

Prevalence of Dental Caries and Associated Factors Among Finote Selam Primary School Students Aged 12-20 years, Finote Selam Town, Ethiopia

Amare Teshome¹, Asmare Yitayeh², Muchye Gizachew³

¹Department of Dentistry, School of Medicine, University of Gondar, Gondar, Ethiopia. ²Department of Physiotherapy, School of Medicine, University of Gondar, Gondar, Ethiopia. ³Department of Microbiology, School of Biomedical and Laboratory Sciences, University of Gondar, Gondar, Ethiopia.

Abstract

Background and purpose: There is dearth of researches about the prevalence and associated factors of dental caries in the study area. Therefore, revealing the prevalence of dental caries and its associated factors will help in the development of successful oral health assessment and intervention strategies.

Objective: To determine the prevalence of dental caries and its associated factors among Finote Selam Primary School Students.

Methods: An institution based cross sectional study was conducted between November 2012 and February 2013. Face to face interview was used to collect socio-demographic data using pre-tested structured questionnaire. Clinical examination was done by two dentists via using disposable glove, portable torch, wooden spatula and probes in class. Bivariate and multivariate logistic regression analyses were performed to test the association between dependent and independent variables.

Results: Two hundred ninety one students were included in this study. One hundred forty one (48.5%) of the students were identified as having dental caries. The mean Decayed, Missed and Filled Tooth (DMFT) was 1.23. The prevalence was higher in females (54.6%). Lack of tooth brushing habit (AOR=3.52, 95% CI: 1.85-6.43), frequent consumption of sugared foods (AOR=3.41, 95% CI: 1.24-5.63) and residency (AOR=1.78, 95% CI: 1.02-3.25) were found to have significant association with dental caries.

Conclusion: Almost half of the students were identified as having dental caries. The mean DMFT was 1.23. Tooth brushing habit, consumption of sugared foods and living in urban area were the most important predisposing factors for dental caries. Oral health education should be given at school level and there should be a need to provide an immediate restorative dental service for those decayed teeth.

Key words: Dental caries, Associated factors, Prevalence, DMFT

Background

Dental caries is a chronic bacterial infectious disease which causes the destruction of the hard parts of a tooth. It is generally believed to be caused by acid producing mutants – Streptococci and Lactobacilli bacteria [1-3]. In many low income countries, the treatment of dental caries in children alone would exceed the total child healthcare budget [4]. The burden of suffering from dental caries in children is a common phenomenon and found across all socioeconomic strata. Pain from untreated caries can affect school attendance, eating and speaking, and, subsequently impair growth and development. Moreover, the psychosocial impact of this disease often significantly diminishes quality of life [5-8].

The World Health Organization [WHO] recognizes dental caries as a pandemic disease and reports that its prevalence among school aged children ranges from 60% to 90%. [6, 9]

The prevalence of dental caries in Africa was reported to be 24.1% in Nigeria [10], 43.3% in Kenya [11], and 30.5% in Sudan [12] with a mean DMFT of 0.45, 3.4 and 0.42 respectively [11-13]. Two community based studies done in Ethiopia indicated that dental caries was 36.3% and 47.8% [13,14].

The growing consumption of sugared foods in the developing world, poor tooth brushing habits, poor oral hygiene and low level of awareness about dental caries are

some of the factors that increased the levels of dental decay [14-17].

In Ethiopia, oral health prevention and treatment gets low attention in the government and the existing dental services are private owned and expensive. Even though dental caries is high in some parts of the country, much is not known about the extents and factors affecting it in the study area. Therefore this study aimed to determine the prevalence of dental caries and its associated factors among Finote Selam Primary school students.

Materials and Methods

Study design and study area

An institution based cross sectional study was conducted from November 2012 to February 2013 at Finote Selam Governmental Primary School. Finote Selam is one of the oldest towns of Amhara region located 387 km away from Addis Ababa and has a total population of 25,148 (2007) of whom 12,069 were males and the remains were females. During the study period, 3252 students were attending their education from Grade 1 to 8. Among those students, 1199 were within the study age group.

Approaching of the study participants

During data collection, students of several classes were approached. All students (12-20 years) were considered to be included in the study. To the best of literature knowledge,

no sufficiently powered studies conducted on dental caries prevalence and associated factors in the study site. Allowing for a required confidence of 95% and 5% precision, the required sample size was estimated to be 291 students. Simple random sampling technique was used in the data collection process. The students who meet the inclusion criteria were randomly selected. Students who were not able to cooperate and those who were not present at the study period were excluded from the study.

Data collection

A structured questionnaire prepared in English was used to collect the socio-demographic data and factors that contribute caries to exist among the study participants. Domains of scale were identified by pilot testing, and conceptual model and linguistic validation were conducted by translating the tool to local language and back to English again. Pre-test was done to check the validity of the questionnaire. A three days training was given for data collectors focusing on briefing about the data collection instruments and the overall aim of the study. Data were collected by three trained nurses under the supervision of one senior dentist who works at Finote Selam Hospital via face to face interview using closed ended questionnaires.

Oral examinations

The clinical examination was done by two dentists via using disposable glove, portable torch, wooden spatula and probes in class. Dental caries were assessed by using the Decayed, Missed, filled Tooth (DMFT) index; which describes the prevalence of dental caries in permanent teeth in an individual. According to DMFT index dental caries is recorded as being present when a lesion in pit or fissure or on smooth surface has a detectable soft flour, undermined enamel, soft wall or

temporary restoration. It was assumed missing due to dental caries if there was history of pain and presence of a cavity prior to extraction.

Data analysis

After coding and editing, data were entered and analyzed using SPSS version 16. Descriptive data were given in percentages depending on variable type. Prevalence estimations were made for males and females separately. Logistic regression analyses were performed to test the association between dependent and independent variables. P-value less than 0.05 were considered statistically significant.

Ethical clearance

Prior to the commencement of data collection, ethical clearance was obtained from Jimma University Ethical Review Committee, and Letter of cooperation was written to Finote Selam Primary School. A written informed consent was also sought from parents and/or legal guardians of those students. Those study participants who had dental caries were referred to the Finote Selam Hospital for treatment.

Results

A total of two hundred and ninety one students were included in this study and the respondent rate was 100%. From this, 150 (51.5%) were boys and had a mean age (\pm SD) of 13.5 ± 1.5 . More than half (64.6%) of the study population were within 12-14 years. Majority of the students (78%) were within Grade 5 – 8 (*Table 1*).

As shown in *Table 1*, the overall prevalence of dental caries is 48.5%. The prevalence is almost equally distributed within the age ranges. It was highly prevalent among female and urban dwelled students.

Table 1. Distribution of dental caries with socio-demographic characteristics of study participants (N=291) attending at Finote Selam Primary School, Ethiopia, 2012 to 2013.

Socio-demography	Frequency N (%)	With Dental caries n (%)	Without Dental caries n (%)
Sex			
Female	141(48.5)	77(54.6)	64(45.4)
Male	150(51.5)	64(42.6)	86(57.4)
Age			
12-14	188(64.6)	92 (48.9)	96(51.1)
15-17	81(27.8)	40(49.3)	41(50.7)
18-20	22(7.6)	9(40.9)	13(59.1)
Religion			
Orthodox	267(91.8)	131(49.1)	136(50.9)
Muslim	19(6.5)	7(36.8)	12(63.2)
Protestant	5(1.7)	3(60.0)	2(40.0)
Residency			
Urban	235(80.8)	124(52.8)	111(47.2)
Rural	56(19.2)	17(30.4)	39(69.6)
Grade level			
1-4	64(22)	24(37.5)	40(62.5)
5-8	227(78)	117(51.5)	110(48.5)
Family income (ETB*/month)			
<500	76(26.1)	39(51.3)	37(48.7)
500-1000	89(30.6)	26(29.2)	63(70.8)
>1000	126(43.3)	76(60.3)	50(39.7)
Fathers educational level			
Illiterate	50(17.5)	25(50.0)	25(50.0)
Can read & write	93(32.5)	50(53.8)	43(46.2)
Grade 1-8	44(15.4)	17(34.7)	32(65.3)
Grade 9-12	28(9.8)	14(50.0)	14(50.0)
Above grade12	71(24.80)	35(49.3)	36(50.7)

Mothers educational level			
Illiterate	105(36.3)	60(57.1)	45(42.9)
Can read & write	61(21.1)	34(55.7)	27(44.3)
Grade 1-8	46(15.9)	20(43.5)	26(56.5)
Grade 9-12	29(10.0)	10(34.5)	19(65.5)
Above grade 12	48(16.7)	17(34.0)	33(66.0)
Fathers occupation			
Farmer	108(37.1)	43(41.7)	65(58.3)
Merchant	81(27.8)	45(58.0)	38(42.0)
Government employee	74(25.4)	40(51.4)	34(48.6)
others	28(9.7)	13(46.4)	15(53.6)

Distribution of Dental caries among dietary and tooth brushing habits

Majority (76.92%) of the study participants among those who do not brush their teeth experienced dental caries. The prevalence of dental caries was found to be high in those who take sweets (50.36%). Regarding to frequency of tooth brushing, it was found that 68.42% of students who brushes their teeth sometimes, had dental caries (*Table 2*).

Distributions of Decayed, Missed and Filled Tooth (DMFT)

The mean DMFT was 1.23 among the study participants and none of them got filling treatment. The mean DMFT was high between 12-14years (DMFT= 1.34). Females have a little bit higher DMFT (1.31) (*Table 3*).

Distribution of dental caries by type of teeth

First molar of mandible (29.4%) and maxillary (12.7%) were prone to dental caries than other teeth (*Table 4*).

Logistic regression analysis of factors associated with dental caries

Table 5 shows that variables which were appeared as significantly associated factors with dental caries in bivariate analysis: sex, residency level of education, tooth brushing habit and consumption of sugared foods were entered into a multivariate logistic regression model as independent variables for the outcome of dental caries. Living in urban area increases the chance of having dental caries 1.78 times higher [AOR=1.78, 95%CI: (1.02-3.25)] than living in a rural area. Students who were not brushing their teeth have 3.52 times higher [AOR=3.52 %CI: (1.85-6.43)] chance of developing dental caries than those who brushed their teeth frequently. Students who use more sugared foods frequently have 3.42 times [AOR= 3.41 %CI: (1.24-5.63)] a chance of developing dental caries than those who use sugared foods rarely.

Discussion

The prevalence of dental caries in this study was found to be 48.5%, which is similar with the studies conducted in Kenya and in a rural high land community in North Ethiopia (43.3% and 47.8% respectively) [11,14], but lower than WHO oral health reports of school children (60-90%) and Qatar (85%) [6,18].

A study done on the prevalence & distribution of dental caries in the 12-15 years urban children in Nigeria showed that 24.1% had caries [10]. This result is lower than the prevalence of dental caries found in our study. The possible explanation about the variations might be the dental health consideration and the awareness level of most of Ethiopians', including Finote Selam Primary School students is low. In

addition, there is scarcity of dental professionals around Finote Selam town which again plays a role to contribute for the high prevalence of dental caries.

In our study, the mean DMFT is 1.23, which is relatively comparable to the study done in Uganda (DMFT= 1.5) [20]. This DMFT value is at low level of world oral health standards [7]. However, it is higher compared to the study done in Nigeria (DMFT= 0.45) [10] and Sudan (DMFT= 0.42) [13]. It might be owing to the lack of oral health education. Like the studies done in Qatar [19] and Kenya [21], our finding indicates that the decay component (DT) was the primary contributor for DMFT.

In this study dental caries was most prevalent in first molar (42.2%) which is similar with the study done in Nigeria of which (46.5%) was on first molar [10]. This may be due to its first eruption and main role in mastication.

The study done in Kenya showed that females (54.78%) were more affected by dental caries compared to males. This finding corresponds with our result (54.6%) [11]. In most studies dental caries is strongly age related but in this study it has no significant association ($p > 0.05$). This may be due to the age range among the study participant is narrow.

In our study, the prevalence of dental caries is high among the study participants who have high (60.3%) monthly family income. This may be due to increased consumption of sugared foods. It is supported by the evidence that fermentable carbohydrates have been associated with caries initiation and development which has similar finding with this study that among those who use sugared foods frequently 50.4% develops dental caries [11].

It was found that 76.9% of the students who do not brush their teeth developed dental caries which has similar finding with the study done in northern Ethiopia. However, low rate of caries were detected among those who used the local brush [15]. This might be due to regular brushing of the teeth, mainly after each meal, is one of the methods for preventing the occurrence of dental caries [11].

This study found that the students who live in urban area have a chance of developing dental caries by 1.78 times (AOR=1.78, (95% CI =1.02- 3.25) higher than those students who live in rural area which is equivalent to the study conducted in Uganda (OR=1.69; 95% CI 1.21–2.37) [21] and in Zimbabwe where 27.6% of children in the urban area, and 20.9% in the rural, had caries ($P < 0.01$) [23]. From this finding, it is true that the chance of developing dental caries is higher in urban dwellers than rural ones.

In this study, students who consumed more sugared foods frequently had 3.41 times [AOR= 3.41% CI: (1.24-5.63)] higher chance of developing dental caries than those who

Table 2. Prevalence of dental caries by dietary and tooth brushing habits of study participants (N= 291) attending at Finote Selam Primary School, Ethiopia, 2012 to 2013.

Predisposing factors	With Dental caries, n (%)	Without Dental caries, n (%)
Tooth brushing habit		
Yes	111(44.1)	141(55.9)
No	30(76.9)	9(23.1)
Frequency of brushing(n=252)		
After every meal	8(21.1)	30(78.9)
Twice/day	23(44.2)	29(55.8)
Once/day	45(46.4)	52(53.6)
Some times	35(53.8)	30(46.2)
Time of brushing(n=252)		
Morning	53(45.3)	64(54.7)
Before bed	1(33.3)	2(66.7)
Mixed	6(14.6)	35(85.4)
Not fixed	51(56.1)	40(43.9)
Brushing material(n=252)		
Tooth brush with paste	36(39.5)	55(60.5)
Mefakia	62(47.3)	69(52.7)
Charcoal	7(46.7)	8(53.3)
Others	6(50.0)	6(50.0)
Consumption of sugared foods		
Yes	138(50.4)	136(49.6)
No	3(17.6)	14(82.4)
Frequency of consumption(n=138)		
3x/ day	10 (55.6)	8(44.4)
2x/day	39(60)	26(40)
1x/day	48(54.5)	40(45.5)
2x/week	13(54.2)	11(45.8)
Some times	28(35.4)	51(64.6)

Table 3. Distribution of DMFT among study participants (n=291) attending at Finote Selam Primary School, Ethiopia, 2012 to 2013.

Variables	Decayed	Missed	Mean DMFT
Age			
12-14	211	41	1.34
15-17	58	29	1.07
18-20	13	7	0.909
Gender			
Male	128	46	1.16
Female	154	31	1.31
Religion			
Orthodox	259	62	1.20
Muslim	15	15	1.58
Protestant	8	0	1.6
Grade level			
1-4	84	21	1.64
5-8	198	56	1.12
Family income/month			
<500	79	7	1.13
500-1000	52	22	0.86
>1000	151	48	1.58

Table 4. Distribution of dental caries by type of teeth affected among Finote Selam Primary School Students (n=291), 2012 to 2013.

Arch	Tooth						
	Central Incisor	Lateral Incisor	Canine	1 st Premolar	2 nd Premolar	1 st Molar	2 nd Molar
Maxillary	5	4	7	5	12	36	32
Mandible	2	5	12	3	31	83	45

consumed sugared foods rarely. It is supported by a study done in Kenya where children consuming more sugary foods and drinks frequently were almost 7 times (OR= 7.00) more likely to develop caries when compared to those who do not consume sugary foods and drinks [16].

Among those students who never brush their teeth in this study, 30 (76.9%) showed dental caries which is higher than

the study done in Jordan (64.4%) [23]. This may be due to the poor habit and improper usage of the tooth brushing sticks in the country in the study area.

Conclusion and Recommendation

The finding of the study indicated that prevalence of dental caries among the students was high. The DMFT index of this

Table 5. Logistic regression analysis of factors associated with dental caries among Finote Selam Primary School Students (N=291), 2012 to 2013.

Variables	Dental caries, n (%)	COR (95% CI)	AOR((95% CI)	p-value
Sex				
Male	64(45.4)	1	1	
Female	77 (54.6)	0.62 (0.38,0.98)	0.32(0.15-1.02)	0.04
Residency				
Rural	17(30.4)	1	1	
Urban	124(52.8)	2.52 (1.37 , 4.78)	1.78 (1.02-3.25)	0.002
Grade level				
Grade1-4	24(37.5)	0.56(0.31, 0.99)	0.23(0.14-2.43)	0.04
Grade5-8	117(51.5)	1	1	
Tooth brushing habit				
Yes	111(44.1)	1	1	
No	30(76.9)	4.23(1.93, 9.28)	3.52(1.85-6.43)	0.0001
Consumption of sugared foods				
Yes	138(50.4)	4.74(1.33, 8.84)	3.41(1.24-5.63)	
No	3(17.6)	1	1	0.008

study was low with high prevalence of decayed teeth followed by missed tooth but absolute lack of filled tooth. Residency, tooth brushing habit and consumption of sugar food and drinks were significantly associated with the occurrence of dental caries.

On the bases of our findings, we recommend that:

- Regional Educational Bureau should incorporate oral health education in the curriculum of primary schools.
- There should be a need to provide an immediate restorative dental service for those who have decayed teeth
- The community should develop a system of routine dental visit once every six month, and there should

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be community based large scale study on the study area. A further study to identify the etiology should also be carried out.

Conflict of Interest

All Authors declare that there is no any conflict of interest.

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