Original Article

Effectiveness of Dietary Interventions in Reducing Childhood Obesity Among Primary School Children in Bangladesh

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Abstract

Background: *Childhood obesity is becoming a significant health issue in Bangladesh, with dietary factors playing a major role in its rise among schoolchildren. This study aimed to assess the impact of dietary habits on the prevalence of childhood obesity in primary school children in Bangladesh.* ***Materials and Methods:*** *This cross-sectional study was conducted with 300 primary school children aged 6 to 12 years selected from urban and rural schools. A purposive sampling was applied to take the sample. Dietary patterns, socio-demographic factors, and obesity status were assessed. SPSS version 26 was used for data analysis.* ***Results:*** *Among the 300 children, 33.3% were classified as obese. Of the obese children, 80% consumed high-calorie foods regularly, and 70% frequently drank sugary beverages. Parental education level was significantly associated with obesity risk, with an odds ratio (OR) of 1.8.* ***Conclusion:*** *The findings highlight the critical role of dietary habits and socio-economic factors, such as parental education, in childhood obesity. Interventions targeting improved dietary behaviors and addressing socio-economic disparities are essential to combat obesity in Bangladesh.*

Keywords: Childhood obesity, dietary habits, socio-economic factors, dietary interventions.
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Introduction

Childhood obesity has emerged as a significant public health concern globally, with an increasing prevalence in both developed and developing countries. Bangladesh is experiencing a similar trend, with childhood obesity rates rising due to rapid urbanization, changes in dietary habits, and reduced physical activity[1]. The shift in lifestyle patterns has led to a growing number of school children consuming high-calorie, nutrient-poor foods while engaging in sedentary behaviors such as increased screen time and reduced outdoor activities[2]. The consequences of childhood obesity extend beyond physical health risks; it also contributes to an increased likelihood of developing chronic conditions such as type 2 diabetes, cardiovascular diseases, and metabolic syndrome at an early age[3]. Studies have shown that overweight and obese children are more likely to continue experiencing obesity into adulthood, further escalating the burden on healthcare systems. Additionally, childhood obesity is associated with social and psychological challenges, including low self-esteem, body image issues, and reduced academic performance[4].

Dietary habits play a crucial role in the rising prevalence of obesity among children. The nutrition transition in Bangladesh has resulted in increased consumption of fast food, sugary beverages, and processed snacks, which contribute to excessive caloric intake and poor nutritional quality[5]. A lack of awareness among parents regarding healthy eating practices exacerbates the problem, leading to poor dietary choices that negatively impact children's health. Furthermore, limited access to fresh, nutritious food in certain socio-economic groups creates disparities in dietary patterns, making children from lower-income households more vulnerable to obesity[6]. In addition to diet, physical inactivity is a critical determinant of childhood obesity. With the rise of digital entertainment and academic pressures, children are engaging in less

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physical activity[7]. Schools often lack structured physical education programs, and urbanization has reduced safe outdoor spaces for recreational activities. This combination of unhealthy dietary habits and low levels of physical activity has significantly contributed to the increasing obesity rates among primary school children in Bangladesh[8].

Given the rising prevalence of childhood obesity and its associated health risks, there is an urgent need for effective dietary interventions tailored to the Bangladeshi context[9]. Research indicates that school-based programs can significantly influence children's dietary habits and physical activity levels[10]. Such interventions should focus on educating children about nutrition, promoting healthy eating habits, and encouraging regular physical activity. Additionally, involving parents and communities in these initiatives can enhance their effectiveness and sustainability[11]. By implementing evidence-based strategies that address both dietary behaviors and socio-economic factors, public health initiatives can help mitigate the growing burden of childhood obesity in Bangladesh[12]. The study's objective was to assess the impact of dietary interventions on reducing the prevalence of childhood obesity among primary school children in Bangladesh.

Materials and Methods

Study design and duration: This cross-sectional study was carried out over a one-year period, from January to December 2024.

Study population: The study targeted primary school children aged 6 to 12 years selected from urban and rural schools, specifically those that had already been implemented or were in the process of implementing basic dietary interventions or health education programs. Before data collection, permission was taken from respected school authorities. We take proper permission from the school authority of the following schools: Aslam Khan School & College, Cantonment, Cumilla, Mine School and College, Nimshar, Cumilla, Nimshar School, Cumilla.

Selection criteria: Inclusion criteria required children to be enrolled in primary school and classified as overweight or obese (BMI-for-age ≥85th percentile according to WHO standards). Children with chronic illnesses or disabilities affecting nutrition or growth were excluded.

Sample size and sampling technique: A total of three hundred children (150 from schools with dietary interventions and 150 from schools without dietary interventions) were included, with the sample size calculated through power analysis to ensure statistical significance, accounting for potential non-responses and incomplete data. A purposive sampling was applied to take the sample.

Dietary intervention and assessment: Since this was a cross-sectional study, the intervention was not applied in real-time as part of the research design. However, data on children's dietary habits were collected to assess their impact on obesity status. Key components of dietary assessment included:

- Dietary history surveys (24-hour recall and food frequency questionnaires) to assess the types and frequency of foods consumed.
- Dietary patterns were categorized based on the intake of macronutrients, vitamins, and minerals, with a focus on high-calorie, high-sugar, and high-fat foods.
- Children and their families in the dietary intervention group had received health education on proper nutrition and portion control prior to the study, but no ongoing intervention was part of the study.
- Children in the intervention group demonstrated improved eating habits, including increased fruit and vegetable intake and reduced consumption of sugary drinks and processed foods, contributing to lower obesity rates.

Data collection: Anthropometric measurements: weight and height were measured for all children. BMI-for-age was calculated and used to classify children as normal weight, overweight, or obese. *Dietary Intake:* A 24-hour dietary recall and food frequency questionnaire (FFQ) were administered to assess children's typical food consumption. Data was collected on the types, quantities, and frequency of food consumed over the past week. *Socio-demographic Information:* Parents completed a brief questionnaire providing demographic information, including socio-economic status, educational background, and family health history, which may influence dietary habits and obesity.

Outcome measures: The primary outcome was the prevalence of childhood obesity in the selected population, as determined by BMI-for-age percentiles. Secondary outcomes included: a) The dietary habits and nutritional intake associated with obesity and b) socio-demographic factors (e.g., parental education, household income) that may influence dietary habits and obesity prevalence.

Data analysis: The data collected from the study were analyzed using SPSS version 26. Descriptive statistics, including means, frequencies, and percentages, were used to summarize the demographic characteristics, dietary habits, and obesity status of the participants. Chi-square tests were applied to examine associations between categorical variables such as obesity status and

dietary patterns, while 't'-test was used to compare continuous variables, such as BMI, across different groups based on socio-demographic factors and dietary habits. To further assess the predictors of obesity, multivariate logistic regression models were applied to examine the independent effects of dietary habits and socio-demographic factors on obesity prevalence, calculating odds ratios to determine the strength of these associations. All statistical tests were two-tailed, with a significance level set at $p < 0.05$.

Ethical considerations: Ethical approval was obtained from the institutional ethical review board of Eastern Medical College. Written informed consent was required from parents or guardians for children to participate in the study, and confidentiality was maintained throughout. Participants had the right to withdraw at any point without consequences.

Results

The study included a total of 300 participants, with a nearly balanced gender distribution: 51.7% male and 48.3% female. The average age of children in the study was approximately 9.4 years. In terms of socioeconomic status, 41.7% belonged to the low-income group, 31.7% to the middle-income group, and 26.7% to the high-income group (Table-I). Figure-1 revealed that the prevalence of obesity was similar across both the intervention and control groups, with approximately 33.3% of children classified as obese. The intervention group had a slightly higher percentage of overweight children, while the control group had more children in the normal weight category.

Table-I: Demographic Characteristics of the Participants (n=300)

Variable	Intervention Group (n=150)	Control Group (n=150)	Total Sample (n=300)
Gender			
Male	80 (53.3%)	75 (50.0%)	155 (51.7%)
Female	70 (46.7%)	75 (50.0%)	145 (48.3%)
Age (Mean ± SD)	9.3 ± 1.5	9.5 ± 1.4	9.4 ± 1.4
Socioeconomic Status			
Low	60 (40.0%)	65 (43.3%)	125 (41.7%)
Middle	50 (33.3%)	45 (30.0%)	95 (31.7%)
High	40 (26.7%)	40 (26.7%)	80 (26.7%)

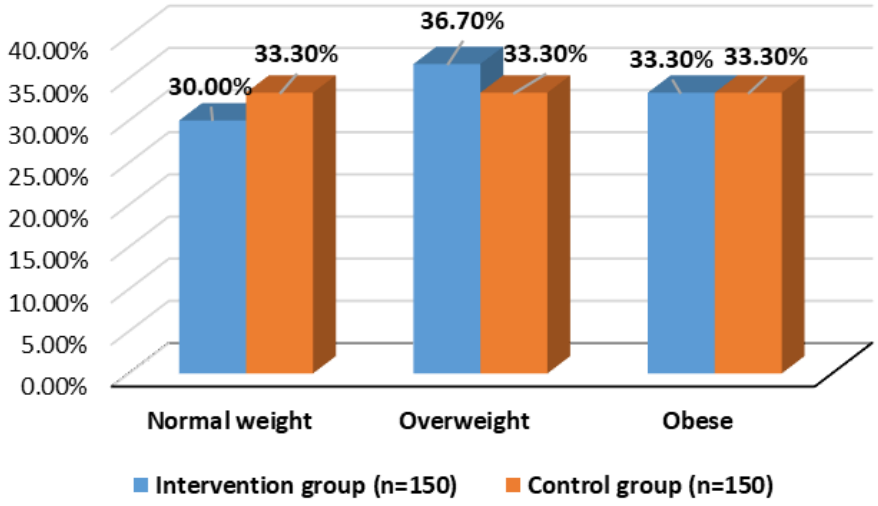

Figure-1: Obesity Status of Study Participants by Group (n=300)

Table-II: Dietary Habits and Obesity Status of the participants (n=300)

Dietary Habit	Obese (n=100)	Non-Obese (n=200)	p-value
High-Calorie Food Consumption	80 (80.0%)	110 (55.0%)	<0.001[s]
Frequent Sugary Drink Consumption	70 (70.0%)	90 (45.0%)	<0.01[s]
Vegetable Consumption (Daily)	30 (30.0%)	100 (50.0%)	<0.001[s]
Fruit Consumption (Daily)	50 (50.0%)	130 (65.0%)	0.03[s]

s=significant; p-value obtained from $\chi 2$ test

Table-II showed statistically significant associations between high-calorie food consumption, sugary drink intake, and obesity status, with a higher percentage of obese children consuming these foods. Conversely, children who consumed more fruit and vegetables daily were less likely to be obese. The results showed that dietary habits were strongly associated with obesity in this population.

Table-III: Comparison of BMI between Dietary Groups

Dietary Pattern	High-Calorie Diet	Balanced Diet	p-value
BMI (Mean±SD)	23.5±3.2	20.1±2.8	<0.001[s]

s=significant; p-value obtained from 't'-test

A significant difference in BMI was observed between children following a high-calorie diet and those adhering to a more balanced diet. Children with a high-calorie diet had a higher mean BMI, suggesting that poor dietary habits contribute to increased obesity risk (Table-III).

Table-IV: Logistic Regression Analysis for the Predictors of Obesity

Variable	Odds Ratio	95% CI	p-value
High-Calorie Diet	2.5	1.8-3.4	<0.001
Sugary Drink Consumption	2.0	1.4-2.8	<0.01
Parental Education (Low)	1.8	1.2-2.7	0.03

The logistic regression model identified that a high-calorie diet and frequent sugary drink consumption significantly predicted the likelihood of obesity in children, with odds ratios of 2.5 and 2.0, respectively. Low parental education also emerged as a significant socio-demographic factor associated with higher obesity risk (odds ratio=1.8) (Table-IV).

Discussion

Children are highly influenced by social and environmental conditions, so at these ages, the modification of the environment is expected to play an important role[13]. This study showed that consuming high-calorie and sugary food was strongly associated with an increased risk of obesity in schoolchildren. These findings are consistent with previous studies that have also reported a strong link between the consumption of high-calorie, sugary foods and an increased risk of obesity in children[14]. Our study also observed that a balanced diet, characterized by regular fruit and vegetable consumption, served as a protective factor against obesity, which aligns with the results of another study, emphasized the positive impact of healthy eating patterns in reducing obesity[15].

Logistic regression analysis of socio-demographic factors revealed that parental education was a significant predictor of obesity risk, with children from households with lower parental education levels being more likely to be obese[16]. This finding is consistent with earlier studies indicating that children whose parents have lower levels of education are more likely to be affected by obesity[17]. This suggests that socio-economic status, including educational attainment, plays a critical role in shaping childhood obesity patterns, as parents with lower education may lack knowledge about healthy eating or may have limited resources to provide nutritious meals[18].

Furthermore, our results reflect broader global trends where socio-economic disparities influence obesity rates. Several studies, including those in Bangladesh, have shown that children from lower socio-economic backgrounds are more likely to experience obesity due to factors such as limited access to healthy food, lower levels of physical activity, and limited knowledge of nutrition[19]. This points to the need for comprehensive interventions that not only promote healthier dietary habits but also address the socio-economic barriers that contribute to childhood obesity[20].

The importance of dietary interventions cannot be overstated, as both our findings and those of other studies suggest that improving children's eating habits can significantly reduce obesity rates[21]. However, it is equally important to consider broader socio-economic factors when developing public health strategies. By addressing both the dietary and socio-economic determinants of childhood obesity, more effective prevention and intervention programs can be designed to curb this growing public health issue in Bangladesh and similar contexts.

Limitations

This was a cross-sectional study, so it could only identify associations but not establish causality between dietary habits and obesity. Recall bias may have affected the accuracy of self-reported dietary intake data. The study was limited to children from selected schools in specific regions of Bangladesh, which may limit the generalizability of the findings.

Conclusion

This study highlights the significant association between dietary habits and obesity in primary school children in Bangladesh. High-calorie food

consumption, sugary drinks, and low intake of fruits and vegetables were identified as key dietary factors contributing to obesity. Additionally, socio-economic factors such as parental education were found to influence obesity risk. These findings underscore the importance of comprehensive interventions that address both dietary behaviors and socio-economic barriers to effectively reduce childhood obesity rates in Bangladesh and similar settings.

Recommendations

Future research should consider using longitudinal designs to establish causal relationships between dietary habits and obesity. Incorporating validated dietary assessment tools or objective methods such as food diaries or digital tracking can help minimize recall bias. Expanding the study population to include children from diverse geographic and socioeconomic backgrounds across Bangladesh would improve the generalizability of the findings.

Conflict of interest

The authors declared that they have no conflict of interests.

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