Prevalence and correlates of childhood obesity in suburban area of Odisha: A cross sectional study

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ABSTRACT

BACKGROUND: In India obesity and overweight is increasing among urban adolescents. Both under and over nutrition is grappling the country at faster rate. Present study was an attempt to explore obesity and overweight prevalence among school going children in suburban areas of Cuttack city, Odisha, India and their correlates.

METHODS: A cross-sectional study was done among school children in suburban area of Cuttack city, Odisha. A predesigned and pretested questionnaire was used to interview the study participants to elicit information about their age, number of siblings, birth order of the child, working status of parents, television screen viewing time, mode of transport to school and dietary habit of the students. A total of 550 children studying in class five to ten participated in our study.

RESULTS: Out of 550 children screened, nearly (14) 2.5% students were thin or severely thin, whereas (67)12.1% students were overweight or obese. Univariate analysis revealed that girls were almost five times at higher risk of being overweight/obesity compared to boys (OR: 4.78 95%CI: 1.35-16.93). Children who used motorized vehicles for going to school had an unadjusted Odds ratio of 10.08 [95%CI: 2.08-48.77] of being overweight or obese compared to those who walked to school. Having more than one child at home (OR= 0.15, 95%CI: 0.039-0.6) and doing physical activity for more than 30min per day (0.105, 95%CI: 0.015-0.72) were found to be protective against overweight and obesity.

CONCLUSIONS: Bearing in mind the burden of overweight and obesity among school children there is a need for periodic screening, awareness at school and parent counselling.

Key words: Overweight, obesity, prevalence, risk factors, Odisha, India

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INTRODUCTION

Developed countries are under the clutch of obesity, which is slowly inching towards developing countries[1]. Thirty five million children in developing countries were estimated to be either overweight or obese and more than ninety million were at risk of it [1]. In rapidly growing developing countries like China, Brazil and India obesity and overweight is increasing among urban adolescents [2-3]. Many of them in particular India is grappling

with both under- and over-nutrition [4]. Repeated episodes of malnutrition, followed by nutritional rehabilitation are known to alter body composition and increase the risk of obesity [5]. This is more of concern for a country like Indian where almost half of the children are undernourished [6]. Further, childhood obesity increases the risk of obesity in adults, and parental obesity interplay significantly to alter this risk [7]. There are several interactive factors contributing to the increased prevalence of obesity in childhood. It is noteworthy that in developing society of India along with technological advancement and epidemic of sedentary lifestyles in urban and suburban areas under-nutrition among adolescents is inclining towards over nutrition.

Harvard growth follow up study on adolescents demonstrated that, morbidities among obese individuals like cardiovascular diseases, diabetes were 50-100% higher compared to non-obese [8]. Many studies in urban areas have shown the burden of obesity/overweight among urban school going adolescents in India [9-13]. Consequences of childhood overweight and obesity is its persistence into adulthood with all its health risks. This is more likely to persist, when its onset is in late childhood or adolescence. Studies have also indicated that majority of these children are having better socio economic background. Dual burden of nutritional status among children have demarcated, obesity to be problem of urban areas and under nutrition is a matter of concern in rural areas [1]. Very few studies have done among suburban areas, where people with low to medium socio economic condition lives and very rarely being considered to get facilities available for urban people and rural people. Present study was an attempt to explore obesity and overweight prevalence among school going children in suburban areas of Cuttack city, Odisha, India and their correlates.

METHODS

We conducted a cross-sectional study among schoolchildren in suburban area of Cuttack city, Odisha. Assuming 20% of school children in the reference age group are either overweight or obese (as obtained from the pilot study conducted among 30 students from different non sampled school of same locality), a sample of at least 502 students were needed in order to estimate this level of prevalence of overweight and obesity within +/- 5% precision and with 95% confidence interval and 80% power. Considering 10% non-response rate we decided to select 550 students for our study.

The required number of students for this study was selected from seven randomly selected schools in Cuttack city of Odisha. All students from classes five to ten present on the day of our visit were enrolled for the study. The schools were informed well in advance and were provided with all the information about the study and consent was taken from the respective school principals and the parents of the selected children. A predesigned and pretested questionnaire was used to interview the study participants to elicit information about their age, number of siblings, birth order of the child, working status of parents, television screen viewing time, mode of transport to school and dietary habit of the students. Body weight was measured using digital weighing machine with an accuracy of 100grams. Three readings were taken for each student and average of those three was considered for final analysis. Height was measured in stadiometer in centimeter. Ethical approval for conducting the study was obtained from ethical committee, Indian Institute of Public Health-Bhubaneswar.

For analysis the Statistical Package for the Social Sciences (SPSS® 16.0) and World Health Organization (WHO) Multicentric Growth Reference Study (MGRS) [14] growth chart were used. Data was entered into Microsoft® Excel® and body mass index (BMI) was calculated. Then the Z scores were calculated for each individual according to WHO guideline [15]. The median BMI used in the above formula was taken from the WHO 2007 Multicenter Growth Reference Study Charts [16]. Nutritional grading was done using percentiles which was calculated by sing the formula [(Calculated BMI-Median BMI of same age group)/Standard Deviation]. For example, Overweight: >+1SD (equivalent to BMI 25 kg/m2 at 19 years) , Obesity: >+2SD (equivalent to BMI 30 kg/m2 at 19 years) , Thinness: <-2SD and Severe thinness: <-3SD. subsequent analysis was done based upon nutritional grading [16]. Distribution of overweight and obesity across different variables were described as frequency and percentage. For

analysis purpose screen viewing time and physical activities duration were categorized later into less than 30 minutes and more than 30 minutes. Uni-variate analysis was done to determine the risk factors for overweight and obesity. Multivariate analysis was attempted with selected significant variables (having p value <0.05) from uni-variate analysis.

RESULTS

A total of 550 children comprising 193 boys and 357 girls studying in class five to ten were selected for the study. Mean age of boys was 10.91 (±3.50) year and that of girls was 11.2 (±3.17) year. No difference in mean body mass index across gender was observed, which was nearly 16.8 (+3.56) Kg/m2 [Table 1] .

Family characteristics show that, 238 (44.18%) were single child of their parents and one-third were the first child of their parents. Almost 90 percent of the students mentioned that either of their parents were working. Majority, around 90% of the students were non vegetarian. Two-fifth (42.72%) informed that they used to watch television for more than one hour per day, two-third mentioned that they walk to school every day and most of them (81.27%) were involved in physical activity for more than 30 minutes per day [Table 2]. Nearly (14) 2.5% students were thin or severely thin, whereas (67) 12.2% students were overweight or obese. Out of 550 students nearly 4.5% were obese and 7.6% were overweight. Among boys the prevalence of overweight and obesity was 11.9% and among girls it was 11.3% [Table 3].

Univariate analysis reveals that girls were almost five times higher risk of being overweight/obesity compared to boys (OR: 4.78; 95% CI: 1.35-16.93). Students commuting to school by vehicle have 10 (OR: 10.08; 95% CI: 2.08-48.77) times higher risk to be overweight or obese than those who come to school walking. In contrary, children having more than one siblings at home, and of 10-14 years of age are at low risk to be overweight or obese as compared to children with more than one siblings at home (OR: 0.152 95%CI: 0.039-0.6) and age group less than 10 years (OR: 0.08 95%CI: 0.01-0.66) respectively. But on multiple logistic regression we found none of the factors were significantly associated with overweight and obesity in school children except gender and mode of transport to school. Being girl and coming to school through a motor vehicle were at more chance of developing overweight or obesity [Table 4].

DISCUSSION

Obesity among Indian children is becoming grave with prevalence of 16% [17]. In the present study the prevalence of overweight and obesity was found to be 12.2%, which is quite similar to the prevalence reported by Midha et al in there meta-analysis report.Few studies have been carried out to study the overweight/obesity in cities and among affluent group reported prevalence to vary between8% to 25% [12,17,18]. In a study by Premnath et al, 2009 in Mysore, the prevalence of both overweight and obesity among adolescents was 11.9% [19]. In a study done among private school going adolescents in Odisha, the prevalence of overweight and obesity was documented to be 28.63% [20]. Similar to our study the prevalence

TABLE 1

CHARACTERISTICS OF PARTICIPANTS

VARIABLES	BOYS(N=193) MEAN [SD]	GIRLS (N=357) MEAN [SD]
Age in years	10.91 (3.50)	11.2(3.17)
Weight in Kg	34.45(14.19)	33.28(11.55)
Height in cm	139.9(18.87)	138.6(14.07)
BMI (Kg/m2)	16.87(3.6)	16.88(3.51)
Waist circumference in cm	60.03(13.59)	59.72(12.02)
Hip circumference in cm	72.56(12.24)	72.7(10.75)
Waist-Hip Ratio	1.29(6.05)	1.06(4.08)

TABLE 2

DESCRIPTION OF STUDY PARTICIPANTS (N=550)		
VARIABLES	CATEGORIES	PERCENTAGE (95%CI)
Gender	Boys	35.09[31.19-39.15]
	Girls	64.91[60.85-68.81]
Diet	Vegetarian	10.09[07.76-12.84]
	Non vegetarian	89.91[87.16-92.23]
Mode of transport to school	Self mode	63.09[58.99-67.05]
	Transport	36.91[32.95-41.01]
Number of children at home	Single	44.18[40.07-48.36]
	>1 children	55.82[51.64-59.93]
Order of the child	1st child	34.37[30.48-38.41]
	Non first child	52.73[48.55-56.88]
Parent working	Single parent	89.46[86.68-91.82]
	Both parents	08.54[06.41-11.11]
Age group	5-9years	28.55[24.89-32.43]
	10-14years	53.27[49.09-57.40]
	>14 years	18.18[15.13-21.57]
Screen television viewing time	<1 hour	57.27[13.11-61.36]
	>1 hour	42.73[38.64-46.89]
Physical Activity	<30min	18.36[5.41-24.97]
	>30min	81.27[77.85-84.37]
	Missing	0.37[0.11-0.98]

TABLE 3

NUTRITIONAL GRADING ACCORDING TO Z-SCORE			
NUTRITIONAL GRADING	BOYS(N=193) FREQUENCY (%)	GIRLS (N=357) FREQUENCY (%)	TOTAL (N=550) FREQUENCY (%)
Overweight: >+1SD (equivalent to BMI 25 kg/m2 at 19 years)	13(6.7)	29(8.1)	42(7.6)
Obesity:,>+2SD (equivalent to BMI 30 kg/m2 at 19 years)	10 (5.2)	15(4.2)	25(4.5)
Thinness: < -2SD	7(3.6)	4(1.1)	11(2.0)
Severe thinness: <-3SD	3(1.6)	0(0.0)	3(0.5)
Normal	160(82.9)	309(86.6)	469(85.3)

was found to be more among age group 6-10 years [21]. Our study reported the prevalence to be more among females compared to males similar to other studies from India [22].

Univariate analysis shows, students who walk to the school were at less risk compared to those, who come to school by any vehicle. Even though the exact distance of their house to school was not asked, it is believed that walking to school is a sort of physical exercise carried out by students. This also indirectly reflects the socio-economic status of their family, as affluent families prefer to send their children to school by any vehicle. Studies have shown the cost effectiveness of walking to school in terms of reducing obesity [23]. Being single child in the family increases the risk of becoming obese. Students having siblings at home were found to be protective towards becoming obese, similar to findings from The United States [24]. Researchers have found that, additional children in the family may dilute available parental time and resources [25-26]. However, siblings may also act as a stimulus

TABLE 4

UNIVARIATE ANALYSIS OF FACTORS WITH CHILDHOOD OVERWEIGHT AND OBESITY

VARIABLES	CATEGORIES	OVERWEIGHT/OBESE (N=64) N (%)	PREVALENCE OR (95%CI)
Gender	Male	34.33[23.72-46.24]	1
	Female (Ref)	65.67[53.74-76.28]	4.78[1.35-16.93]*
Diet	Vegetarian (Ref)	17.90[10.08-28.46]	1
	Non vegetarian	82.10[71.54-89.92]	0.83[0.163-4.25]
Mode of transport to school	Self mode(Ref)	37.32[26.38-49.32]	1
	Transport	62.68[50.55-73.62]	10.08[2.08-48.77]*
Number of children at home	Single(Ref)	64.18[52.20-74.95]	1
	>1 children	35.81[25.05-47.80]	0.152[0.039-0.6]*
Order of the child	1st child	35.81[25.05-47.80]	1.18[0.36-3.09]
	Non first child(Ref)	40.29[29.08-52.34]	1
Parent working	Single parent (Ref)	89.55[80.43-95.31]	1.38[0.25-7.48]
	Both parents	10.45[4.68-19.57]	1
Age group	5-9years	41.79[30.45-53.88]	1
	10-14years	40.29[29.08-52.35]	0.08[0.01-0.66]*
	>14 years	17.92[10.08-28.46]	0.43[0.025-7.43]
Television viewing time	<1 hour	58.21[46.37-69.55]	1
	>1 hour	41.79[30.45-53.83]	1.31[0.39-1.27]
Physical Activity per day	<30min	14.92[4.10-19.32]	1
	>30min	85.08[75.01-92.16]	0.105[0.015-0.72]*

for cooperative play, or activities that increase the time each child devotes to physical activity. Additional siblings may decrease the availability of food for each child (thus lowering BMI), particularly for families living in poverty.

Physical activities have direct inevitable influence on BMI. In our studies physical activity more than 30 min per day had protective effect on obesity compared to less than 30 min activities per day. Similar findings were documented form Saraswathi et al, 2011 in Mysore and Odisha [22]. In our study no significant difference was observed between Screen viewing time, occupation of parents and order of child at family.

Limitation: This cross sectional study was based on responses from students except for anthropometric measurement, so response bias cannot be excluded. It was aimed to have an inkling to prevalence of overweight and obesity, though detail risk factor study might give more insight into it. Further, there is lack of information about the impact of school environment on nutritional status of school children and perception of parents and school teachers towards having optimum nutrition of children. Additional studies are needed to understand these aspects in detail.

CONCLUSION

The problem of obesity and overweight has pervaded to peri-urban school children in Odisha. Measures should be initiated to curb the problem in the early stage. School teachers and parents have an important role in this context. To begin with few initiaves like compulsory physical activity, discouraging sedentary lifestyle and long screen viewing and educating on healthy food options in schools could be beneficial.

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