

ORIGINAL RESEARCH

A cross sectional study to find out the determinants associated with overweight and obesity among school children of 13-19 years age group

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ABSTRACT

Background: Obesity is a complex, multifactorial, and largely preventable disease that is emerging among all ages and socio-economic groups. The rapid increase in the prevalence of childhood obesity over the past few years is a result of environmental and cultural influences rather than genetic factors. **Material & Method:** The present study was a school based cross sectional study carried out among the students of government and private schools of Gwalior city. Written permission was taken from the Head/Principal of the school and the time suitable for data collection was enquired. Out of total 1000 selected as study participants i.e. school children of Gwalior city, 50 percent each were taken from Government and Private schools. **Result:** Of 327 overweight/obese study participants 164 were girls and nearly same numbers of boys i.e. 163 were in this category but girls have higher proportion of obesity grade I/overweight (46.2%) as compared to boys (33.3%). Among study participants 432 students had family history of overweight / obesity which has significant difference with non-overweight / non-obese, however family history of overweight / obesity was not correlated with overweight / obesity in their children. **Conclusion:** The proportion of overweight/ obesity in both genders of teenagers is increasing. Students from private schools, from joint families, have family history of overweight/ obesity or NCDs were more obese than their counterpart groups. Spending lots of hours watching television coupled with junk food/fast food intake and less physical activity were also emerged as contributing risk factors for overweight/ obesity in study population.

Keywords: Overweight, Obesity, School, Children.

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INTRODUCTION

World Health Organization (WHO) defined Obesity or overweight as a condition of abnormal or excessive fat accumulation that may impair health. Rate of overweight and obesity continue to grow in adults and children. From 1975 to 2016, the prevalence of overweight or obese children and adolescents aged 5–19 years increased more than four-fold from 4% to 18% globally.⁽¹⁾

The words ‘obese’/‘obesity’ have their roots in French and Latin, where the verb ‘obedere’ means ‘over eat’ and ‘obesitas’ means being very fat. Obesity is a complex, multifactorial, and largely preventable disease that is emerging among all ages and socio-economic groups. The prevalence of obesity seems to

be increasing in most parts of the world, even where it used to be rare.^(2,3)

The rapid progress of urbanization and demographic trends is associated with a cluster of unhealthy lifestyles. The cause of can be broadly divided into environmental, social and genetic factors, at the simplest level, obesity results from long-term positive energy balance i.e. the interaction of energy intake and energy expenditure. Due to lifestyle preferences or any other reasons when energy expenditure is less than energy intake it results in obesity. The rapid increase in the prevalence of childhood obesity over the past few years is a result of environmental and cultural influences rather than genetic factors.⁽⁴⁾

In developing nations sedentary activities and consumption of high calorie foods of low nutritional

value may be the most important etiological factors responsible for the very high rate of overweight in children. There are supporting evidence that excessive sugar intake by soft drink, increased portion size, and fast foods have been playing major roles in the rising rates of obesity all around the world. Overweight children have more chances to become obese adult than normal children.^(4,5)

As per World Health Organization (WHO) estimates, 41 million children under five years and more than 340 million children and adolescents in the age group of 13 to 19 years were having overweight or obesity in the year 2018.^(6,7) Although obesity can be easily identified at first sight, a precise assessment requires measurements and reference standards.

The present study was intended to reveal the prevalence and its associated factors among teenage school children of Gwalior city.

MATERIAL & METHOD

The present study was a cross sectional study conducted in the government and private schools of Gwalior city. Students of age group between 13 to 19 years were included for the study.

According to a study and the recent articles prevalence of overweight and obesity among school children varies from 03-29%.⁽⁸⁾

By considering a 10% allowable error and 95% confidence interval, the sample size to be taken will be $N = 4PQ/L^2$, where P= Prevalence = 29%, Q = (100 - P) = 71%, L = relative error = 10%

The minimum sample size required for the study is 980 so to round off the sample size of minimum of 1000 school children is taken.

List of government and private schools was obtained from the Office of the District Education Officer. A total of 10 schools (5 government and 5 private) located in urban region of Gwalior city were selected randomly from the list. The desired sample was

distributed equally in all 10 schools and 100 subjects were taken from each school.

Written permission from the school authorities and parents were taken before data collection. Approval from the institutional ethics committee was also obtained.[IEC certificate No. 20/IEC-GRMC/2019]

A pretested semi structured questionnaire was used to get information from the study participants. The variables studied included details regarding socio-demographic factors, family history, physical activity, dietary history and anthropometric measurements like weight, height, waist circumference and hip circumference. The height was measured with stadiometer. The height was recorded to the nearest 0.1 cm. The weight was measured in kilograms using standardized bathroom weighing machine. The weight was recorded to the nearest 0.5 kg.

After taking interviews from the study population, all forms were collected and compiled. Data was entered into Microsoft excel sheet and analyzed using SPSS. Descriptive statistics like frequency, percentages, measures of central tendency, measures of dispersion and inferential statistical tests like chi-square test, and odds ratio were used. The statistical significance was evaluated at 95% confidence level (p < 0.05).

RESULTS

Of the 1000 study subjects in the present study 355 were girls and 645 were boys. Majority were aged 15 years (38.3%) which was followed by children aged 16 and 15 respectively. The overall mean age of study subjects was 15.18 years with a range from 13 to 19 years. The mean age of boys was 15.17 years and of girls was 15.21 years. Students from class 8th to 12th were included in study. Of the 1000 study subjects highest were from class 10th (38.3%) while lowest were from class 12th (7.8%).

Of 327 overweight/obese study participants, girls have higher proportion of obesity grade I/overweight (46.2%) as compared to boys (33.3%). (Table 1)

Table 1: Prevalence of overweight / obesity according to gender

Sex	Normal weight	Overweight / obesity	OR	95% CI	df.
Girls (n=355)	191 (53.8%)	164 (46.2%)	2.53	1.93-3.33	p value<0.001 χ ² value45,56; df.=1
Boys (n=645)	482 (74.7%)	163 (25.3%)	Ref		
Total	673	327			

Among study participants 432 students had family history of overweight / obesity which has significant difference with non-overweight / non-obese, however family history of overweight / obesity was found positive among 193 (44.7%) children. (Table 2)

Table 2: Association of overweight / obesity according to BMI with relation to family history among study participants

Family history of overweight / obesity	Normal Weight (n=673)	Overweight / obesity (n=327)	Total (n=1000)	OR	95% CI	p value
Present	239 (55.3%)	193 (44.7%)	432	2.61	1.99-3.43	<0.001
Absent	434 (76.4%)	134 (23.6%)	568	Ref		
Total	673	327	1000			

*Chi square value = 49.56; df=1

Overweight/ obesity was found 32.9% Hindus and 25% Muslims. According to the type of family it was more among the children living in joint families and children belonging to upper socio-economic status. Notably, 66.5% overweight/ obese children were reported from families where their first-degree relatives were suffering with any non-communicable disease.

Regarding the dietary practices, prevalence of overweight and obesity is almost equal in vegetarians and non-vegetarians however fast food and junk food consumption and its frequency were reported higher prevalence of overweight and obesity.

Overweight and obesity among children who are doing any kind of physical exercise was 20.5% while it was 61.8% among children not doing any kind of physical exercise apart from routine activities.

Behavioral and psychological problems were found among children with overweight and obesity. Common problems reported were Unable to concentrate (49.8%), Lack of self-confidence (45.6%), Feeling of negligence (39.8%) and Concern about physical appearance (14.7%).

DISCUSSION

This was a cross sectional analytical study to know prevalence of overweight and obesity among school going teenagers (age 13-19 years) in Gwalior district of Madhya Pradesh. After applying inclusion and exclusion criteria data of height, weight, age and class etc were collected from 1000 participants. Weight in Kg and height in meters was used to calculate BMI of studied participants. The data were compared in terms of population distribution such as diet, exercise, gender, type of school, type of family, family history of obesity, number of meals per day, intake of junk food, sleep duration, religiosity, monthly income of family and education status of father etc.

Many studies done in India had shown that the prevalence of overweight and obesity are increasing among adolescents and children day by day. Indians, as an ethnic group are particularly at a higher risk for insulin resistance (syndrome X) and central obesity, both forerunners of diabetes, CHD and other "life style" disorders. It is now evident that these disorders begin early (during childhood days) and manifest over the course of life owing to interactions and accumulation of various risk factors, throughout the life course.⁽⁹⁻¹³⁾

The effect of many above mentioned factors on childhood obesity seem to be obvious, but largely have not proven by the clinical studies. In this study the convenient type of non-probability sampling was used in which pre-designed semi-structured questionnaires were distributed among participants.

For simple comparison purposes initial two groups were further assembled as non-overweight / non-obese group and last two groups as overweight / obese group. Jain, S. et al⁽¹⁴⁾ (2010) and Lobstein, T et al⁷ (2019) in their study reported that teenagers'

obesity is universal and found in both developed and developing nations, and its trend is increasing as industrialization expands.

Different studies on this topic have chosen different age groups and different numbers of participants criteria for childhood obesity, Chhatwal, J et al⁽¹⁵⁾ (2004) carried out study on 2008 children from Ludhiana city of 9-15 years of age; Jain, S et al⁽¹⁴⁾ (2010) studied childhood obesity pattern and associated risk factors in 2785 students of 10-16 years from class 5 to 11 in Meerut city. Mahajan, P. B. et al⁽¹⁶⁾ (2011) had taken sample of 12,685 children in the age group of 6-12 years, studying in class 1-7, from government and private schools of urban as well as rural areas of Puducherry. Our study used 1000 teenager students from the urban and rural parts of Gwalior from class 8-17 in which 645 were boys and 355 were girls.

We revealed that the overweight and obesity was more among the children living in joint families and upper socio-economic status. Family habits of diet, exercise and other behavior also affects childhood obesity as children learn them by modeling. In our search most of studies on types of family and their effect on childhood obesity were from India. Prashanth, K et al⁽¹⁷⁾ (2011) and Dewan, M. et al⁽¹⁸⁾ (2017) reported higher prevalence of obesity in children from nuclear families while in our study there was higher prevalence of obesity in joint families' children (42.6%).

The present study reported that the prevalence of overweight and obesity is almost equal in vegetarians and non-vegetarians however fast food and junk food consumption and its frequency were reported higher prevalence of overweight and obesity. Similar finding was observed by Borude, S. et al⁽¹⁹⁾ who conducted a study on 235 Indian patients suffering from morbid obesity and reported no co-relation with type of diet and obesity.

CONCLUSION

The proportion of overweight/ obesity in both genders of teenagers is increasing. Students from private schools, from joint families, having family history of overweight/ obesity, NCDs were more obese than their counterparts. Spending lots of hours watching television coupled with junk food/fast food intake and less physical activity were also emerged as contributing risk factors overweight/ obesity in study population. Less sleep duration was also found in overweight/ obese participants. The behavior problems were also significantly higher in overweight/ obese group.

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