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Prevalence and Associated Factors of Dental Caries among Secondary Level Students of Capital City of Karnali Province, Nepal

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Abstract: Introduction: Dental caries is common and old infectious disease causes by streptococcus mutans. It is one of the major public health problems worldwide. Dental caries suffered from pain that cause to difficult sleeping, eating and communication. In Nepal, the morbidity of dental caries is very high among school children compared to other age groups. Therefore, the objective was designed toassess the prevalence of dental caries among secondary level students in Birendra nagar, Municipality, Surkhet.
Methods: Descriptive cross- sectional study design. Data was collected from the selected secondary level school's student by multi cluster method. Schools was selected by simple random sampling techniques.Result:Among 165 participants, the number of participants were from public and private school. The prevalence of dental caries among school children was found to be 20% and there was significant association between frequency of brushing with dental caries (P=0.05). Conclusion:Frequency of brushing and sugar contain food consumption are associated with the higher prevalence of dental caries among secondary school children. Regular dental visits and good brushing practice can reduce the prevalence of dental caries in secondary school children. Hence, continuous oral health programs including demonstration of proper brushing technique along with oral health awareness programs at school can help to reduce the burden of dental caries among school children.

Keywords: Dental caries, Prevalence of caries, secondary schools student and Surkhet.

I. Introduction

Dental caries is a microbial disease of the calcified tissues of the teeth characterized by demineralization of the inorganic portion and destruction of the organic substance of the tooth, thus forming oral cavity [1].It is most common and important public health problem worldwide, but more in developing countries [2].It affects approximately 6.2 billion children's teeth globally and 2.43 billion permanent teeth in 2015. Due to inadequate health care services and economic factors, developing countries have a higher prevalence of dental caries than developed countries, it has an effect on oral education and practice in such countries[3].Dental caries had seen among 62.9 billion people worldwide in 2019. In the South East Asian region, prevalence of dental caries varies from 25 to 95 % in 2015.In South East Asian nations like India and China, the prevalence of dental caries was 54 % and 60 %, respectively [4].36.7 % of students aged 13 to 19 who attended school had dental caries in India. Untreated dental caries is an emergency condition which can cause difficulties in sleeping, pain and infection?In Nepal, the caries prevalence is found to be 64% in urban area and 78% in rural population, whereas approximately 31% of age group 35–44 years have a deep periodontal pocket [5]. The 2004 National Oral health Pathfinder Survey in Nepal revealed that prevalence of dental caries aged 12-16 years to be 25.6%. In 2014, prevalence of dental caries was 58% among 12- 15 years school children in Kathmandu. In Dhanusha, prevalence of dental caries was 33% among school children aged 12 to 15 years in 2015 [3].

In Nepal most of the school students are directly affectedly by the dental caries and their risk factors with increase in the lack of proper oral hygiene and increase sugar consummation for various reason [6].The cost for oral treatment is not covered by government led health insurance programme in Nepal. It increases the out-of-pocket expenditure for marginalized people. The human resources for dental and oral health are scarce. At national level this type of study is very limited where the impact of study may be unique. Therefore, we have designed the study on the prevalence of dental caries and associated factors among secondary level students of selected school of Birendranagar, Municipality, Surkhet. Also, to identify the associated factors of dental caries among secondary school level students.

II. Methods

2.1 Study design

A descriptive cross-sectional study was used the prevalence and associated factors of dental caries among secondary level students.

2.2 Study method

The study was quantitative.

2.3 Description of study design and method

Cross sectional study design is carried to find out the prevalence and associated factor of dental caries among secondary school level students. The respondents of South Asian Scholars Academy School and Shree Nepal Rastriya Secondary School Birendranagar municipality secondary school students were selected. Then face to face interview is carried to collect information from secondary school student at Birendranagar Municipality Surkhet.

2.3 Study site and its justification

The urban municipality of Surkhet, Districts was selected. Birendranagar is a district headquarter of Surkhet District as well as provincial headquarter of Karnali Province.

2.4 Study population

The study population was the secondary level school students.

2.5 Sampling unit

The sample unit was student of 9^{th} and 10^{th} class secondary level school student

2.6 Sample size

Sample size of the study was calculated by using Cochran's formula
For infinite population
n = (z^2pd/d^2): Where,
n = Sample size with infinite population, z = z Statistic for a level of confidence interval 95% (1'96)
p = prevalence of dental caries among secondary level student proportion by review of literature [7].
i.e. 26 %
d =Acceptable margin error (7%) = 0. 07
q=1- 0.26 =0.74
n= (1.96) ^2*0.26*0.74/0.07, n= 150 with 10% non- respondent
n= 165

2.7 Number of participants

The number of participants of this study was 165.

2.8 Sampling technique

At first Birendranagar municipality was categories in two parts urban and rural due to characteristics. I choose urban part of the municipality. Then, firstly 13 government schools and 19 private schools were selected for the study and divided into two school cluster. After, that lottery was created as entering school's name. To selected two schools randomly from each group. After consulting with principal of each school then the selection of section was done randomly.

2.9 Inclusion and Exclusion criteria

Student of class 9^{th}, and 10^{th} of selected schools were enrolled.Those students who were not present during data collection were excluded.

2.10 Data collection technique

Data was collected by face-to-face interview, which comprised of demographic information and question related to prevalence and associated factors of dental carries. Interview was around 20 minutes for each individual.

2.11 Data collection tool

Initially a consent form was sent to the parents of the school children and assent was obtained from the students. The consent form was prepared in both English and Nepali language. Dental caries data was collected using mouth mirror and explorer under adequate daylight and was recorded in standardized format of WHO decayed, missing and filled teeth index (DMFT) for permanent and decayed, extracted and filled (def) index for primary dentition by dentist. Additional data on associated factors was collected using pre-testand pre-designed questionnaire.

2.12 Data collection Procedure

The objective of the study was made clear to the participant and informed consent was taken. Participant was assured that their confidentiality of information. Data collection by face-to-face interview and personnel history was recorded. Oro-dental examinations were carried out using a plane mirror and Keyexplorer under adequate daylight. The number of Decayed, missing and filled teeth and surfaces were recorded on examination forms, as per WHO guidelines.

2.13 Statistical Analysis

Data entry was done in Epi -data 3.1 version. After collection of data, data was checked out systematically then edited, coded and entered. A data analysis was done in IBM SPSS 16.0 version. Descriptive statistics in terms of frequency, percentage, mean, median, and standard deviation was used to present the data and chi – square test was done as inferential statistics.

2.14 Ethical consideration

The ethical approval was obtained from IRC-KAHS (Ref: 079/080/13). A permission letter was also obtained fromrespective schools.

III. Results

A total of 165 secondary school students were enrolled in this study. 101 (61.2%) were male and 64 (38.8 %) were female. 73.9 % of the students were from 13 to 15 years of age, 26 .1% were from 15 to 17 years of the age. Majority of secondary school students were between 13 to 15 years of age. About more than half of the mothers29.7% was engaged in agriculture and 17.8% mothers had occupation of service. On the study of respondent's husband education level. It was found that 29.7% husband was educated up to secondary level where 12.1% husband were involved in foreign employee as shown in Table 1.

Table 1 Socio-Demographic characteristics of respondents (n=165)

Characteristics	Frequency	Percentage
Age		
13- 15	122	73.9
15- 17	43	26.1
Gender		
Male	101	61.2
Female	64	38.8
Types of school		
Private	66	40.0
Government	99	60.0
Ethnicity		
Dalit	24	14.5
Janajati	17	10.3
Brahmin/ Chhetri	103	62.4
Thakuri	21	12.7
Religion		
Hindu	151	91.5
Buddhist	6	3.6
Christian	8	4.8
Parents education level		
Father education		
Illiterate	32	19.4
Literate	48	29.4
Primary level	15	9.1
Secondary level	48	29.4
Higher secondary level	16	9.7
University level	6	3.6
Mother education		
Illiterate	50	30.3
Literate	43	26.1
Primary level	23	13.0
Secondary level	33	20.0
High Secondary Level	14	8.5

University Level	2	1.2
Parents occupation		
Father occupation		
Agriculture	35	21.2
Business	43	26.2
Job holder	36	21.8
Foreign employee	20	12.1
Mother occupation		
Agriculture	49	29.7
Business	46	27.9
Job holder	29	17.8
Foreign employee	3	1.8
House wife	38	23.0
Types of family		
Nuclear family	84	50.9
Joint family	81	49.1

Table 2 Association between socio -demographic factors and dental caries

Characteristics	**Dental caries**		**Chi – square**	**P-value**
	No dental caries	**Dental caries**		
Ethnicity				
Dalit	27(75.0%)	9 (25.0%)	0.719	0.039
Non-Dalit	105 (81.4)	24(18.6%)		
Religion				
Hindu	122(80.8 %)	29(19.2%)	0.702	0. 040
Others	10(71.4)	4(28.6%)		
Mother education				
Up to basic level	93(80.2%)	23(19.8)	0.007	0.093
Secondary level	39(79.6%)	10(20.4%)		
Father occupation				
Agriculture	39(79.6%)	10(20.4)	0.007	0.093
Non-Agriculture	93(80.2%)	23(19.8%)		
Types of family				
Single family	67(79.8%)	17(20.2%)	0.006	0.93
Joint family	65(80.2%)	16(19.8%)		

Table 2 signifies ethnicity and religion were significantly associated with dental caries, with p-values of 0.039 and 0.040, respectively. Among the participants, 75.0% of Dalits had no dental caries, while 81.4% of non-Dalits had no dental caries. Similarly, 80.8% of Hindus had no dental caries, while only 71.4% of those belonging to other religions had no dental caries. Interestingly, the type of family was found to be significantly associated with dental caries, with a p-value of 0.006. Specifically, 79.8% of those from single families had no dental caries, while 80.2% of those from joint families had no dental caries. Overall, these findings suggest that ethnicity and religion may be important factors to consider when addressing dental caries in this population, while the mother's education level and father's occupation may not be as significant.

Table 3 depicts that the association between frequency of dental visit and dental caries one hundred ten students neither had dental caries nor did they visit dentist, 6 students who had dental caries did not visit dentist. Among

them 28 who sited dentist 22(16.7%) once in a year, 6 (18.2) had dental caries and 22(16.7%) did not have the problem of dental caries. In chi – square test there was association between frequency of dental visit and dental caries (p= 0.005), however there was association between there frequency of brushing and dental caries (p=0.05). Moreover, this study found that there was association between dental problem and dental caries (0.012).

Table 3 Association between enabling factors and dental caries

Characteristics	**Dental caries**		**Chi – square**	**P-value**
	No dental caries	**Dental caries**		
Frequency of dental visit				
Yes	22(16.7%)	6(18.2)	0.043	0. 005
No	110(83.3%)	27(81.8%)		
Frequency of teeth brush				
Once a day	84(63.6%)	20(63.6%)	0.104	0.05
Twice day	48(36.4)	13(39.4)		
Dental problem				
Yes	36 (27.3%)	13(39.4%)	1.85	0.012
No	96 (72.7%)	20(60.3%)		

Table 4 indicates that the food consumption pattern, dietary habit and practices related to oral hygiene practice Thirty-nine (23.6%) of the participants used sugar contain snack twice a day. Most of the students fifty (30.0%) usually used to eat strictly food. Fourth-nine (29.6) of the students were used to cleaned mouth with mouth washer their teeth and one hundred sixteen (70.0%) of the students were not used to mouth washer their teeth.

Table 4 Food consumption pattern among secondary school students in BN Municipality, Surkhet

	Dental caries		**Total**	**Chi – square**	**P- value**
Characteristic	**Absent**	**Present**			
Eat strictly food					
Yes	38 (76.0)	12 (24.0)	50(100%)	0.719	0.693
Sometimes	72 (80.8)	16 (24.2)	88(53.0)		
No	22 (81.0)	5 (18.5)	27(16.3)		
Sugar contains snack					
Once a day	28 (84.8)	5 (15.2)	33(20.0)	1.283	0.526
Twice a day	29 (74.4)	10 (25.6)	39(23.6)		
Rarely	75 (80.6)	18(19.4)	93(56.3)		
Used mouth wash					
Yes	42 (8 5.7)	7 (14.3)	49(29.6)	1.422	0.233
No	90 (77.6)	26 (22.4)	116(70.0)		

Table 5 shows that the students from Government setting had higher prevalence of dental caries than private (23.6 versus 18.2). However, this was not statistically significant. Similarly, no statistically significant was found between the occurrence of dental caries female (20.3) and female respondents (19.8).

Table 5Caries prevalence by Gender and School

Characteristics	**Dental caries**			
	Absent	**Present**	**Chi - square**	**P -value**
Age				
13-15	96(97.6%)	26(24.2%)	0.503	0.047
15-17	36(34.4%)	7(8.6%)		
Gender				
Male	81 (80. 2%)	20 (19.8 %)		0.936
Female	51(79.7%)	13 (20.3%)		
Types of school				
Private	42 (76.4%)	13 (23.6)		0.409
Government	90 (81.8%)	20 (18.2%)		
Types of class				
9 class	55(83.3%)	11 (16.7)	0.764	0.038
10 class	77(77.8)	22(22.2%)		

Table 6 shows that the association between use of fluoride and prevalence of dental caries was statistically significant (p= 0.150) where, that was found to be highest among to the participants who used don't know fluoridate.

Table 6Association between use of fluoride and prevalence of dental caries

Characteristics	**Prevalence of dental caries**		**Chi- square**	**P- Value**
Fluoride	**Absent**	**Presents**		
Fluoride contains	33 (78.6%)	9 (21.4%)		0.150
Not fluoride	10 (62.5%)	6 (37.5%)		
Don't know	89(83.2%)	18 (16.8%)		

Table 7 shows that the association between brushing habit and prevalence of dental carries was statistically significant (p= 0.05) where, that was found to be highest among to the participants who were.

Table 7Association between Brushing habit and dental caries

Characteristics	**Prevalence of dental caries**		**Chi- square**	**P- Value**
Brushing habit	**Absent**	**Presents**		
Once a day	84(80.8%)	20 (19.2%)	0.104	0.005
Twice a day	48(78.7%)	13(21.3%		

Table 8 Component of DMFT

Variable of DMFT		
Private school	**Frequency**	**Percentage**
Decayed	13	7.87
Missing	6	3.63
Filled	1	0.60
Government school	**Frequency**	**Percentage**
Decayed	20	12.12
Missing	4	2.42
Filled	2	1.21

Table 8 shows that the DMFT of government school, where decayed was higher 20 (12.12%) than private school 13 (7.87%). Whereas missing 6 (3.63%) in private school was higher than 4 (2.42%) than government school.

IV. Discussion

Dental caries is a common health problem among secondary school children. A previously study on Prevalence and Associated Factors of Dental Caries among Basic School Children in Kathmandu Metropolitan City. The prevalence of dental caries among school children was found to be 55.84% and mean DMFT [8].The prevalence of dental caries was among 33% going secondary school going children, which may be poor oral hygiene and consumption of sugar contain food. Many studies found that dental carries experience in 6-13 Years old school children was 61.6%, in primary dentition it caries was 48.25% and in permanent dentition it was 34.4%. [6] Similar study conducted at Pokhara, Nepal had reported that the outpatient department of dental surgery of Manipal Teaching Hospital Pokhara children had poor hygiene Prevalence of dental caries in study population was found to be 47.1%. Caries prevalence in the age group 5-7Among all children [9]. However, in this study, 107 (64.8%) students did not use tooth paste and 16(34%) used tooth paste without fluoride and only (56.9%) used toothpaste with fluoride. Similar to our study, most of the participants brushed their tooth once per day which was the main factor to cause dental caries because after eating and drinking, if teeth is not cleaned, the fermentable bacteria Streptococcus mutans has a tendency to produce plaque quickly, which can lead to the onset of tooth decay [10].

In the present study, only 33.3% of the study respondents said they cleaned their teeth twice daily. Moreover, the majority of the participants reported they clean their teeth unassisted which may mean that they were not cleaning their teeth effectively. The majority of the students (96.4%) cleaned their teeth using different tools. Tooth-brush (76.4%) and local chew-stick (78.7%) were the most commonly utilized [11]. Decayed teeth formed the major component of total DMFT score, followed by missing and the least contribution was of filled teeth. Comparable proportions are evident in majority of studies[12]. Almost half of the students brushed their teeth only once a day(63.0%) brushed more than twice a day. Findings from a similar study among ethnic Chepang children in Nepal reported that 56% brushed daily, and only 24% brushed twice daily [13].

The prevalence of dental caries was 60.3% and 55.6% in the primary and permanent dentition respectively. Similarly, the prevalence of dental caries was 60.3% in primary dentition which was similar to that of the study by Zmarandache et al [14].The prevalence of dental caries was high in the low socioeconomic status because of their poor oral hygiene practice, lack of awareness, improper food intake and family status. This finding is similar to the study conducted by Sogi G and Baskar D[15].

The adolescents with pain or history of dental caries might have had a behavioral change after a dental visit. However, the frequency consumption of sugar undoubtedly contributes to the onset of dental caries and the associations have been confirmed by several studies[16]. This study gives a representation of oral health

condition of school children of age groups 12 -17 years. In addition, it also presents the oral health related behaviors. Dental caries prevalence and severity was investigated using DFT and DMFT indices. The observed DFT and DMFT values of the children were well within the national and WHO goals [17].

V. Conclusion

The study concludes that the prevalence of dental caries was 20 % higher Non-Dalit than Dalit. Prevalence of dental caries was higher among school students who have not use fluoride contain teeth paste. The association between the type of family and dental caries also highlights the potential influence of social and familial factors on oral health. Low grade level, poor oral hygiene and dietary along with lack of dental visit were the associated factors for dental caries. Therefore, health education on oral hygiene, dietary habits and dental visit should be given for children to prevent and control dental caries. Similar type of study can be conducted on large population for generalized of evidence.

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