

## Original Research Article

# A study of the prevalence of childhood obesity and overweight in private and government schools of Meerut city

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### ABSTRACT

**Background:** As per WHO childhood obesity is one of the most serious public health challenges of the 21st century, it is a global problem affecting many low and middle-income countries, particularly in urban settings. Childhood obesity affects adulthood and becomes the cause of non-communicable diseases like diabetes and cardiovascular diseases. Overweight and their related diseases are preventable with early intervention and lifestyle modifications. Here we aimed to find out the prevalence of overweight and obesity of school going children of Meerut city.

**Methods:** Four Hundred children from four schools of Meerut city were studied. Age, weight, height, socioeconomic status, food habits, and family history were recorded for further analysis.

**Results:** Out of 400 children, 7% were overweight and 4% had obesity. We observed that obesity was more prevalent in private school going students. Leisure time and fast food are the major causes of obesity.

**Conclusions:** A total of 11% of school going children were overweight and obese which is alarming and should be tackled in a more proactive and urgent manner. This study concludes that there is dire need of awareness against the junk foods at the same physical activities, games, health education and awareness programs should be included in the education system for students, parents, and teachers to understand and fight the obesity.

**Keywords:** Inactive lifestyle, Education, Lifestyle modifications, Food habits

### INTRODUCTION

It has been reported that in India is the country with highest children living with obesity after China. The previous study reported that around 14.4 million children in India are overweight. Global data suggest more than two million children and adults are either overweight or obese.<sup>1</sup>

An individual with abnormal or excessive fat accumulation which can put an individual to health risk is defined as overweight or obese. Obesity is measured using body mass index (BMI) which can be calculated as a person's weight (in kilograms) divided by the square of

his or her height (in meters). Any individual having a BMI of more than 30 kg/m<sup>2</sup> is considered as obese and BMI more than or equal to 25 is treated as overweight.<sup>2</sup>

An overweight or obese individual is at risk of developing major chronic diseases. This was once believed to be the problem of developed countries, however recent data has shown the urban areas of developing countries with an increasing prevalence of overweight and obesity.<sup>2</sup>

As India battling malnutrition at the same time the country has developed nutritional problem obesity. According to the National Family Health Survey (NFHS-4) in the past decade, the number of people having

obesity has doubled in India. NFHS-4 survey has highlighted that obesity is more common in an urban area as compared to rural areas.<sup>3</sup> The proportions of children in the general population who are overweight and obese have doubled over the past two decades in developed and developing countries including India and have a rising prevalence of diabetes.<sup>4</sup>

In India nutritional status changes considerably region to region and childhood malnutrition varies up to 20 to 80% from region to region, surprisingly at the same time, there is a considerable rise in prevalence of childhood overweight and obesity throughout the country.<sup>5</sup> In the present study we tried to find out the prevalence of overweight and obesity in school going children of Meerut city.

## METHODS

For this study 400 school going children from 4 different schools of Sadar Meerut were enrolled and studied between February 2017 to June 2018. For having more realistic sample and representation from different social classes, 2 private and 2 government schools from Meerut city were chosen. A pre-designed questionnaire based on Global school-based student health survey was used to capture the physical, medical and lifestyle details of the subjects.<sup>6</sup>

Before conducting the study a formal written consent from children, their parents, and permission from schools were secured. Permission was secured from school authorities and state education department.

Students of age group 12 to 18 years studying in sixth to the tenth standard were included in this study and subjects with illness or on medication or not consented were excluded.

All the subjects (their parents and teachers) were interviewed to collect the details like age, sex, food habits, time spent on non-physical and leisure activities, time spent on physical activities and games and family history of obesity.

Eating habits like intake of junk/fast food weekly and monthly recorded. Foods commonly considered junk foods include salted snack foods, chewing gum, candy, sweet desserts, fried fast food, high cheese foods like burgers, pizza and sugary carbonated beverages like Pepsi, coca-cola.

Physical activity of the children is classified as per WHO guidelines. Children indulge in physical activity for 60 to 90 minutes moderately to vigorously per day classified as physically active. Moderate activity included brisk walking, dancing, household chores, and vigorous exercise includes running, fast cycling, fast swimming, moving a heavy load, playing football etc.<sup>7</sup>

Height and weight of the subjects and as recorded using the digital weighing machine and meter tap to calculate the BMI. BMI was calculated according to the WHO child growth reference, 2007 and a set of thresholds based on single standard deviation spacing was used in the study.

$BMI = \text{weight (kg)} / \text{height}^2 \text{ (m}^2\text{)}$  (i.e. weight in kilograms is divided by square of weight in meter).

Subjects were grouped as per the BMI ranges as underweight (<18.5 kg/m<sup>2</sup>), normal (18.5 to 25 kg/m<sup>2</sup>), overweight (25 to 30 kg/m<sup>2</sup>) and obese (>30 kg/m<sup>2</sup>)

Study data were stored and analyzed using IBM SPSS ver. 20 software. Data was first entered in the Microsoft Excel 2010 software and analyzed. The risk factors were assessed by using Fisher's exact and chi-square test. Level of significance was assessed at 5%.

## RESULTS

The result is designed and reported based on the BMI index in four categories as below (Table 1).

**Table 1: Distribution of BMI among the subjects.**

BMI category	N	%	mean BMI (kg/m <sup>2</sup> )	Mean weight (kg)	Mean height (m)
Underweight	88	22	15.88	39.66	1.58
Normal	268	67	22.93	53	1.52
Overweight	28	7	27.47	66	1.55
Obese	16	4	32.81	63	1.45

Data is expressed as mean, BMI; body mass index, N; no of subjects, underweight (<18.5 kg/m<sup>2</sup>), normal (18.5 to 25 kg/m<sup>2</sup>), overweight (25 to 30 kg/m<sup>2</sup>) and obese (>30 kg/m<sup>2</sup>).

BMI below 18.5 is considered as Underweight, BMI between 18.5 and 25 is considered normal, BMI between 25 and 30 is considered as overweight and BMI above 30 is considered as obese.

**Table 2: Distribution of BMI of subjects school wise (n=200).**

BMI category	Private school		Govt. school		Total
	N	%	N	%	
Underweight	40	45.45	48	54.55	88
Normal	128	47.76	140	52.24	268
Overweight	20	71.43	8	28.57	28
Obese	12	75.0	4	25.0	16

Data is expressed as mean, BMI; body mass index, N; no of subjects, underweight (<18.5 kg/m<sup>2</sup>), normal (18.5 to 25 kg/m<sup>2</sup>), overweight (25 to 30 kg/m<sup>2</sup>) and obese (>30 kg/m<sup>2</sup>).

For this study, a comparative analysis was also done between the children going to the private school and thus

going to the government schools. In this study we found that 71% of overweight subjects' are private school going, similarly, 75% obese subjects i.e. 39 are also from private school going group (Table 2). This shows the overweight and obesity are more prevalent among private school going children.

This is mainly attributed to the social-economic stratification in India where rich and upper-middle-class children go to the private schools, similarly, this difference reflects on the diet and physical activity of children.

Age wise analysis of data shows that the obesity and overweight are more prevalent in the age group of 15 year to 18 years, this could be due to the changes in the lifestyle with age like more involvement in leisure lifestyle with decreased physical activity, more intake of junk food etc.

As per the collected data, it is evident the most prominent factor of overweight and obesity is the erratic diet pattern and consumption of junk food. More than 38% of the subjects have eaten out once or more in a week, 71% of subject eaten chocolates or chips or wafers at, 36% subjects had cheesy food like sandwich or, 42% subject had pizzas, 54% had fast food like eat noodle or fries, 53% subject consumed sugary or carbonated drinks at least once or more in a week.

## DISCUSSION

This study was conducted on 400 students between the age of 10 to 15 years in 2 government and 2 private schools in Meerut city. Based on the BMI subjects were divided into 4 groups as normal, underweight, overweight and obese.

The current study recorded the prevalence of obesity and overweight as 4% and 7% respectively and the overall prevalence of 11%. Finding of this study agrees with those of Khot et al, as per their study on school children of Aurangabad combined prevalence was 10% (overweight: 7%; obesity: 3%) which is like ours and slightly higher in a study in Nagpur i.e. a combined prevalence of 14% (overweight: 12%; obesity: 2%).<sup>8</sup> In the study by Jacob et al 2014 in which WHO growth reference charts, 2007 was used like ours but the sample size was only 150. In Kerala, it was 10.7% (overweight: 7.56%; obesity: 3.10%) respectively through the school children belonged to the rural area of Kerala unlike ours.<sup>9</sup> Bhargava et al in their study at hill states of India recorded the prevalence of overall overweight and obesity was 15.6 % which is higher than our result.<sup>10</sup> On analysis of age wise distribution of BMI current study shows that overweight and obesity is highest in 14-15 year age group school children and similar findings were observed by Kavitha et al in her study at Gulbarga where the prevalence of overweight and obesity were more among 15 years students followed by 14 year age group of children.<sup>11</sup>

This study records that 71% of overweight and 75% obese subjects' were enrolled in private schools, this difference was significant (chi-square: 578.62,  $p < 0.00002$ ). Majority of the students of private schools belong to the upper middle and upper socio-economic group having better resources and leisure amenities. On the other hand, the govt. school going students are from a lower socioeconomic group. Similar findings were reported from Bhubaneswar and Chennai by the studies of Jagadesan et al and Patnais et al.<sup>12,13</sup>

Other major factors and behaviors responsible for overweight and obesity are unhealthy food habits and lack of physical activity. These risk behaviors among overweight and obese children were compared with non-obese children. In our study, we found the association between fast food eating and obesity significant. (chi square=23.94,  $p < 0.05$ ). More percentage of obese children was taking fast food compared to that of non-obese children. Similar observations were reported by Martha "At present, Indians and teens, in particular, do prefer to eat American chains shunning traditional cuisines".<sup>14</sup>

This study observed that around 55% of both obese and non-obese subject has spent significant time on leisure activities like TV watching, mobile phones and video games, this association of leisure time and obesity was found significant (chi square=2.77,  $p = 0.0956$ ,  $p > 0.05$ ). Similar observations were recorded by Shah et al in their study at Mehsana, Gujarat.<sup>15</sup> Another factor of obesity assessed in this study is a family history of obesity, this study record that 15% obese children had a family history of overweight and obesity compared to that of non-obese children 7.5% which was found significant (chi-square value 4.1145,  $p = 0.0425$ ,  $p < 0.05$ ), this observation is similar to the meta-analysis by Kanciruk who conclude that the children with a family history of obesity were at an elevated risk for overweight and obesity compared with children who did not have a family history of obesity.<sup>16</sup>

## CONCLUSION

We conclude that the prevalence of overweight and obesity is higher among private school goers than the students of government schools. Other major factors like food habit, time spent on physical activity and family history of obesity also factors of obesity.

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