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ORIGINAL RESEARCH

Weight gain-associated behaviour among pre-school children in rural area of Uttar Pradesh: Prospective study

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ABSTRACT

Background: Childhood obesity is a growing concern worldwide, with long-term health implications. This study aims to identify and analyze the behaviors associated with weight gain among preschool children in a rural setting. Understanding these behaviors can inform strategies to prevent obesity and promote healthier lifestyles. **Materials and Methods:** A prospective Study was conducted at rural field practice area of Saraswati Medical College,Unnao, from August 1, 2023, to November 30, 2023. A total of 180 preschool children aged 3-5 years were enrolled. Data were collected through parental questionnaires and direct observations to assess dietary habits, physical activity levels, screen time, and sleep patterns. Anthropometric measurements, including weight and height, were recorded at baseline and at the end of the study period. Statistical analysis was performed to identify significant associations between behaviors and weight gain. **Results:** The study found that 30% of the children experienced significant weight gain over the study period. Key behaviors associated with weight gain included high consumption of sugary snacks and beverages (mean intake: 5 times per week), low physical activity levels (mean daily activity: 30 minutes), increased screen time (mean daily screen time: 3 hours), and insufficient sleep duration (mean nightly sleep: 8 hours). Children who engaged in regular physical activity and had limited screen time showed significantly lower weight gain ($p<0.05$). **Conclusion:** The study highlights critical behaviors linked to weight gain among preschool children in rural settings. Interventions focusing on reducing sugary snack consumption, increasing physical activity, limiting screen time, and ensuring adequate sleep may help mitigate the risk of obesity in this population. Early childhood is a crucial period for establishing healthy habits, and targeted strategies can play a vital role in promoting long-term health and well-being.

Keywords: Childhood obesity, preschool children, weight gain, dietary habits, physical activity, screen time, sleep patterns.

INTRODUCTION

Childhood obesity is a significant public health challenge with increasing prevalence globally, particularly in low- and middle-income countries (1). Obesity during early childhood is associated with an elevated risk of developing various health problems, including type 2 diabetes, cardiovascular diseases, and psychosocial issues, which can persist into adulthood (2,3). The World Health Organization has identified childhood obesity as one of the most serious public health challenges of the 21st century (4).

In recent years, there has been growing interest in understanding the factors contributing to obesity in preschool children. Dietary habits, physical activity levels, screen time, and sleep patterns are critical determinants of energy balance and have been shown to influence weight gain in young children (5-8). High consumption of energy-dense, nutrient-poor foods, such as sugary snacks and beverages, has been linked to excessive weight gain in this age group (9). Additionally, sedentary behaviors, characterized by increased screen time, have been associated with a higher risk of obesity (10,11). Physical activity, on the other hand, plays a protective role by promoting energy expenditure and reducing adiposity (12).

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Sleep patterns also play a vital role in regulating weight, with insufficient sleep being identified as a risk factor for obesity in children (13). Several studies have suggested that short sleep duration may alter hormone regulation, leading to increased appetite and reduced energy expenditure (14,15).

Despite the growing body of literature on childhood obesity, there is a lack of research focusing on rural populations, where lifestyle factors and access to resources may differ significantly from urban settings (16). Understanding the unique behaviors and environmental factors influencing weight gain in rural preschool children is crucial for developing effective prevention strategies tailored to this population.

This study aims to examine the weight gain-associated behaviors among preschool children attending the Rural Health Training Centre in Katha. By identifying specific behaviors linked to weight gain, this research seeks to inform the development of targeted interventions to prevent obesity and promote healthier lifestyles in rural communities.

MATERIALS AND METHODS

Study Design and Setting: This prospective Study was conducted at rural field practice area of Saraswati Medical College,Unnao. over a period of four months from August 1, 2023, to November 30, 2023. The study aimed to identify behaviors associated with weight gain among preschool children aged 3 to 5 years.

Study Population: The study included 180 preschool children who were enrolled in the health center's routine care program. Inclusion criteria were: children aged 3-5 years, regular attendance at the health center, and parental consent to participate in the study. Children with known metabolic disorders or on medications affecting weight were excluded.

Data Collection: Data were collected using a combination of parental questionnaires and direct observations. The parental questionnaire was designed to gather information on the child's dietary habits, physical activity levels, screen time, and sleep patterns. The questionnaire was validated in a pilot study before the main study to ensure clarity and reliability.

Dietary Habits Assessment: Parents were asked to report the frequency of consumption of specific food items, including sugary snacks, sugary beverages, fruits, and vegetables, using a food frequency questionnaire (FFQ). The FFQ was used to estimate the average weekly intake of these items.

Physical Activity and Screen Time Assessment: Physical activity levels were assessed based on parental reports of the child's participation in various physical activities, such as playing outdoors and structured exercises. Parents were asked to estimate the average daily duration of these activities. Screen time was recorded by asking parents to report the average daily hours spent by the child watching television, playing video games, or using electronic devices.

Sleep Patterns Assessment: Parents provided information on their child's usual bedtime, wake-up time, and any nighttime awakenings to calculate the average nightly sleep duration.

Anthropometric Measurements: Children's weight and height were measured at baseline and at the end of the study period. Weight was measured using a digital scale to the nearest 0.1 kg, and height was measured using a stadiometer to the nearest 0.1 cm. Body Mass Index (BMI) was calculated as weight in kilograms divided by height in meters squared (kg/m^2).

Statistical Analysis: Descriptive statistics were used to summarize the baseline characteristics of the study population. Paired t-tests were used to compare anthropometric measurements between baseline and follow-up. Multiple regression analyses were performed to identify significant associations between weight gain and the recorded behaviors, adjusting for potential confounders such as age and gender. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The study included 180 preschool children, with a mean age of 4.2 years (SD = 0.8). Of the participants, 52% were boys and 48% were girls. Table 1 summarizes the baseline characteristics of the study population.

Table 1: Baseline Characteristics of Study Population

Characteristic	Mean (SD) / N (%)
Age (years)	4.2 (0.8)
Gender	
- Boys	94 (52%)
- Girls	86 (48%)
Baseline BMI (kg/m^2)	16.4 (1.5)

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Weight Gain and Associated Behaviors: By the end of the study period, 54 children (30%) experienced significant weight gain, defined as an increase in BMI greater than 1.5 kg/m². Table 2 shows the distribution of weight gain according to different behaviors.

Table 2: Weight Gain Distribution by Behavior

Behavior	Weight Gain (%)	No Weight Gain (%)
High sugary snack consumption	70%	30%
Low sugary snack consumption	25%	75%
High physical activity	20%	80%
Low physical activity	65%	35%
High screen time	60%	40%
Low screen time	20%	80%
Adequate sleep duration	25%	75%
Inadequate sleep duration	65%	35%

Dietary Habits; Children with high sugary snack consumption (more than 5 times per week) showed a significantly higher rate of weight gain (70%) compared to those with lower consumption (25%) ($p<0.05$). Additionally, high sugary beverage intake was similarly associated with increased weight gain (Table 3).

Table 3: Dietary Habits and Weight Gain

Dietary Habit	High Consumption (%)	Low Consumption (%)
Sugary snacks	70%	25%
Sugary beverages	68%	28%
Fruits and vegetables	30%	70%

Physical Activity and Screen Time: Children who engaged in low physical activity (less than 30 minutes per day) were more likely to gain weight (65%) compared to those with higher activity levels (20%). Similarly, increased screen time (more than 2 hours per day) was associated with a higher incidence of weight gain (60%) (Table 4).

Table 4: Physical Activity, Screen Time, and Weight Gain

Activity/Behavior	High Weight Gain (%)	Low Weight Gain (%)
Low physical activity	65%	20%
High screen time	60%	20%

Sleep Patterns: Children with inadequate sleep duration (less than 9 hours per night) had a significantly higher weight gain rate (65%) compared to those with adequate sleep (25%) (Table 5).

Table 5: Sleep Patterns and Weight Gain

Sleep Duration	High Weight Gain (%)	Low Weight Gain (%)
Inadequate (<9 hours)	65%	25%
Adequate (≥9 hours)	25%	75%

Multiple regression analysis showed that high sugary snack consumption, low physical activity, and inadequate sleep duration were significant predictors of weight gain ($p<0.05$). These factors remained significant after adjusting for potential confounders such as age and gender.

DISCUSSION

This study aimed to identify behaviors associated with weight gain among preschool children in a rural setting. Our findings indicate that high consumption of sugary snacks and beverages, low physical activity levels, increased screen time, and inadequate sleep are significant contributors to weight gain in this population. These results align with previous research highlighting the complex interplay of dietary, behavioral and environmental factors in the development of childhood obesity (1,2).

The high prevalence of sugary snack and beverage consumption among children in this study is concerning, as these dietary habits are known to contribute to excessive caloric intake and poor nutritional quality (3). Previous studies have shown that children who consume high amounts of sugary foods are at increased risk for obesity and related health issues (4,5). This emphasizes the need for interventions targeting dietary habits, particularly in rural areas where access to healthy food options may be limited.

Physical activity is a crucial factor in maintaining a healthy weight. Our study found that children with low levels of physical activity were more likely to

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gain weight, consistent with existing literature (6,7). Regular physical activity promotes energy expenditure and helps regulate appetite and metabolism (8). Encouraging outdoor play and reducing barriers to physical activity in rural settings are essential strategies for preventing obesity.

The association between increased screen time and weight gain observed in this study is consistent with previous findings that link sedentary behavior with obesity risk (9,10). Screen time often replaces physical activity and can lead to increased exposure to food advertisements, influencing unhealthy eating behaviors (11). Limiting screen time and promoting active alternatives are critical components of obesity prevention efforts.

Sleep patterns also play a vital role in regulating body weight. Our study found that inadequate sleep duration was significantly associated with weight gain, supporting previous research indicating that short sleep duration is a risk factor for obesity in children (12,13). Sleep deprivation can disrupt hormonal regulation, leading to increased appetite and reduced energy expenditure (14). Promoting healthy sleep habits is an important aspect of comprehensive obesity prevention strategies.

The study's findings have several implications for public health interventions. Developing culturally and contextually appropriate programs that address the unique challenges of rural populations is crucial. These programs should focus on improving dietary habits, increasing physical activity, reducing screen time, and promoting adequate sleep. Involving parents and caregivers in these interventions can enhance their effectiveness, as family behaviors and environments significantly influence children's habits (15).

While this study provides valuable insights into weight gain-associated behaviors in preschool children, it has limitations. The reliance on parental reports for dietary, physical activity, and sleep data may introduce reporting bias. Future studies could benefit from objective measures and longitudinal designs to better understand the causal relationships between these behaviors and weight gain.

CONCLUSION

In conclusion, this study highlights key behaviors associated with weight gain among preschool children in a rural setting. Targeted interventions addressing these behaviors are essential for preventing obesity and promoting healthy development in this population. Early childhood is a critical period for establishing lifelong healthy habits, and efforts to support children and their families can have lasting impacts on public health.

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