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RESEARCH ARTICLE

Prevalence of overweight and obesity among school-going children of Satara district, Maharashtra

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ABSTRACT

Background: Worldwide, obesity has been more than doubled since 1980 as per recent data. In the year 2014, it has been reported that more than 1.9 billion adults, 18 years and above, were overweight. Of these, over 600 million were obese which means that overall 39% of adults worldwide are either overweight or obese. **Aims and Objectives:** The aims and objectives of this study were to find the prevalence of overweight and obesity and factors associated with them among school children. **Materials and Methods:** The present study was community-based cross-sectional study. The study was conducted between January 1 and March 31, 2014 in four schools of Satara district, Maharashtra. List of all government and private schools in Satara district was obtained, and four schools were selected by simple random sampling. Thus, a total of 90 students from each school were enrolled in the study, so final sample size was 360. **Results:** Among 360 study participants, the prevalence of overweight was 9.16% and obesity was 2.5%. Of 185 boys and 175 girls, the prevalence of overweight and obesity was 12.97% in boys compared to 9.14% in girls. 14.04% of school students from private school was found overweight or obese compared to only 6.88% of students from government school. Family history of obesity, working status of mother, and less duration of sleeping have a direct relationship on childhood obesity. **Conclusion:** The findings of the present study showed that boys have more prevalence of overweight and obesity compared to girls. Private school-going children found more overweight and obese compared to government school-going children. Family history of obesity, working status of mother, and less duration of sleeping have a direct relationship on childhood obesity.

KEY WORDS: Childhood Obesity; Overweight and Obesity; Prevalence; Duration of Sleeping

INTRODUCTION

The term obesity is derived from Latin word "obesus" that means pump or having eaten oneself fat. Moreover, obesity is a product of imbalance or difference between energy intake and energy spent. Nowadays, adolescent or childhood obesity is a matter of growing concern across the whole world. WHO has designated obesity as global epidemic. Worldwide, obesity has been more than doubled since 1980 as per recent data. In the year 2014, it has been reported that more than 1.9 billion adults, 18 years and above, were overweight. Of these, over 600 million were obese which means that overall 39% of adults worldwide are either overweight or obese. About 41 million children <5 years old were found overweight or obese in the year 2014.[1-3]

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Overweight and obesity rates have been increased and reached epidemic proportion in developed counties, and they are rapidly increasing in developing countries.[4,5] Obesity considered as the first wave of a defined cluster

of non-communicable diseases called as a "New world syndrome" creating a huge burden on socioeconomic and public health, especially in poorer countries.[6]

Over the past two decades, proportion of children among general population who are overweight and obese has doubled in developed as well as in developing counties including India,[7,8] and parallelly, there is a increasing prevalence of diabetes.[9,10] A developing country like in India, there was more migration of people from rural to urban areas due to industrialization, and more job opportunities lead to rapid change in food habits and lifestyle. India has facing dual burden, on the one hand, increasing the popularity as a fast weight gaining nation and, on the other hand, struggling with malnutrition.[11,12] As a result of this, childhood obesity has been attributed to recent emerging socioeconomic trends in India. There are many long-term consequences as childhood obesity tends to persist in adulthood along with its health risks. Obesity is more likely to persist in later days of life if it starts in childhood.[13]

Causation of childhood obesity is multifactorial. There has been a complex interaction between various factors such as genetic, psychological, environmental, sociocultural, neuroendocrine, and metabolic in etiopathogenesis of childhood obesity.[14,15]

There are various physical, psychological, and socioeconomic adverse effects of obesity. Childhood obesity has a negative impact on cognitive and social development and it badly affects self-esteem.

Chronic and morbid conditions such as type 2 diabetes mellitus, hypertension, hypercholesterolemia, and atherosclerosis which were primarily seen in adults and the elderly are becoming more common in children as consequences of increasing prevalence of childhood obesity. There have been various difficulties in treating obesity in adulthood added to that many long-term adverse effects of childhood obesity, so its prevention has now become public health priority. Recognition of childhood overweight and obesity during school days helps in preventing as well as effective controlling of disease progression into adulthood.[16] Keeping this in mind, the present study was conducted in school children of Satara district with the objective of finding out prevalence of overweight and obesity and its associated factors.

MATERIALS AND METHODS

The present study was community-based cross-sectional study. The study was conducted between January 1 and March 31, 2014, in four schools of Satara district, Maharashtra. List of all government and private schools in Satara district was obtained, and four schools (two government and two private schools to represent equally various types of socioeconomic strata of society) were selected by simple random sampling. Nature and purpose of the study were explained to the principal/headmaster of selected schools, and after obtaining their permission, data collection was started. Nearly 30 students from each 8th, 9th, and 10th class were selected by purposive sampling after obtaining their parents informed verbal consent. Thus, a total of 90 students from each school were enrolled in the study, so final sample size was 360. Approval from the Institutional Ethical Committee of College, Institute of Medical Sciences and Research, Mayani, was obtained before the start of the study.

A pilot study was undertaken before starting for data collection to validate and make necessary modification in questionnaire. The pre-designed and pre-tested questionnaire contains information about various sociodemographic characters including parents working status, family history of overweight and obesity, and anthropometric measurements.

Inclusion Criteria

Students of 8th, 9th, and 10th class and those who were willing to participate in the study were included.

Exclusion Criteria

Students who were not willing to participate in the study, those who were absent during school visits, and those who had chronic diseases, endocrinal problems, and physical and mental defects were excluded from the study.

Height was measured in centimeters using stadiometer and weight was measured in kilograms on standardized weighing machine. Both weight and height were measured with only school uniforms and without wearing shoes. Body mass index (BMI) was calculated using formula weight in kilograms divided by height in square meters. To find prevalence, age-specific cutoff values of BMI for overweight and obesity separate for boys and girls were used [Table 1].[17]

Table 1: Age-specific cutoff values for risk of overweight and obesity corresponding to adult equivalent BMI of 23 and 28 kg/m^2 at the age of 18 years for Indian boys and girls

Age in years	Adult equivalent			
	BMI 23 kg/m^2		BMI 28 kg/m^2	
	Boys	Girls	Boys	Girls
12	19.3	19.4	23.3	23.3
13	20	20.2	24.3	24.3
14	20.7	20.9	25.1	25.2
15	21.3	21.5	25.9	26
≥16	21.9	22	26.7	26.7

BMI: Body mass index

Statistical Analysis

Percentages and Chi-square test were applied wherever necessary and $P < 0.05$ was considered as statistically significant with confidence interval of 95%. Calculations are performed using SPSS version 21.

RESULTS

Majority 35% of the study participants were 15 years old followed by 14 years (30.83%). About 76.39% of school students belong to Hindu religion. 66.94% of study participants reside in nuclear family, while 33.06% live in joint family. 52.5% of study participants were from government school and 47.5% were from private school. Among the study participants, 120 (33.33%) were studied in each class of 8th, 9th, and 10th [Table 2].

Among 360 study participants, the prevalence of overweight was 9.16% and obesity was 2.5%. Of 185 boys and 175 girls, prevalence of overweight and obesity was 12.97% in boys compared to 9.14% in girls. However, this difference was not found to be statistically significant with $P = 0.24$. 14.04% of school students from private school was found overweight or obese compared to only 6.88% of students from government school, and this difference was found to be statistically significant with $P < 0.02$[Table 3].

More number of study participants 29.79% was found overweight or obese with those having a family history of overweight and obesity compared to only 7.63% with those having no family history of overweight and obesity, and this difference was found highly statistically significant with $P < 0.0001$. Prevalence of overweight and obesity was found higher 25.38% in study participants who had working mother compared to only 10% in those who had not working mother, and this difference was found highly statistically significant with $P < 0.0001$. Prevalence of overweight and obesity was found higher 32.29% in study participants with <7 h of sleeping duration compared to only 10.98% in those who had sleeping duration of >7 h, and this difference was also found highly statistically significant with $P <0.0001$[Table 4].

DISCUSSION

Prevalence of overweight and obesity was found more in boys compared to girls in the present study. Private school-going children found more overweight and obese compared to children going to government schools. Parameters such as family history of obesity, working mother, and less duration of sleeping have an direct relationship with childhood obesity. In the present study, 24 (12.97%) boys and 16 (9.14%) girls found overweight or obese. A study conducted by Meharda *et al*.[18] showed that 43 (8.60%) boys and 63 (12.60%) girls were overweight or obese. These study findings show higher prevalence than our study and this may be due to geographic and sociocultural variations. Harish *et al*.,[19] in their study, reported that a prevalence of obesity in boys was 125 (6.03%), and in girls, it was 229 (8.85%). Prevalence of overweight and obesity was found 7.65% in boys and 12.45% in girls in a study conducted by Prashanth *et al*.[1] A study conducted by Goyal *et al*.[4] showed that prevalence of overweight and obesity was 17.2% in boys and 10.8% in girls. The overall prevalence of overweight and obesity was 200 (15.61%) as shown by a study conducted by Ghonge *et al*.[14] The present study shows that the prevalence of overweight and obesity was significantly higher 24 (14.04%) in children going in private school compared to those who went to government school 13 (6.88%). A study conducted by Meharda *et al*.[18] showed that prevalence of overweight and obesity was significantly higher 270 (14.00%) in children going in private school compared to those who went to government school 36 (7.20%). Ghonge *et al*.,[14] in their study, reported that the number of children with overweight and obesity was significantly higher in 51 (8.83%) children going in private school compared to those who went to government school 21 (2.98%). A study conducted by Prasad *et al*.[20] also showed significantly more prevalence of overweight and obesity in children going in private school 154 (18.7%) compared to those who went to government sch ool 78 (7.4%). These three study findings were similar to the present study. In the present study, it was found that more number of children was overweight and obese with positive family history of overweight and obesity compared to number of overweight

Table 2: Distribution of study participants according to sociodemographic characteristics

Variable	Boys *n*=185 (%)	Girls *n*=175 (%)	Total *n*=360 (%)
Age (years)			
12	3 (1.62)	2 (1.14)	5 (1.39)
13	21 (11.35)	19 (10.86)	40 (11.11)
14	57 (30.81)	54 (30.86)	111 (30.83)
15	64 (34.59)	62 (35.43)	126 (35.00)
≥16	40 (21.62)	38 (21.71)	78 (21.67)
Religion			
Hindu	143 (77.30)	132 (75.43)	275 (76.39)
Muslim	31 (16.76)	29 (16.57)	60 (16.67)
Christian and others	11 (5.94)	14 (8.00)	25 (6.94)
Type of family			
Nuclear	127 (68.65)	114 (65.14)	241 (66.94)
Joint	58 (31.35)	61 (34.86)	119 (33.06)
Type of school			
Government	98 (52.97)	91 (52.00)	189 (52.50)
Private	87 (47.03)	84 (48.00)	171 (47.50)
Class studying			
8th	62 (33.51)	58 (33.14)	120 (33.33)
9th	61 (32.97)	59 (33.71)	120 (33.33)
10th	62 (33.51)	58 (33.14)	120 (33.33)

Table 3: Prevalence of overweight and obesity in relation with gender and type of school

	Normal (no overweight and obese)	Overweight and obese	Total	*P* value
Prevalence in relation with gender				
Boys	161 (87.03)	24 (12.97)	185 (100)	χ^2=1.33 df=1 *P*=0.24
Girls	159 (90.86)	16 (9.14)	175 (100)	
Prevalence in relation with the type of school				
Government	176 (93.12)	13 (6.88)	189 (100)	χ^2=4.98 df=1 *P*<0.02
Private	147 (85.96)	24 (14.04)	171 (100)	

Figures in parenthesis indicates percentage

Table 4: Factors associated with overweight and obesity

	Normal (no overweight and obese)	Overweight and obese	Total	*P* value
Association with family history of overweight and obesity				
Positive family history	69 (70.41)	29 (29.59)	98 (100)	χ^2=29.25 df=1 *P*<0.0001
Negative family history	242 (92.37)	20 (7.63)	262 (100)	
Association with working status of mother				
Working	97 (74.62)	33 (25.38)	130 (100)	χ^2=14.97 df=1 *P*<0.0001
Not working	207 (90.00)	23 (10.00)	230 (100)	
Association with duration of sleeping in h				
<7 h	65 (67.71)	31 (32.29)	96 (100)	χ^2=23.01 df=1 *P*<0.0001
≥≥7 h	235 (89.02)	29 (10.98)	264 (100)	

Figures in parenthesis indicates percentage

and obese children with negative family history of overweight and obesity, and this difference was found highly statistically significant. Prevalence of overweight and obesity was found more in study participants with working mother compared to those overweight and obese children whose mothers were not working. This association was also found statistically significant. Overweight and obesity were found more in children who were taking <7 h of sleep compared to those who were taking more than 7 h of sleep. This association was also found statistically significant. Similar association with respect to family history, working status of mother, and duration of sleeping was found in a study conducted by Meharda *et al*.,[18]

Strength of the Study

Prevalence of overweight and obesity was found more in private school-going children compared to government school-going children. Findings of the study revealed that overweight and obesity are genetically inherited from parents to their child and less sleep duration also has a positive impact on getting child obese. Identification of obesity in early age helps us to do intervention such as lifestyle modifications easily and prevent complications of obesity in near future.

Limitation of the Study

To validate results more precisely, more number of children should involve from both government and private schools. Other methods of assessing overweight and obesity such as waist-hip circumference and skinfold thickness were not used in the present study

CONCLUSION

Findings of the present study showed that boys have more prevalence of overweight and obesity compared to girls. Private school-going children found more overweight and obese compared to government school-going children. A family history of obesity, working status of mother, and less duration of sleeping have a direct relationship on childhood obesity.

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