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Dental Carries Prevalence and Associated Factors of Secondary Level Students in Eastern Nepal

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ABSTRACT

Background: Dental caries or a tooth decay is a common oral health condition characterized by demineralization of tooth enamel and subsequent formation of cavities It is a global public health problem and influence the overall health of children.

Method: A cross-sectional study was conducted among 343 secondary level school students by complete enumeration sampling method. A pretested, standardized, closed-ended questionnaire and a standard Decayed, Missing, and Filled primary Teeth (DMFT) tools were adopted to find out the prevalence and associated factors of Dental Caries. Face to face interview and oral assessment under natural day light were uses for data collection methods. Data were coded, entered, cleaned and analyzed by using SPSS version 22. Descriptive and bi-variate statistics were employed to test the association between dependent and independent variables. P-value less than 0.05 was taken as significant association and result was presented in text, tables and graph.

Result: The overall prevalence of dental caries was 68.5% with a mean and SD of DMFT of 1.53±1.462 and female students were most sufferer (70.1%) from dental caries. There was a significant association of dental caries with mother's educational status (p=0.009), consumption of sugary tea/coffee (p=<0.001), frequency of soft drinks consumption (p=0.004), frequency of tooth brushing (p=<0.001) and changing time of new tooth brush (p=<0.001).

Conclusion: The study found a high prevalence of dental caries among the students, which were attributed to consumption of sugary foods and drinks and poor oral hygiene practices. The researchers hold a strong conviction that relevant authorities can provide the necessary actions to raise the awareness regarding the issue.

Key words: dental caries; DMFT; prevalence; students.

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INTRODUCTION

Dental caries is a global public health issue that influence the overall health of people and biological, socio-behavioral and environmental factors are the common risk factors and primary prevention is based on these risk factors.[1] The WHO Global Oral Health Status report 2022 states that oral illnesses impact around 3.5 billion people globally, with a quarter of those afflicted living in middle-income countries.[2] Dental caries is the most prevalent and preventable oral disease of childhood and caused by the plaque forms on the surface of tooth. A continued high intake of free sugars, inadequate exposure to fluoride and a lack of removal of plaque by toothbrushing can lead to caries, pain and sometimes tooth loss and infection.[3] Dental caries leads to increase the economic costs of individuals and society and decrease the individual quality of life that influences by the socio-economics, lack of preventive measures and dietary behavior.[4] Reports from the World Health Organization Dental caries affects 60–90% of school-age children globally, with Asian and Latin American countries having the highest rates of the disease.[5] Likewise, according to the Global Burden of Disease 2019, untreated dental caries is the most prevalent medical condition while majority of low- and middle-income nations lack enough resources for the diagnosis, treatment, and prevention of oral health issues and almost has the modifiable risk factors like- poor hygiene, sugar consumption, social and commercial determinants, tobacco use etc.[3] In general, the prevalence of dental caries is higher in developing countries. In India, more than half (52.0%) of students between the age of 3-18 years were suffering from dental caries and the similar proportion (53.7%) in Bangladesh.[6] In context of Nepal, prevalence of dental caries in rural communities is higher as compared to urban and male students are more sufferer than female[7] and almost

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58% of school enrolled students usually suffering from dental caries.[5] Everyone is at risk of dental caries but children and adolescents have high risk and almost half billion children are affected by milk teeth dental caries.[8] Middle-income countries people have higher prevalence of dental caries and adults have higher prevalence due to the disease is cumulative and associated with socio-economic status like poor and disadvantaged population. Treatment of dental caries is costly and large amount of countries budget has been spent for its management.[9] So, the main objective of this study was to identify the prevalence of dental caries and its associated factors in secondary level students of selected schools in Dhankuta Municipality, Nepal.

METHODS

An analytical cross-sectional study was conducted to determine the prevalence of dental caries among secondary school children, as well as to identify associated factors. This study was conducted in Dhankuta Municipality which is one of the 77 districts of Nepal and lies in the Koshi Province. This municipality comprises the 10 wards among them 2 wards were selected purposively and from selected wards five schools were selected simple random method. The study was conducted from February 1 to July 1, 2023. Complete enumeration sampling technique was applied, which involves studying the entire population or sample frame without selecting a subset. Altogether, 343 secondary level (grade 9 and 10) students from five schools were included in the study. In this technique, every individuals or unit in the population was included in the study. Out of total 10 wards in Dhankuta Municipality, 2 wards were selected purposively and from selected wards, five schools were selected using simple random technique. The study proceeded after obtaining ethical approval from the Institutional Review Committee of Shree Medical and Technical College-SMTC IRC (Ref# SMTC-IRC-20230305-71) ensuring compliance with ethical guidelines. Permission to carry out the study was obtained from the respective school authorities. Parents of participating students were asked to offer written informed consent and those provided to informed written consent were eligible for the study. The students were informed about aims, methods and anticipated benefit of the study. Those students whose parents did not provide the written consent and those participants were unwilling to screening were excluded from the study. During the study period all the ethical considerations as well as confidentiality was maintained to respect for human dignity and principle of justice. Data were collected by using following methods:

Sociodemographic and factor associated to dental carries related data were collected by using the semi-structured questionnaire with students by using face to face interview method. To ensure the quality of the data, the questionnaire was initially developed in English and translated into Nepali. Before collecting data, the questionnaire was pretested in a similar setting in a different ward other than selected wards. The questionnaire was corrected and modified based on the response of pre-testing.

Status related to dental carries was obtained by DMFT (Decayed, Missing, and Filled Teeth) screening index method, which was developed by World Health Organization (WHO).[10] This index serves as a comprehensive method for assessing dental caries . Screenings were performed via visual assessment with the help of dental explorer and mouth mirror. The basic oral assessment of every child was performed by a single, well-trained registered dental hygienist by seating each subject on a chair under natural day light. A tooth was categorized as decayed when a carious lesion and a restoration are present on the enamel. It was recorded as missing when a tooth has been extracted due to caries or any other reasons such as trauma or orthodontic reasons and a tooth was classified as filled if it had either a permanent restoration, or if a filling was defective but not decayed.

The dental hygienist systematically documented the observations for each student on a designated scoring sheet. To prioritize the well-being of the student, the assessments were conducted on all cooperative participants, regardless of parental consent, while

ensuring that their comfort and safety were upheld throughout the process. Hence, 3rd molar (wisdom teeth), unerupted tooth, supernumerary teeth and primary tooth retained with permanent successor erupted were excluded for the DMFT diagnosis. The collected data were then checked for completeness and recoded for analysis. All the data were entered into SPSS version 22.0 for analysis. The data were analyzed using a descriptive and bivariate analysis at 95 percent confidence level. The characteristics were stated significant at the chi-square tests at P value < 0:05. Dependent variable of this study was prevalence of dental carries and independent variables were: a. Socio-demographic variables (age, sex, ethnicity, religion, grade, parents educational and occupation status). b. associated factors: consumption of sugar, tea, coffee, soft drinks, tooth brushing habit, frequency and time taken for brushing, changing time for new tooth brush, types of tooth brush and paste used, dental consultation and mouth rinsing habit.

RESULTS

In this study, 65% of participants were within the age of 12-15 years and most (53.6%) were female. Whereas, 55% of them followed Hinduism and highest proportion (65.6%) were from Janajati ethnicity. Similarly, about equal proportion (50%) of participants were from grade 9 and 10 from both private and government school. Likewise, majority of participants mother (49.8%) and father (61.8%) had gained secondary level and above education. In terms of occupation, most (54.8%) of mother engaged in household work and service (38.2%) was the main occupation of participants father (Table 1). Among the 343 students, higher proportion (68.5%) had presence of dental caries and remaining had no dental caries at all. The mean DMFT was found to be 1.53 (Figure 1).

Among total participants, almost (91.5%) of them consumed tea/coffee. Among them 53.9% reported consuming on a daily basis. About 98% of participants consumed soft drinks and among them 59.2% consumed several times in a week and 38.5% of them consumed occasionally. In terms of tooth brushing

Table 1. Distribution of respondents according to the socio-demographic variables. (n=343)

Characteristics	Frequency (%)
Age (Years)	
12- 15	223(65.0)
16-19	120(35.0)
Sex	
Male	159(46.4)
Female	184(53.6)
Religion	
Hindu	189(55.1)
Non-hindu	154(44.9)
Ethnicity	
Bhramin/Chhetri	85(24.8)
Janajati	232(67.6)
Others	26(7.6)
Grade	
Grade 9	172(50.1)
Grade 10	171(49.9)
Type of school	
Private	175(51.0)
Government	168(49)
Mother's education	
Illiterate	31(9.0)
Basic level	141(41.1)
Secondary level and above 12	171(49.8)
Fathers education	
Illiterate	11(3.2)
Basic level	120(35)
Secondary level and above	212(61.8)
Mothers occupation	
Agriculture	33(9.6)
Service	69(20.1)
Home maker	188(54.8)
Others	53(15.5)
Fathers occupation	
Agriculture	83(24.2)
Service	131(38.2)
Foreign employer	73(21.3)
Others	56(16.3)

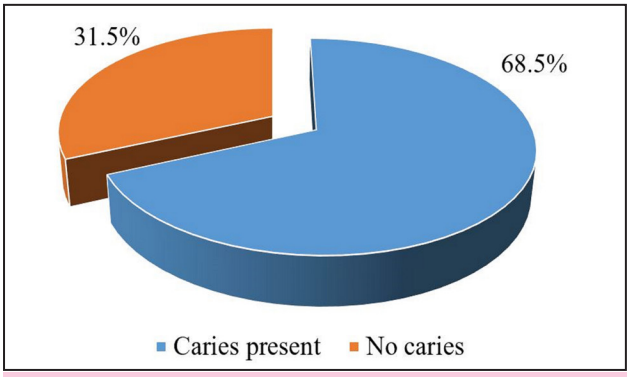

Figure 1. Prevalence of dental caries.

habits, almost half (47.8%) of participants brushed their teeth for 2-3 minutes and about equal number (49.0%) of participants had habits of changing their tooth brush in every six months. While, 74.9% of participants used fluoride-based tooth paste and more than half (58.9%) of them never visited to dental services (Table 2).

According to Pearson's chi-square test, there was a statistical association of prevalence of dental caries and mother's education (p=0.009). There is a higher prevalence of dental caries those students' mother has lower educational status and also some behavioral factors are statistical associated with prevalence of dental caries like consumption of sugary tea/coffee (p=<0.001), frequency of consumption of soft drinks (p=<0.001), frequency of tooth brushing (p=<0.001) and frequency of changing tooth brush (p=<0.001) respectively. But some socio-demographic variables were not significant associated with the prevalence of dental caries (Table 3).

Table 2. Distribution of dental caries risk factors.

Risk factors	Frequency (%)
Tea/coffee consumption (N=343)	
Yes	314(91.5)
No	29(8.5)
Frequency of consumption (N=314)	
Everyday	185(53.9)
Several times in a week	129(37.6)
Soft drinks consumption (N=343)	
Yes	335(97.7)
No	8(2.3)
Frequency of soft drinks consumption (N=335)	
Several times in a week	203(59.2)
Occasionally	132(38.5)
Frequency of tooth brushing	
Less than 2 min	140(40.8)
2-3 min	164(47.8)
More than 3 min	39(11.4)
Tooth brush changed	
In a year	110(32.1)
In every six months	168(49.0)
In every three months	65(19.0)
Types of toothpaste used	
No use of toothpaste	13(3.8)
Non-fluoridated toothpaste (write brand name)	73(21.3)
Fluoridated toothpaste (write brand name)	257(74.9)
Frequency of dental visit	
In every six months	3(0.9)
Only when necessary	138(40.2)
Never	202(58.9)

Table 3. Factors associated with dental caries of study population.

Characteristics	Prevalence of dental caries		Chi-square	p-value
	No caries f (%)	Dental caries f (%)		
Age				
12-15 years	75(33.6)	148(66.4)	1.350	0.243
16-19 years	33(27.5)	87(72.5)		
Mean: 15.17; S.D: 1.037				
Sex				
Male	53(33.3)	106(66.7)	0.468	0.49
Female	55(29.9)	129(70.1)		
Religion				
Hindu	62(32.8)	127(67.2)	0.339	0.561
Non-hindu	46(42.6)	108(46)		
Ethnicity				
Brahmin/Chhetri	31(36.5)	54(63.5)	1.415	0.493
Janajati	70(30.2)	162(69.8)		
Others	7(26.9)	19(73.1)		
Studying grade				
Grade 9	60(34.9)	112(65.1)	1.845	0.174
Grade 10	48(28.1)	123(71.9)		
Type of school				
Private	57(32.6)	118(67.4)	0.195	0.658
Government	51(30.4)	117(69.6)		
Educational status of mother				
Illiterate	8(25.8)	23(74.2)	9.427	0.009*
Basic level	33(23.4)	108(76.6)		
Secondary level and above 12	67(39.2)	104(60.8)		
Consumption of tea/coffee				
Yes	89(28.3)	225(71.7)	17.006	0.001*
No	19(65.5)	10(34.5)		
Consumption of soft drinks				
Everyday	0(0.0)	1(100)	11.417	0.004*
Several times in a week	50(24.6)	153(75.4)		
Occasionally	55(58.3)	77(58.3)		
Several times in a week	45(35.2)	83(64.8)		
Frequency of tooth brushing				
Once a day	32(15.9)	169(84.1)	87.259	0.001*
Twice a day	76(62.8)	45(37.2)		
Sometimes	0(0.0)	21(14.4)		
Changing time of new brush				
In a year	3(2.6)	113(97.4)	118.81	0.001*
In every six months	49(31.4)	107(68.6)		
In every three months	56(78.9)	15(21.1)		

**Pearson Chi-square* *Significant level at 0.05*

DISCUSSION

Our study explores the prevalence of dental caries and its associated factors among secondary level students of Dhankuta Municipality. This study found that the

prevalence of dental caries was 65% and female students were more sufferer. A study conducted in Dolakha, Nepal[7] found quite higher prevalence of dental caries (90.2%) and male students were more sufferer. This variation might be due to sampling techniques. Moreover, a study of Debre Berhan Town, Ethiopia[11] found lower result than present study as 34.2% of students had dental caries and the nearly similar result was found by a study conducted in Kathmandu valley[12] as 56% of students had dental caries and equal number of male and female study population. These similarities might be due to the similar study setting and methodology. Based on this study, the larger portion of respondents were Hindu (55.1%) and Janajati ethnic group (67.6%). Similarly, most (50.1%) of student's father and mother (43.1%) gained secondary level education. Our study was in line with study conducted in Kigali, Rwanda[13] that almost half of child parents had good educational status which might be the similarities of socio-economic status of these countries. However, the findings of the current study have been inconsistent with the study conducted in Abu Dhabi, UAE[1] as it shows that majority of the parents had attained university degree. The possible explanation about the variations might be the consideration and awareness for the academic qualification of UAE population. While, higher proportion of father (25.8%) and mother (22.2%) can read and write only in a study conducted in North-East Ethiopia.[11] Present study found that, 91.5% of students were consuming sugary tea/coffee and majority of them consumed on a daily basis and same proportion of study population consumed soft drinks. These findings has been contradicted by a study of Ethiopia[14] and Brazil[15] where about 40% of child consumed tea/coffee and soft drinks. This variation might be due to oral health consideration and the awareness level of most of the Ethiopians and cultural and regional variance. Present study found that only half of students changed their tooth brush every six months, used fluoride tooth paste and used medium type of brush and this finding was supported by a study of Nigeria[16] and Kathmandu, Nepal[17] where most of child used fluoride toothpaste. In terms of dental visit, about 60% of students visit the health care settings for dental care and consistent to the study at Dharan, Nepal[19] and Saudi Arabia[18] and in an another study of Nawalparasi, Nepal different finding was found as there was poor dental hygiene[19] and more than half of children experienced dental caries at Dharan, Nepal.[20] Current study reported that the mother's educational status was significantly associated with the prevalence of dental caries as lower the education higher the consequences of dental caries. This finding was relevant with the study of United Arab Emirates[1]where mothers education was associated with the prevalence of dental caries. In terms of dietary habits (consumption of sugary tea/ coffee, soft drinks) of students was also significantly associated tested by Pearson's Chi-square with dental caries where those students who consumed frequently these items has higher risk and prevalence of dental caries. This finding also relevant with the study of Vadodara city of India[21] and Ethiopia[8] as higher the consumption of sugar and its contained drinks has higher risk for dental caries. Hence, other variables like age and sex of children, religion, ethnicity, educational status of father, occupation of parents were not found any statistical association with the prevalence of dental caries.

CONCLUSIONS

Present study found that the higher prevalence of dental caries among the school going children in Dhankuta municipality of Nepal. Dietary habits, poor oral hygiene practices and mother's education were identified as potential factors contributing to the prevalence of dental caries. Oral health promotive and oral disease preventive measures through strategic health education programs can be implemented by respective stakeholders will play a pivotal role for prevention and control of current issue.

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committee of Shree Medical and Technical College-IRC (SMTC-IRC).

Data Availability

The data used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest: None

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