

ASSESSMENT OF CHILDHOOD OBESITY AND ITS ASSOCIATION WITH LIFESTYLE FACTORS

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ABSTRACT

Background: Childhood obesity has become a major public health concern worldwide, with increasing prevalence due to unhealthy dietary habits, physical inactivity, prolonged screen time, and other lifestyle-related factors. Early identification of these modifiable risk factors is essential for preventing obesity-related complications during childhood and adulthood.

Aim: The present study aimed to assess the prevalence of childhood obesity and evaluate its association with lifestyle factors among school-going children. Specifically, the study sought to determine the prevalence of overweight and obesity using Body Mass Index (BMI), assess dietary habits, physical activity, screen time, and sleep patterns, and examine the relationship between these lifestyle factors and childhood obesity.

Materials and Methods: A hospital-based cross-sectional observational study was conducted in the Department of *Kaumarbhritya* from reputed Ayurvedic Institute, over a period of 12 months. A total of 120 children aged 6–12 years fulfilling the inclusion criteria were enrolled. Demographic details, anthropometric measurements, dietary habits, physical activity, screen time, and sleep duration were recorded using a structured questionnaire. BMI was classified according to age-appropriate standards. Statistical analysis was performed using the Chi-square test and multivariable logistic regression, with a p-value <0.05 considered statistically significant.

Results: Among 120 children, 21 (17.5%) were obese and 24 (20.0%) were overweight. Inadequate physical activity was observed in 72 (60.0%) children, prolonged screen time (>2 hours/day) in 76 (63.3%), frequent junk food consumption in 73 (60.8%), and inadequate sleep (<9 hours/day) in 68 (56.7%). Childhood obesity showed significant associations with reduced physical activity (p=0.009), prolonged screen time (p=0.004), frequent junk food intake (p=0.027), inadequate sleep (p=0.041), and frequent consumption of sugar-sweetened beverages (p=0.008). Screen time >2 hours/day was the strongest independent predictor of obesity (AOR=3.42; p=0.003).

Conclusion: Childhood obesity is strongly associated with unhealthy lifestyle behaviours. Early screening, regular BMI assessment, health education, promotion of physical activity, healthy dietary practices, reduced screen time, and parental involvement are essential to prevent obesity and improve long-term health outcomes among children.

Keywords: Childhood obesity; Body Mass Index; Lifestyle factors; Physical activity; Screen time; School-going children.

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INTRODUCTION

Childhood obesity has become one of the most serious public health concerns worldwide, affecting

both developed and developing nations. It is defined as an abnormal or excessive accumulation of body fat that adversely affects a child's health and well-being. Over the past few decades, the prevalence of

childhood obesity has increased dramatically due to rapid urbanization, unhealthy dietary transitions, reduced physical activity, and increased sedentary behaviour. According to the World Health Organization (WHO), the number of children and adolescents living with overweight and obesity has risen substantially, making obesity one of the leading risk factors for future non-communicable diseases (NCDs) and premature mortality [1].

The development of childhood obesity is multifactorial and results from a complex interaction between genetic, environmental, behavioural, and socioeconomic factors. Although genetic predisposition influences body weight, lifestyle-related factors play a much greater role in the current obesity epidemic. Increased consumption of energy-dense, nutrient-poor foods, frequent intake of sugar-sweetened beverages, prolonged screen time, inadequate physical activity, poor sleep quality, and reduced outdoor recreational activities have been consistently identified as major contributors to excessive weight gain among children [2,3]. These modifiable risk factors have become increasingly common with modernization and technological advancement, particularly in urban settings.

Childhood obesity is associated with numerous short-term and long-term health consequences. Obese children are more likely to develop hypertension, dyslipidaemia, insulin resistance, type 2 diabetes mellitus, non-alcoholic fatty liver disease, musculoskeletal disorders, and obstructive sleep apnoea. In addition to physical health problems, obesity negatively affects psychological well-being, resulting in low self-esteem, anxiety, depression, social isolation, and poor academic performance. Importantly, obesity during childhood often persists into adulthood, thereby increasing the lifelong risk of cardiovascular disease, metabolic syndrome, and several chronic illnesses [4,5].

Lifestyle behaviours established during childhood have a profound influence on future health outcomes. The increasing availability of processed foods, reduced opportunities for physical exercise, excessive use of smartphones, computers, television, and other digital devices have contributed significantly to sedentary lifestyles among children. Furthermore, inadequate sleep duration and irregular eating patterns have emerged as additional behavioural determinants of obesity. Several recent studies have demonstrated that these lifestyle factors are independently associated with higher body mass index (BMI) and greater adiposity among school-going children [6,7].

India is currently experiencing a rapid nutritional transition characterized by the coexistence of undernutrition and obesity. Changing food habits, increased consumption of fast foods, reduced physical activity, and urban lifestyles have resulted in a steady rise in childhood overweight and obesity.

School-going children are particularly vulnerable because they spend considerable time in sedentary educational and recreational activities while having easy access to calorie-dense foods. Consequently, childhood obesity has become an emerging public health challenge requiring immediate preventive strategies involving schools, families, healthcare professionals, and policymakers [8,9].

Assessment of obesity and identification of associated lifestyle factors are essential for developing effective preventive interventions. Understanding the behavioural determinants of obesity can facilitate early screening, promote healthy lifestyle practices, and reduce future disease burden. Therefore, the present study was undertaken to assess the prevalence of childhood obesity and evaluate its association with lifestyle factors among school-going children, thereby generating evidence that may support the planning of targeted health promotion and obesity prevention programmes [10]. The present study aimed to assess the prevalence of childhood obesity and evaluate its association with lifestyle factors among school-going children. Specifically, the study sought to determine the prevalence of overweight and obesity using Body Mass Index (BMI), assess dietary habits, physical activity, screen time, and sleep patterns, and examine the relationship between these lifestyle factors and childhood obesity.

MATERIALS AND METHODS

Study Design: Hospital-based cross-sectional observational study.

Department: Department of *Kaumarbhritya* (Ayurvedic Pediatrics).

Study Place: OPD of *Kaumarbhritya* from reputed ayurveda institute.

Study Population: School-going children attending the Department of *Kaumarbhritya* and children recruited from affiliated schools who fulfilled the eligibility criteria.

Sample Size: A total of 120 children meeting the eligibility criteria were enrolled in the study.

Study Duration: 12 months.

Inclusion Criteria:

- Children aged 6–12 years.
- Children whose parents/guardians provided written informed consent.
- Children who were willing to participate in the study.
- Children with complete demographic and lifestyle-related information.

Exclusion Criteria:

- Children with known endocrine disorders or genetic syndromes associated with obesity.
- Children receiving medications known to affect body weight (e.g., corticosteroids or hormonal therapy).

- Children with chronic systemic illnesses or severe physical disabilities limiting physical activity.
- Children with incomplete clinical or lifestyle data.
- Children whose parents/guardians declined to provide informed consent.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean $\pm$ standard deviation (SD), while categorical variables were presented as frequency and percentage. The

RESULT

Table 1. Demographic Characteristics of the Study Participants

	Variable	Number of Children (n)	Percentage (%)	P-value
Age Group (years)	6–8	34	28.3	0.041
	9–10	46	38.3	
	11–12	40	33.4	
Gender	Male	66	55	0.562
	Female	54	45	
Residence	Urban	74	61.7	0.118
	Rural	46	38.3	
Total		120	100	

Table 2. Nutritional Status of Children According to BMI Classification

BMI Category	Number of Children (n)	Percentage (%)	P-value
Underweight	12	10	<0.001
Normal weight	63	52.5	
Overweight	24	20	
Obese	21	17.5	
Total	120	100	

Table 3. Lifestyle Characteristics of the Study Participants

Variable		Number of Children (n)	Percentage (%)	P-value
Daily Physical Activity	≥ 60 min/day	48	40	0.003
	<60 min/day	72	60	
Daily Screen Time	≤ 2 hours	44	36.7	<0.001
	>2 hours	76	63.3	
Sleep Duration	≥ 9 hours/day	52	43.3	0.018
	<9 hours/day	68	56.7	
Frequency of Junk Food Intake	≤ 2 times/week	47	39.2	0.006
	>2 times/week	73	60.8	
Total		120	100	

Table 4. Association Between Lifestyle Factors and Childhood Obesity

Variable	Obese (n=21)	Non-Obese (n=99)	P-value
Physical activity <60 min/day	18 (85.7%)	54 (54.5%)	0.009
Screen time >2 hours/day	19 (90.5%)	57 (57.6%)	0.004
Junk food >2 times/week	17 (81.0%)	56 (56.6%)	0.027
Sleep duration <9 hours/day	16 (76.2%)	52 (52.5%)	0.041
Sugar-sweetened beverages ≥ 3 /week	15 (71.4%)	38 (38.4%)	0.008

Table 5. Multivariable Analysis of Factors Associated with Childhood Obesity

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	P-value
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association between childhood obesity and categorical lifestyle variables, including physical activity, dietary habits, screen time, sleep duration, and sugar-sweetened beverage consumption, was assessed using the Chi-square test or Fisher's exact test, wherever appropriate. Variables showing significant associations in univariate analysis were further evaluated using multivariable logistic regression analysis to identify independent predictors of childhood obesity, and the results were expressed as adjusted odds ratios (AORs) with 95% confidence intervals (CIs). A two-tailed p-value of <0.05 was considered statistically significant for all analyses.

Screen time >2 hours/day	3.42	1.52–7.68	0.003
Physical activity <60 min/day	2.89	1.28–6.54	0.011
Junk food >2 times/week	2.47	1.12–5.46	0.024
Sleep duration <9 hours/day	2.15	1.01–4.61	0.047
Frequent sugary beverage intake	2.74	1.21–6.20	0.016

Figure 1. Nutritional Status of Children According to BMI Classification

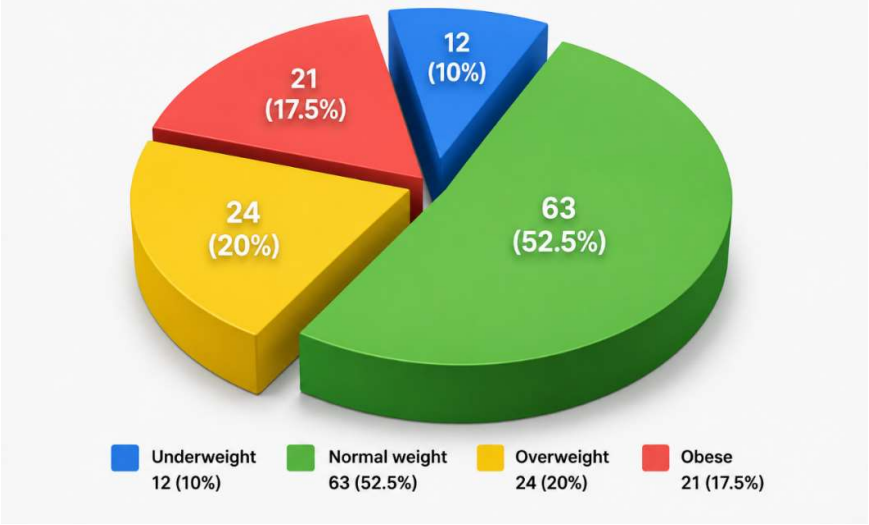


Figure 2. Lifestyle Characteristics of the Study Participants

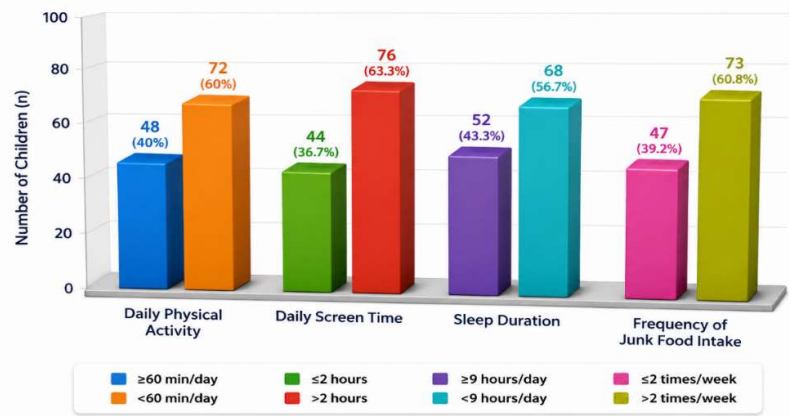
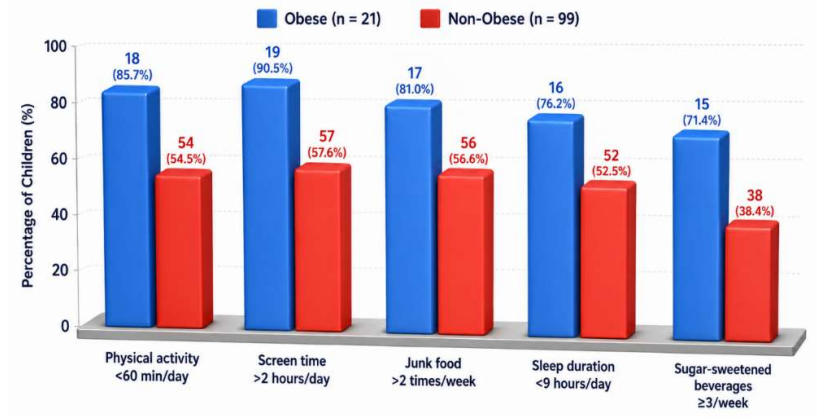


Figure 3. Association Between Lifestyle Factors and Childhood Obesity



A total of 120 children were included in the study. The largest proportion belonged to the 9–10 years age group.

group (46; 38.3%), followed by 11–12 years (40; 33.4%) and 6–8 years (34; 28.3%). The distribution of age groups was statistically significant ($p = 0.041$). Male children constituted 66 (55.0%) of the study population, while 54 (45.0%) were females, with no statistically significant gender difference ($p = 0.562$). Regarding place of residence, 74 (61.7%) participants were from urban areas and 46 (38.3%) were from rural areas; however, this difference was not statistically significant ($p = 0.118$).

Assessment of nutritional status using BMI revealed that the majority of children had normal body weight (63; 52.5%). Twenty-four (20.0%) children were classified as overweight, while 21 (17.5%) were obese. Additionally, 12 (10.0%) children were underweight. The prevalence of overweight and obesity together accounted for 37.5% of the study population. The distribution of BMI categories showed a highly statistically significant difference ($p < 0.001$), indicating a considerable burden of excess body weight among the enrolled children.

Evaluation of lifestyle factors demonstrated that 72 (60.0%) children performed less than 60 minutes of physical activity per day, whereas only 48 (40.0%) achieved the recommended daily activity level. This difference was statistically significant ($p = 0.003$). Most participants (76; 63.3%) reported screen time exceeding 2 hours per day, while 44 (36.7%) had screen exposure of 2 hours or less ($p < 0.001$). Regarding sleep duration, 68 (56.7%) children slept for less than 9 hours daily, whereas 52 (43.3%) had adequate sleep ($p = 0.018$). Frequent junk food consumption (>2 times per week) was observed in 73 (60.8%) participants compared with 47 (39.2%) children who consumed junk food less frequently, and this association was also statistically significant ($p = 0.006$). These findings indicate that unhealthy lifestyle practices were common among the study population.

A significant association was observed between unhealthy lifestyle behaviors and childhood obesity. Among obese children ($n = 21$), 18 (85.7%) reported engaging in less than 60 minutes of physical activity daily, compared with 54 (54.5%) among non-obese children ($p = 0.009$). Similarly, 19 (90.5%) obese children had screen time exceeding 2 hours per day, whereas this behavior was reported by 57 (57.6%) non-obese children ($p = 0.004$). Frequent junk food consumption (>2 times per week) was noted in 17 (81.0%) obese children compared with 56 (56.6%) non-obese children ($p = 0.027$). Short sleep duration (<9 hours/day) was present in 16 (76.2%) obese children and 52 (52.5%) non-obese children ($p = 0.041$). Furthermore, regular consumption of sugar-sweetened beverages (≥ 3 times/week) was significantly higher among obese children (15; 71.4%) than among non-obese children (38; 38.4%) ($p = 0.008$). These findings suggest that sedentary behavior, unhealthy dietary habits, and inadequate sleep are strongly associated with childhood obesity. Multivariable logistic regression analysis identified

several independent predictors of childhood obesity. Children with screen time greater than 2 hours per day had 3.42 times higher odds of obesity (AOR = 3.42; 95% CI: 1.52–7.68; $p = 0.003$). Those performing less than 60 minutes of physical activity daily had nearly 2.9-fold increased odds of obesity (AOR = 2.89; 95% CI: 1.28–6.54; $p = 0.011$). Frequent junk food consumption was independently associated with obesity (AOR = 2.47; 95% CI: 1.12–5.46; $p = 0.024$). Children sleeping less than 9 hours per day had approximately 2.15 times higher odds of obesity (95% CI: 1.01–4.61; $p = 0.047$). Likewise, frequent intake of sugar-sweetened beverages significantly increased the likelihood of obesity (AOR = 2.74; 95% CI: 1.21–6.20; $p = 0.016$). Overall, excessive screen time emerged as the strongest independent predictor of childhood obesity in the present study.

DISCUSSION

The present study demonstrated that children aged 9–10 years (38.3%) constituted the largest age group, with a slight male predominance (55.0%). Similar findings were reported by Singh et al., who observed a higher prevalence of overweight and obesity among school-aged children between 9 and 12 years, with boys being marginally more affected than girls. Likewise, Sharma et al. reported that urban school-going boys exhibited a greater tendency toward obesity due to reduced physical activity and increased sedentary behaviour. These findings suggest that middle childhood is a critical period for implementing preventive interventions against obesity.[11,12]

In the present study, 17.5% of children were obese and 20.0% were overweight, indicating that more than one-third (37.5%) of the participants had excess body weight. Comparable findings were reported by Ranjani et al., who documented a steadily increasing prevalence of childhood overweight and obesity in Indian school children. Similarly, the recent study by Rao et al. demonstrated that overweight and obesity continue to rise among Indian children due to rapid nutritional transition and lifestyle modification. These observations reinforce the growing burden of pediatric obesity in developing countries.[13,14]

The present study found that 60.0% of children had inadequate physical activity, 63.3% had screen time exceeding two hours daily, 56.7% reported insufficient sleep, and 60.8% frequently consumed junk food. These findings closely agree with the study by Moitra et al., who reported that inadequate physical activity, excessive screen exposure, and poor sleep quality commonly coexist among Indian adolescents and significantly contribute to increased adiposity. Similarly, Patil et al. observed that unhealthy dietary habits and prolonged screen time were highly prevalent among obese school children. These findings highlight the importance of lifestyle modification in obesity prevention.[15,16]

A significant association was observed between obesity and lifestyle factors, including reduced physical activity, prolonged screen time, frequent junk

food intake, inadequate sleep, and consumption of sugar-sweetened beverages. Similar associations have been reported by Saha et al., who found that sedentary behaviour and unhealthy dietary practices significantly increased the likelihood of childhood obesity. Likewise, a recent Indian study conducted in the Andaman and Nicobar Islands demonstrated that increased screen time, inadequate physical activity, and frequent fast-food consumption were independently associated with higher BMI among school children. These consistent findings emphasize the crucial role of modifiable behavioural factors in childhood obesity.[17,18]

Multivariable logistic regression identified screen time exceeding two hours per day (AOR = 3.42) as the strongest independent predictor of childhood obesity, followed by inadequate physical activity, junk food consumption, short sleep duration, and frequent intake of sugar-sweetened beverages. Similar findings were reported by Moitra et al., who identified screen time and reduced physical activity as independent predictors of increased BMI among Indian adolescents. Furthermore, a recent review by Gupta et al. concluded that behavioural interventions targeting screen exposure, dietary practices, sleep hygiene, and physical activity are the most effective strategies for reducing childhood obesity. These findings support comprehensive school- and family-based lifestyle interventions to prevent obesity during childhood.[19,20]

CONCLUSION

The present study demonstrated that childhood obesity is a growing health concern among school-going children, with more than one-third of the participants being either overweight or obese. Unhealthy lifestyle behaviours, including inadequate physical activity, prolonged screen time, frequent consumption of junk food and sugar-sweetened beverages, and insufficient sleep, were found to be significantly associated with obesity. Among these factors, excessive screen time emerged as the strongest independent predictor of childhood obesity. These findings emphasize that obesity in childhood is largely influenced by modifiable behavioural and environmental factors rather than biological factors alone. Early identification of at-risk children through regular BMI assessment and lifestyle evaluation is essential for timely intervention. School-based health education, promotion of regular physical activity, healthy dietary practices, reduced sedentary behaviour, and active parental involvement should be prioritized to prevent childhood obesity. Implementing comprehensive, multidisciplinary, and community-based preventive strategies can substantially reduce the burden of childhood obesity and improve the long-term physical and psychological health of children.

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