

To Study the prevalence of overweight and obesity in school children A Cross sectional study

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Abstract

Background: 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.¹ Females are more likely to be obese as compared to males, owing to inherent hormonal differences.² 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.³ There has been a phenomenal rise in proportions of children having obesity in the last 4 decades, especially in the developed world.

Aim & Objective: 1. To Study the prevalence of overweight and obesity in school children between the ages of 12-15 years. 2. To study the association of various factors responsible for overweight and obesity in school children. **Methods:** Cross sectional study, **Study setting:** Non-government schools in the urban area near a Medical College. **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 $p < .05$. Association of overweight and obesity with gender not significant at $p < .05$. Association of overweight and obesity with socioeconomic status was significant at $p < 0.5$.

Keywords: BMI, Obesity, Overweight, Dietary pattern

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Introduction

The world is undergoing a rapid epidemiological and nutritional transition characterized by persistent nutritional deficiencies, as evidenced by the prevalence of stunting, anemia, and iron and zinc deficiencies. Concomitantly, there is a progressive rise in the prevalence of obesity, diabetes and other nutrition related chronic diseases (NRCDs) like obesity, diabetes, cardiovascular disease, and some forms of cancer.

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.¹

Females are more likely to be obese as compared to males, owing to inherent hormonal differences.² 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.³ 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.⁴⁻⁹ 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 NRCDs.

This summary provides a public health overview of selected key issues related to the prevention of obesity and chronic diseases with a life-course perspective of nutrition and child growth. The ecological model, as described by Davison *et al.*, suggests that child risk factors for obesity include dietary intake, physical activity, and sedentary behavior.¹⁰

The impact of such risk factors is moderated by factors such as age, gender. Family characteristics parenting style, parents' lifestyles also play a role. Environmental factors such as school policies, demographics, and parents' work-related demands further influence eating and activity behaviors. Genetics are one of the biggest factors examined as a cause of obesity. Some studies have found that BMI is 25–40% heritable.¹¹

However, genetic susceptibility often needs to be coupled with contributing environmental and behavioral factors in order to affect weight.¹² The genetic factor accounts for less than 5% of cases of childhood obesity.¹¹ Therefore, while genetics can play a role in the development of obesity, it is not the cause of the dramatic increase in childhood obesity. Review of the literature investigates factors behind poor diet and offers numerous insights into how parental factors may impact on obesity in children.¹³

Methodology

Study design: Cross sectional study. **Study setting:** Non-government schools in the urban area near a Medical College. **Study population:** The study population included all the School children between the ages of 12 and 15 years.

Inclusion criteria:

1. 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 of 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

Age in years	Frequency	Percentage
12-13	240	40%
14-15	360	60%
Total	600	100

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%)

Table 2: Distribution of overweight and obesity students according to Sex

Sex	No of school children	Percentage
Male	100	59.18%
Female	69	40.82%
Total	169	100%

The above table 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 3: Prevalence of overweight and obesity among school children's

Health status	Frequency	Percentage
Normal BMI	431	71.83%
Overweight	104	17.33%
Obesity	65	10.84%
Total	600	100%

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 4: Association of overweight and obesity with age group

Age	Overweight and obesity			Percentage	Total (%)
	Present	Percentage	Absent		
12-13	69	28.75%	171	71.25%	240 (40%)
14-15	100	27.77%	260	72.23%	360 (60%)
Total	169	28.16%	431	71.84%	600(100)

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 5: Association of overweight and obesity with gender

Sex	Overweight and obesity			Percentage	Total (%)
	Present	Percentage	Absent		
Male	100	27.02%	270	72.98%	370(100)
Female	69	30%	161	70%	230(100)

Total	169	28.16%	431	71.84%	(100)
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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 6: Association of overweight and obesity with socioeconomic status

Socio-Economical Class	overweight and obesity			Percentage	Total (%)
	Present	Percentage	Absent		
I	100	51.02	196	48.98	296(100)
II	36	15.51	196	84.49	232(100)
III	30	52.63	27	47.37	57(100)
IV	2	18.18	9	81.82	11(100)
V	1	25	3	75	4(100)
Total	169	28.16	431	71.84	600(100)

Chi Square=12.6211 df: 1 p value = 0.000381, Rows 1&2 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)¹⁴ 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.

The proportion of overweight/obesity was higher (5.0%) in late adolescence (>15 yr of age) than in early adolescence (< 15 yr of age). Avula Laxmaiah et al (2007)¹⁵ Conducted study at Hyderabad,he found that the prevalence of overweight it was the highest at the age of 14 years (9.2%) and decreased to 5.3% at the age of 17 years.

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*¹⁶ reported on affluent Indian 2 to 17 yr 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.

Chhatwal *et al*¹⁷ reported overall prevalences of childhood obesity and overweight in Punjab as 11.1 and 14.2 per cent, respectively and again a higher prevalence in boys (12.4 vs 9.9%, 15.7 vs 12.9%). Sidhu and colleagues¹⁸ 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. Avula Laxmaiah et al (2007)¹⁵ Conducted study at Hyderabad,he found that the prevalence of overweight among girls tended to increase from 6.2% at 12 years to 10.8% at the age of 15 years and gradually decreased at 17 years (9.2%), whereas in boys. Haider Javed Warraich et al (2009)¹⁹ He found that the, in the 6th class out of total104children, 67 were male and female 37.

Premanath M et al (2008)²⁰ in their study observed that, there were 23527 boys (54.5%) and 19625 girls (45.5%). Karki, A et al (2019)²¹ He found that the Among 328 male children, 62 (19.0%) were overweight and 35 (10.6%) were obese. Likewise, among 247 female children,

45 (18.2%) were overweight and 6 (2.4%) were obese. contract result found in the study of Kumar S et al (2007)²² He found that the total of 1496 children studied (975 boys, 521 girls). Prevalence of obesity was more in girls (8.82%) than boys (4.10%). Karki, A et al (2019)²¹ He found that Among 328 male children, 62 (19.0%) were overweight and 35 (10.6%) were obese. Likewise, among 247 female children, 45 (18.2%) were overweight and 6 (2.4%) were obese.

Association of overweight and obesity with age group. 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 ($p > 0.05$).

Similar result found in the of Bharati D.R et al (2008)¹⁴ 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. The proportion of overweight/obesity was higher (5.0%) in late adolescence (>15 yr of age) than in early adolescence (< 15 yr of age). But the difference was not statistically significant.

Association of overweight and obesity with gender. 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 ($p > 0.05$). Similar result found in the of Bharati D.R et al (2008)¹⁴

Association of overweight and obesity with socioeconomic status. 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 ($p<0.0003$).

Contract result found in the study of Karki, A et al (2019)²¹ He studied association between monthly income of the family .it was found that children belonging to families with monthly incomes more than 50,000 NRs ($> 487.8\$$) had 1.7 times more likely of having high junk food consumption than those belonging to families with incomes of less than 10,000 NRs ($< 97.6 \$$) per month. No significant association was found between the monthly income of the family

Conclusion

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 $p<.05$. Association of overweight and obesity with gender not significant at $p<.05$. Association of overweight and obesity with socioeconomic status was significant at $p<0.5$.

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