

Dietary Pattern as a Common Risk Factor for Constipation and Poor Oral Health in School-Age Children

Dr. Tamanna Ferdousi^{1*}, Dr. Umme Habiba Saima²

¹Specialist, Department of Paediatric Surgery, KPJ Specialized Hospital & Nursing College, Dhaka, Bangladesh

²Specialist, Department of Orthodontics and General Dentistry, KPJ Specialized Hospital & Nursing College, Dhaka, Bangladesh

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***Corresponding Author:** Dr. Tamanna Ferdousi, Specialist, Department of Paediatric Surgery, KPJ Specialized Hospital & Nursing College, Dhaka, Bangladesh

Abstract

Background: Constipation and poor oral health are common but often overlooked problems in school-age children. Emerging evidence suggests that unhealthy dietary patterns may contribute to both conditions. This study aimed to assess the relationship between dietary habits, constipation and oral health status among school-age children in Bangladesh.

Methods: This cross-sectional analytical study was conducted at the Department of pediatric surgery, Bangladesh Shishu Hospital & Institute and Dhaka Dental College and Hospital, Bangladesh from May 2018 to April 2020. A total of 100 school-age children were enrolled using a consecutive sampling technique. Data were analyzed to determine associations between dietary factors, constipation and oral health outcomes

Results: The mean age of participants was predominantly 6–8 years (37%), with 58% being male. Low fiber intake (72%), inadequate water intake (59%) and frequent fast-food consumption (≥ 2 –3 times/week in 44%) were common. Constipation was present in 39% of children, while dental caries affected 67%, gingivitis 28% and poor oral hygiene 42%. Significant associations were found between constipation and low fiber intake ($p = 0.018$), fast-food intake ≥ 4 times/week ($p = 0.027$), inadequate water intake ($p = 0.041$) and daily sugary snacks ($p = 0.030$). Similar dietary factors were significantly associated with poor oral health. Children with constipation were more likely to have poor oral health (74.4% vs. 62.3%; $p = 0.012$).

Conclusion: Unhealthy dietary patterns are important shared risk factors for both constipation and poor oral health. Improving diet quality may reduce the burden of these conditions in school-age children.

Keywords: Constipation, Oral health, Dietary habits, Children, Fiber intake, Fast food

1. INTRODUCTION

Constipation and poor oral health are two common yet often overlooked health problems among school-age children, particularly in low- and middle-income countries. Although these conditions appear unrelated at first glance, emerging evidence suggests that unhealthy dietary habits may serve as a shared etiological factor contributing to both [1, 2]. School-age children frequently adopt dietary practices that include inadequate fiber intake, high consumption of processed foods, reduced water intake and increased preference for sugary snacks [3]. These habits not only impair gastrointestinal motility but also predispose children to dental caries, gingivitis and poor overall oral hygiene. Understanding the role of dietary pattern as a unifying risk factor is

essential for guiding preventive strategies and promoting holistic child health [4].

Constipation is a common functional gastrointestinal disorder in children and is responsible for nearly 3% of pediatric outpatient visits. Its prevalence varies widely, ranging from 10% to 30% globally, depending on diagnostic criteria and population characteristics [5, 6]. Diet plays a central role in the development of constipation. Insufficient dietary fiber, inadequate fluid intake and excessive intake of refined carbohydrates can lead to hard stools and infrequent bowel movements [7]. Prolonged constipation may negatively affect school performance, appetite and quality of life, making early identification and intervention crucial [8].

Similarly, oral health remains an important public health concern in children. Dental caries is among the most prevalent chronic childhood diseases worldwide and is strongly associated with dietary behaviors [9]. Frequent consumption of sugar-rich foods and beverages promotes bacterial fermentation and acid production, resulting in enamel demineralization and caries formation [10]. Poor oral hygiene habits and limited access to dental care further compound the problem, contributing to gingivitis, halitosis and other oral health issues. Oral health problems in children not only cause pain and discomfort but may also affect nutrition, growth, school attendance and psychosocial wellbeing [11].

Despite the high burden of these conditions, few studies have explored the shared influence of dietary patterns on both constipation and oral health outcomes in the same pediatric population [12]. Identifying dietary behaviors that simultaneously predispose children to gastrointestinal and oral health problems offers an opportunity to target modifiable lifestyle factors through integrated preventive strategies [13]. This approach is particularly relevant in countries like Bangladesh, where changing food habits, urbanization and increased accessibility to processed foods are influencing children’s health in multiple ways [14].

The objective of this study was to evaluate dietary pattern as a common risk factor for constipation and poor oral health among school-age children attending the Bangladesh Institute of Child Health. By examining the relationship between specific dietary habits, bowel behavior and oral health status, the study seeks to generate evidence that may guide parental counseling, school-based nutrition programs and community health interventions. Understanding these associations may contribute to the development of holistic strategies to improve both gastrointestinal and oral health outcomes in children.

3. RESULTS

Table 1. Socio-Demographic Characteristics of the Study Population (n = 100)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	6–8	37	37.0
	9–10	33	33.0
	11–12	30	30.0
Sex	Male	58	58.0
	Female	42	42.0
Residence	Urban	63	63.0

2. METHODOLOGY & MATERIALS

This cross-sectional analytical study was conducted at the Department of pediatric surgery, Bangladesh Shishu Hospital & Institute and Dhaka Dental College and Hospital, Bangladesh from May 2018 to April 2020. A total of 100 school-age children were enrolled using a consecutive sampling technique. Children aged 6 to 12 years who attended the outpatient department for general health consultation or minor complaints and whose parents provided informed consent were included in the study. Children with chronic gastrointestinal disorders such as Hirschsprung disease or inflammatory bowel disease, those taking medications that influence bowel habits including laxatives, opioids, or anticholinergics and children with systemic conditions affecting oral health such as congenital oral anomalies or uncontrolled metabolic diseases were excluded. Data were collected through a structured questionnaire administered to parents or guardians, which recorded socio-demographic characteristics and detailed dietary patterns including fiber intake, fast-food consumption, sugary snack frequency and daily water intake. Constipation was assessed using the Rome III/IV diagnostic criteria, while oral health status was evaluated by trained dental professionals using a standardized oral examination checklist that included dental caries index, gingival condition and oral hygiene status. All examinations were performed under adequate light using disposable instruments following aseptic techniques. The primary objective was to determine whether dietary pattern served as a common risk factor for both constipation and poor oral health. Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize variables, while chi-square tests were applied to assess associations between dietary factors, constipation and oral health outcomes. A p-value of less than 0.05 was considered statistically significant.

	Semi-urban	21	21.0
	Rural	16	16.0
Mother's Education	No schooling	17	17.0
	Primary	29	29.0
	Secondary	38	38.0
	Higher secondary & above	16	16.0

Table 1 presents the socio-demographic characteristics of the 100 school-age children included in the study. The majority of participants were aged 6–8 years (37%), followed by 9–10 years (33%). More than half of the children were male (58%). Most respondents

resided in urban areas (63%), while only 16% came from rural settings. Regarding maternal education, 38% of mothers had secondary-level education, whereas 17% had no formal schooling.

Table 2. Distribution of Dietary Patterns among School-Age Children (n = 100)

Dietary Factor	Category	Frequency (n)	Percentage (%)
Daily Fiber Intake	Adequate	28	28.0
	Low	72	72.0
Fast Food Consumption	≤1 time/week	31	31.0
	2–3 times/week	44	44.0
	≥4 times/week	25	25.0
Water Intake	Adequate (≥5 glasses/day)	41	41.0
	Inadequate	59	59.0
Sugar-Rich Snacks	Rarely	19	19.0
	3–5 times/week	47	47.0
	Daily	34	34.0

Table 2 summarizes the dietary patterns of the study participants. A majority of children had low daily fiber intake (72%), while only 28% consumed adequate fiber. Fast-food consumption was common, with 44% eating fast food 2–3 times per week and 25% consuming it ≥4 times

weekly. Inadequate water intake was reported in 59% of the children. Regarding sugary snacks, 34% consumed them daily and 47% ate them 3–5 times per week, indicating a high prevalence of unhealthy dietary habits among the study population.

Table 3. Prevalence of Constipation and Oral Health Problems (n = 100)

Variable	Category	Frequency (n)	Percentage (%)
Constipation (Rome III/IV criteria)	Present	39	39.0
	Absent	61	61.0
Dental Caries	Present	67	67.0
	Absent	33	33.0
Gingivitis	Present	28	28.0
	Absent	72	72.0
Overall Poor Oral Hygiene	Present	42	42.0
	Absent	58	58.0

Table 3 shows the prevalence of constipation and oral health problems among the study participants. Constipation was present in 39% of children according to Rome III/IV criteria. Dental caries was the most common oral health issue, affecting 67% of the sample. Gingivitis

was observed in 28% of children, while overall poor oral hygiene was noted in 42%. These findings indicate a substantial burden of both gastrointestinal and oral health problems in this population.

Table 4. Association between Dietary Pattern and Constipation (n = 100)

Dietary Factor	Constipation Present n (%)	Constipation Absent n (%)	p-value
Low Fiber Intake	33 (45.8%)	39 (54.2%)	0.018*
Fast Food ≥4 times/week	15 (60.0%)	10 (40.0%)	0.027*
Inadequate Water Intake	29 (49.2%)	30 (50.8%)	0.041*
Daily Sugary Snacks	19 (55.9%)	15 (44.1%)	0.030*

Table 4 demonstrates the association between dietary patterns and constipation among the study participants. Children with low fiber intake showed a significantly higher prevalence of constipation (45.8%, $p = 0.018$). Constipation was also more frequent in those consuming fast

food ≥ 4 times per week (60.0%, $p = 0.027$). Inadequate water intake was associated with constipation in 49.2% of children ($p = 0.041$). Similarly, daily intake of sugary snacks was linked to a higher proportion of constipation cases (55.9%, $p = 0.030$).

Table 5. Association between Dietary Pattern and Poor Oral Health ($n = 100$)

Dietary Factor	Poor Oral Health Present n (%)	Good Oral Health Present n (%)	p-value
Low Fiber Intake	55 (76.4%)	17 (23.6%)	0.006*
Fast Food ≥ 4 times/week	21 (84.0%)	4 (16.0%)	0.014*
Inadequate Water Intake	33 (55.9%)	26 (44.1%)	0.039*
Daily Sugary Snacks	28 (82.4%)	6 (17.6%)	0.009*

Table 5 presents the association between dietary habits and poor oral health among the children. Low fiber intake was significantly linked with poor oral health, affecting 76.4% of those with inadequate fiber consumption ($p = 0.006$). Fast-food intake ≥ 4 times per week was also associated with a high prevalence of poor oral

health (84.0%, $p = 0.014$). Inadequate water intake contributed to poor oral health in 55.9% of children ($p = 0.039$). Daily consumption of sugary snacks showed a strong association as well, with 82.4% of these children exhibiting poor oral health ($p = 0.009$).

Table 6. Relationship between Constipation and Poor Oral Health ($n = 100$)

Variable	Poor Oral Health Present n (%)	Poor Oral Health Absent n (%)	p-value
Constipation Present	29 (74.4%)	10 (25.6%)	0.012*
Constipation Absent	38 (62.3%)	23 (37.7%)	

Table 6 shows the relationship between constipation and poor oral health among the study participants. Poor oral health was more common in children with constipation, affecting 74.4% of those with the condition, compared to 62.3% among those without constipation. This association was statistically significant ($p = 0.012$).

4. DISCUSSION

This study examined the dietary patterns of school-age children and explored their association with constipation and poor oral health. The findings highlight that unhealthy dietary habits including low fiber intake, inadequate water consumption, frequent fast-food intake and high sugary-snack consumption were highly prevalent and significantly associated with both constipation and adverse oral health outcomes. In our study, 72% of the children consumed a low-fiber diet and 59% had inadequate water intake, which strongly contributed to the 39% prevalence of constipation. These findings align with the recommendations of Howarth and Sullivan et al., who emphasized that insufficient fiber and fluid intake are among the leading causes of functional constipation in children [15].

and Khayat et al., who observed similar patterns using the Rome criteria [16, 17]. The role of diet and gut health in pediatric constipation is further supported by Saeed et al., who highlighted the significant influence of the gut microbiota on bowel habits and gastrointestinal function in children [18]. Moreover, inadequate water intake in 59% of our sample showed a significant association with constipation ($p = 0.041$), a finding consistent with guidance by Yacob and Di Lorenzo et al., who stress hydration as a core component of constipation management [19].

The present study also revealed a high burden of oral health problems, with dental caries observed in 67% and poor oral hygiene in 42% of participants. Dietary factors showed strong correlations, as children consuming sugary snacks daily exhibited an 82.4% prevalence of poor oral health. This aligns with the work of Khalid et al., who demonstrated that sugar-rich diets significantly increase the risk of dental diseases [20]. Additionally, fast-food consumption four or more times per week was significantly associated with poor oral health (84%, $p = 0.014$), consistent with evidence presented by Arhakis et al., highlighting the interplay between systemic health conditions, nutritional habits and oral health outcomes in children [21].

Constipation prevalence in our study (39%) is comparable to the rates reported by Chogle et al.

The relationship between constipation and poor oral health observed in our study is noteworthy. Children with constipation were more likely to have poor oral health (74.4% vs. 62.3%, $p = 0.012$). This association may be explained by shared risk factors such as inadequate fiber and fluid intake, as well as high intake of sugary, low-nutrient foods. Kovacevska et al., have suggested that gastrointestinal dysfunction may be linked to oral health problems through nutritional deficiencies and altered dietary behaviors, supporting the interconnected nature of our findings [22].

Behavioral and psychosocial factors may also contribute. Oлару et al., reported that constipation can be influenced by lifestyle, stress and poor dietary routines—factors that may also impact oral hygiene behaviors [23]. Madhu and Agarwal et al., similarly noted that chronic constipation can affect children's daily activities and health practices, potentially explaining the overlap between constipation and poor oral health in our study [24].

The high prevalence of unhealthy eating habits in our study echoes observations by Şengüzel et al. and Shefa et al., who documented poor dietary patterns in Bangladeshi children, often linked with developmental challenges and limited nutritional awareness among caregivers [25, 26]. The broader implications of poor diet quality in school-age children have also been highlighted by Colombo et al., who emphasized that inadequate nutrition contributes not only to constipation but also to widespread oral health problems, obesity and micronutrient deficiencies [27].

Our findings also reinforce the importance of nutritional counseling for families. Salvatore et al., demonstrated that parental guidance and structured dietary advice significantly improve functional gastrointestinal symptoms in children [28]. This approach may also help reduce the burden of dental diseases, especially in populations with high consumption of sugary snacks and poor hydration habits, as seen in our study.

5. LIMITATIONS OF THE STUDY

This study was conducted in a single center with a relatively small sample size, which may limit the generalizability of the findings to all school-age children in Bangladesh. The cross-sectional design precludes establishing causal relationships between dietary patterns, constipation and oral health. Dietary intake and habits were assessed using parent-reported questionnaires, which may be subject to recall bias. Additionally, other potential confounding factors such as physical

activity, socioeconomic status and oral hygiene practices were not comprehensively analyzed. Future multicenter studies with larger sample sizes and longitudinal follow-up are recommended to confirm these associations.

6. CONCLUSION

In conclusion, this study supports a growing body of evidence that dietary patterns play a central role in both gastrointestinal and oral health outcomes in children. Integrating dietary assessment, caregiver education and early screening into routine pediatric and school health programs may significantly reduce the burden of constipation and oral disease in this population.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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