Prevalence of Obesity Among Adolescents: A Study from Western Maharashtra Assessment of Knowledge, Attitudes, and Practices of Adolescents Regarding Obesity in Private Schools in Western Maharashtra

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ABSTRACT

Introduction: Adolescents who are overweight or obese at an early age face an increased risk of developing non-communicable diseases, including diabetes and cardiovascular disorders. Studies indicate that individuals who were obese during childhood or adolescence have a 50-100% higher chance of developing conditions such as heart disease, diabetes, cancer, and arthritis later in life

Material and Methods: This school-based, cross-sectional study was conducted over eight months, from February to September 2022, focusing on adolescents in the Satara district of Maharashtra. The study required a sample size of 3383, determined through statistical calculations. A multi-stage cluster sampling method was employed, with eight schools randomly chosen from a total of 24 using a lottery method. After completing the questionnaires, their height and weight were measured and recorded. The primary objective was to assess the prevalence of overweight and obesity. Body Mass Index (BMI) was classified based on WHO guidelines, categorizing participants as 'underweight,' 'normal weight,' 'overweight,' or 'obese.'

Results: Out of the 3383 samples, 136 individuals (4.02%) were classified as underweight, 2909 individuals (85.99%) fell within the normal weight range, 211 individuals (6.24%) were classified as overweight, and 127 individuals (3.75%) were categorized as obese. The Prevalence of obesity found to be 3.75%.

Conclusion: The study on the prevalence of obesity among adolescents in Western Maharashtra found that 3.75% of the adolescent population were classified as obese. This prevalence highlights the need for continued monitoring and research to understand the factors influencing obesity in this region.

Keywords: Prevalence, Obesity, adolescents

1. INTRODUCTION

Obesity has become a widespread public health issue, with the World Health Organization highlighting its rapid increase and the heightened risk of non-communicable diseases associated with it. Studies from the Eastern Mediterranean region indicate concerning obesity rates among both children and adults, with over half of total deaths linked to these diseases. Findings from the National Health and Nutrition Examination Survey (2011-2014) show that childhood obesity rates have remained steady at approximately 17% for individuals aged 2 to 19 over the past decade. However, while obesity rates have been declining among children aged 2 to 5, they have remained consistent for those aged 6 to 11 and have increased among adolescents aged 12 to 19 [1].

Adolescents who are overweight or obese at an early age face an increased risk of developing non-communicable diseases, including diabetes and cardiovascular disorders. Studies indicate that individuals who were obese during childhood or adolescence have a 50-100% higher chance of developing conditions such as heart disease, diabetes, cancer, and arthritis

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later in life [2]. Obesity is a condition characterized by excessive or unnecessary fat accumulation in adipose tissue to a level that negatively impacts health [3]. In 2019, the World Obesity Federation estimated that by 2025, approximately 206 million children and adolescents aged 5 to 19 would be affected by obesity, with this number projected to increase to 254 million by 2030 [4]. The rise in childhood obesity has been linked to changes in dietary patterns, such as replacing traditional meals with high-calorie, nutrient-poor foods, increased snacking, frequent dining out, and a more sedentary lifestyle [5].

The health conditions associated with obesity and being overweight are expected to place a growing burden on the nation [6]. Research indicates that the prevalence of overweight adolescents ranges between 10% and 30%, with variations across different regions due to differences in lifestyle, particularly dietary habits and levels of physical activity [7]. A child's diet and sedentary behavior significantly influence their likelihood of becoming obese [8]. In today's era, many children lead inactive lifestyles and are reluctant to step out of their comfort zones. These factors have intensified the health risks, making it crucial to address the issue seriously to minimize its negative effects on individuals and society as a whole [9]. Among individuals of South Asian descent, central obesity is a significant indicator of the risk of chronic diseases, contributing to both morbidity and mortality [10]. Childhood and adolescent obesity is influenced by various factors, including genetics, socioeconomic status, and lifestyle habits. Key contributors include low levels of physical activity, poor dietary choices such as inadequate fruit and vegetable intake, insufficient sleep, prolonged sedentary behaviors like watching television and playing video games, excessive consumption of sugary beverages and junk food, as well as smoking and alcohol use [11,12]. Given these concerns, the present study aims to assess the prevalence of obesity among schoolchildren.

2. MATERIAL AND METHODS

This school-based, cross-sectional study was conducted over eight months, from February to September 2022, focusing on adolescents in the Satara district of Maharashtra. The study required a sample size of 3383, determined through statistical calculations. A multi-stage cluster sampling method was employed, with eight schools randomly chosen from a total of 24 using a lottery method. Data collection involved a structured datasheet containing sociodemographic variables, which were reviewed by experts from the Community Medicine department. Standardized and calibrated height meters and weighing scales were utilized, with daily calibration performed before data collection. Students with physical deformities were excluded from the study. Participants included students from grades 5th, 6th, 7th, 8th, 9th, and 10th who were informed about the study process and data collection procedures. After completing the questionnaires, their height and weight were measured and recorded. The primary objective was to assess the prevalence of overweight and obesity. Body Mass Index (BMI) was classified based on WHO guidelines, categorizing participants as 'underweight,' 'normal weight,' 'overweight,' or 'obese.'

Ethics statement

The study had been approved ethically by the Institute Ethical Committee (KIMSDU/IEC/01/2020 on dated 1.12.2020. Written authorization for data collection was received from the Principals of all five colleges. Throughout this study, informed consent was also obtained from each participant and their parents.

3. RESULTS

Table.1 Adolescents socio-demographic variables

(*n*=3383)

Variables		Frequency(F)	Percentage (%)
Age	11	474	14.01
	12	479	14.16
	13	589	17.41
	14	619	18.30
	15	606	17.91
	16	616	18.21
Gender	Male	1591	47.03
	Female	1792	52.97

The data presented in table no.1 shows the distribution of participants by age. 474 Samples (14.01%) in the age group of 11 years. 589 Samples (17.41%) in the age group of 12 years. 589 Samples (17.41%) in the age group of 13 years. 619 Samples

(18.30%) in the age group of 14 years. 606 Samples (17.91%) in the 15-year-old group and 616 Samples (18.21%) in the age group of 16 years. The data presents the gender distribution of participants in the study There were 1591 male participants, making up 47.03% of the total sample. The female participants numbered 1792, representing 52.97% of the sample.

Table no. 2 Adolescent's BMI distribution according to WHO scale

(n=3383)

Variables	Category of BMI.	Frequency(F)	Percentage (%)
Body Mass Index (BMI)	Underweight	136	4.02
	Normal	2909	85.99
	Overweight	211	6.24
	Obese	127	3.75

The data presents in table no.2 shows the distribution of samples based on their Body Mass Index (BMI) categories. Out of the 3383 samples, 136 individuals (4.02%) were classified as underweight, 2909 individuals (85.99%) fell within the normal weight range, 211 individuals (6.24%) were classified as overweight, and 127 individuals (3.75%) were categorized as obese. The Prevalence of obesity found to be 3.75%.

Table no. 3 Distribution of children in schools according to age group and category of BMI.

(n=3383)

Age	Underweight		Normal		Overweight		Obese	
	F	%	F	%	F	%	F	%
11	29	0.86	404	11.94	26	0.77	15	0.44
12	35	1.03	383	11.32	28	0.83	33	0.98
13	22	0.65	536	15.84	8	0.24	23	0.68
14	15	0.44	455	13.45	124	3.67	25	0.74
15	3	0.09	571	16.88	15	0.44	17	0.50
16	32	0.95	560	16.55	10	0.30	14	0.41
Total	136	4.02	2909	85.99	211	6.24	127	3.75

Table no. 3 provides data of Body Mass Index (BMI) categories across different age groups. The distribution is as follows- Among 11-year-olds, 29 (0.86%) were underweight, 404 (11.94%) had a normal BMI, 26 (0.77%) were overweight and 15 (0.44%) were obese. For 12-year-olds, 35 (1.03%) were underweight, 383 (11.32%) had a normal BMI, 28 (0.83%) were overweight and 33 (0.98%) were obese. In the 13-year-old group, 22 (0.65%) were underweight, 536 (15.84%) had a normal BMI, 8 (0.24%) were overweight and 23 (0.68%) were obese. For 14-year-olds, 15 (0.44%) were underweight, 455 (13.45%) had a normal BMI, 124 (3.67%) were overweight and 25 (0.74%) were obese. Among 15-year-olds, 3 (0.09%) were underweight, 571 (16.88%) had a normal BMI, 15 (0.44%) were overweight and 17 (0.50%) were obese. In the 16-year-old group, 32 (0.95%) were underweight, 560 (16.55%) had a normal BMI, 10 (0.30%) were overweight and 14 (0.41%) were obese. Across all age groups, 136 individuals (4.02%) were underweight, 2909 (85.99%) had a normal BMI, 211 (6.24%) were overweight, and 127 (3.75%) were obese.

4. DISCUSSION

The overall prevalence of overweight and obesity among adolescents was found to be 6.24% were overweight, and 3.75% were obese.

A comparable study was conducted in South Karnataka, India, using a school-based, cross-sectional design over four months. A total of 1000 participants were selected through a multistage stratified random sampling method. Data from 900 adolescents aged 12 to 15 years were analyzed. The findings revealed that the overall prevalence of overweight among

adolescents was 9.9%, while obesity was observed in 4.8% of the participants [13].

A meta-analysis conducted by Singh S et al. (2023) examined the prevalence of childhood obesity in India over the past two decades and explored its socioeconomic determinants. The study analyzed data from 21 studies conducted between 2003 and 2023, covering a total of 1,86,901 children. After screening 2,147 titles and abstracts, the research estimated the pooled prevalence of childhood obesity at 8.4% and childhood overweight at 12.4% [14].

A cross-sectional study conducted by Jain B et al. (2023) in the urban field practice area of the Community Medicine Department at LLRM Medical College, Meerut, involved 872 adolescents. The study found that the prevalence of overweight and obesity among participants was 17.43% and 6.88%, respectively. The results showed that obesity was notably higher in females and among those with unhealthy eating habits, physical inactivity, prolonged television viewing, and consumption of junk food while watching television [15].

Sinha KV (2019) conducted a community-based cross-sectional study at the Urban Health Training Centre's field practice area. The study involved 900 adolescents aged 10 to 19 years. Measurements of height, weight, waist circumference, and hip circumference were recorded, and results were compared using body mass index (BMI). The study also incorporated questions from the Global School-based Student Health Survey (GSHS). The findings revealed that 167 participants (18.5%) were overweight, while 51 (5.8%) were obese, resulting in a combined prevalence of overweight and obesity of 24.3% (95% CI = 21.4–27.5) [16]

Rathoria E et al. (2021) conducted an observational study at the Hind Institute of Medical Sciences in Safedabad, Barabanki. The study included adolescents attending outpatient services in the Departments of Pediatrics and Obstetrics and Gynecology between January and September 2020, after applying exclusion criteria and obtaining written consent from both the adolescents and their parents or guardians. Demographic data, medical history, physical examination, and anthropometric measurements of weight and height were recorded on a pre-designed form. BMI was calculated using the formula: $BMI = weight (kg) / height^2 (m^2)$. A total of 415 adolescents participated, consisting of 206 girls and 209 boys. The study found an overall prevalence of overweight and obesity of 14.94%, with 5.06% classified as obese and 9.88% as overweight [17].

A study conducted by Jagadesan S et al. (2014) involved a cross-sectional analysis of 18,955 children (aged 6–11 years) and adolescents (aged 12–17 years) from 51 schools (31 private and 20 government). Overweight and obesity were classified using the International Obesity Task Force (IOTF 2000) and Khadilkar's criteria (2012), while hypertension was assessed using the IDF criteria for children aged ≥10 years and adolescents. The study found that the prevalence of overweight and obesity was significantly higher in private schools compared to government schools, according to both the IOTF and Khadilkar criteria. Specifically, the prevalence in private schools was 21.4% (IOTF) and 26.4% (Khadilkar), compared to 3.6% and 4.6% in government schools, respectively. The odds ratios were 7.4 (95% CI: 6.3–8.6; P<0.001) for IOTF and 6.9 (95% CI: 6.2–7.8; P<0.001) for Khadilkar criteria [18].

Gautam L et al. (2024) conducted a school-based cross-sectional study involving 768 randomly selected adolescents from 10 schools in the Nagarjun municipality of Nepal. Anthropometric measurements of height and weight were taken using standard tools, and body mass index (BMI) was calculated. The study found an overall prevalence of overweight and obesity among adolescents to be 6.38% (95% CI 4.64% to 8.11%). The average weight, height, and BMI of the participants were 50.22±9.37 kg, 160.17±9.14 cm, and 19.56±3.24 kg/m², respectively [19].

5. CONCLUSION

The study on the prevalence of obesity among adolescents in Western Maharashtra found that 3.75% of the adolescent population were classified as obese. This prevalence highlights the need for continued monitoring and research to understand the factors influencing obesity in this region. The findings suggest that obesity remains an important public health concern. Future efforts should focus on promoting healthy lifestyle choices, including balanced diets and regular physical activity, to prevent the potential rise in obesity rates. Additionally, targeted interventions, particularly in schools and communities, are crucial to address this growing health issue among adolescents.

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