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A comparison study on the prevalence of obesity and its associated factors among school Children

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Abstract

Background: Childhood obesity has become a serious public health problem in many low-and-middle income countries. This study aims to determine the prevalence and assess the factors associated with obesity among school children.**Material and Methods:Study Design:** This was a school-based, cross-sectional, questionnaire based study carried out over a period of three months, from July 2019 to February 2020. We adopted a multistage stratified random sampling procedure. Six schools were selected by a simple random technique.**Selection of subjects**: **(inclusion and exclusion of students)** The subjects were children, 6 to 15 years of age. Children with history of chronic diseases like Tuberculosis, asthma, diabetes were not included.Anthropometric measurements: Trained investigators weighed all of children without shoes and heavy clothing, using an electronic weighing scale with an error of ±100 g. **Result:**The average Body Mass Index (BMI) for boys was 17.9 and that of girls was 18.32.In male category, 67 (38%) were underweight, 71 (40.3%) were healthy weight and 38 (21.5%) were Overweight + Obese. In female category, 36 (29 %) were underweight, 57 (45.9%) were healthy weight and 31 (25%) were Overweight + Obese.It has been found that, more no. of subjects and more than 2 hours watching T.V are from overweight+obese group whereas less than 1 hours watching T.V belonged to underweight and healthy weight were less numbers. It has been found that, more no. of subjects doing physical exercise are from healthy weight group whereas less no. of subjects doing physical exercise belonged to underweight and overweight + obese. Thus physical exercise helps in maintaining healthy weight and prevents obesity and underweight.**Conclusion:**We found a high prevalence of overweight and obese children in our study. Since obesity in adulthood has its onset in childhood, it is important to have effective implementation of school health activities to reduce and curb the burden of childhood obesity.
Keywords: Obesity, overweight, children.

Introduction

Obesity and overweight are abnormal accumulation of body fat. Obesity as classified by World Health Organization (WHO) asbody mass index (BMI) of ≥ 30 kg/m^2 and ≥ 25 kg/m^2 is considered as overweight. [1]BMI is calculated as weight in kilograms divided by the square of the height in meters. However, for Asian Indians population the BMI cut-off points are much lesser for obesity and overweight. BMI > 25 kg/m^2 is considered as obesity and 23 to 24.99 kg/m^2 is considered as overweight. [2]Worldwide, at least 2.8 million people die each year as a result of being

overweight or obese, and an estimated 35.8 million (2.3%) of global Disability-Adjusted life Years (DALYs) are caused by overweight or obesity. [3] In 2014, more than 1.9 billion adults were overweight. Of these over 600 million were obese.Overall, about 13% of the world's adult population (11% of men and 15% of women) were obese and over (38% of men and 40% of women) were overweight. [4]It has been estimated that the number of obese individuals could increase to 1.12 billion in 2030, which would account for 20% of the world's adult population. [5] In India, 1.2 billion people are obese which is the third most populous country in the world. [6]In 2014, 9.8 and 20.0 million men and women were obese respectively.[7] In 2015-16, the National Family Health Survey (NFHS-4) reported that prevalence of obesity is 18.04 % in men and 19.56 % in women. [8]
NHFS-4 Key Indicators for Maharashtra, prevalence of obesity is 23.6 %[9]. It is increasing in urban and rural

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population in India. [10] Among Indians, both abdominal and generalized obesity are present in male and female. [11] Generalized obesity is more in male and abdominal obesity in female. [12]In our study, we decided to study any differences in the prevalence of childhood obesity based on types of schools, educational and occupational status of both the parents (father and mother). Thus, this study aims to determine the prevalence of overweight and obese children and to assess the factors associated with obesity among school children.This study will help us to understand the potential causes and risks associated with childhood obesity. Finally, there is a focus on ways to prevent childhood obesity as prevention strategies are key to reducing the epidemic. The present study has been conducted to estimate the prevalence and determinants of overweight and obesity among school children aged between 6 and 15 years.

Aims and objectives

Aim: Aim of present study is to find prevalence of childhood obesity and find the factors influencing health status (Body Mass Index= BMI) of children between 6 to 15 years of age.
Objectives
Objectives of the study are
1. To find variation in prevalence of underweight, healthy weight and overweight/obese school going children depending on gender.
2. To show relation between physical activity status and childhood obesity.
3. Physical activity its influence on BMI of children.
4. To show relation between eating habits like vegetarian, Non-vegetarian or mixed on BMI of children.
5. To show influence of watching T.V and obesity in BMI of children.

Materials and methods
Study Design: This was a school-based, cross-sectional, questionnaire based study carried out over a period of three months, from July 2019 to February 2020. We adopted a multistage stratified random sampling procedure. For the selection of schools, a list of all schools was obtained.

Selection of subjects: **(Inclusion and Exclusion of students)** The subjects were children, 6 to 15 years of age. After reaching the concerned school, the classes were selected randomly from each grade. Students were selected from each class by the simple random technique, using the students register, till the desired sample from each class was met. Children with history of chronic diseases like Tuberculosis, asthma, diabetes were not included.
Anthropometric measurements
 Trained investi-gators weighed all of children without shoes and heavy clothing, using an electronic weighing scale with an error of ±100 g. The weighing scale was regularly checked with known standard weights. A portable anthropometric rod was used for measuring the height, with an error to the nearest of 0.1 cm, using standard procedures.
Questionnaire
 A predesigned and pretested interviewer administered questionnaire was used to collect information.Information was collected on physical activity, such as participation in sports and games, aerobic physical exercises. Diet preferences such as vegetarian, Non-vegetarian or mixed were taken into consideration.
Statistical Analysis
 Body mass index (BMI, kg/m2) was calculated on measured height and weight and was used to identify underweight, overweight and obese conditions using age and sex appropriate normative cut points. For classification, WHO reference charts for BMI, 2007 different for boys and girls, was used. Children were categorized into three groups namely underweight ($\leq$ 5th percentile), normal (5th to 85th percentile) and overweight ($\geq$ eighty-fifth percentile) + obese ($\geq$ ninety-fifth percentile). We examined the prevalence of overweight, healthy weight and underweight in each gender by age group and sex. Group comparisons were performed using tables gender wise (Male and female)

Result

A total of 300 children in the age group of 6 to 15 years were analyzed. Out of these 176 (58.6%) subjects were males and 124 (41.3%) subjects were females in table 1.

Table 1: Gender wise distribution of subjects

Subjects	Frequency	Percentage
Male	176	58.6
Female	124	41.3
Total	300	100

Table 2: BMI category for male and female

Subjects	Male Frequency (%)	Female Frequency (%)
Underweight (UW)	67 (22.3)	36 (12)
Healthy weight (HW)	71 (23.6)	57 (19)
Overweight + Obese (OW)	38 (12.6)	31 (10.3)
Total	176 (58.6)	124 (41.3)

In table 2, Body Mass Index, we have categorized Male and Female as Underweight (UW), Healthy weight (HW) and Overweight + Obese (OW). The average Body Mass Index (BMI) for boys was 17.9 and that of girls was 18.32.

In male category, 67 (38%) were underweight, 71 (40.3%) were healthy weight and 38 (21.5%) were Overweight + Obese.In female category, 36 (29 %) were underweight, 57 (45.9%) were healthy weight and 31(25%) were Overweight + Obese.

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Table 3: Distribution of BMI (Category) according the dietary pattern

Subjects	Vegetarian n (%)	Non-Vegetarian n (%)	Mixed n (%)	Total
Underweight (UW)	23 (7.6)	37 (12.3)	43 (14.3)	103 (34.3)
Healthy weight (HW)	29 (9.6)	41 (13.6)	58 (19.3)	128 (42.6)
Overweight + Obese (OW)	18 (6)	22 (7.3)	29 (9.66)	69 (23)

In table 3 shows the distribution of BMI (Category) according the dietary pattern.

Table 4: BMI distribution according to the duration of T.V/phone/Tab/Computer viewing per day

Subjects	Less than 1 hour n (%)	1 to 2 hours n (%)	More than 2 hours n (%)	Total
Underweight (UW)	47 (15.6)	33 (11)	23 (7.6)	103 (34.3)
Healthy weight (HW)	61 (20.3)	39 (13)	28 (9.3)	128 (42.6)
Overweight + Obese (OW)	9 (3)	22 (7.3)	38 (12.6)	69 (23)

In table 4, From the above figures it has been found that, more no. of subjects and more than 2 hours watching T.V are from overweight+obese group whereas less than 1 hours watching T.V belonged to underweight and healthy weight were less numbers.

Table 5: BMI distribution according to the physical activity per day

Subjects	Always (7 days) n (%)	Often (3–5 days) n (%)	Sometimes (1–2 days) n (%)	Rare (0–1 day) n (%)	Total
Underweight (UW)	53 (17.6)	39 (13)	11 (3.6)	3 (1)	103 (34.3)
Healthy weight (HW)	43 (14.3)	40 (13.3)	35 (11.6)	11 (3.6)	128 (42.6)
Overweight + Obese (OW)	5 (1.66)	9 (3)	21 (7)	34 (11.3)	69 (23)

In table 5, it has been found that, more no. of subjects doing physical exercise are from healthy weight group whereas less no . of subjects doing physical exercise belonged to underweight and overweight + obese. Thus physical exercise helps in maintaining healthy weight and prevents obesity and underweight.

Discussion

Various studies have been conducted in India to assess the prevalence of overweight/obese school-going children. But the burden of the problems associated with being overweight or obese is unclear, as different studies have used different methods/cut-offs points to define childhood overweight and obese status. [13]Our study found that mean BMI differed significantly between males and females. A study conducted in Peru also found similar significant differences among males and females, although not for age and BMI. [14] Our study revealed that the overall prevalence of overweight and obese status was in male were 10.8% and female 6.2% respectively, and the prevalence of overweight and obese status was higher among males compared to females, which is similar to other studies. [15] A study done in Hyderabad and Ethiopia showed a higher prevalence of overweight status but a lower prevalence of obesity among girls compared to boys. [16,17] Other studies have found higher rates of obesity among females compared to males.[18] In the current study, few of the students were found to be underweight. The effective implementation of a mid-day meal program may be associated with such nutritional outcomes among school children in Andhra Pradesh.[19] This finding can be attributed to the fact that children of a higher socioeconomic status tend to study in private schools and are more likely to be overweight/obese due to lifestyle patterns leading to inappropriate dietary habits and decreased physical activity. [20]Regarding dietary patterns, our results showed no significant differences between vegetarians and mixed/non-vegetarians in terms of risk of being overweight/obese. This is similar to associations observed in other studies.[21] Diet alone is not a precursor of obesity. The duration and intensity of physical activity along with diet plays a major role in the occurrence of obesity. Even after controlling genetic liability and childhood environment, decreased rate of weight gain was associated with persistent physical activity.[22] The association between the consumption of junk food and obesity was not statistically significant in our study. However, the association between frequent consumption of junk/fast foods and the risk of being overweight was found to have a significant positive correlation in other studies. In many areas, especially urban areas, there is a tendency to consume high-calorie snacks and junk food.Like other studies, this study also has its limitations. Firstly, since this study is observational study in nature, the cause-and-effect relationship cannot be established. Secondly, the application of international reference standards to categorize BMI in an Indian setting may pose one of the limitations of the study. Also, in this study, we did not take into consideration, the sexual maturation among adolescents and physical activity level was not measured.

Conclusion

In conclusion, the present study indicates that the prevalence of overweight and obesity among children has been very high during the past years. Furthermore, the main influencing factors for overweight and obesity are sex, age, diet, physical activity andleisure time (watching T.V/Phone/Tab /Computer). These data suggest that efforts related to the prevention and control of overweight and obesity should be a public health priority in the India. These findings will be

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submitted to relevant departments as a reference for efforts to reverse these trends.

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