



Prevalence of Dental Caries and Associated Factors among Patients Visiting a Tertiary Care Teaching Hospital in Madhesh Province, Nepal: A Cross-Sectional Study

Harendra Mohan Singh¹, Md. Asdaq Hussain¹, Abanish Singh², Rajesh Shah³, Harish Kumar Shah³, Merazul Haque⁴, Kaushal Kumar Singh⁵

¹Department of Conservative Dentistry and Endodontics, National Medical College, Birganj, Nepal, ²Department of Community Dentistry, National Medical College, Birganj, Nepal, ³Department of Periodontology and Oral Implantology, National Medical College, Birganj, Nepal, ⁴Department of Prosthodontics and Maxillofacial Prosthetics, National Medical College, Birganj, Nepal, ⁵Department of Orthodontics and Dentofacial Orthopedics, National Medical College, Birganj, Nepal.

ABSTRACT

Background

Globally, dental caries is the most common oral health issue and a major public health problem. The prevalence of dental caries in a population is influenced by a number of risk factor such as gender, socioeconomic status, dietary patterns and oral hygiene habits. The aim of this study was to determine the prevalence of dental caries and associated factors among patients who visited the tertiary care teaching hospital in Madhesh Province, Nepal.

Methods

An analytical cross-sectional study was conducted among patients who visited the dental Outpatient Department in a tertiary care teaching hospital. Data collection was done from 6th April 2024 to 31st August 2024 after taking ethical approval from the Institutional Review Committee. Patients above 18 years visiting the dental OPD of a teaching hospital, and who had provided informed consent were enrolled in the study. Convenience sampling was done. A pretested standardized, close-ended questionnaire was distributed by researchers to gather information regarding the associated factors and oral hygiene practices. Clinical examination was performed for dental caries according to the criteria given by the World Health Organization (WHO) using the “DMFT” index.

Results

The overall prevalence of dental caries was 69.9%. Mean DMFT score was 2.91 ± 3.34 . No statistically significant association was found between caries prevalence and gender ($p = 0.05$). There was statistically significant association of caries prevalence with socio-economic status ($p = 0.02$), brushing status ($p < 0.001$), use of fluoride toothpaste ($p < 0.001$) and consumption of sugar foods before bed ($p < 0.001$).

Conclusions

The prevalence of dental caries among the study participants was high. Factors associated with dental caries included poor oral hygiene practice, consuming sugar foods before bed and between the meals.

Keywords: dental caries; prevalence; DMFT; Nepal.

INTRODUCTION

Dental caries is a bacterial infectious disease and one of the most common oral health issues throughout the world, which develops over time and affects any age group.^{1,2} Dental Caries is related to behavioral factors like poor oral hygiene; unhealthy dietary habits such

as consuming refined carbohydrates frequently; improper feeding practices for infants.³⁻⁶ Despite immense enhancement in global oral health issues, the prevalence of dental caries among adults is still high and the disease affects most of the population in both developed and developing countries.⁷ The

Correspondence: Dr. Harendra Mohan Singh, Department of Conservative Dentistry and Endodontics, National Medical College, Birganj, Nepal. Email: singh296.hms@gmail.com, Phone: +977-9843275766. **Article received:** 2024-11-29. **Article accepted:** 2025-03-05. **Article published:** 2025-03-31.

prevalence of dental caries among adults was found to be 83.0%, 57.7%, 57.4% and 33.0% in different regions of Nepal.⁸⁻¹² So far, there is a lack of sufficient study regarding the prevalence of dental caries in this particular region of Nepal. So, this study was conducted to determine the prevalence of dental caries and associated factors among Nepalese patients visiting the tertiary care teaching hospital in Madhesh Province, Nepal.

METHODS

An analytical cross-sectional study was conducted at National Medical College and teaching Hospital in Parsa, Birganj from April 6, 2024 to August 31, 2024. Data collection was done after taking ethical approval from the Institutional Review Committee (Ref. F-NMC/691/080-081). All Patients aged over 18 years visiting the dental OPD (Out Patient Department) of National Medical College and Teaching Hospital (NMCTH), who had provided written informed consent were enrolled in the study using a convenience sampling technique. A patient with dental emergency, critical illness and mental disability were excluded. The study considered 95% power and 95% confidence interval. With reference to the findings of study by Subedi et al⁴, considering the prevalence of dental caries 80.36%, the calculated sample size was 242. Taking into account, the non-response and fit the study design, 270 samples were enrolled in the study using the formula:

$$n = Z^2 (Pq) / e^2$$

Where, $z = 1.96$; $p = 80.36\%$; $q = 1 - p = 19.64\%$ and $e = 5\%$ absolute error

A pretested standardized, close-ended printed questionnaire was distributed by the researchers to all patients aged over 18 years visiting the dental OPD of NMCTH to gather information regarding the socio-demographic characteristics, sugar intake and oral hygiene practices. The questions were formulated based on the study published by Joshi et al.¹² Foods and drinks that contain free sugars were considered sugar foods. Free sugars include sugars that are added to foods by manufacturers, cooks, or consumers, as well as sugars that are naturally present

in honey, syrups and fruit juices.¹³ Consuming sugary foods within an hour before bedtime significantly increases the risk of dental caries due to reduced saliva production during sleep, allowing bacteria to more easily produce acid from the sugar and damage the tooth.¹⁴ Clinical examination was performed for dental caries according to the criteria by the World Health Organization (WHO) using the “DMFT” index (WHO modification on 1987) after air-drying the teeth, under artificial light, and with the aid of a mouth mirror and explorer. Data were entered in Microsoft Excel and then transferred to Statistical Package for Social Sciences Version 16 software were used for statistical analysis. Descriptive statistics including mean, standard deviation, and frequency were calculated. Mann-Whitney test and Kruskal-Wallis test were performed for comparison of mean caries experiences.

RESULTS

Among 270 patients, Male patients were 138(51.1%) and female patients were 132(48.9%). The majority of patients, 163(60.4%) were married whereas 80(29.6%) patients were single. The majority of patients, 98(36.3%) had upper middle class of socioeconomic status and 73(27.0%) patients had lower middle and upper lower class of socioeconomic status (Table 1).

Table 1. Demographic profiles (n=270).	
Variables	Frequency (%)
Gender	
Female	132 (48.9)
Male	138 (51.1)
Marital status	
Single	80 (29.6)
Married	163 (60.4)
Divorced	2 (0.7)
Separated	7 (2.6)
Widowed	18 (6.7)
Socioeconomic status	
Upper	22 (8.1)
Upper Middle	98 (36.3)
Lower Middle	73 (27.0)
Upper Lower	73 (27.0)
Lower	4 (1.5)

Out of 270 patients, Overall prevalence of dental caries was 188(69.6%). The prevalence of dental caries in males and females was 91(65.9%) and 97(73.5%) respectively (Table 2).

Table 2. Caries experience (n=270).

Caries experience	Male n(%)	Female n(%)
Caries	91(65.9)	97 (73.5)
No Caries	47 (34.1)	35 (26.5)

Among the participants minimum age was 18 years whereas maximum age was 79 years with mean age 36.66 ± 15.09 . Minimum monthly income was 4000 and maximum was 200000 Nepalese rupees among all the participants with mean value 37503.7 ± 27336.23 . Minimum Socioeconomic Status (SES) score was 4 whereas maximum score was 29 with mean score 14.84 ± 6.01 . Mean DMFT score was 2.91 ± 3.34 (Table 3).

Table 3. Descriptive statistics of variables. (n=270)

Variables	Minimum	Maximum	Mean	SD
Age	18	79	36.66	15.09
Income	4000	200000	37504	27336.23
SES Score	4	29	14.84	6.01
Decayed	0	7	1.37	1.59
Missing	0	13	0.86	1.86
Filled	0	6	0.69	1.12
DMFT	0	17	2.91	3.34

Out of 270 patients, 246 (91.1%) brushed their teeth whereas 24 (8.9%) did not brushed their teeth. Among 246 who brushed their teeth, 222(90.2%) patients used tooth brush and 24 (9.8%) used datiwan. The majority of patients 175 (64.8%) brushed their teeth once a day whereas 89 (33.0%) brushed twice a day. 170 (63.0%) patients brushed their teeth in morning and 90 (33.3%) brushed both in morning and before bed. The majority of patients 225(83.3%) used fluoridated toothpaste and 45(16.7%) did not used fluoridated toothpaste. Most of the patients 243(90.0%) did not take any sweet drinks/foods before bed. The majority of patients 155(57.4%) had taken snacks two times between the meals. Similarly, 52(19.3%) had ate one time in between meals. The majority of patients 163 (60.4%) had consumed sugar foods between the

meals sometimes whereas 58 (21.5%) patients had consumed sugar foods twice a day (Table 4).

Table 4. Tooth brushing habits and sugar intake.

Variables	Frequency (%)
Brushing teeth	
Yes	246 (91.1)
No	24 (8.9)
Method of brushing teeth (n=246)	
Tooth brush	222 (90.2)
Datiwan	24 (9.8)
Times you brush	
More than three times	2 (0.7)
Twice a day	89 (33.0)
Once a day	175 (64.8)
Irregularly	4(1.5)
Timing of the tooth brush	
Before bed	2(0.7)
Morning	170 (63.0)
Both in morning & before bed	90 (33.3)
No fixed time	8(3.0)
Use of fluoridated toothpaste	
Yes	225(83.3)
No	45(16.7)
Sugar foods before bed (within an hour)	
Yes	27(10.0)
No	243(90.0)
Eat between the meals	
Once per day	52(19.3)
Twice per day	155(57.4)
More than two time	28(10.4)
Sometimes	35(13)
Sugar food consumption between the meals	
Once per day	26(9.6)
Twice per day	58(21.5)
More than two time	23(8.5)
Sometimes	163(60.4)

There was no statistically significant association of caries prevalence with gender ($p = 0.05$). There was statistically significant association of caries prevalence with socio-economic status ($p = 0.02$), brushing habit ($p < 0.001$), use of fluoride toothpaste ($p < 0.001$) and consumption of sugar foods before bed ($p < 0.001$) (Table 5).

Table 5. Comparison of mean caries experiences (DMFT).		
Variables	Mean ± SD	p-value
Gender		
Male	2.56±3.13	0.05*
Female	3.29±3.51	
Socioeconomic Status		
Upper	2.14±2.35	0.002**
Upper Middle	2.35±3.12	
Lower Middle	3.00±3.43	
Upper Lower	3.59±3.59	
Lower	7.25±1.25	
Brushing status		
Yes	2.56±3.21	<0.001*
No	5.58±3.52	
Use of fluoridated Toothpaste		
Yes	2.44±3.04	<0.001*
No	5.27±3.76	
Sugar foods before bed (within an hour)		
Yes	6.52±3.69	<0.001*
No	2.51±3.05	

*Mann-Whitney test; ** Kruskal-Wallis test; p-value < 0.05 was statistically significant.

DISCUSSION

The prevalence of dental caries was found to be 69.6%, which is higher compared to studies done by Khapung et al⁹ (57.74%) and Singh et al¹⁰ (57.5%) but lower than the studies done by Karki et al¹⁵ (79.26%), Bhagat et al⁸ (83.0%). The prevalence was found to be 64.41% in a study done in a tertiary care centre in Pokhara, Nepal¹⁶ which is slightly lower than our study. This discrepancy may be due to the hospital setting of this study, while data collection in the other two studies was at the community level and also might be due to the sociodemographic differences in the study population⁴. The mean DMFT score in our study was 2.91 $\pm$ 3.34 which is lower to studies done by Karki et al¹⁵ (5.44 $\pm$ 4.75), Subedi et al⁴ (3.26 $\pm$ 3.10) and higher to studies done in china and Africa.^{17, 18} This variation might be due to the study population variation and the sociodemographic difference between the countries. In this study, the prevalence of dental caries was higher among the female participants (73.5%) than male participants (65.9%)

which were supported by similar other studies.^{9, 19, 20} Higher prevalence in females might be due to hormonal fluctuations during events such as menstruation, puberty and pregnancy making the oral environment more prone to caries.^{18, 21} and other risk factors like early eruption of tooth in female which leads to long exposure time in oral environment, salivary composition, salivary flow rate, genetic variations.²² Our study showed that majority of patients used tooth brush for cleaning their teeth which was similar to various other studies.^{10, 23} The majority of patients brushed once a day which supported by similar studies.^{12, 24} Majority of the participants used fluoridated toothpaste (83.3%) which was similar to other studies^{12, 24} but higher than studies conducted in Africa (18.0%) and China (5.0%)^{25, 26} Dental caries was more prevalent among those who did not brushed their teeth than those who brushed their teeth. This was also similar to a study done in East Africa where participants with poor oral hygiene practice were 1.96 times more prone to develop dental caries. This can be attributed to insufficient removal of the microbial bio-films, and food debris at one brushing which makes them more prone to dental caries.¹⁸ The majority of Patients did not taken any Sugar foods before bed which was similar to study done by Joshi et al.¹² Although this study gives an insight into the opinions and attitudes of the respondents, it has some limitations such as its cross-sectional nature and chances of a response bias. This study was done in one hospital premises and focused on patients who visited hospital for various dental issues. Therefore, the findings cannot be generalised.

CONCLUSIONS

The prevalence of dental caries among the study participants was high. Factors associated with dental caries included poor oral hygiene practice, consuming sugar foods before bed and between the meals.

Conflict of interest: None

Funding: None

List of abbreviations

DMFT index: Decayed, Missing, Filled Tooth

SD: Standard deviation

SPSS: Statistical package for social sciences

WHO: World Health Organization

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Citation: Singh HM, Hussain MA, Singh A, Shah R, Shah HK, Haque M, Singh KK. Prevalence of Dental Caries and Associated Factors among Patients Visiting a Tertiary Care Teaching Hospital in Madhesh Province, Nepal: A Descriptive Cross-Sectional Study. *JCMS Nepal.* 2025; 21(1): 23-28.