of the study participants

Variables		Frequency	Percent
Carbonated drinks (No. of times weekly)	Never drank	160	17.8
	Once a week	369	41.0
	Twice a week	211	23.4
	Thrice weekly	101	11.2
	More than 3 times	59	6.6
Participation in Outdoor sports	Yes	616	68.4
	No	284	31.6
Mode of transportation to school	Bus	93	10.3
	Bicycle	408	45.3
	Car	15	1.7
	Motor cycle	57	6.3
	Walking	327	36.4
Time spent watching TV (No. of hours daily)	<1 hour	167	18.6
	1-2 hour	498	55.3
	3-4 hour	235	26.1
Eating snacks while watching TV	Yes	737	81.9
	No	163	18.1
Total		900	100

With regards to the distance travelled to reach school, more than half the students travelled less than 20 minutes to reach the school while about 85 (9.4%) took about 40-49 minutes to reach the school. A majority 408 (45.3%) used bicycle as the mode of transportation to reach the school, while 327 (36.4%) walk to reach the school. Out of total study population, 616 (68.4%) participated in some form of outdoor sports. More than half (55.3%) spent about 1-2 hours watching the television. It was observed that more than 80% (737) consumed some kind of snack while watching television.

The present study showed that out of 900 participants, 167 (18.5%) were overweight while 51 (5.8%) were obese. So, the total prevalence of overweight and obesity was 24.3% (95% CI= 21.4 – 27.5). [Table 3]. Table 4 depicts association of some variables with overweight and obesity combined. It was found that the association was significant with respect to male as compared to female adolescents, those who were studying in private school as compared to government school and those who did not do outdoor sports.

Table 3: Classification of study participants according to their BMI

Classification	BMI	Frequency	Percentage
Underweight	<3rd percentile	138	15.3
Normal Weight	3rd percentile to adult equivalent of BMI <23	544	60.4
Overweight	Adult equivalent of BMI 23 - 27.99	167	18.5
Obesity	Adult equivalent of BMI ≥ 28	51	5.8
Total		900	100

Table 4: Association between Overweight/ Obesity and some variables

Variable		Overweight/ Obesity		Total	Chi-square	p Value
		Yes (%)	No (%)			
Gender	Male	147 (31.01)	327 (68.99)	474	25.2	0.000*
	Female	71 (16.67)	355 (83.33)	426		
School	Private	86 (38.91)	135 (61.09)	221	28.9	0.000*
	Govt.	132 (20.65)	507 (79.35)	639		
Outdoor sports	No	88 (30.98)	196 (69.02)	284	10.3	0.001*
	Yes	130 (21.10)	486 (78.9)	616		

*Significant

DISCUSSION

The present study showed that the prevalence of overweight and obesity among 10-19 years adolescents was 24.3% (95% CI= 21.4 – 27.5). A study conducted by T. Agarwal et al among affluent adolescent school children in Ludhiana in the year 2008 revealed that the prevalence of overweight was 12.7% and obesity was 34% respectively, a total 46.7%.[9] Similar study done by Shridhar M et al among 12-15 years adolescent in Mangalore in the year 2012 revealed that the prevalence of combined overweight and obesity was 14.7%.[7] Another study done by Chhatwal et al among 9-15 years school children in Punjab in the year 2004 revealed that the combined prevalence of overweight and obesity was 25.3%.[10] The same prevalence found by S. Kumar et al was 14.7%.[3]

The present study showed that the combined prevalence of overweight and obesity was more among male and participants who studied in private school. A study done by Gupta DK et al showed that males and privately-funded school children had significantly higher increase in prevalence and risk of being overweight and obese.[11] In another study by Kunwar R et al, the prevalence of overweight and obesity among girls was less than among boys.[12]

The present study shows that the prevalence of overweight was more among college students and obesity was more among govt. school students respectively. Hence type of school was highly associated with overweight and obesity. Another study done by Preetam BM et al among school children aged 6-12 years in Pondicherry in the year 2011 revealed that children from private schools are at greater risk of being overweight and obese.[13]

The present study shows that according to the SES majority adolescents belonged to class II and class III. A study done by Ramachandran A et al among adolescent school children aged 13-18 years in madras revealed that prevalence of overweight increases with an increase in SES.[14]

The present study shows that the prevalence of both overweight and obesity were more in those who did not participated in any of the outdoor sports which were found to be statistically highly significant. A study done by Goyal RK et al among adolescent school children aged 12-18 years in Ahmadabad in the year 2010 revealed that the physical activity like outdoor sports have a remarkable effect on prevalence of overweight and obesity.[15]

The present study shows that the prevalence of overweight and obesity was more in those subjects who watched television for 1-2 hours per day. Hence watching TV was significantly associated with overweight and obesity. Bharati et al found a positive association between obesity and TV watching and also between obesity and consumption of fast food.[16]

The present study shows that overweight was more in those subjects who slept for 8-10 hours per day and was found to be statistically significant A

study among Chinese school Children showed that who were obese were also more likely to have shorter sleep times compared to children of normal weight.[17]

The present study shows that the prevalence of overweight and obesity were high in those who were consuming junk foods as compared to those who were not consuming which were found to be statistically highly significant. Similarly, M Steiner-Asiedu et al showed that snacking on foods with high sugar content were associated with high likelihood of being overweight and obese.[18] In contrast, Boon TY, et al., observed 156 students in Kuala Lumpur and went on to conclude that there was no significant association between snacking patterns and BMI.[19]

CONCLUSION

The prevalence of overweight and obesity is 18.5% and 5.8% among adolescents aged 10-19 years. It was found that the prevalence of overweight and obesity was more in boys compared to girls. The present study found positive association of overweight and obesity with age, type of school, use of mode of transport to school, participation of outdoor sports, participation in indoor sports, duration of TV watching, duration of sleep, habit of eating snacks while watching TV. Lifestyle modification plays an important role in reducing risk of overweight and obesity among adolescents. The children and more importantly the parents should hold knowledge of the various methods of improving life style. In today's world, where there modernisation and digitalization are playing an important role, there should be focus on Non-exercise physical activities.

Recommendations

The school curriculum should encourage more physical activities in school. In the present system, there is less emphasis on sports activities as the child gets older. So, older children should be encouraged more.

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