

Original Research Article

Overweight and obesity and lifestyle of urban adolescent school children of eastern state of India

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Received: 24 September 2017

Accepted: 29 September 2017

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ABSTRACT

Background: There is reduction of childhood under nutrition and at the same time a gradual increase in childhood obesity especially urban area is seen due to rapid urbanization, economic and food transition and changes in lifestyle. On this backdrop present study is taken up to find out the prevalence of overweight and obesity among adolescent school children of urban Sambalpur and its association with lifestyle behavior.

Methods: A comparative, cross-sectional study was conducted from December 2016 to April 2017 among 600 children of class VI to X of two government and two private schools. Thirty students were chosen in each class using systematic sampling method. Pre-designed and pre-tested questionnaire was used to elicit the information on demographic variables and lifestyle behavior's. The risk factors were assessed by using the Chi-square test. For all the statistical tests, a p-value of <0.05 was considered as statistically significant.

Results: Prevalence of overweight and obesity were 8.9% and 3.4% respectively. Obesity was found more among girls (3.8%) and more children from private school were obese. Association of fast food, physical inactivity with obesity was significant.

Conclusions: Overall combined prevalence of childhood overweight and obesity was 12.3 per cent. Percentage of overweight and obese children studying in private schools was more as compared to government school children. School health program should incorporate health education of teachers, students, parents and a convergence of education and health sector can reduce the modifiable lifestyle behavior's.

Keywords: Adolescent, Obesity, Overweight, Physical inactivity, TV viewing

INTRODUCTION

In 21st century demographic, economic and food transition plus double burden of disease negates the advantage of demographic dividend of increase in the percentage of young population in our country. Similarly, in the field of nutrition there is double burden of malnutrition which is reflected by progress in reduction of underweight and stunted children and there is a trend of rise in overweight and obesity both among adults and children making India the third most obese country in the

world after US and China. Adolescence includes children from 10 to 19 years of age. Adolescence is a critical period of growth and development. As growth spurt occurs during this phase of life it becomes more crucial in terms of nutrition.¹ In the South-East Asia Region, though chronic under nutrition is prevalent among the poor and marginalized Obesity is seen among those belonging to the affluent society.^{1,2}

Nutritional status of the Indian population varies significantly from region to region. Childhood under

nutrition was found to be between 20 to 80 % in certain regions and in few regions there is an upward trend of prevalence of childhood overweight and obesity.³ Obesity among children from private schools in metropolitan cities were found between 20% and 29% respectively.⁴ In children, the development of obesity is associated with the simultaneous deterioration in chronic diseases risk profiles.^{5,6} In the recent National Family Health Survey 4 (2015-16) no study on the nutritional status of adolescent children was conducted and findings in this regard at national level would have been helpful in view of adoption of continuum of care approach in RMNCH+A. In developing countries such as India, especially in urban populations, childhood obesity is emerging as a major health problem. Limited data is available on the prevalence of obesity in children in Indian sub-continent and Odisha in particular. Sambalpur assumes more importance in view of rapid urbanization and industrialization besides it being an education hub of the state. In view of this epidemiological transition and lack of relevant research in this area, this study has been conducted with the aim to assess the prevalence of overweight and obesity among urban school going children and to identify its determinants.

METHODS

Study area

Sambalpur city was chosen as the study area. Students from both government and private schools were selected.

Study design

A comparative, cross-sectional study design was selected for present study.

Duration of study

Present study was conducted during the period of December 2016 to April 2017.

Selection of schools

List of all high schools from Sambalpur city was obtained from education office and permission was taken from the school authority to conduct the study. The city was divided into 3 zones because Sambalpur Municipality, Hirakud and Burla NAC are major constituent of this city. Two schools were selected from each zone at random (One from private and one from Government school) in the city.

Sample size

Taking prevalence of overweight and obesity both as 15% (based on a pilot survey in the local schools) and precision of 20% at 95% confidence interval with 10% of non-response rate sample size was 600.

Selection of subjects

From each school 100 students were taken. In each class out of the students present twenty were taken by using systematic sampling method. Prior consent was taken from the participants.

Inclusion criteria

Children in the age group of 10 to 15 years present in schools. Students without any significant past history of chronic illness since, 3 months

Exclusion criteria

Children below age 10 years and above age 15 years. Children from schools outside Sambalpur city and those who remain absent on survey day. Children with chronic illness, endocrinal problems, physical and mental defects.

Research tools

A pre-designed and pre-tested schedule Standardized OMRON digital weighing scale and Portable digital height rod (Door mounted design) were used.

Variables

The students were interviewed with the available schedule to elicit demographic characteristics such as age and sex; lifestyle such as food habits, skipping breakfast, TV watching, social media, videogames and physical activity. To classify subjects as regularly eating or not eating breakfast, we used self-report of breakfast intake. We assessed breakfast skipping based on response to a single, Likert-style item, "How many days in a week (on average) do you skip breakfast?" with response options ranging from 0 to 7 days. Sixty minutes of moderate to vigorous exercise a day by children from 5-17 years make them physically active.

Examples of moderate activity are brisk walking, dancing, household chores and vigorous exercise includes running, fast cycling, fast swimming, moving heavy load, playing football etc.⁷ Weight and standing height measurement procedure was followed as per RBSK Job aid.⁸ Calculation of BMI was done and BMI chart was used to interpret differently for children and teens even though it was calculated as weight (in Kg) ÷ height² (in meters) according to WHO child growth reference, 2007 and a set of thresholds based on single standard deviation spacing was used in the study.⁹

- Thinness: <-2SD
- Underweight: >-2SD, <1SD
- Normal: between >-1SD and <+1SD
- Overweight: between +1SD and <+2SD
- Obese: >+2SD.

Fast food easily prepared processed food served in snack bars and restaurants as a quick meal or to be taken away.

Statistical analysis

The data was entered Microsoft Excel 2016 spread sheet and was analyzed by using the Epi info (version 7.2.01). The risk factors were assessed by using the Fisher's exact and Chi-square test. For all the statistical tests, a p- value of <0.05 was considered as statistically significant.

RESULTS

Out of 560 school children prevalence of overweight and obesity were 8.9% and 3.4% respectively in the present study. So, the combined prevalence was 12.3 per cent. Least prevalence of overweight and obesity was found in 11-12-year age group i.e. 6 (5.4%) and 2 (1.8%). Prevalence of 12.9 % (15) overweight and 5.2% (6) obesity was highest in 14-15-year age group school children (Table 1).

Table 1: Age wise distribution of BMI of school children.

Age in years	Normal		Underweight		Overweight		Obese		Total No
	No	%	No	%	No	%	No	%	
10-11	62	56.4	40	36.4	6	5.4	2	1.8	110
11-12	69	62.7	32	29	7	6.4	2	1.8	110
12-13	71	64.5	28	25.5	8	7.3	3	2.7	110
13-14	84	73.7	10	8.8	14	12.3	6	5.2	114
14-15	87	75	8	6.9	15	12.9	6	5.2	116
Total	373	66.6	118	21.1	50	8.9	19	3.4	560

Prevalence of overweight and obesity were more i.e. 30 (10.3%) and 11(3.8%) among girls than those of boys {20 (7.4%) and 8(3.0%)} respectively (Table 2).

Table 2: Sex wise distribution of BMI of school children.

BMI	Boy	Girl
Normal	184 (68.1) *	189 (65.2)
Underweight	58 (21.5)	60 (20.7)
Overweight	20 (7.4)	30 (10.3)
Obese	8 (3.0)	11 (3.8)
Total	270 (100)	290 (100)

According to Table 3, Students of private school were found more overweight (42, 14%) and obese (16, 5.33%) than that of their counterparts of government school 8 (3.1%) and 3 (1.2%) respectively. Table 4 depicts association between lifestyles and obesity.

Table 3: Distribution of BMI of children according to type of school.

BMI	Government school		Private school	
	No	%	No	%
Normal	159	61.1	214	71.33
Underweight	90	34.6	28	9.33
Overweight	8	3.1	42	14.00
Obese	3	1.2	16	5.33
Total	260	100	300	100

Percentage of lifestyle risk behaviours among overweight and obese children ranged from family history of overweight 10 (14.5%) to taking fast food (45, 65.2%) and physical inactivity (45, 65.2%) and the corresponding values among other children ranged from family history of overweight 36 (7.3%) to TV watching (218, 44.4%).

Table 4: Association of BMI of children with their lifestyles.

Lifestyle	Overweight and obese		*Others		Chi square/p value
	Yes	No	Yes	No	
Take fast food	45 (65.2) **	24 (34.8)	170 (34.6)	321 (65.4)	23.94, p<0.05
Skipped breakfast	23 (33.3)	46 (66.7)	55 (11.2)	436 (88.8)	24.71, p<0.00001
Spent more time with tv /video game/pc	38 (55.1)	31 (44.9)	218 (44.4)	273 (55.6)	2.77, p=0.0956, p>0.05
Physical inactivity present	45 (65.2)	24 (34.8)	212 (43.2)	279 (56.8)	11.835, p=0.000581, p<0.05
Family history of overweight	10 (14.5)	59 (85.5)	36 (7.3)	455 (92.7)	4.1145, p=0.0425, p<0.05

*Normal and underweight children **Figure In parenthesis denotes percentage

DISCUSSION

Present study was conducted to classify 560 students from 11 to 15 years in two government and two private schools into normal, underweight, overweight and obese according to their BMI. Though few of them were found underweight our focus was on subjects with overweight and obesity. Our research work revealed that prevalence of overweight and obesity was 8.9% and 3.4% respectively or combine prevalence was 12.3 per cent. Among school children of Aurangabad combined prevalence was 10% (overweight:7%; obesity:3%) which was closer to ours and slightly higher in a study in Nagpur i.e. a combined prevalence of 14% (overweight:12%; obesity:2%).^{10,11} However, In Aurangabad CDC growth charts were used. In the later, WHO growth reference charts, 2007 was used like ours but sample size was only 150. In Kerala it was 10.7% (overweight: 7.56%; obesity: 3.10%) respectively though the school children belonged to rural area of Kerala unlike ours.¹² In the hill states of India prevalence of overall overweight and obesity was 15.6 % higher than our result.¹³

On analysis of age wise distribution of BMI in our study prevalence of 12.9 % overweight and 5.2 % obesity was found to be highest in 14-15 year age group school children and similar findings were observed by Kavitha M et al in her study at Gulbarga where prevalence of overweight and obesity were more among 15 years students followed by 14 year age group of children.^{6,14,15} It was more among the smaller children of age group 6, and 9 years with 8.79% and 5.67% in a study conducted by Jacob S. K.¹² However, our study included students from 11 to 15 years only. Goyal RK et al reported in his paper that prevalence of overweight and obesity was highest at the age of 12 years.¹⁵

While obesity seems to be growing in children regardless of sex, it can be noted that there is a sex wise variation in the prevalence of overweight and obesity in children irrespective of the place as revealed in many studies done in India and abroad. Our finding suggested no significance (Chi-square: 1.8383, $P>0.05$) though higher prevalence of overweight and obesity {30 (10.3%) and 11(3.8%)} was found among girls than those of boys i.e. {20 (7.4%) and 8(3.0%)} respectively. Similarly, among rural children of Kerala more girls were found overweight (9.09%) than boys (5.96%). But in terms of obesity unlike our findings boys were more obese (3.35%) than girls (2.85%).¹² Prevalence of overweight and obesity were more among females with 17.74% and 6.45% compared males (4.55% and 1.44%) and sex was significantly associated with overweight and obesity unlike ours.¹⁴

In the present study students of private school were found more overweight (42, 14%) and obese (16, 5.33%) than that of their counterparts of government school {8(3.1%)

and 3 (1.2%) respectively and this difference was significant (Chi-square: 57.8721, $p<0.00001$). Majority of the students of private schools belong to upper middle and upper socioeconomic group as pursuing study in these schools involves more investment besides scholastic performance of the students. On the other hand, free education and other amenities allows majority of students of lower socioeconomic group to have access to such schools. In the present study there was no scope to interview parents and hence socioeconomic status could not be assessed. In Nairobi the prevalence among children in private schools was found significantly higher (29.0%) than among those in public schools (11.5%) ($p = 0.000$). Similar findings were reported from Bhubaneswar and Chennai.¹⁶⁻¹⁸

Among lifestyle behaviours unhealthy diet and physical inactivity are primary risk factors. These risk behaviours among overweight and obese children were compared with non-obese children. At present, Indians and teens in particular do prefer to eat American chains shunning traditional cuisines according to a report from Martha.¹⁹ In our study we found the association between fast food eating and obesity significant. (Chi square=23.94, $p<0.05$). More percentage of obese children i.e. 45 (65.2) were taking fast food compared to that of non-obese children (170, 34.6%). Thompson J.J et al observed a high prevalence of both overweight (41%, including 15% who were obese) and breakfast skipping (68%) and on multivariate analysis found that more frequent breakfast skipping was associated with greater odds of overweight.²⁰

Children spend lot of time in viewing TV and playing video games, which are now regarded as the most modifiable risk factors of childhood obesity. We observed around 55% of both obese and non-obese children were used to TV watching and videogames and association of TV viewing and obesity was not found significant. (Chi square= 2.77, $P=0.0956$, $P>0.05$). Similar findings were reported by Saha from Mehsana, Gujarat.²¹ However, association between TV watching and increase in body weight was reported by Proctor MH and his team in their prospective study.²² Television watching remained an independent predictor of body fat change in their study. They found the association between TV watching and obesity because our study was a cross sectional study and theirs was a prospective study focusing on TV watching, diet and physical activity.

Unlike the children of seventies or eighties nowadays students are preoccupied with schooling, coaching, tuition besides use of modern gadgets in their leisure time has made them physically inactive. In our study we found more among the obese children were physically inactive (45, 65.2%) than that of non-obese group (212, 43.2%) and association between physical inactivity and obesity was found significant. (Chi square =11.835, $p=0.000581$,

$p < 0.05$). Our finding is consistent with many Indian studies besides WHO.^{14,16,23,24}

We found that 10 (14.55) obese children had family history of overweight/obesity compared to that of non-obese children 36(7.3%) which was found significant. (Chi square value 4.1145, $p = 0.0425$, $p < .05$) From a meta-analysis by Kanciruk M it was found that children with a family history of obesity were at an elevated risk for overweight and obesity compared with children who did not have a family history of obesity.²⁵

CONCLUSION

Overall combined prevalence of childhood overweight and obesity was 12.3 per cent. Percentage of overweight and obese children studying in private schools was more as compared to government school children. Association of dietary habits like fast food and skipping breakfast, physical inactivity and family history of overweight with overweight and obesity was found significant. School health program should incorporate health education of teachers, students, parents and a convergence of education and health sector, strict adherence to physical education and training period, NCC, Scout and regulation on use of modern gadgets can reduce the modifiable lifestyle behaviours.

ACKNOWLEDGEMENTS

The author is thankful to HOD and biostatistician of the department for their support and guidance. All thanks go to all the students and school managements whose participation made this research complete and successful.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Panda SC. Overweight and obesity and lifestyle of urban adolescent school children of eastern state of India. *Int J Res Med Sci* 2017;5:4770-5.