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Original Research Article

Prevalence of obesity and overweight among high school children in Nagpur, Maharashtra: a cross sectional study

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Abstract: Childhood obesity once considered a problem in affluent countries is now, a problem of the developing countries also. Individuals develop their eating and activity patterns during childhood and 50-80% of obese children continue to be obese adult's .Therefore, it is important to determine the prevalence of the problem and study associated risk factors relating to overweight and obesity among adolescents. A predesigned, pretested questionnaire was used to interview the participants from 3 private English medium schools which were selected by simple random sampling (a sample size of 150 students from std. 8th, 9th and 10th). Anthropometric measurements i.e. height and weight and BMI was calculated and interpreted from WHO BMI classification for children 2007.The Data was analysed through pivot tables in Microsoft excel 2016 and Epi info Software. A total of 150 students of high school were included in the study which belonged to age group of 12 to 17 years. 45.33% students were females and 54.66% students were males.34.7% students were underweight, 51.3% students were normal, 12% students were overweight and 2% students were obese. About 6.67% females were found to be overweight or obese and 7.33% males were overweight and obese. *P-value* for risk factors i.e. consumption of fast food, binge eating and family history of overweight was 0.000 , 0.000 and 0.00518 respectively which were highly significant. Other risk factors had *p*-value >0.05 which were not significant and thus not contributing to obesity in our study. Habits like binge eating, fast food consumption and also presence of family history of disease significantly contributes more to the problem of obesity. Educating the community on the aspects of healthy food habits and desired lifestyles is the need of the hour.
Keywords: Obesity, overweight, BMI, Prevalence, Risk factors

INTRODUCTION

Healthy is not a goal, it is a way of living. According to WHO [1], obesity is defined as abnormal or excessive fat accumulation that may impair health .Obesity can now be seen as the first wave of a defined cluster of non - communicable diseases . It has been called the 'New World Syndrome'. Childhood obesity was considered as a problem in affluent countries. But now-a-days, this problem has started appearing in the developing countries [2] also and has within no time, increased enormously. According to a study published in the noted journal Lancet [3], India is the third most obese country in the world after US and China. Obesity among children in India has become a public health issue .Though, nationally representative data on this subject from India is lacking, however, the available Indian studies have revealed that the prevalence of overweight and obesity in India was 3.1% to 29% and 0.73 % to 7% respectively [4]. Individuals develop their eating and activity patterns during childhood and 50-80% of obese children continue to be obese adults. However, whether or not obesity persists into adulthood, childhood obesity appears to increase the risk of subsequent morbidities like diabetes, hypertension, CVS diseases, dyslipidaemia's, osteoarthritis, cancer, stroke etc. Sedentary lifestyle, decreased physical activity, concept of pocket money, low cost of junk food is the main factors contributing to it [5]. Therefore, this study was conducted to determine the magnitude of this upcoming problem in school going children in Nagpur city, Maharashtra, India.

OBJECTIVES

- To study the prevalence of obesity and overweight among high school children in Nagpur, Maharashtra.
- To find out the risk factors related to overweight obesity.

MATERIAL AND METHODS

Study design and setting -Cross sectional study was undertaken in private schools in Nagpur

Study period-May, 2016 to December 2016

Sampling technique and sample size- The sample size was calculated from a previous study which gave a prevalence of overweight and obesity at 6.19 percent. Precision sample calculated with design effect 1 was 84. Simple Random sampling technique was used for selecting the zone and the schools in, Nagpur. Out of all the students present in std. 8^{th}, 9^{th} and 10^{th} were pooled, Participants from each school were randomly selected. A total of 168 students were randomly selected of which 12 did not fit in the inclusion criteria, and 6 of them did not complete the proforma. Thus a total of 150 school children were obtained for study

Inclusion criteria

- Students who agreed to be a part of the study.
- Students without any significant past history or those who were not suffering from any chronic illness from past 3 months were be included in the study.

STATISTICAL ANALYSIS

The data was entered into Microsoft Excel 2016 spread sheet and was analysed 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

METHODOLOGY

After obtaining consent from the school authorities and parents of the participants and explaining to them the objectives as well as the method of this proposed study, a predesigned, pretested questionnaire was used to interview the participants to elicit information on their family characteristics like economic status, education and occupation of their parents. Information on individual characteristics like age, gender, time spent for watching TV and outdoor games, etc. was collected. For measuring height, drop down tape measure was used. Students were asked to remove their shoes and were made to stand with their back to the wall and told to look forward. The heels, buttocks and back of the shoulders should be in contact with the wall. The measuring device is lowered till it rests gently on the students head and the measurement was noted. For measuring weight, the modern day weight scale was used. Student was asked to remove his/her shoes or any heavy items from pockets and was asked to stand on the weight scale while looking straight ahead. The reading was noted.

BMI is interpreted differently for children and teens even though it is calculated as weight (in Kg) ÷ $height^2$ (in meters). Because there are changes in weight and height with age, as well as their relation to body fatness, BMI levels among children and teens need to be expressed relative to other children of the same sex and age [5]. These percentiles were calculated from the WHO growth reference charts, 2007.

WHO BMI CLASSIFICATION (2007) FOR INTERPRETATION OF SCORE

Underweight -Less than the 5th percentile

Normal - 5th percentile to less than the 85th percentile.

Overweight - 85th to less than the 95th.percentile.

Obesity - Equal to or greater than the 95th percentile

RESULTS

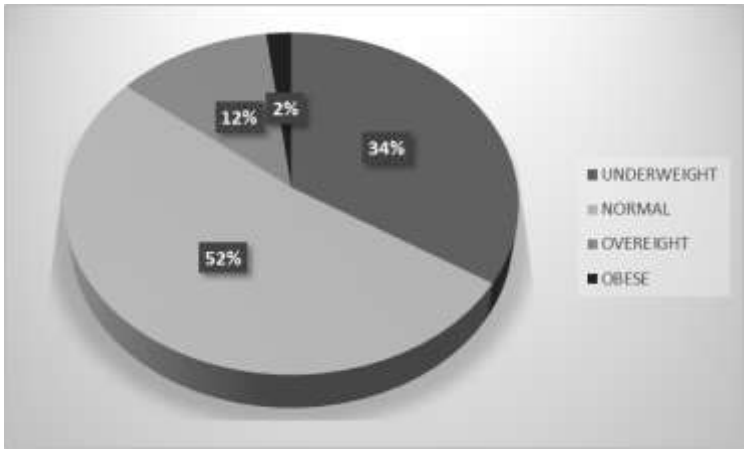

Fig-1: Pie diagram showing distribution according to weight

The prevalence of both overweight and underweight is relatively high, demonstrating the existence of the double burden of malnutrition among adolescents in developing countries [8]. Prevalence of overweight and obesity is 14.00%. In a similar study conducted in Nagpur, among the urban school going children, the prevalence of obesity was 14.52% [4]. In a similar cross sectional study to find the prevalence of overweight and obesity conducted in Private schools in Gulbarga in 2014, 150 high school students were included in the study [6].

Table 1: Distribution of Students According To Age and Sex

AGE (YEARS)	FEMALES N Percent	MALES N Percent	TOTAL N Percent
12	12 (17.65%)	4 (4.88%)	16 (10.67%)
13	26 (38.24%)	24 (29.27%)	50 (33.33%)
14	18 (26.47%)	30 (36.59%)	48 (32%)
15	11 (16.18%)	15 (18.29%)	26 (17.33%)
16	1 (1.47%)	8 (9.76%)	9 (6%)
17		1 (1.22%)	1 (0.67%)
TOTAL	68 (45.33%)	82 (54.66%)	150 (100%)

150 students were included in the study out of which 45.33% were females and 54.66% were males. A similar cross sectional study conducted in Bahraini adolescents (2001), included children in the age group of 12-17 years of age [7].

Table 2: BMI – Age Distribution

AGE (YEARS)	UNDERWEIGHT N Percent	NORMAL N Percent	OVERWEIGHT N Percent	OBESE N percent
12	6 (4%)	7 (4.7%)	3 (2%)	
13	24 (16%)	20 (13.3%)	4(2.7%)	2 (1.3%)
14	13 (8.7%)	29 (19.3%)	5(3.3%)	1 (0.7%)
15	7 (4.7%)	15 (10%)	4(2.7%)	
16	2 (1.3%)	6 (4%)	1(0.7%)	
17			1(0.7%)	
TOTAL	52 (34.7%)	77 (51.3%)	18 (12%)	3 (2%)

Age group of 14-16 years (mid adolescent) has the maximum no. of students (50) falling in the category of normal BMI percentile, percentage being 33.3% .Overweight and obese in our study was 14% and the others category included Underweight and Normal at 86%

Table 3: Sex-BMI Distribution

GENDER	OVERWEIGHT AND OBESITY N Percent	OTHERS CATEGORY N Percent	CHI SQUARE	P VALUE
FEMALES	10(6.66%)	58(38.66%)	0.000	1.00 NS
MALES	11(7.33%)	71(47.33%)		

NS*: **not significant***

BMI is the measure of one's body mass. Females typically have higher body fat than males and males tend to have a higher proportion of muscle mass[9]. In our study the prevalence of overweight and obesity in females is 6.66%, which is almost near to 7.33% in males. Gender did not show any significant association with overweight and obesity.

Table 4: Risk Factors Assessment

RISK FACTOR	OVERWEIGHT AND OBESITY		OTHERS		CHI SQUARE	PVALUE <0.05
	Yes %	No %	Yes %	No %		
Fast food	18 (12)	3(2)	19 (12.66)	110(73.33)	45.23	0.000**HS**
Binge eating	20 (13.33)	1(0.66)	14 (9.33)	115 (76.66)	68.63	0.000**HS**
Food between meals	5(3.33)	16(10.67)	41(27.34)	88(58.67)	0.23	0.631NS
Physical activity	10(10.67)	5(5.33)	91(60.67)	38(25.33)	0.073	0.786 NS
Family history of overweight	8(5.34)	13(8.66)	15(10)	114(76)	7.81	0.005 **S**

HS: highly significant, NS: not significant, **S**: significant

FAST FOOD – 12% of the total students in the overweight and obese category were found to prefer fast food to regular food. This was found to be highly significant at X^2= 45.23 with P< 0.000 .BINGE EATING - Binging is a pattern of disordered eating which consists of uncontrollable and compulsive eating especially when one is bored or stressed. In the overweight and obese category, 13.33% of the totals are binge eaters. X^2= 68.63 with P<0.000 which was found to be highly significant. Food in between meals - Children have high calorie needs as they are growing and tend to be varying physically active. Avoidance of food in between meals is the standard advice for body wt. control, the rationale being that snacking leads to over consumption and thus contributes to wt. gain. However, this is not what happens with children. Many studies have suggested that children in general, tend to be well tuned into their appetite and given the opportunity will only eat what they need. Therefore, if they are snacking, they will cut down their calories during main meals, thus suggesting that eating in between meals will only help in the nutritional growth of their body [10]. Prevalence of obesity is high in children who do not have food in between meals i.e. 10.67%. physical activity -3.33% of total students falling in the overweight and obese category do not indulge in any sort physical activity and rather prefer a sedentary lifestyle, which includes watching TV. Also 25.33% of the students falling in the normal category are at a risk of becoming overweight due to lack of physical exercise.

FAMILY HISTORY OF OVERWEIGHT –

It has now been well established that overweight and the different forms of obesity are conditions tending to concentrate within a family. Obesity risk is 2-8 times higher for a person with a family history as opposed to a person with no family history of obesity [12]. X^2= 7.81 with P<0.005 which was found to be significant.

Table 5: Sleep Hours

RISK FACTOR	OVERWEIGHT AND OBESITY		OTHERS		CHI SQUARE	PVALUE <0.05
	<8hrs %	>8hrs %	<8hrs %	>8hrs %		
Sleep Hours	16(10.67)	5(3.33)	101(67.33)	28(18.66)	0.000	1.000NS

P-value is **not significant**. According to National sleep foundation, children aged 12- 18 years need 8-10 hours of sleep each night to function at their best. Sleep is food for the brain and is very important for the healthy functioning of the body. Lack of sleep disrupts the balance of key hormones that control appetite [13]. 10.67% students sleep for less than 8 hours a day.

DISCUSSION

Childhood obesity is rapidly emerging as a global epidemic. Once just a problem of wealthy nations, it now affects countries at all economic levels, bringing a wave of ill health and lost productivity [15]. In this study, we have presented the estimates on the prevalence of overweight and obesity in high school going children who were aged 12-17 years in Nagpur city, by using the individual weight and height measures to calculate the BMI. The prevalence of overweight and obesity was found to be 12% and 2% respectively. Adequate physical exercise and reducing sedentary time are some of the other ways in which problems like obesity can be tackled at home [16]. A problem like binge eating , which in our study is significantly contributing to overweight and obesity can be treated by self-help programmes (may be individually, using a book or online course, or as part of a self-help support group), guided self-help (self-help supervised by regular contact with a professional), a specialist group intervention or individual (one-to-one) psychological therapy [17]. Our results revealed that avoiding fast food and binging could help in reducing the prevalence of overweight and obesity. The prevalence was significantly lower in children who preferred regular food to fast food and those who had no family history of overweight. However, risk factors like indulgence in physical activity, etc. we're not found to be significant in our case, A minimum of 60 min, but most likely 80-90 min of moderate-intensity physical activity per day may be needed to avoid or limit weight regain in formerly overweight or obese individuals.(11).

In addition, in our study, the prevalence of under nutrition was found to be quite high i.e. 34.7%, highlighting the need for policies focusing on both under and over nutrition. Both under nutrition and obesity are now amongst the top ten leading risk factors to the global burden of diseases as identified by WHO [18].

CONCLUSIONS

A total of 150 students of high school (8^{th}, 9^{th}, 10^{th} std.) were included in the study which belonged to age group of 12 to 17 years.45.33% students were females and 54.66% students were males.34.7% students were underweight, 51.3% students were normal, 12% students were overweight and 2% students were obese. About 6.67% females were found to be overweight or obese and 7.33% males were overweight and obese. The study confirmed the findings of other studies that were carried out in other parts of the country and emphasized that proper sleep pattern and healthy eating behaviour could contribute in controlling overweight and obesity. Also sedentary lifestyle that includes habits like binge eating, fast food consumption and also presence of family history of overweight significantly contributes more to the problem of obesity

RECOMMENDATIONS

The need of the hour is to undertake more prevalence studies with larger sample size considering the emerging epidemic. Importance of understanding the family history among overweight and obese has to be communicated to teachers and parents alike to focus on preventive and promotive measures Educating parents and teachers about importance of healthy eating, nutrition related knowledge and emphasis on effects of fast food and binge eating be stressed.

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