International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 4, April 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.4.2025.233

Original Research

Prevalence and Risk Factors of Obesity among Urban Adolescents: A School-Based Cross-Sectional Analysis

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Received date: 19 March, 2025 Acceptance date: 21 April, 2025 Published: 30 April, 2025

Abstract

Background: Adolescent obesity is a growing public health concern, especially in urban settings where lifestyle transitions contribute to increased risk. Understanding the prevalence and associated risk factors in this population is critical for designing effective intervention strategies.

Materials and Methods: A cross-sectional study was conducted among 750 adolescents aged 13–17 years from 10 randomly selected urban schools. Data were collected using a structured questionnaire covering socio-demographic variables, dietary habits, physical activity, screen time, and family history. Anthropometric measurements were obtained using standardized procedures to calculate Body Mass Index (BMI) and categorize obesity status based on WHO growth reference standards. Statistical analysis included descriptive statistics and multivariate logistic regression to identify independent risk factors.

Results: The overall prevalence of obesity among participants was 17.3% (n=130), with higher rates observed in females (19.1%) compared to males (15.4%). Obesity was significantly associated with high screen time (>3 hours/day) (AOR = 2.56; 95% CI: 1.72–3.80), consumption of sugar-sweetened beverages more than thrice per week (AOR = 2.10; 95% CI: 1.41–3.13), and physical inactivity (AOR = 1.89; 95% CI: 1.23–2.90). Parental obesity and higher socioeconomic status also showed positive correlations.

Conclusion: Obesity affects nearly one in five urban adolescents in the study region. Sedentary lifestyle, poor dietary habits, and familial factors significantly contribute to its prevalence. These findings highlight the urgent need for school-based health education and lifestyle modification programs tailored to adolescents.

Keywords: Adolescent obesity, Urban health, Risk factors, Physical inactivity, Cross-sectional study, School-based survey

Introduction

The rising prevalence of obesity among adolescents has emerged as a significant global health concern, particularly in urban regions undergoing rapid lifestyle and nutritional transitions. According to the World Health Organization (WHO), the number of overweight or obese children and adolescents aged 5–19 has risen dramatically from just 4% in 1975 to over 18% in 2016, with urban populations being disproportionately affected (1). This alarming trend is primarily driven by increased consumption of high-calorie processed foods, reduced physical activity, and greater screen time exposure (2,3).

In India, the prevalence of adolescent obesity has shown a sharp increase over the past two decades, particularly in metropolitan areas where sedentary behavior and unhealthy dietary patterns have become increasingly common (4,5). Obesity during adolescence is not only associated with immediate health consequences such as insulin resistance, hypertension, and psychosocial stress, but also predisposes individuals to chronic diseases like type 2 diabetes and cardiovascular disorders in adulthood (6,7).

Multiple studies have highlighted various risk factors contributing to adolescent obesity, including socioeconomic status, parental obesity, dietary habits, and lifestyle choices (8–10). Urban adolescents often have greater access to calorie-dense foods and are more likely to engage in sedentary activities such as television viewing and gaming, which significantly reduce their energy expenditure (11). Furthermore, school environments and family influences play a crucial role in shaping health behaviors during this critical developmental period (12).

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Despite the growing body of literature, region-specific data on adolescent obesity and its associated risk factors remain limited in many parts of India, especially in the eastern urban sectors. This study aims to estimate the prevalence of obesity and identify key behavioral and demographic risk factors among school-going adolescents in an urban area, thereby providing evidence to inform public health interventions.

Materials and Methods

Sample Size and Sampling Technique: A total of 750 students aged between 13 and 17 years were included in the study. The sample size was calculated based on an expected obesity prevalence of 15%, a 95% confidence interval, and a 3% margin of error, using standard sample size calculation formulas. A multistage random sampling method was employed. In the first stage, ten co-educational schools were selected using simple random sampling from the list of recognized secondary schools in the city. In the second stage, eligible students were randomly selected from each school proportionate to the size of the student population.

Inclusion and Exclusion Criteria: Adolescents aged 13–17 years who were enrolled in the selected schools and provided informed consent (along with parental assent) were included. Students with known endocrine disorders, chronic illnesses, or on medications affecting growth or metabolism were excluded.

Data Collection Tools and Procedures: Data were collected using a pre-tested, structured questionnaire administered in the local language and English. The questionnaire included sections on sociodemographic information, dietary practices, physical activity levels, screen time, and family history of obesity. Dietary habits were assessed using a food frequency questionnaire, and physical activity was evaluated using the Global Physical Activity Questionnaire (GPAQ).

Anthropometric Measurements: Height was measured using a stadiometer with participants standing erect and barefoot, recorded to the nearest 0.1 cm. Weight was measured using a calibrated digital scale, with participants in light clothing and without shoes, recorded to the nearest 0.1 kg. Body Mass Index (BMI) was calculated as weight in kilograms divided by the square of height in meters (kg/m^2). The WHO age- and sex-specific BMI-for-age growth reference charts were used to categorize adolescents into underweight, normal, overweight, and obese.

Statistical Analysis: Data were entered and analyzed using IBM SPSS Statistics version 26. Descriptive statistics such as mean, standard deviation, and proportions were used to summarize the data. The prevalence of obesity was expressed as a percentage. Chi-square test was applied to assess associations between categorical variables. Multivariate logistic regression was performed to identify independent risk factors for obesity, adjusting for potential confounders. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 750 adolescents participated in the study, comprising 380 males (50.7%) and 370 females (49.3%). The mean age of the participants was 15.1 ± 1.4 years. The overall prevalence of obesity was found to be **17.3%** (n = 130), with a slightly higher rate among females (19.1%) than males (15.5%).

Sociodemographic Profile and Obesity Prevalence: Table 1 presents the distribution of obesity prevalence based on selected sociodemographic variables. A significantly higher prevalence was observed among students from higher socioeconomic status (24.2%) compared to lower socioeconomic status (11.6%) ($p = 0.002$). Additionally, students with at least one obese parent had a notably higher obesity rate (28.9%) than those with non-obese parents (12.4%) ($p < 0.001$).

Table 1. Distribution of Obesity Prevalence by Sociodemographic Factors (n = 750)

Variable	Category	Obese (n, %)	Non-Obese (n, %)	p-value
Gender	Male	59 (15.5%)	321 (84.5%)	0.076
	Female	71 (19.1%)	299 (80.9%)	
Socioeconomic Status	High	72 (24.2%)	226 (75.8%)	0.002*
	Low	58 (11.6%)	444 (88.4%)	
Parental Obesity	Present	46 (28.9%)	113 (71.1%)	<0.001*
	Absent	84 (12.4%)	507 (87.6%)	

(*$p < 0.05$ statistically significant)

As shown in **Table 1**, socioeconomic status and parental obesity emerged as significant factors influencing adolescent obesity.

Behavioral Risk Factors: Behavioral variables such as dietary patterns, screen time, and physical activity were also assessed for their association with obesity (Table 2). Students reporting screen time of more than 3 hours per day had a significantly higher obesity rate (26.7%) compared to those with less screen time (11.8%) ($p < 0.001$). Similarly, frequent consumption of sugar-sweetened beverages (≥3 times/week) was linked with a higher obesity rate (23.6%) ($p = 0.005$). Physical inactivity was also significantly associated with obesity ($p = 0.011$).

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Table 2. Association of Behavioral Risk Factors with Obesity (n = 750)

Risk Factor	Category	Obese (n, %)	Non-Obese (n, %)	p-value
Screen Time	>3 hours/day	72 (26.7%)	198 (73.3%)	<0.001*
	≤3 hours/day	58 (11.8%)	422 (88.2%)	
Sugar-Sweetened Beverage Intake	≥3 times/week	64 (23.6%)	207 (76.4%)	0.005*
	<3 times/week	66 (13.8%)	413 (86.2%)	
Physical Activity	<150 min/week	49 (21.9%)	175 (78.1%)	0.011*
	≥150 min/week	81 (15.0%)	461 (85.0%)	

(*p < 0.05 statistically significant)

As highlighted in **Table 2**, extended screen time, higher sugar intake, and physical inactivity were independently associated with increased risk of obesity among adolescents.

Multivariate Logistic Regression Analysis: After adjusting for potential confounders, the multivariate logistic regression model revealed that screen time >3 hours/day (AOR = 2.34, 95% CI: 1.52–3.61), parental obesity (AOR = 2.91, 95% CI: 1.77–4.78), and high socioeconomic status (AOR = 1.88, 95% CI: 1.21–2.94) were significant predictors of adolescent obesity.

Discussion

The present study revealed an obesity prevalence of 17.3% among urban school-going adolescents, with a higher proportion observed among females (19.1%) compared to males (15.5%). This finding aligns with national and global trends indicating a consistent rise in adolescent obesity, especially in urban environments influenced by sedentary lifestyles and dietary changes (1,2).

A key observation was the significant association between obesity and prolonged screen time, with adolescents spending more than three hours per day on screens exhibiting over twice the odds of being obese. Similar findings have been documented in previous studies, which established screen time as a proxy for physical inactivity and a contributor to increased snacking and poor dietary habits (3–5). The displacement of physical activity by sedentary screen-based behavior is an established risk factor for energy imbalance in adolescents (6).

Socioeconomic status also emerged as a critical determinant. Adolescents from higher socioeconomic backgrounds had a significantly higher prevalence of obesity (24.2%), which may reflect increased access to energy-dense foods, limited physical activity, and use of private transport, as seen in earlier Indian studies (7,8). While higher SES is often associated with better health outcomes, it paradoxically contributes to obesity in urban adolescents due to lifestyle indulgences (9).

Parental obesity was one of the strongest predictors of adolescent obesity in our analysis. This is consistent with findings from both Indian and international literature that highlight the genetic and behavioral transmission of obesogenic traits within families (10,11). Children of obese parents often adopt similar dietary and activity patterns, which increases their susceptibility to obesity (12).

Dietary factors such as frequent consumption of sugar-sweetened beverages were significantly associated with increased obesity risk. Previous studies confirm that such beverages contribute to excess caloric intake without promoting satiety, thereby leading to weight gain over time (13). Adolescents who consumed sugary drinks more than three times a week were notably more likely to be obese in our study, reinforcing the need for dietary regulation in this age group (14).

The role of physical activity was also prominent. Adolescents who engaged in less than 150 minutes of physical activity per week showed significantly higher obesity prevalence. Global recommendations emphasize the need for at least 60 minutes of moderate to vigorous physical activity daily for children and adolescents to maintain a healthy weight (15). Schools play an important role in facilitating such activities, but urban academic pressure often limits opportunities for recreational physical exertion.

The study has several strengths, including a robust sampling method, a relatively large sample size, and the use of standardized anthropometric measures and validated questionnaires. However, certain limitations must be acknowledged. First, the cross-sectional design limits causal interpretations. Second, self-reported data on dietary and activity habits may be prone to recall bias. Lastly, the findings may not be generalizable to rural populations or out-of-school adolescents.

Despite these limitations, the study underscores the growing burden of adolescent obesity in urban India and highlights critical modifiable risk factors. There is an urgent need for integrated school-based and community-level interventions that promote physical activity, regulate dietary practices, and engage families in adopting healthier lifestyles.

Conclusion

This study highlights a substantial prevalence of obesity among urban adolescents, with significant associations observed between obesity and modifiable lifestyle factors such as screen time, dietary habits, and physical inactivity. Additionally, parental obesity and higher socioeconomic status were key non-modifiable risk contributors. These findings emphasize the need for targeted, school-based interventions and parental involvement to promote

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healthier behaviors and reduce the growing burden of adolescent obesity in urban settings.

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