

# Study of various risk factors responsible for overweight and obesity in school children

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## Abstract

**Background:** Now a day's children's obesity is burning issue. Obesity has reached epidemic levels in developed countries. The highest prevalence rates of childhood obesity have been observed in developed countries; however, its prevalence is increasing in developing countries as well.<sup>1</sup> Females are more likely to be obese as compared to males, owing to inherent hormonal differences.<sup>2</sup> It is emerging convincingly that the genesis of Type 2 Diabetes and Coronary Heart Disease begins in childhood, with childhood obesity serving as an important factor.<sup>3</sup> There has been a phenomenal rise in proportions of children having obesity in the last 4 decades, especially in the developed world. **Aim and Objective:** To study the various risk factors responsible for overweight and obesity in school children. To study Proportion of overweight and obesity in school children. **Methods:** Cross sectional study, **Study setting:** Non-government schools in the urban area near a Medical College. **Study duration:** 2 years (October 2016 to December 2018). **Study population:** The study population included all the School children between the ages of 12 and 15 years. **Sample size:** 600 **Results:** The maximum number of study subjects belonged to the age group of 14-15 years i.e. 360 (60%). The participants belonged to the age group of 12-13 years i.e. 240 (40%). Female constituted 100 (59.18%) of study population and males constituted rest 69 (40.82%) of study population. Majority of participants were from Urban areas i.e. 458 (76.33%) and while 115 (23.67%) were from Rural area. Majority of study subjects belonged to Hindu religion i.e. 460 (76.66%). Muslims, Buddhists and other religion were 59 (9.83%), 52 (8.66%) and 29 (4.83%) respectively. Majority of participants belonged in mixed dietary pattern i.e. 161 (81.3%) and Vegetarian 83 (13.84%). prevalence of overweight was 17.33% (104) and obesity was found 10.84% (24) **Conclusions:** The maximum number of study subjects belonged to the age group of 14-15 years., Majority study participants were females Majority of study subjects belonged to Hindu religion, Majority of participants belonged in mixed dietary pattern, prevalence of overweight was 17.33% (104) and obesity was found 10.84% (24). Association of overweight and obesity with age group not significant at  $p < 0.05$ . Association of overweight and obesity with gender not significant at  $p < 0.05$ . Association of overweight and obesity with socioeconomic status was significant at  $p < 0.05$ . **Keywords:** BMI, Obesity, Overweight, Dietary pattern.

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## INTRODUCTION

Now a day's children's obesity is burning issue. Obesity has reached epidemic levels in developed countries. The highest prevalence rates of childhood obesity have been observed in developed countries; however, its prevalence is increasing in developing countries as well.<sup>1</sup> Females are more likely to be obese as compared to males, owing to inherent hormonal differences.<sup>2</sup> It is emerging convincingly that the genesis of Type 2 Diabetes and Coronary Heart Disease begins in childhood, with childhood obesity serving as an important factor.<sup>3</sup> There has been a phenomenal rise in proportions of children having obesity in the last 4 decades, especially in the

developed world. Studies emerging from different parts of India within last decade are also indicative of similar trend.<sup>4-9</sup> This view has been challenged over recent years and we presently consider these as different forms of the global malnutrition problem. This new conceptualization leads us to simultaneously address the root causes of nutritional deficiencies which in turn will contribute to the control of under nutrition and the prevention of obesity, diabetes, and other NRCs.

### Need for the study

Childhood obesity is one of the most serious public health challenges of the 21<sup>st</sup> century. The problem is global and is steadily affecting many low- and middle-income countries, particularly in urban settings. The prevalence has increased at an alarming rate. Globally in 2010, the number of overweight children under the age of five is estimated to be over 42 million. Close to 35 million of these are living in developing countries. Childhood obesity is the new emerging epidemic in India. In last 15 years the prevalence of overweight and obesity has increased almost four times (4 to 15%). India has the second highest number of obese children in the world, with 14.4 million reported cases. According to the recent statistics around 5-8.8% of school children are obese in India. There was very few studies conducted in Maharashtra about factors affecting obesity in school children and impact of obesity on their quality of life. The obesity has reached an epidemic proportion in urban Indian population. If we allow this epidemic to continue we will top the world in Diabetes and CHD earlier than estimated. The cost of treating diabetes mellitus and associated disorders alone will consume a major chunk of our national resources, which we cannot afford. Only community-based approaches can address such large numbers of affected children. So I conducted this study to find the prevalence of overweight and obesity in school children between the ages of 12-15 years. And to study the association of various factors responsible for overweight and obesity in school children. And to study the quality of life of overweight and obese school children compared to non-obese school children both quantitatively and qualitatively. To make suitable recommendations for prevent the childhood obesity in school children.

### METHODOLOGY

**Study design:** Cross sectional study. **Study setting:** Non-government schools in the urban area near a Medical College. **Study duration:** 2 years (from October 2016 to December 2018). **Study population:** The study population included all the School children between the ages of 12 and 15 years.

**Inclusion criteria:** Male and Female children of 12-15 years of age.

**Exclusion criteria:** 1. Those not willing to participate in the study. 2. Those currently receiving any psychotropic medication and on steroids. 3. Those with co-morbid physical disabilities, long-term health problems or mental health disorders they rated as having a greater impact on their life than their weight. 4. Those with disease history of anorexia nervosa, bulimia, major depression, panic disorders, psychosis, bi-polar disorders.

**Approval for the study:** Written approval from Institutional Ethics committee was obtained beforehand. Community medicine and School departments were informed about the study. Written approval of Education department was obtained. After obtaining written approval study was undertaken by interviewing study participants with the help of questionnaire. All the overweight and obese students were included in the study

**Sample size:** Considering the prevalence of Obesity and Overweight in various studies ranges from 2-19%. (23, 24, 25)

**Prevalence (P)** of obesity and overweight in adolescents was taken as 10%.

**Allowable error (L)** 25 % on either side of the prevalence at 95% confidence interval was taken as level of precision of the estimate. Based on this assumption the sample size calculated was as follows:

$$\text{Sample size} = 4PQ / L^2 = 4 \times 10 \times 90 / 2.5 \times 2.5 = 3600 / 6.25 = 576$$

P = prevalence of obesity and overweight, Q = 100 – P, L = Allowable error (% of P)

**Sample Size- 576 rounded to 600**

**Selection of schools:** For the selection of schools, the list of all schools belonging to different categories Government schools and Private schools was obtained from the school authorities of the local government. From the list of school by systematic random sampling method, we selected 10% schools. i.e. 3 private schools were selected for study. First we selected 10th number school and then every 10th school was included in the study.

**Selection of subjects:** As the standards of the school are divided in to Primary schools, Middle school and Secondary schools, we conducted our study on children of Middle school. i.e. 7th-9th standard (12-15 years) 2 divisions from each standard were randomly selected and all students of those divisions were included in the study. For every overweight and obese student selected, 3 control students were selected and included in the study. Total of 600 students were studied from these schools, of different affluence, as well as both boys and girls.

**Sampling technique:** Systematic random sampling method used for school selection, we selected 10% schools. i.e. 3 private schools were selected for study. First we selected 10th number school and then every 10th school was included in the study. 7th-9th standard (12-15 years) 2

divisions from each standard were randomly selected and all students of those divisions were included in the study. For every overweight and obese student selected, 3 control students were selected and included in the study. explained the purpose of study and who gave consent and detailed history such cases included in this study

**Methods of Data Collection and Questionnaire:** Predesigned and pretested questionnaire was used to record the necessary information. Questionnaires included general information, socioeconomic details, Personal details of the individual like age, gender, religion, place of residency, parents education, parents occupation, type of family, per capita income and socioeconomic class, BMI, Family health status. Dietary history obtained by using diet questionnaire, physical activity and quality of life history obtained by using specific questionnaire. The interview technique was used as a tool for data collection. All the overweight and obese students explained the purpose of

study. Informed consent was collected from the participants and confidentiality was assured. Those who fulfilled the criterion and agreed to participate were included in the study. Detailed history was obtained from participants. History taking involved personal details of the individual, name, age, sex, family income, per capita income, Socioeconomic status, Religion, place of residence, no of family member, parents education, parents occupation, detailed dilatory history, physical activity history, quality of life all detailed history write in questionnaire. The data were entered in Microsoft Excel and data analysis was done by using SPSS for windows. The analysis was performed by using percentages in frequency tables and association of the other determinants related to obesity.  $p < 0.05$  was considered as level of significance using the Chi-square test and Fishers exact test.

## RESULTS AND OBSERVATIONS

**Table 1:** Distribution of study subjects according to age

Sr No	Age in years	Frequency	Percentage
1	12-13	240	40%
2	14-15	360	60%
<b>Total</b>		<b>600</b>	<b>100</b>

The maximum number of study subjects belonged to the age group of 14-15 years i.e. 360 (60%). The participants belonged to the age group of 12-13 years i.e 240 (40%).



**Figure 1:** Sex wise Distribution

The above figure no 1 shows sex wise distribution of overweight and obesity study subjects. Female constituted 100 (59.18%) of study population and males constituted rest 69 (40.82%) of study population.

**Table 2:** Distribution of study subjects according to Religion

Sr No	Religion	Frequency	Percentage
1	Hindu	460	76.66
2	Muslim	59	9.83
3	Buddhist	52	8.66
4	Other	29	4.83
<b>Total</b>		<b>198</b>	<b>100</b>

Majority of study subjects belonged to Hindu religion i.e. 460 (76.66%). Muslims, Buddhists and other religion were 59 (9.83%), 52 (8.66%) and 29 (4.83%) respectively.

**Table 3:** Distribution of study subjects according to Socio-Economical Class

Sr No	Socio-Economical Class	Frequency	Percentage
1	I	296	49.33%
2	II	232	38.66%
3	III	57	9.5%
4	IV	11	1.83%
5	V	4	0.66%
<b>Total</b>		<b>600</b>	<b>100%</b>

The majority of the study subjects belonged to I Class i.e. 296 (49.33%). The study participants from Class II, III, IV and V were 232 (38.66%), 57 (9.5%), 11 (1.83%) and 4 (0.66%) respectively.

**Table 4:** Distribution of study subjects according to Dietary pattern

Sr No	Dietary pattern	frequency	Percentage
1	Vegetarian	83	13.84%
2	Mix	517	86.16%
<b>Total</b>		<b>600</b>	<b>100%</b>

Majority of participants belonged in mixed dietary pattern i.e. 161 (81.3%) and Vegetarian 83 (13.84%).

**Table 4:** Prevalence of overweight and obesity among school children's

Sr No	Health status	Frequency	Percentage
1	Normal BMI	431	71.83%
2	Overweight	104	17.33%
3	Obesity	65	10.84%
<b>Total</b>		<b>600</b>	<b>100%</b>

The above table shows majority of study participants belonged in Normal BMI group i.e 431 (71.83%) prevalence of overweight was 17.33% (104) and obesity was found 10.84% (24)

**Table 5:** Association of overweight and obesity with age group

Sr No	Age	Overweight and obesity			Percentage	Total (%)
		Present	Percentage	Absent		
1	12-13	69	28.75%	171	71.25%	240 (40%)
2	14-15	100	27.77%	260	72.23%	360 (60%)
<b>Total</b>		<b>169</b>	<b>28.16%</b>	<b>431</b>	<b>71.84%</b>	<b>600(100)</b>

Chi Square= 0.0673 df= 1 p value=0.795351

The proportion of overweight and obesity was highest in the age group of 14-15 years i.e. 100 (17.77%) and 69 (28.75%) in 12-13 years age group. When statistical analysis using Chi- square test was done, proportion of overweight and obesity was statistical not significant in age group ( $p > 0.05$ ).

**Table 6:** Association of overweight and obesity with gender

Sr No	Sex	Overweight and obesity				Total (%)
		Present	Percentage	Absent	Percentage	
1	Male	100	27.02%	270	72.98%	370(100)
2	Female	69	30%	161	70%	230(100)
<b>Total</b>		<b>169</b>	<b>28.16%</b>	<b>431</b>	<b>71.84%</b>	<b>(100)</b>

Chi Square= 0.6196 df: 1 p value= 0.431203

The proportion of overweight and obesity was highest in female i.e.69 (30%) and the proportion in male was 100 (27.02%). When statistical analysis using Chi- square test was done, difference between two groups was statistically not significant ( $p > 0.05$ )

**Table 7:** Association of overweight and obesity with socioeconomic status

Sr No	Socio-Economical Class	overweight and obesity			Percentage	Total (%)
		Present	Percentage	Absent		
1	I	100	51.02	196	48.98	296(100)
2	II	36	15.51	196	84.49	232(100)
3	III	30	52.63	27	47.37	57(100)
4	IV	2	18.18	9	81.82	11(100)
5	V	1	25	3	75	4(100)
<b>Total</b>		<b>169</b>	<b>28.16</b>	<b>431</b>	<b>71.84</b>	<b>600(100)</b>

Chi Square=12.6211 df: 1 p value = 0.000381, Rows 1and2 pooled together, Row 2,3,4 pooled together

The proportion of overweight and obesity was highest in III socio economical class i.e.52.63% followed by I Class 51.02% followed by V class 25% ,18.18% in class IV and 15.51% in II class.

Statistical analysis using Chi square test was done, the difference between groups was highly statistically significant ( $p < 0.0003$ ).

## DISCUSSION

In this study maximum number of study subjects belonged to the age group of 14-15 years i.e. 360 (60%). The participants belonged to the age group of 12-13 years i.e

240 (40%) similar result found in the study of Bharati D.R *et al.* (2008)<sup>10</sup> Conducted study at Wardha, central part of India he observed that the Overall, 79(3.1%) children were overweight while 32(1.2%) were obese. In this study sex

wise distribution of overweight and obesity study subjects. Female constituted 100 (59.18%) of study population and males constituted rest 69 (40.82%) of study population. Similar studies found following observations *Khadilkar et al.*<sup>11</sup> reported on affluent Indian 2- to 17-year-old children and showed that the prevalence of overweight and obesity was 18.2 per cent by the IOTF classification while it was 23.9 per cent using WHO cut-points and the prevalence was higher in boys. Sidhu and colleagues<sup>12</sup> from Amritsar reported overweight in 10 per cent among boys and 12 per cent among girls and obesity in 5 per cent boys and 6 per cent in girls. Kotian and co-workers<sup>13</sup> reported that the overall prevalence of overweight and obesity were 9.3 and 5.2 per cent, respectively among boys and 10.5 and 4.3 per cent among girls, in a semi urban city in Karnataka. In this study Majority of study subjects belonged to Hindu religion i.e. 460 (76.66%). Muslims, Buddhists and other religion were 59 (9.83%), 52 (8.66%) and 29 (4.83%) respectively. Similar result observed in the study by Karki, A *et al.* (2019)<sup>14</sup> The majority of the study subjects belonged to I Class i.e. 296 (49.33%). The study participants from Class II, III, IV and V were 232 (38.66%), 57 (9.5%), 11 (1.83%) and 4 (0.66%) respectively. Similar result found in the study by Mundada V.D (2013)<sup>15</sup> Dietary pattern Majority of participants belonged in mixed dietary pattern i.e. 161 (81.3%) and Vegetarian 83 (13.84%). Contract result in the study conducted by Dhole S.S., Mundada V.D (2013)<sup>15</sup> He found that the prevalence overweight was higher in vegetarian diet (11.23%) and obesity was maximum in the mix diet (7.4%). Similar result found in the study of Rebecca Kuriyan *et al.* (2007)<sup>16</sup> from their study reported that among eating behaviours, the consumption of fried food items, more than 6 times/week, was associated with significantly higher odds of being overweight (3.1,  $p = 0.014$ ) when compared to fried food consumption less than 2.5 times/week. None of the other eating behaviours were found to be significantly associated with being overweight. In this study majority of study participants belonged in Normal BMI group i.e 431 (71.83%) prevalence of overweight was 17.33% (104) and obesity was found 10.84% (24). similar result found in the study of Dhole S.S., Mundada V.D (2013)<sup>15</sup> He found that the Out of 392 children who had watch television per day, 337(86%) children had normal BMI, 30(7.7%) children were overweight and 25(6.4%) children were obese.

## CONCLUSION

The maximum number of study subjects belonged to the age group of 14-15 years. Majority study participants were females. Association of overweight and obesity with age group not significant at  $p < .05$ . Association of overweight and obesity with gender not significant at  $p < .05$ .

Association of overweight and obesity with socioeconomic status was significant at  $p < 0.5$ . Girls who were satisfied with their body weight had significantly higher scores in emotional functioning ( $p = 0.003$ ), social functioning ( $p = 0.006$ ), school functioning ( $p = 0.127$ ) and total HRQoL ( $p = 0.001$ ) compared to girls who were dissatisfied with their body weight.

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