



Study of Overweight And Obesity In School Children And Impact On Their Quality Of Life: A Crosssectional Study

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Abstract

Childhood obesity is a global public health challenge affecting low- and middle-income groups, particularly in urban areas. This cross-sectional study conducted in urban areas near Shree Narayan Medical College & Hospital in Bihar, India, aimed to assess the prevalence of overweight and obesity among school children aged 12 to 15 years. A sample size of 580 students was selected from non-government and governmental schools. Data were collected using questionnaires and analyzed using SPSS. The results showed that 17.41% of the participants were overweight and 12.76% were obese. Females constituted a higher proportion of overweight and obese students compared to males. The study also explored the impact of obesity on the quality of life of obese students, revealing various problems related to activities, feelings, school, and other aspects. Furthermore, the study investigated the relationship between body weight satisfaction and health-related quality of life (HRQoL), finding significant differences in HRQoL scores among girls based on their satisfaction with body weight. These findings highlight the high prevalence of overweight and obesity among school children in the study area and the associated impact on quality of life. Effective interventions and strategies are needed to address this growing public health issue and improve the well-being of children and adolescents.

Keywords: childhood obesity, prevalence, overweight, obesity, school children

Introduction

One of the most serious public health challenges of the 21st century is perhaps the childhood obesity. Actually, the problem is global and it is steadily affecting many low- and middle-income groups of different countries, particularly in urban areas. The prevalence is increasing fastly at an alarming rate [1-2]. Globally in 2010, the number of overweight children under the age of five is estimated to be over 42 million. Out of it, it is interesting to note that close to 35 million of these are living in developing countries [3]. It is also troublesome to note that globally the prevalence of obesity is in progressive rise. It has reached an epidemic form in developed countries whereas its prevalence in developing countries is increasing fastly [1]. However, females

are more likely to be obese as compared to males, owing to inherent hormonal differences [3].

It is obvious that the world is undergoing a rapid epidemiological and nutritional transition characterized by persistent nutritional deficiencies, as evidenced by the prevalence of anaemia, iron and zinc deficiencies [4-6]. The ecological model, as described by Davison et al., suggests that child risk factors for obesity include dietary intake, physical activity, and sedentary behavior [7-10]. However, the impact of such risk factors is moderated by factors such as age and gender. Family characteristics, parenting styles, parents' lifestyles etc. also play a role. Environmental factors such as school policies,

demographics, and parents' work-related demands further influence eating and activity behaviours. The genetic factor accounts for less than 5% of cases of childhood obesity [11]. Interestingly, studies have found that BMI is 25–40% heritable [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.

Methodology: This was a Cross sectional study conducted in non-government and governmental schools in urban areas near Shree Narayan Medical College & Hospital, Saharsa, Bihar, India under Department of Community medicine from October 2020 to December 2022. The study population included all the school children in the age group of 12 to 15 years. Inclusion criteria: Male and Female children of 12-15 years of age. Exclusion criteria: Those not willing to participate in the study, those receiving any psychotropic medication and on steroids and those with co-morbid physical disabilities, long-term health problems or mental health disorders as they rated as having a greater impact on their life than their weight. 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 questionnaires.

Sample size: Considering the prevalence of Obesity and Overweight in various studies ranging from 2-19% [12-14], 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 the above assumption, the sample size calculation was as follows:

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 is rounded off to 580.

Selection of schools: For the selection of schools, the list of all schools belonging to different categories of Government schools and Private schools were obtained from different 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 and 3 Government schools were selected for 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 580 students were studied from these schools, of different affluence, as well as both boys and girls.

Methods of Data Collection and Questionnaire:

Pre-designed and pre-tested questionnaires were 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 students explained the purpose of study. Informed consents were collected from the participants and confidentiality was assured. Detailed history was obtained from participants. 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.

Figure 1: WHO-Asian BMI classification

Nutritional status	BMI (kg/m ²)
Underweight	<18.5
Normal range	18.5-22.9
Overweight	23-24.9
Obese I	25-29.9
Obese II	>30

Results And Observations: This was a Cross sectional study conducted in non-government and governmental schools in urban areas near Shree Narayan Medical College & Hospital, Saharsa, Bihar, India under Department of Community medicine on school children in the age group of 12 to 15 years (7th to 9th class).

Based on age distribution, it was found that, maximum number of study subjects belonged to the age group of 14-15 years i.e., 348 (60%). The

participant belonged to the age group of 12-13 years i.e., 232 (40%) [Table 1]. The distribution of study participants who were overweight or obese by gender shown (57.14%) of the study's participants were female and the remaining 75 (42.86%) were male [Table 2] and based on WHO- Asian BMI classification, about 405 (69.83%) of study participants had a normal BMI, while the prevalence of overweight or Obese were 17.41% (101) and 12.76% (74) respectively.

Table 1: Distribution of study subjects according to age

Age in Years	Frequency	Percentage
12-13	232	40%
14-15	348	60%
Total	580	100%

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

Gender	No. of School children	Percentage
Female	100	57.14%
Male	75	42.86%
Total	175	100%

Table 3: Prevalence of overweight and obesity among school children

Health Status	Frequency	Percentage
Normal BMI	405	69.83%
Overweight	101	17.41%
Obese	74	12.76%
Total	580	100%

Table 4: Impact of obesity on their quality of life (N-74)

Impact of Obesity	Score	Frequency	Percentage
Activities Problem	1-15	66	89.19
	16-30	08	10.81
Feeling Problem	1-10	61	82.43
	11-20	13	17.57
Problem in School	1-10	58	78.38
	11-20	16	21.62
Other Problem	1-10	55	74.32
	11-20	19	25.67

[Foot note: Activities problem (High score- 30), Feeling problem (High score-20), Problem in school (High score-20), Other problem (High score-20)].

Obese students had activities problem score 1-15 i.e., 89.19% & in Score 16-32 i.e., 10.81%, Feeling problem 82.43% in score 1-10 & 17.57% in score 11-20, Problem in school 78.38% participants belonged in score 1-10 & 24.62% in score 11-20 and other problem 70.76% participants belonged in score 1-10 & 29.24 % in score 11-20 respectively [Table 4].

Table 5: Adolescent self-reported HRQoL scores according to adolescents’ perception regarding their body weight status

Variable	Under weight	Normal weight	Over weight	Obese	F value	p-value
Girl						
Physical functioning	78.3 ±12.5	76.2±23.3	78.5±17.3	81.7±14.8	1.23	0.214
Emotional functioning	60.2±24.1	68.3±31.2	57.5±24.6	62.5±23.5	0.67	0.694
Social functioning	81.7±18.7	82.4±19.6	80.3±19.2	81.6±16.2	1.43	0.290
School functioning	70.2±20.4	72.1±21.2	71.5±20.4	75.6±19.2	0.83	0.374
HRQOL total score	72.9±17.6	75.3±21.4	74.7±17.7	84.9±15.4	0.67	0.243
Boy						
Physical functioning	80.8±13.4	78.4±22.4	79.5±18.5	86.2±17.5	4.23	0.001
Emotional functioning	60.3±22.5	69.2±21.4	60.0±23.5	64.6±22.5	4.73	0.003

Social functioning	74.2±22.5	83.5±20.2	81.4±18.5	82.6±15.3	4.24	0.006
School functioning	67.2±19.1	74.5±19.2	74.8±18.9	78.6±18.3	1.86	0.127
HRQOL total score	72.9±18.5	76.3±20.5	76.1±18.2	79.9±16.4	6.47	<0.001

The above table shows indicates the HRQoL scores according to participant's satisfaction regarding their body weight using the general linear model (ANCOVA). In girls, except for physical functioning, the subscales and total scores of HRQoL were significantly different according to girls' satisfaction regarding their body weight. Results of the post hoc test showed that those boys 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.

Discussion:

In this study, the majority of participants—348 or 60%—belonged to the 14–15 age range. 232 (40% of the participants) were in the 12- to 13-year-old age range. Similar findings were made in the investigation of Bharati D.R. et al. [15], which was carried out in Wardha, in the heart of India. Overall, 79 (3.1%) of the youngsters were overweight, and 32 (1.2%) were obese, according to his observations. In late adolescence (age > 15 years), the proportion of overweight/obesity was higher (5.0%) than in early adolescence (age 15 years). Hyderabad was the site of a study undertaken by Avula Laxmaiah et al. [16]. He discovered that the incidence of being overweight peaked at the age of 14 (9.2%) and then dropped to 5.3% by the time people reached their seventeenth year. In this study, the distribution of overweight and obesity study participants by sex showed that women made up 100 (57.14%) of the population while men made up the remaining 75 (42.86%). Similar research was discovered after making observations. In a study of affluent Indian children aged 2 to 17 years, Khadilkar et al. [17] found that the prevalence of overweight and obesity was higher in males and was 18.2% by IOTF categorization compared to 23.9 percent by WHO cut-points. According to Chhatwal et al. [18], the prevalence of childhood obesity and overweight was 11.1 and 14.2 percent, respectively, in Punjab, with boys experiencing a greater prevalence (12.4 vs. 9.9%, 15.7 vs. 12.9%). According to Sidhu and colleagues [19] from Amritsar, 10% of boys and 12% of girls were overweight, and 5% of boys and 6% of girls were

obese. Hyderabad was the site of a study undertaken by Avula Laxmaiah et al. [16]. He discovered that the incidence of overweight in girls tended to rise from 6.2% at age 12 to 10.8% at age 15, then progressively decline to 9.2% at age 17. According to research by Haider Javed Warraich et al. [20], of the 104 students in the sixth class, 67 were male and 37 were female. In their study, Premanath M et al. [21] found that there were 19625 females (45.5%) and 23527 boys (54.5%). In 328 male youngsters, 62 (19.0%) were overweight, and 35 (10.6%) were obese, according to Karki, A. et al. [22]. Similar to this, 6 (2.4%) and 45 (18.2%) of 247 female children were obese. The study by Kumar S et al. (2007) [22] revealed that, among the 1496 youngsters tested (975 boys and 521 girls), girls were more likely to be obese (8.82%) than boys (4.10%). In 328 male youngsters, 62 (19.0%) were overweight, and 35 (10.6%) were obese, according to Karki, A. et al. [23]. Similar to this, 6 (2.4%) and 45 (18.2%) of 247 female children were obese. When overweight and obesity were correlated with age groups, it was shown that the proportion of overweight and obesity was highest in the 14–15-year-old age group, at 100 (17.77%), and at 69 (28.75%) in the 12–13-year-old age group. When a statistical analysis using the Chi-square test was conducted, the percentage of overweight and obesity in the age group was not statistically significant ($p > 0.05$). Similar findings were made by Bharati D.R. et al. [15], who performed research in Wardha, central India, and discovered that overall, 79 (3.1%) of the children were overweight and 32 (1.2%) of them were obese. In late adolescence (age

> 15 years), the proportion of overweight/obesity was higher (5.0%) than in early adolescence (age 15 years). However, there was no statistically significant change. The relationship between overweight and obesity and gender revealed that the proportion of overweight and obesity was highest in females, at 69 (30%), and at 100 (27.02%) for men. Chi-square test statistical analysis revealed that there was no statistically significant difference between the two groups ($p > 0.05$). Similar findings were made in the Bharati D.R et al. [15] investigation.

According to the table, participants had activities problems in the range of 1 to 15, or 89.19%, in the range of 16 to 30, or 10.81%, and feelings problems in the range of 1 to 10, or 82.13%, while 17.87 % had a problem in grades 11–20. Other problem Participants made up 78.38% of the score 1–10 range and 21.62% of the score 11–20 range. Similar findings were reported in Dhole S.S. and Mundada [24]. Except for physical functioning, the HRQoL subscales and total scores for girls were significantly different based on the participants' satisfaction with their body weight, according to the general linear model (ANCOVA) used to calculate the HRQoL scores. The post hoc analysis revealed that, in comparison to girls who were unhappy with their body weight, boys who were satisfied with their weight had significantly higher scores in emotional functioning ($p = 0.003$), social functioning ($p = 0.006$), school functioning ($p = 0.127$), and overall HRQoL ($p = 0.001$). Similar findings were obtained in the Jalali-Farahani et al. [25] investigation.

Conclusion: The majority of the study participants were between the ages of 14 and 15 years old. Male study participants made up the majority. The majority of the study participants were of the Hindu faith. Almost all of the individuals had a mixed food pattern. Obesity was observed in 12.76% (74) and overweight in 17.41% (101).

Recommendations: Childhood lays the groundwork for lifetime good health. Nothing gives kids a more immersive experience than their time in school, aside from their daily lives at home. This means that schools have a great opportunity to promote youth health and combat obesity at the perfect time—before issues become entrenched. Education of students is one of the primary ways that schools may improve health and is also one that most closely aligns with

every school's mission. To teach children the skills they need to choose and sustain healthy lifestyles, nutrition and physical activity. Classes can be incorporated into the curriculum in core classroom topics, physical education, and after-school programmes. School physical education should put a strong emphasis on encouraging children to engage in high-quality and frequent activity, in addition to providing evidence-based nutrition and activity lessons. Schools can support students' physical well-being by providing them with chances to eat well and keep active outside the classroom. Schools can stop selling unhealthy meals and add better food options to their cafeteria menus to enhance nutrition. Schools should create secure routes for students to walk or bike to school and can encourage active playtime to increase activity. Wellness initiatives for faculty and staff can play a significant role in enhancing the learning environment by promoting both faculty and staff health and school-wide enthusiasm for initiatives that focus on students. Schools can also be significant sources of information on the health of students. Teachers and policymakers can evaluate the success of present programmes and determine the direction of future programmes with the aid of anonymous, school-level data on indicators like pupils' body mass index (BMI).

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