



PREVALENCE AND RISK FACTORS OF OVERWEIGHT AND OBESITY AMONG SCHOOL-GOING ADOLESCENTS IN RAJASTHAN: A CROSS-SECTIONAL STUDY

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Abstract

Introduction: Adolescent obesity has emerged as a critical public health challenge in India, with rising prevalence rates threatening long-term health outcomes. This study aimed to assess the prevalence of overweight and obesity and identify associated risk factors among school-going adolescents in Jodhpur, Rajasthan.

Methods: A school-based cross-sectional study was conducted among 500 adolescents aged 13-18 years from March to August 2024 at Vyas Medical College & Hospital, Jodhpur. Multistage stratified random sampling was employed to recruit participants from government and private schools. Data were collected through semi-structured questionnaires capturing sociodemographic characteristics, dietary habits, physical activity patterns, and screen time. Anthropometric measurements including height, weight, and waist circumference were recorded using standardized protocols. Body Mass Index was calculated and classified according to WHO growth reference standards. Statistical analysis included chi-square tests and multivariate logistic regression.

Results: The prevalence of overweight and obesity was 17.4% and 7.0% respectively, with combined prevalence of 24.4%. Females showed higher prevalence (27.6%) compared to males (21.6%). Multivariate analysis identified significant independent predictors: private school attendance (AOR=2.47), urban residence (AOR=1.82), higher family income (AOR=2.73), maternal education (AOR=1.94), family history of obesity (AOR=3.21), insufficient physical activity (AOR=2.08), excessive screen time (AOR=1.89), frequent junk food consumption (AOR=1.76), and motorized transportation (AOR=1.67).

Conclusion: Nearly one-quarter of adolescents were overweight or obese, indicating substantial disease burden. Multiple modifiable risk factors were identified, necessitating comprehensive school-based and family-centered interventions addressing nutrition, physical activity, and sedentary behaviors.

Keywords: Adolescent obesity, overweight, risk factors, school health, India

Introduction

Adolescent overweight and obesity has emerged as one of the most pressing public health challenges of the 21st century, affecting both developed and developing nations with alarming velocity. The transition from childhood to adulthood represents a critical window where lifestyle behaviors, dietary patterns, and physical activity habits become established, making this period particularly vulnerable to the development of excess adiposity. The magnitude of this epidemic is staggering: global estimates indicate that the prevalence of obesity among children and adolescents aged 5-19 years has increased from just 2% in 1990 to 8% in 2022, representing a four-fold increase over three decades (World Health Organization, 2022). With over 390 million children and adolescents classified as overweight worldwide, this condition has transcended its traditional association with high-income countries and now represents a significant burden in low and middle-income nations as well.

India, home to the world's largest adolescent population of approximately 253 million individuals, faces a unique epidemiological paradox. While undernutrition continues to affect substantial segments of the population, the nation is simultaneously witnessing an unprecedented rise in overweight and obesity among its youth. A comprehensive scoping review examining 93 studies across India revealed that the prevalence of overweight among adolescents ranged from 1.25% to 35.8%, while obesity prevalence varied between 0.3% and 24.6% (Jena et al., 2024). These wide variations reflect geographical, socioeconomic, and urban-rural disparities that characterize the Indian landscape. A landmark multicentric study conducted in five major Indian cities involving 38,296 urban schoolchildren reported overweight and obesity prevalence of 18.5% and 5.3% respectively, suggesting that approximately 15 million children in urban India alone could be classified as overweight (Misra et al., 2011). More recent meta-analytical evidence indicates a pooled obesity prevalence of 8.4% and overweight prevalence of 12.4% among Indian children and adolescents, with male children demonstrating higher susceptibility compared to their female counterparts (Singh et al., 2023).

The etiology of adolescent obesity is multifactorial, encompassing a complex interplay of genetic predisposition, environmental influences, behavioral patterns, and socioeconomic determinants. The rapid nutritional transition occurring in India has fundamentally altered traditional dietary patterns, with increasing consumption of energy-dense, nutrient-poor foods displacing traditional diets rich in complex carbohydrates and fiber. Concurrently, technological advancement and urbanization have precipitated dramatic reductions in physical activity levels among adolescents. Research indicates that insufficient physical activity was examined in 36.5% of studies on adolescent obesity in India, while high-calorie dietary habits featured in 44% of investigations, and higher socioeconomic status was reported as a risk factor in 36.5% of studies (Jena et al., 2024).

Screen time has emerged as a particularly concerning modifiable risk factor. A systematic review and dose-response meta-analysis encompassing 44 studies demonstrated that adolescents in the highest category of screen time were 1.27 times more likely to develop overweight or obesity compared to those with minimal screen exposure (Haghjoo et al., 2022). The mechanisms underlying this association are multifaceted, including displacement of physical activity, increased exposure to food marketing, mindless eating while viewing screens, and disrupted sleep patterns. Evidence from longitudinal studies spanning adolescence to young adulthood indicates that both screen time and physical activity during teenage years predict obesity risk in early adulthood, with screen time demonstrating stronger and more consistent associations than physical activity levels (Gordon-Larsen et al., 2007).

Socioeconomic factors play a pivotal role in shaping obesity risk among Indian adolescents, though the relationship differs markedly from patterns observed in Western nations. In India, higher socioeconomic status generally correlates with increased obesity risk, reflecting greater access to calorie-dense foods, reduced physical labor, ownership of labor-saving devices, and attendance at private schools with limited physical education infrastructure. Studies have documented that adolescents from higher socioeconomic backgrounds demonstrate prevalence rates of overweight

ranging from 2.2% to 26.9%, while obesity prevalence ranged from 1.3% to 23.7% (Jena et al., 2024). Parental education, particularly maternal education, has been identified as a significant predictor of childhood obesity, with higher parental education often associated with increased purchasing power for processed foods and sedentary entertainment options (Seum et al., 2022).

Urban residence has consistently emerged as a risk factor, with urban-dwelling adolescents demonstrating substantially higher obesity prevalence compared to their rural counterparts. This urban-rural gradient reflects differential exposure to obesogenic environments characterized by greater availability of fast food outlets, reduced opportunities for active transport, and increased screen time. Type of school attended also significantly influences obesity risk, with students in private schools demonstrating more than twice the likelihood of being overweight or obese compared to government school students, likely reflecting socioeconomic sorting and differential lifestyle patterns (Misra et al., 2011).

The health consequences of adolescent obesity extend far beyond aesthetic concerns, encompassing immediate medical complications and long-term health trajectories. Obese adolescents face elevated risks of developing type 2 diabetes mellitus, hypertension, dyslipidemia, non-alcoholic fatty liver disease, sleep apnea, and orthopedic complications during their teenage years. Perhaps more concerning is the tracking phenomenon whereby adolescent obesity strongly predicts adult obesity, with estimates suggesting that without intervention, 70-80% of obese adolescents will remain obese into adulthood, carrying forward their elevated risk for cardiovascular disease, certain cancers, and premature mortality. Beyond physical health, obesity significantly impacts psychological well-being, with affected adolescents experiencing higher rates of depression, anxiety, low self-esteem, and body dissatisfaction. Weight-based teasing and bullying are particularly prevalent, with studies indicating that body weight represents the most common reason for peer victimization among adolescents.

Given the multifactorial etiology and serious health implications of adolescent obesity, comprehensive epidemiological research is essential to understand its prevalence and associated risk factors within specific populations. Such evidence forms the foundation for developing targeted, culturally appropriate prevention and intervention strategies. The present study seeks to contribute to this knowledge base by examining the prevalence and risk factors of overweight and obesity among school-going adolescents in Jodhpur, Rajasthan, a region of India where contemporary data on this issue remains limited despite the area's unique sociocultural and dietary characteristics.

The aim of the study is to assess the prevalence of overweight and obesity and identify associated sociodemographic, behavioral, and lifestyle risk factors among school-going adolescents in Jodhpur, Rajasthan.

Methodology

Study Design

This investigation employed a school-based, cross-sectional, descriptive study design.

Study Site

The study was conducted at Vyas Medical College & Hospital, Jodhpur, a tertiary care teaching institution located in western Rajasthan. Jodhpur, the second-largest city in Rajasthan.

Study Duration

The data collection was conducted over a six-month period extending from March 2024 to August 2024.

Sampling and Sample Size

A multistage stratified random sampling technique was employed to ensure representativeness and adequate distribution across key demographic subgroups. In the first stage, schools within the study area were stratified into government and private institutions to capture socioeconomic diversity.

From each stratum, schools were randomly selected using computer-generated random numbers. In the second stage, within selected schools, classes from grades 8 through 12 were identified, representing the target age range of 13-18 years. From these classes, students were randomly selected through systematic random sampling, with every third student on the class roster being approached for participation until the desired sample size was achieved.

The sample size was calculated using the formula for estimating prevalence in cross-sectional studies: $n = (Z^2 \times p \times q) / d^2$, where Z represents the standard normal variate (1.96 for 95% confidence interval), p denotes the anticipated prevalence of obesity (taken as 12% based on previous Indian studies), q equals $1-p$ (0.88), and d represents the desired precision (taken as 3%). Incorporating a 10% non-response rate, the final calculated sample size was approximately 450 adolescents. However, to enhance statistical power for subgroup analyses and account for potential incomplete data, the study aimed to recruit 500 participants.

Inclusion and Exclusion Criteria

The study included adolescents aged 13-18 years who were enrolled in participating schools, present on the day of data collection, able to comprehend the study questionnaire (either independently or with minimal assistance), and provided written informed assent along with parental consent. Exclusion criteria were established to minimize confounding and ensure data validity: adolescents with known chronic medical conditions affecting growth or weight (such as hypothyroidism, Cushing's syndrome, or genetic syndromes), those receiving medications known to influence body weight (such as corticosteroids or antipsychotics), students with physical disabilities preventing accurate anthropometric measurements, those who had recently undergone major surgery or had acute illness, and pregnant or lactating females were excluded from participation.

Data Collection Tools and Techniques

Data collection was accomplished through multiple complementary methods to ensure comprehensive assessment. A semi-structured, pretested questionnaire was administered through face-to-face interviews conducted by trained research assistants. The questionnaire captured sociodemographic details including age, sex, parental education and occupation, family income, type of school, and household characteristics. Dietary assessment encompassed frequency of consumption of various food groups, junk food intake patterns, meal regularity, and dietary preferences. Physical activity evaluation utilized standardized questions adapted from the Global Physical Activity Questionnaire, assessing time spent in moderate-to-vigorous physical activity, participation in sports, active transportation, and overall sedentary time. Screen time was quantified by recording average daily hours spent watching television, using computers, playing video games, and using smartphones on both weekdays and weekends. Additional questions addressed sleep duration, family history of obesity and metabolic diseases, and presence of weight-related health concerns.

Anthropometric measurements were conducted following standardized protocols recommended by the World Health Organization. Height was measured to the nearest 0.1 cm using a portable stadiometer with the subject standing barefoot, heels together, back straight, and head positioned in the Frankfort horizontal plane. Weight was recorded to the nearest 0.1 kg using a calibrated digital weighing scale with subjects wearing light clothing and no footwear. Each measurement was repeated twice, and the average value was recorded. Body Mass Index was calculated as weight in kilograms divided by height in meters squared. Age and sex-specific BMI percentiles were determined using WHO growth charts for children and adolescents aged 5-19 years. Overweight was defined as BMI-for-age greater than +1 standard deviation above the WHO growth reference median, while obesity was defined as BMI-for-age greater than +2 standard deviations above the reference median. Waist circumference was measured at the midpoint between the lower costal margin and the iliac crest using a non-stretchable measuring tape, with subjects standing and at the end of normal expiration.

Data Management and Statistical Analysis

All collected data were checked for completeness and consistency. Data were entered into a computerized database using Microsoft Excel and subsequently imported into SPSS version 25.0 for statistical analysis. Categorical variables such as sex, type of school, socioeconomic status categories, and prevalence of overweight and obesity were presented as frequencies and percentages. Continuous variables including age, BMI, height, and weight were expressed as means with standard deviations or medians with interquartile ranges depending on distribution normality as assessed by the Kolmogorov-Smirnov test. Bivariate analysis was performed using chi-square tests for categorical variables and independent t-tests or Mann-Whitney U tests for continuous variables to identify factors associated with overweight and obesity. Multivariate logistic regression analysis was conducted to determine independent predictors of obesity, adjusting for potential confounders. Variables demonstrating p-value less than 0.25 in bivariate analysis were included in the multivariate model. Odds ratios with 95% confidence intervals were calculated to quantify associations. A p-value less than 0.05 was considered statistically significant for all analyses. Results were presented through appropriate tables, charts, and graphs to facilitate interpretation.

Ethical Considerations

The study protocol received approval from the Institutional Ethics Committee of Vyas Medical College & Hospital, Jodhpur, prior to commencement of data collection, ensuring compliance with ethical principles outlined in the Declaration of Helsinki and Indian Council of Medical Research guidelines. Written informed consent was obtained from the parents or legal guardians of all potential participants, and written informed assent was secured from the adolescents themselves.

Results

Table 1: Sociodemographic Characteristics of Study Participants (N=500)

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group (years)	13-14	152	30.4
	15-16	198	39.6
	17-18	150	30
Gender	Male	268	53.6
	Female	232	46.4
Type of School	Government	218	43.6
	Private	282	56.4
Residence	Urban	367	73.4
	Rural	133	26.6
Father's Education	Below 10th grade	142	28.4
	10th-12th grade	189	37.8
	Graduate and above	169	33.8
Mother's Education	Below 10th grade	176	35.2
	10th-12th grade	201	40.2
	Graduate and above	123	24.6
Family Income (monthly)	<₹25,000	183	36.6
	₹25,000-50,000	198	39.6
	>₹50,000	119	23.8
Family History of Obesity	Yes	127	25.4
	No	373	74.6

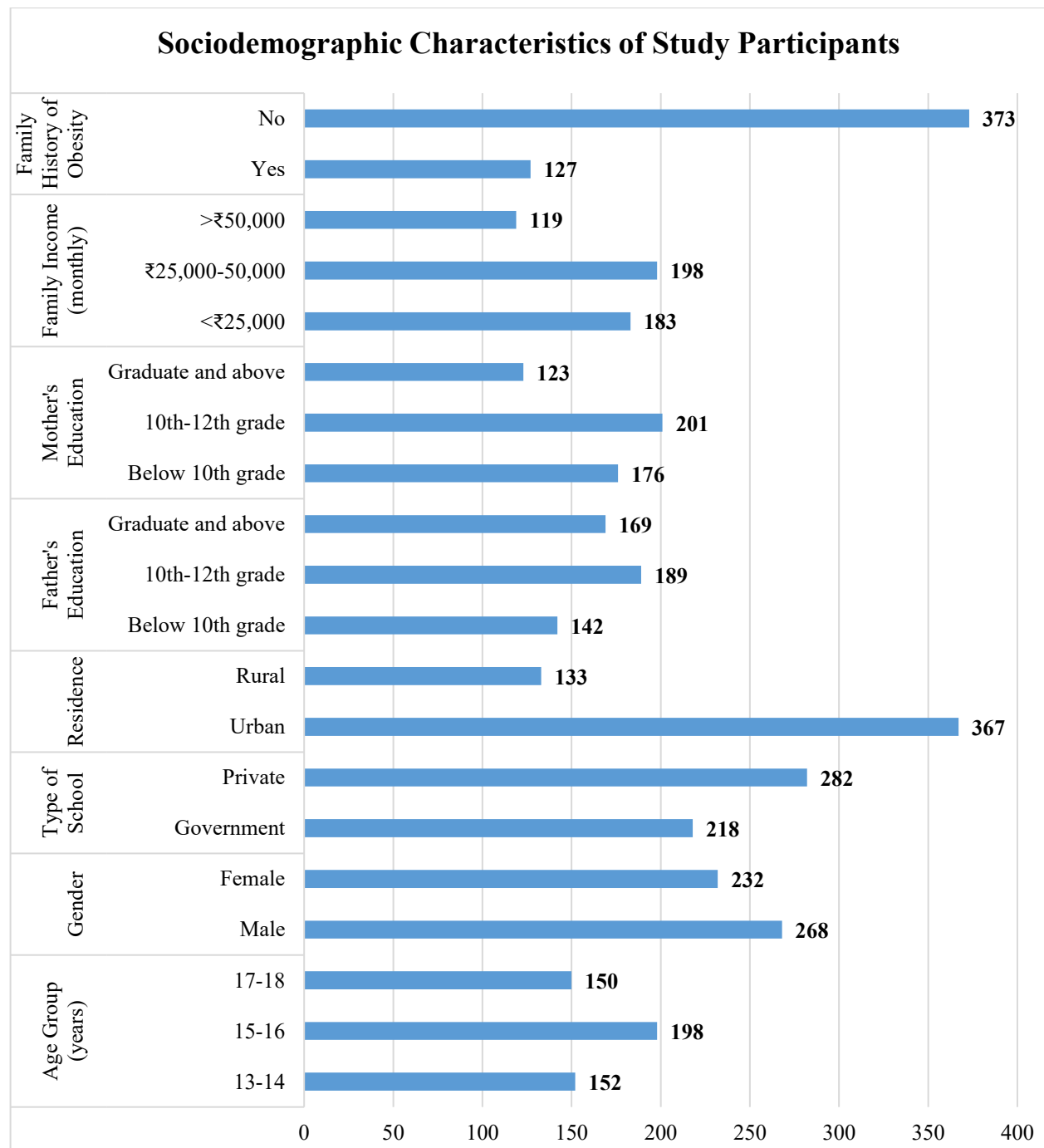


Fig: 1

Table 2: Prevalence of Overweight and Obesity among Study Participants

BMI Category	Overall (N=500)	Males (n=268)	Females (n=232)	p-value
	n (%)	n (%)	n (%)	
Underweight	64 (12.8)	38 (14.2)	26 (11.2)	0.318
Normal weight	314 (62.8)	172 (64.2)	142 (61.2)	0.493
Overweight	87 (17.4)	42 (15.7)	45 (19.4)	0.265
Obese	35 (7.0)	16 (6.0)	19 (8.2)	0.338
Combined Overweight/Obese	122 (24.4)	58 (21.6)	64 (27.6)	0.115
Mean BMI (kg/m ²) ± SD	20.8 ± 4.2	20.5 ± 4.0	21.2 ± 4.4	0.067
Mean Waist Circumference (cm) ± SD	72.4 ± 9.8	73.1 ± 9.5	71.6 ± 10.1	0.095

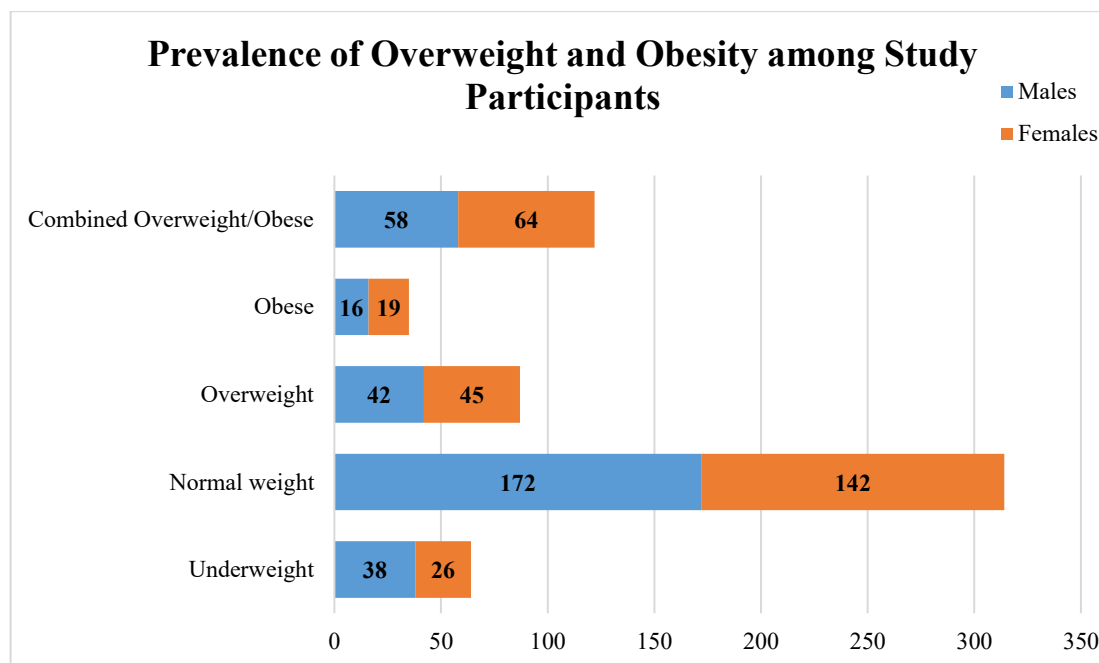


Fig: 2

Table 3: Lifestyle and Behavioral Factors among Study Participants

Factor	Category	Overall n (%)	Overweight/Obese n (%)	Normal/Underweight n (%)	p-value
Physical Activity (moderate-vigorous)	<60 min/day	312 (62.4)	91 (74.6)	221 (58.5)	0.002
	≥60 min/day	188 (37.6)	31 (25.4)	157 (41.5)	
Screen Time (daily)	<2 hours/day	163 (32.6)	28 (23.0)	135 (35.7)	0.008
	≥2 hours/day	337 (67.4)	94 (77.0)	243 (64.3)	
Junk Food Consumption	≤2 times/week	247 (49.4)	46 (37.7)	201 (53.2)	0.003
	>2 times/week	253 (50.6)	76 (62.3)	177 (46.8)	
Soft Drink Consumption	Rarely/Never	198 (39.6)	38 (31.1)	160 (42.3)	0.024
	Regular (≥3/week)	302 (60.4)	84 (68.9)	218 (57.7)	
Sleep Duration	<7 hours/day	156 (31.2)	46 (37.7)	110 (29.1)	0.067
	≥7 hours/day	344 (68.8)	76 (62.3)	268 (70.9)	
Breakfast Habit	Regular	321 (64.2)	71 (58.2)	250 (66.1)	0.098
	Irregular/Skip	179 (35.8)	51 (41.8)	128 (33.9)	
Active Transportation to School	Yes	214 (42.8)	38 (31.1)	176 (46.6)	0.002
	No (motorized)	286 (57.2)	84 (68.9)	202 (53.4)	

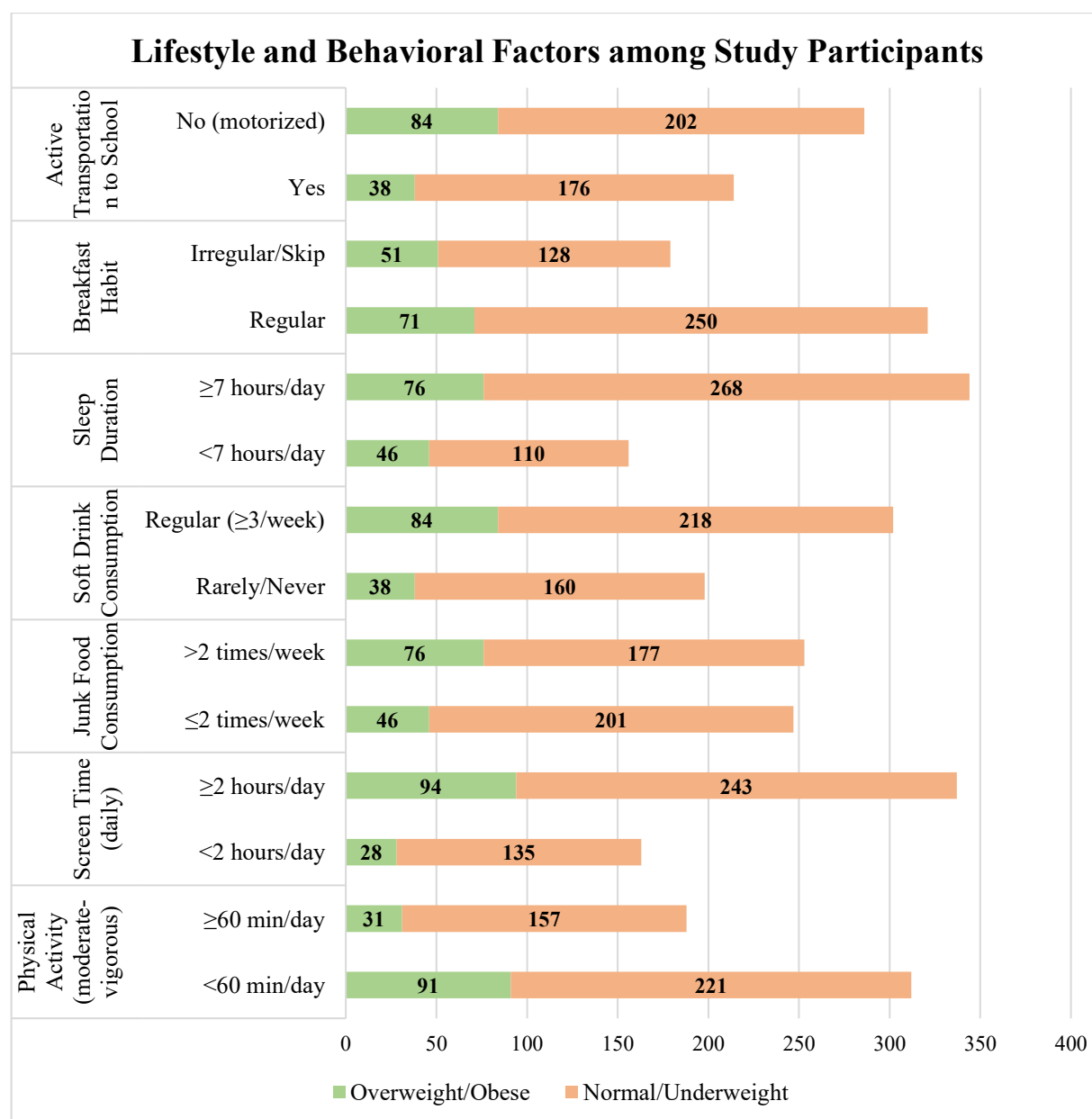


Fig: 3

Table 4: Multivariate Logistic Regression Analysis of Factors Associated with Overweight/Obesity

Variable	Category	Adjusted OR	95% CI	p-value
Gender	Female vs. Male	1.38	0.89-2.14	0.152
Type of School	Private vs. Government	2.47	1.54-3.96	<0.001
Residence	Urban vs. Rural	1.82	1.05-3.15	0.032
Father's Education	Graduate+ vs. <10th	1.68	0.98-2.89	0.061
Mother's Education	Graduate+ vs. <10th	1.94	1.09-3.45	0.024
Family Income	>₹50,000 vs. <₹25,000	2.73	1.58-4.72	<0.001
Family History of Obesity	Yes vs. No	3.21	2.01-5.13	<0.001
Physical Activity	<60 min vs. ≥60 min	2.08	1.29-3.35	0.003
Screen Time	≥2 hrs vs. <2 hrs	1.89	1.15-3.10	0.012
Junk Food Consumption	>2/week vs. ≤2/week	1.76	1.13-2.74	0.013
Active Transportation	No vs. Yes	1.67	1.04-2.68	0.033

Discussion

The present study revealed that 24.4% of school-going adolescents in Jodhpur were either overweight or obese, with 17.4% classified as overweight and 7.0% as obese. These findings align closely with the broader epidemiological trends documented across urban India. The combined overweight and obesity prevalence observed in our study falls within the wide range of 1.25% to 35.8% for overweight and 0.3% to 24.6% for obesity reported in a comprehensive scoping review of 93 Indian studies (Jena et al., 2024). Our results are particularly comparable to the landmark multicentric study by Misra et al. (2011), which documented overweight and obesity prevalence of 18.5% and 5.3% respectively among 38,296 urban schoolchildren across five major Indian cities. The slightly higher prevalence in our study may reflect the temporal trend of increasing adiposity among Indian adolescents, as well as the predominantly urban sample composition with 73.4% of participants residing in urban areas.

The gender-specific analysis revealed interesting patterns, with females demonstrating higher prevalence of combined overweight and obesity compared to males (27.6% vs. 21.6%), though this difference did not reach statistical significance. This finding contrasts with several previous Indian studies that reported higher obesity prevalence among males. For instance, Singh et al. (2023) in their meta-analysis found male children to be at higher risk of developing obesity compared to females. However, our observation is consistent with research from Nepal by Sitaula et al. (2023), which identified female gender as a significant predictor of adolescent obesity. The gender differences in obesity prevalence may reflect complex interactions between biological factors such as hormonal changes during puberty, sociocultural influences on physical activity patterns, and differing dietary behaviors between boys and girls in the Indian context.

The study identified several socioeconomic factors as significant predictors of overweight and obesity among adolescents. Students attending private schools demonstrated 2.47 times higher odds of being overweight or obese compared to their government school counterparts, a finding that resonates with established literature. This association has been consistently reported across multiple Indian studies, including research from Karnataka where private school students were more than twice as likely to be overweight or obese (Misra et al., 2011). The school type essentially serves as a proxy for socioeconomic status, with private school attendance reflecting higher family income, different lifestyle patterns, and potentially reduced emphasis on physical education compared to sports-focused government institutions.

Urban residence emerged as an independent risk factor with 1.82 times higher odds of obesity, corroborating the well-documented urban-rural gradient in childhood obesity prevalence. A systematic review examining risk factors in urban versus rural India reported urban obesity rates of 9% compared to 4% in rural areas, with unhealthy eating, lack of physical activity, and higher income identified as primary urban risk factors (Frontline Medical Sciences, 2024). The urban environment creates an obesogenic ecosystem characterized by greater availability of energy-dense foods, increased screen time opportunities, reduced physical activity due to space constraints and safety concerns, and greater reliance on motorized transportation.

Family income exceeding ₹50,000 monthly was associated with 2.73 times higher odds of obesity, highlighting the direct relationship between economic prosperity and obesity risk in the Indian context. This positive correlation between socioeconomic status and obesity, while counterintuitive from a Western perspective where poverty often correlates with obesity, reflects the unique epidemiological transition occurring in India. Higher income families possess greater purchasing power for processed foods, own more electronic devices facilitating sedentary entertainment, employ domestic help reducing physical labor, and demonstrate changing dietary preferences favoring calorie-dense Western foods over traditional diets (Pedapudi et al., 2020).

Maternal education at graduate level or above was independently associated with 1.94 times higher odds of obesity, while paternal education showed a non-significant trend. This finding aligns with international literature documenting complex pathways through which parental education influences child obesity. A longitudinal study from Germany confirmed that lower parental education was

associated with higher BMI in children five years later, with breakfast consumption and screen time serving as mediators (Seum et al., 2022). However, in the Indian context, higher parental education often translates to higher income and adoption of Western dietary patterns, potentially explaining the positive association observed in our study.

Physical activity emerged as a crucial modifiable risk factor, with adolescents engaging in less than 60 minutes of moderate-to-vigorous physical activity daily demonstrating 2.08 times higher odds of obesity. This finding is particularly concerning given that 62.4% of participants failed to meet WHO recommendations of at least 60 minutes of daily physical activity. The 2022 India Report Card on Physical Activity for Children and Adolescents documented consistently poor grades for overall physical activity, underscoring this as a national challenge (Bhawra et al., 2023). Research from Delhi assessing nutritional status and physical fitness among adolescents similarly identified strong associations between physical inactivity and overweight status (Kumar & Kelly, 2017). The mechanisms linking physical activity to obesity are multifaceted, including direct energy expenditure, improved insulin sensitivity, enhanced metabolic rate, and psychological benefits that may reduce emotional eating.

Screen time exceeding two hours daily was associated with 1.89 times higher odds of obesity, consistent with a comprehensive dose-response meta-analysis of 44 studies which found that adolescents in the highest category of screen time were 1.27 times more likely to develop overweight or obesity (Haghjoo et al., 2022). The pathways linking screen time to obesity include displacement of physical activity, increased exposure to food advertising, mindless eating while viewing screens, disrupted sleep patterns, and reduced metabolic rate during sedentary viewing. Notably, 67.4% of our participants exceeded the recommended two-hour daily screen time limit, reflecting the increasing digitalization of adolescent life in contemporary India. Robinson et al. (2017) documented that screen media exposure leads to obesity through increased eating while viewing, exposure to high-calorie food marketing, and reduced sleep duration.

Dietary behaviors significantly influenced obesity risk, with frequent junk food consumption (more than twice weekly) associated with 1.76 times higher odds of obesity. The nutrition transition in India has been characterized by increasing consumption of energy-dense, nutrient-poor foods including packaged snacks, fried foods, sugar-sweetened beverages, and fast food, displacing traditional diets rich in whole grains, pulses, and vegetables. A study from Surat examining affluent adolescents found that low physical activity, television watching, and dietary patterns strongly predisposed adolescents to overweight and obesity (Bharati et al., 2008). The palatability, aggressive marketing, easy accessibility, and social acceptability of junk foods contribute to their overconsumption among adolescents. Regular soft drink consumption and irregular breakfast habits also showed associations with obesity in our study, though these did not remain significant in multivariate analysis after controlling for other factors.

Active transportation to school emerged as a protective factor, with adolescents using motorized transport demonstrating 1.67 times higher odds of obesity. This finding highlights the importance of incidental physical activity accumulated through daily routines. Research from Canadian adolescents similarly identified strong associations between active transportation and lower obesity prevalence (Janssen et al., 2004). In the Indian context, increasing motorization and parental concerns about safety have reduced opportunities for active commuting, particularly in urban areas, thereby eliminating a significant source of daily physical activity.

Family history of obesity emerged as the strongest predictor in our study, with affected adolescents demonstrating 3.21 times higher odds of obesity. This substantial association reflects the complex interplay of genetic predisposition and shared environmental factors within families. A meta-analysis by Singh et al. (2023) similarly reported that children with family history of obesity faced eight times higher risk of developing obesity. The familial clustering extends beyond genetics to encompass shared dietary patterns, physical activity behaviors, and attitudes toward food and body image. Research from South India by Gulati et al. (2013) documented significant clustering of diet, physical activity, and overweight status in parents and offspring, demonstrating that health

behaviors track within families. This finding underscores the importance of family-based interventions that target the home environment and parental modeling of healthy behaviors rather than focusing exclusively on the adolescent.

When compared to studies from other regions of India, our findings from Jodhpur demonstrate prevalence rates intermediate between highly urbanized metro cities and smaller towns. Delhi-based research by Kaur et al. (2008) reported obesity prevalence of 6.8% among high-income group children, closely matching our findings. However, studies from southern states like Karnataka reported slightly higher prevalence rates, with one investigation documenting overweight and obesity at 10.8% and 6.2% respectively (Ranjani et al., 2016). Regional variations in obesity prevalence across India reflect differential rates of urbanization, varying dietary traditions, cultural attitudes toward body size, and socioeconomic development trajectories. Rajasthan's unique position as a state undergoing rapid economic transformation while maintaining strong cultural traditions may explain the prevalence patterns observed in our study.

Conclusion

This school-based cross-sectional study conducted in Jodhpur revealed that nearly one-quarter of adolescents were overweight or obese, indicating a substantial burden of excess adiposity among school-going youth. The prevalence of 24.4% for combined overweight and obesity reflects the ongoing epidemiological transition in urban India, positioning childhood obesity as a priority public health concern alongside persistent undernutrition. Multiple risk factors were identified spanning socioeconomic domains, lifestyle behaviors, and family characteristics. Private school attendance, urban residence, higher family income, maternal education, family history of obesity, insufficient physical activity, excessive screen time, frequent junk food consumption, and motorized transportation to school emerged as significant independent predictors. These findings highlight the multifactorial etiology of adolescent obesity, necessitating comprehensive interventions addressing individual behaviors, family environments, school policies, and broader societal factors. The identification of predominantly modifiable risk factors offers hope for prevention and intervention strategies.

Recommendations

School-based multi-component interventions should be implemented incorporating nutrition education, daily physical education classes, restrictions on junk food availability in school canteens, and promotion of active transportation through safe walking and cycling infrastructure. Family-centered programs addressing parental knowledge, home food environments, and shared physical activities are essential given the strong familial clustering observed. Health education curricula should emphasize practical skills including reading nutrition labels, preparing healthy snacks, and developing critical awareness of food marketing tactics.

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