

Dietary Habit and Oral Health Status in Secondary School Students Attending a Dental Camp in Bangladesh: A Cross-Sectional Study

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ARTICLE INFO.

Received: April 13, 2026

Accepted: May 13, 2026

Volume: Vol-14, Issue-2, July 2026

DOI: <https://doi.org/10.3329/jcids.v14i2.89542>



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Publisher: Sapporo Dental College, Dhaka, Bangladesh

Web: www.sdch.edu.bd

E-mail: jcds.sdc@gmail.com



Scan QR code to access your article on JCDS BanglaJOL index.

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ABSTRACT:

Background: Dietary habits, particularly frequent intake of sugary snacks and beverages, play a significant role in the development of dental caries and other oral health problems among adolescents. School-based dental camps provide an opportunity to assess oral health status and related behavioral factors.

Objective: To assess dietary habits and oral health status among secondary school students attending a dental camp and to determine the association between sugar consumption and dental caries.

Methods: A descriptive cross-sectional study was conducted among 300 secondary school students (aged 12–16 years) attending a dental camp in two selected secondary schools in Bangladesh. Data were collected through a structured questionnaire covering socio-demographic characteristics, dietary habits, and oral hygiene practices. Clinical oral examinations were performed using mouth mirror and probe under natural light to assess DMFT index (Decayed, Missing, Filled Teeth). Data were analyzed using SPSS version 22. Chi-square test was applied to determine associations; $p < 0.05$ was considered statistically significant.

Results: Among 300 students, 52% were female and 48% were male. Majority (82%) reported daily consumption of sugary snacks, and 68% consumed soft drinks at least three times per week. Dental caries prevalence was 72%. Mean DMFT score found 2.36 ± 1.42 . Students consuming sugary snacks more than once daily had significantly higher caries prevalence ($p = 0.001$); irregular tooth brushing was also significantly associated with higher DMFT scores. ($p = 0.02$)

Conclusion: High frequency of sugary food intake was strongly associated with increased dental caries among secondary school students. Regular school-based dental camps, dietary counseling, and oral health education programs are essential to improve adolescent oral health in Bangladesh.

KEYWORDS: Dietary habit, Dental caries, DMFT, Secondary school students, Sugar consumption

INTRODUCTION:

Oral health is a fundamental component of overall health and quality of life. Dental caries is a biofilm mediated, diet modulated, multifactorial disease characterized by demineralization of dental hard tissues.[1] Despite global improvements in preventive dentistry, dental caries remains highly prevalent among children and adolescents, especially in low and middle-income countries.[2,3] Adolescence represents a transitional phase where dietary autonomy increases and consumption of sugary snacks, fast foods, and carbonated beverages becomes frequent.[4] The World Health Organization (WHO) has identified high free-sugar intake as a major risk factor for dental caries and recommends reducing sugar consumption to less than 10% of total energy intake.[5] Several studies have demonstrated a strong relationship between frequency of sugar intake and caries development rather than total sugar amount alone.[6,7] Repeated acid attacks following sugar consumption lower salivary pH, promoting enamel demineralization and bacterial proliferation.[1] In Bangladesh, rapid urbanization and lifestyle changes have influenced dietary patterns among school going children, increasing exposure to cariogenic foods.[8] However, limited data are available regarding dietary behavior and oral health status among secondary school students. Therefore, this study aimed to assess dietary habits and oral health status among secondary school students and evaluate the association between sugar consumption and dental caries.

MATERIALS AND METHODS:

This descriptive cross-sectional study was conducted among 300

secondary school students aged 12–16 years who attended a school-based dental camp organized in two selected secondary schools in Noakhali district of Bangladesh. Students who were present on the day of the camp and provided informed consent from their parents/guardians through school authority were included in the study, while those with systemic conditions affecting oral health or who refused participation were excluded. A purposive sampling technique was applied. Data were collected using a pre-tested structured questionnaire that included socio-demographic variables (age, sex, parental occupation, and family income), dietary habits (frequency of sugary snack intake, soft drink consumption, fast food intake, and bedtime sugar consumption), and oral hygiene practices (frequency and method of tooth brushing, use of fluoridated toothpaste, and history of dental visits). Following the interview, clinical oral examinations were performed by dental surgeons under natural light using sterile mouth mirror and Community Periodontal Index (CPI) probe in accordance with the World Health Organization (WHO) Oral Health Survey Basic Methods (5th edition).^[9] Dental caries experience was assessed using the Decayed, Missing, and Filled Teeth (DMFT) index for permanent dentition. In this index, “D” represents the number of permanent teeth with untreated carious lesions, “M” indicates teeth missing due to caries, and “F” denotes teeth that have been restored due to caries. Teeth extracted for orthodontic reasons or trauma were not included in the “M” component. The DMFT score for each participant was calculated by summing the D, M, and F components (DMFT = D + M + F), and the mean DMFT score was obtained by dividing the total DMFT of the study population by the total number of examined students. The DMFT index reflects cumulative lifetime caries experience and is widely accepted as a standardized epidemiological tool for assessing and comparing oral health status across populations. Higher DMFT scores indicate poorer dental health status. In addition to caries assessment, gingival condition was evaluated by observing bleeding on probing, inflammation, and plaque accumulation. After data collection, information was entered into SPSS version 22 for analysis. Descriptive statistics were used to compute frequency, percentage, mean, and standard deviation, and Chi-square test was applied to determine associations between dietary habits and dental caries, with statistical significance set at $p < 0.05$.

RESULTS

A total of 300 secondary school students participated in the study. Among them, the majority were aged 14–15 years, and females slightly outnumbered males. Most of the respondents were Muslim. Regarding parental occupation, the majority of fathers were involved in service or business, whereas most mothers were housewives. With regard to monthly family income, most students belonged to middle-income families (Table 1).

Regarding oral hygiene practices, the majority of students reported cleaning their teeth regularly. Most participants used toothbrush and toothpaste for cleaning their teeth, and a substantial proportion used fluoridated toothpaste. In terms of brushing frequency, most students brushed their teeth once daily, while a smaller proportion reported brushing twice daily. A few respondents brushed irregularly or less frequently (Table 2).

Dietary habits showed that a large proportion of students consumed sugary foods such as sweets, biscuits, or chocolates. Many of them reported consuming these items once daily, while a considerable

number consumed sugary snacks more than once per day. Soft drink consumption was also common among the respondents, with a significant proportion reporting regular intake (Table 3).

Clinical examination revealed that dental caries was present in a substantial proportion of students. Both upper and lower jaws were affected in many cases, while some students showed caries confined to either the upper or lower jaw. A small proportion of participants had missing teeth due to caries, and a limited number had filled teeth indicating previous dental treatment (Table 4).

The distribution of DMFT scores indicated that only a small proportion of students (28%) had a DMFT score of zero, indicating no caries experience. A moderate proportion (32%) had a DMFT score of 1–2, while the majority (40%) had a DMFT score ≥ 3 , suggesting a relatively high burden of dental caries among the participants (Figure 1).

Dental caries prevalence was significantly higher among students who consumed sugary snacks more than once daily (82.1%) compared with those who consumed sweets once daily (59.1%) or rarely (40.0%), and the association was statistically highly significant ($p = 0.001$). Students who brushed their teeth once daily or irregularly demonstrated significantly higher DMFT scores compared with those who brushed twice daily ($p = 0.02$) (Table 5).

Table 1: Socio-demographic characteristics of the students (n = 300)

Variables	Category	n (%)
Age (in years)	12–13	90 (30.0)
	14–15	156 (52.0)
	16	54 (18.0)
	Mean ($\pm$ SD): 14.2 $\pm$ 1.3 years	
Sex	Male	144 (48.0)
	Female	156 (52.0)
Religion	Muslim	258 (86.0)
	Hindu	36 (12.0)
	Others	6 (2.0)
Father's occupation	Service	114 (38.0)
	Business	90 (30.0)
	Farmer/Labor	96 (32.0)
Mother's occupation	No formal schooling	48 (16.0)
	Primary	102 (34.0)
	Secondary and above	150 (50.0)
Monthly family income BDT	< 20,000	78 (26.0)
	20,000–40,000	150 (50.0)
	> 40,000	72 (24.0)

Table 2: Oral hygiene practices among students (n = 300)

Variables	Category	n (%)
Method of tooth cleaning	Toothbrush and toothpaste	258 (86.0)
	Tooth powder/finger	24 (8.0)
	Miswak/others	18 (6.0)
Brushing frequency	Once daily	162 (54.0)
	Twice daily	108 (36.0)
	Irregular	30 (10.0)
Use of fluoridated toothpaste	Yes	258 (86.0)
	No	42 (14.0)
Dental visit history	Never visited dentist	228 (76.0)
	Visited dentist before	72 (24.0)

Table 3: Dietary habits related to sugar consumption (n = 300)

Variables	Category	n (%)
Sugary snack consumption	Rarely	30 (10.0)
	Once daily	78 (26.0)
	More than once daily	192 (64.0)
Soft drink intake	Rarely	96 (32.0)
	1–2 times/week	108 (36.0)
	≥3 times/week	96 (32.0)
Fast food consumption	Rarely	111 (37.0)
	1–2 times/week	120 (40.0)
	≥3 times/week	69 (23.0)
Sweet consumption before bedtime	Yes	138 (46.0)
	No	162 (54.0)

Table 4: Dental caries status and DMFT components (n = 300)

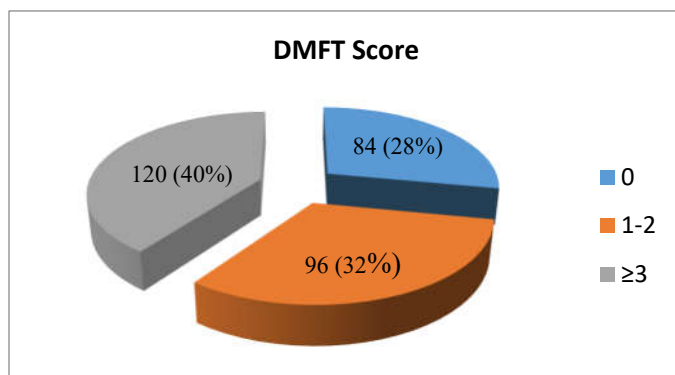
Variables	Category	n (%)
Dental caries presence	Present	216 (72.0)
	Absent	84 (28.0)
Decayed teeth (D)	Present	204 (68.0)
Missing teeth due to caries (M)	Present	24 (8.0)
Filled teeth (F)	Present	30 (10.0)
Mean DMFT score		2.36 ± 1.42

Table 5: Association of sugary snack consumption and tooth brushing frequency with dental caries/DMFT among secondary school students (n = 300)

Variables	Category	Caries Present / Higher DMFT n (%)	Caries Absent / Lower DMFT n (%)	p-value
Frequency of sugary snack consumption	Rarely	12 (40.0)	18 (60.0)	0.001
	Once daily	78 (59.1)	54 (40.9)	
	More than once daily	138 (82.1)	30 (17.9)	
Brushing frequency	Twice daily	48 (44.4)	60 (55.6)	0.02
	Once daily	132 (81.5)	30 (18.5)	
	Irregular	24 (80.0)	6 (20.0)	

Figure 1: Distribution of DMFT scores among students

(n=300)

**DISCUSSION:**

The present study revealed a high prevalence (72%) of dental caries among secondary school students attending a dental camp. The mean DMFT score of 2.36 indicates moderate caries experience in this adolescent population according to WHO classification.[9] This

prevalence is consistent with findings from other developing countries, where caries prevalence among adolescents ranges from 60% to 80%.[10,11] Studies conducted in South Asia have similarly reported increasing caries burden associated with urban dietary transitions.[12] The higher DMFT score in our study compared to some developed nations may reflect differences in preventive services, fluoride exposure, dietary regulation, and oral health awareness.[13] A significant association was found between frequency of sugary snack consumption and caries prevalence ($p=0.001$). Students consuming sweets more than once daily showed markedly higher DMFT scores. This aligns with the ecological plaque hypothesis proposed by Marsh, which suggests that frequent sugar exposure shifts the oral microbial balance toward cariogenic species.[14] Sheiham and James also emphasized that frequency of sugar intake is a stronger predictor of caries than total sugar amount.[6] Soft drink consumption was reported by 68% of participants at least three times weekly. Carbonated beverages not only contain high sugar content but also possess acidic pH, contributing to enamel erosion and caries progression.[15] Moynihan and Kelly's systematic review demonstrated moderate evidence linking free sugar intake with caries throughout the life course.[7] Although 54% of students reported brushing once daily, only 36% brushed twice daily. Inadequate brushing frequency was significantly associated with higher caries prevalence ($p=0.02$). Effective mechanical plaque control is essential in preventing caries development, particularly when sugar intake is high.[16] Petersen et al. emphasized that oral hygiene behavior plays a crucial modifying role in caries risk.[17] The low proportion of regular dental visits (24%) suggests limited preventive dental awareness. Preventive care, including fluoride varnish application, fissure sealants, and dietary counseling, has been shown to significantly reduce caries incidence.[18] Socio-economic factors may also contribute to the observed caries burden. Previous studies indicate that adolescents from lower socioeconomic backgrounds often exhibit higher sugar consumption and reduced access to dental care.[19,20] Though not deeply analyzed in this study, parental education and income may indirectly influence dietary behavior and oral hygiene practices.

This study reinforces the importance of integrating oral health education within school health programs. School-based dental camps provide an effective platform for screening, preventive counseling, and early intervention. The WHO Global Oral Health Program strongly recommends school-based preventive strategies in developing countries.[5] This study's cross-sectional design limits causal inference, and reliance on self-reported dietary data may introduce recall bias.

CONCLUSION:

The present study revealed a high prevalence of dental caries among secondary school students attending dental camps, highlighting a significant public health concern. Frequent consumption of sugary snacks and inadequate oral hygiene practices were identified as key factors associated with increased caries experience. These findings underscore the urgent need for integrated, school-based oral health interventions in Bangladesh. Implementation of comprehensive oral health education programs, promotion of healthy dietary habits, and regular dental screening initiatives could play a crucial role in early detection, prevention, and reduction of the overall burden of dental caries among adolescents.

FUNDING: This research received no external funding.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT: The data presented in this study are available on reasonable request from the corresponding author

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HOW TO CITE

Jannath F, Ahmed S, Mahmood ARMS, Mirbar D, Akter F, Mitul S. Dietary Habit and Oral Health Status in Secondary School Students Attending a Dental Camp in Bangladesh: A Cross Sectional Study. *J. Contemp. Dent. Sci.* [Internet]. [cited 2026 Jul. 13];14(2):9-12. Available from: <https://www.banglajol.info/index.php/JCDS/article/view/89542>



JCDS-ISSN: 2305-9664