

PATTERNS AND PREDICTORS OF CHILDHOOD OBESITY: INSIGHTS FROM A LONGITUDINAL COMMUNITY-BASED STUDY

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Abstract

Background: The global rise in childhood obesity presents substantial public health challenges, highlighting the need for a better understanding of its causes. should look at how a variety of factors, including dietary practices, physical activity, family medical history, socioeconomic status, psychological health, sleep patterns, screen time, and nutritional awareness, contribute to the development of childhood obesity. **Material & Methods:** Over a five-year period, we monitored 100 children aged 6 to 12 years from various socioeconomic backgrounds using a longitudinal approach. The assessments covered dietary consumption, physical exercise frequency, familial obesity history, psychological stress levels, sleep duration, daily screen time, and nutritional awareness. Based on BMI percentiles, obesity was identified. **Results:** Obesity prevalence increased from 20% at baseline to 32% by the end of the research. Interestingly, consuming too many sugar-filled drinks and snacks was found to be a significant predictor of obesity ($p < 0.05$). Children who engaged in regular physical activities and were active were much less likely to become obese ($p < 0.01$). Moreover, children from lower socioeconomic origins or those with obese family members had higher BMI percentiles ($p < 0.05$). Obesity was significantly associated with psychological distress and low self-esteem ($p < 0.05$). Moreover, longer screen times (>4 hours) and less sleep (<8 hours) were linked to greater obesity rates ($p < 0.05$). Elevated BMI percentiles were linked ($p < 0.05$) with inadequate nutritional understanding. **Conclusion:** This study highlights the important need for coordinated prevention and treatment programs by outlining various linked factors impacting juvenile obesity. By addressing these factors, the growing epidemic of childhood obesity can be lessened.

INTRODUCTION

The global rise in childhood obesity poses a serious threat to public health and necessitates a thorough analysis of its causes and consequences.^[1] By examining a wide range of contributing factors, such as dietary habits, physical activity levels, genetic predispositions, socioeconomic status, psychological well-being, sleep patterns, screen time exposure, and nutritional awareness, this study aims to shed light on the complex causes of childhood obesity.^[2,3] The link between childhood obesity and a number of harmful health outcomes, including type 2 diabetes, cardiovascular diseases, and mental health problems, emphasizes the urgent need for this

research.⁴ Adulthood may be affected by these problems, thus raising worries about public health⁵. This study provides a targeted investigation into the prevalent patterns and underlying causes of childhood obesity within a demographically diverse population. It is being conducted in a semi-urban Indian context. The deliberate choice of sites aims to reveal the complex interplay between socioeconomic and cultural factors and obesity. This decision also makes a major contribution to the growing corpus of research on children obesity in the particular circumstances of fast urbanization, changing lifestyles, and dietary shifts that are typical of many emerging nations. The purpose of this research is to provide specific insights into the patterns and variables that are

specific to childhood obesity by unraveling the intricate web of factors that influence it. This study looks at the relationship between the incidence of obesity and a number of factors, including family eating habits, the physical environment, local resources for physical activity, access to healthy food, and nutrition and health education programs⁶. The goal is to identify important points of intervention.

Additionally, the study explores the significance of psychological elements and mental health, acknowledging their influence on eating habits and physical activity levels. The relationship between mental and physical health is vital because mental illnesses like stress, anxiety, and depression can worsen eating disorders and lower physical activity levels, which increase the risk of obesity.^[7] Screen time and sleep patterns are also being scrutinized because of their negative effects on children's health and growing importance in contemporary lifestyles. Obesity risk factors include inadequate sleep and excessive screen time, underscoring the necessity of complete lifestyle changes.

It is anticipated that the results of this study will guide the creation of focused, culturally aware preventative and intervention plans. With a focus on encouraging good eating, increasing physical exercise, enhancing mental health support, encouraging healthy sleep patterns, and limiting screen time, these initiatives seek to address the multifaceted nature of pediatric obesity. The ultimate goal of this research is to provide evidence-based recommendations for practice and policy in various settings, thereby aiding in global efforts to counter the growing childhood obesity epidemic.

MATERIALS AND METHODS

Study Design and Setting: This longitudinal, community-based study was conducted at Maharajah's Institute of Medical Sciences, Vizianagaram, from January 2022 to September 2022. The study aimed to identify patterns and predictors of childhood obesity within the local community.

Participants: A total of 100 children aged 6-12 years, enrolled in schools within the Vizianagaram district, were randomly selected to participate in the study. The sample included an equal number of males and females to ensure gender balance. Inclusion criteria were children residing in the study area during the study period, while those with pre-existing chronic diseases affecting weight were excluded.

Data Collection: Data were collected through a combination of parental questionnaires, children's self-reports, and clinical assessments. The questionnaires covered dietary habits, physical activity levels, family medical history, socioeconomic status, and psychological well-being.

Physical activity was categorized into none, light, moderate, and vigorous, based on the frequency and intensity of activities. Nutritional knowledge was assessed through a quiz designed for children, evaluating their understanding of healthy eating practices.

Clinical Measurements: Height and weight measurements were taken by trained healthcare professionals using standardized equipment. Body Mass Index (BMI) percentiles were calculated based on age and sex, according to the World Health Organization growth charts. Obesity was defined as a BMI at or above the 95th percentile for children of the same age and sex.

Statistical Analysis: Descriptive statistics were used to summarize the sample characteristics and study variables. Logistic regression analysis was employed to identify predictors of obesity, with obesity status as the dependent variable. Independent variables included dietary habits, physical activity, family history of obesity, socioeconomic status, psychological factors, sleep patterns, screen time, and nutritional knowledge. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study protocol was approved by the Institutional Ethics committee of Maharajah's Institute of Medical Sciences. Informed consent was obtained from all parents or guardians, and assent was obtained from children aged above 7 years. All data were anonymized to maintain confidentiality.

RESULTS

Patient Demographics

The study commenced with 100 participants, comprising 50 males (50%) and 50 females (50%). The participants' ages ranged from 6 to 12 years at baseline, with a mean age of 9.2 ± 1.89 . Socioeconomic status was categorized as low (30 participants, 30%), middle (40 participants, 40%), and high (30 participants, 30%).

Prevalence of Obesity

Initially, 20 participants (20%) were classified as obese. By the study's conclusion, the number of obese participants had increased to 32 (32%). This change represents a 12% increase in obesity prevalence over the 5-year period.

Dietary Patterns

Dietary analysis indicated a significant correlation between obesity and high consumption of sugary beverages and snacks ($p < 0.05$). Specifically, children consuming sugary beverages more than four times a week had a mean BMI percentile increase of 15 ± 5 , compared to those who consumed less, leading to a 1.5 times higher likelihood of obesity.

Physical Activity Levels

Physical activity analysis showed a strong inverse correlation with obesity ($p < 0.01$). Children engaging

in at least 60 minutes of moderate to vigorous physical activity daily had a mean BMI percentile $20\% \pm 6\%$ lower than less active peers, translating to a 40% lower risk of developing obesity.

Family History and Socioeconomic Factors

A positive family history of obesity correlated with a higher incidence of obesity ($p < 0.05$). About 60% of obese children had at least one obese parent. Furthermore, children from low socioeconomic backgrounds had a significantly higher mean BMI percentile ($30\% \pm 10\%$) compared to children from high socioeconomic backgrounds, resulting in a 1.8 times greater risk of obesity.

Psychological Factors

Psychological assessments revealed that higher stress levels and lower self-esteem were associated with significant weight gain ($p < 0.05$). Children reporting high stress levels showed a mean BMI percentile increase of $18\% \pm 7\%$, with

stress-related eating identified as a significant predictor of this weight gain.

Additional Parameters

Sleep Patterns: Children averaging less than 8 hours of sleep per night had a $25\% \pm 8\%$ higher mean BMI percentile compared to those who slept 9 hours or more ($p < 0.05$).

Screen Time: Higher screen time, exceeding 4 hours per day, was associated with a $22\% \pm 9\%$ increase in mean BMI percentile over the study period ($p < 0.05$).

Nutritional Knowledge: Children with low nutritional knowledge scores had a $19\% \pm 10\%$ higher mean BMI percentile than their peers with higher scores ($p < 0.05$).

Table 1: Patient Demographics

Characteristic	Total Participants	Percentage
Gender		
Males	50	50%
Females	50	50%
Age (years)		
Range	6-12	
Mean \pm SD	9.2 \pm 1.8	
Socioeconomic Status		
Low	30	30%
Middle	40	40%
High	30	30%

Table 2: Prevalence of Obesity

Time Point	Obese Participants	Percentage
At baseline	20	20%
At study conclusion (5 years later)	32	32%

Table 3: Dietary Patterns and Obesity

Dietary Pattern	Mean BMI Percentile Increase	Odds of Obesity
Sugary beverages >4 times/week	15% \pm 5%	1.5 times

Table 4: Physical Activity and Obesity

Physical Activity Level	Mean BMI Percentile Difference	Risk Reduction
≥ 60 min moderate to vigorous/day	-20% \pm 6%	40%

Table 5: Family History and Socioeconomic Factors

Factor	Mean BMI Percentile Difference	Risk Factor
Positive family history	N/A	60% incidence
Low vs. High socioeconomic status	+30% \pm 10%	1.8 times

Table 6: Psychological Factors

Psychological Factor	Mean BMI Percentile Increase
High stress levels	18% \pm 7%

Table 7: Additional Parameters

Parameter	Mean BMI Percentile Difference	Significance (p-value)
Sleep < 8 hours/night	+25% \pm 8%	< 0.05
Screen time > 4 hours/day	+22% \pm 9%	< 0.05
Low nutritional knowledge	+19% \pm 10%	< 0.05

DISCUSSION

Our results further the growing corpus of knowledge about the intricate interactions between eating

habits, physical exercise, socioeconomic factors, genetic predispositions, and psychological elements that contribute to the complicated etiology of adolescent obesity. Consistent with previous

research, our study emphasizes the substantial influence of consuming a lot of sugar-filled drinks and snacks on the probability of becoming obese.^[8] This is consistent with studies that demonstrate the negative impact of these dietary practices on body weight. Furthermore, our study's findings supporting the protective impact of physical activity against obesity support the idea that regular physical activity can be an important preventive intervention.^[9,10]

Our data revealed a relationship between obesity prevalence and socioeconomic status that lends further credence to the socioeconomic gradient in health theory, which links obesity risk to lower socioeconomic backgrounds. The significance of tackling social determinants of health in the fight against childhood obesity is shown by this relationship. Furthermore, the results of our investigation into the impact of a family history of obesity support the important role that genetic and familial lifestyle factors play in the development of obesity.^[11]

Stress and low self-esteem were shown to be psychological characteristics that predicted weight growth, which is consistent with other research showing a link between psychological discomfort and obesity. This emphasizes the need for obesity prevention and intervention efforts to take a holistic approach, incorporating mental health care.^[12,13] Our study also clarifies the newly identified risk factors of excessive screen time and insufficient sleep, which were both linked to increased obesity rates. These results are in line with other recent research showing the harmful effects of prolonged screen time and sleep deprivation on children's weight increase.^[14]

Our study's inclusion of nutritional knowledge as a variable showed an intriguing correlation: higher BMI percentiles were associated with lower levels of nutritional comprehension. This implies that enhancing nutritional education may be a crucial tactic in initiatives aimed at preventing obesity.

CONCLUSION

Our research illuminates the complexity of factors contributing to childhood obesity, revealing a significant interaction among dietary patterns, physical engagement, genetic backgrounds, and socioeconomic influences. This complexity mandates the adoption of multifaceted, culturally attuned intervention strategies. These should

integrate comprehensive nutritional education, robust mental health support, and extensive lifestyle adjustments to combat this issue effectively. The study advocates for a holistic strategy in addressing childhood obesity, underscoring the importance of custom-tailored interventions that consider the diverse and interconnected causes.

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