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ORIGINAL ARTICLE

Prevalence of Tooth Decay and Associated Factors Among Ethiopian Patients

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Abstract

Objective: To assess the prevalence of tooth decay and it's associated factors among the age group of 15-20 years old visiting Ayder Comprehensive Specialized Hospital. **Material and Methods:** An epidemiological cross-sectional descriptive study was conducted among 384 subjects aged 15-20 years. A closed-ended questionnaire, according to the World Health Organization methodology was used to collect the data. The subjects were examined for the presence of tooth decay using the DMFT Index. One examiner was trained and standardized using a Kappa test (K=0.90). To test the differences in the DMF-T index related to socioeconomic variables, the Chi-square and the Mann-Whitney tests were employed. For all tests, the level of significance was set at $p \leq 0.05$ with 95% Confidence level. **Results:** The magnitude of tooth decay among study participants was 57.8%. The mean decayed, missed and filled was 1.26 and prevalence was higher in males (34.1%). Poor oral hygiene practice was strongly associated factor with tooth decay. 56.2% of visitors from the urban area were mainly affected by tooth decay. **Conclusion:** Tooth decay is highly prevalent among visitors between15-20 years of age. Tooth brushing habit, residency, and consumption of sugary food and drinks were significantly associated with the occurrence of tooth decay. Early diagnosis and prompt treatment can prevent further damage.

Keywords: Dental Caries; Oral Hygiene; Toothbrushing; Preventive Dentistry.

Introduction

Tooth decay is one of the most prevalent health problems among the visitor in Dental institutions. Dental caries is a tenacious-disease causing demineralization and dissolution of hard tissues of teeth. There are three predisposing factors for dental caries development like bacteria, carcinogenic food, and susceptible tooth surface. Also, dental caries is caused by preventable risk factors [1]. Streptococcus mutans and Actinomyces species are causative agents for enamel and root surface caries commonly affecting the population of lower socio-economic status. Recently, the incidence of dental caries is also increasing in a developed country. But its prevalence is lower for developed countries than developing once as there are more dental manpower, good hygiene practice and dental facilities in developed countries than developing once [1,2].

The growing consumption of sugary food 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 [3-6]. However, limited research has been conducted on the prevalence and causes of tooth decay in Ethiopia. Hence the aim of the present study was to assess the prevalence, gender disparity and severity of tooth decay in 15 to 20 years old patients visiting Ayder Comprehensive Hospital.

Material and Methods

Study Population and Sample

The study was a cross-sectional survey of patients between the ages of 15 and 20 years visiting Ayder Hospital, Mekelle, located in the northern part of Ethiopia.

All the subjects within the age of 15-20 years, irrespective of the level of study were selected. A stratified random sampling technique was used to select the participants. Physically or mentally challenged patients, medically compromised or with gross dental/orofacial defects like cleft lip or cleft palate patients were excluded from the study. Third molars, congenitally missing teeth, supernumerary teeth, also, teeth restored for reasons (fracture, cosmetic purpose or use as a bridge abutment) other than tooth decay were also excluded from the study.

Data Collection

A closed-ended questionnaire, according to the WHO methodology [1], was used to collect the data. The questionnaire included two parts: the first part contained questions about socio-demographic characteristics of the study participants like age, gender, religion, and residency, while the second part included factors associated with tooth decay. The questionnaire assessed the oral practices of the subjects like items used for teeth cleaning, type of toothpaste used and intake of sugary food items (sugar consumption [yes /no] and frequency [occasionally / frequently]).

Dental examination was performed using a non-adjustable plastic chair under adequate natural light by a team headed by the researcher, who trained for 15 days prior to the study. Teeth were isolated, quadrant-by-quadrant, with the help of cotton rolls and then crowns of the teeth were examined individually for the presence of dental caries using sterile mouth mirror (Hu Friedy Mfg. Co., LLC, Chicago, IL, USA) and a periodontal probe (Marquis Dental Mfg. Co., Aurora, CO, USA). The observations were recorded in the separate assessment form.

Data quality was assured before data collection, during data collection and after data collection. A pretest was done among visitors of dental OPD in Mekelle, taking 5% of the sample before being deployed at the participating hospital. Based on the pretest results questionnaire was adjusted contextually. Individual

records were recorded in a prepared questionnaire format. The collected data was then checked for completeness and consistency. A specific nonoverlapping code was given for each variable.

Statistical Analysis

One examiner was trained and standardized using a Kappa test (K=0.90) before starting the study. All data were expressed as mean and standard deviation for continuous variables; frequencies and percentages were calculated for categorical data. Statistical analysis of the data was done using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) 11.0 version and Excel 2000. To test the differences in the DMF-T index related to socioeconomic variables, the Chi-square and the Mann-Whitney tests were employed. For all tests, the level of significance was set at $p \leq 0.05$ with 95% Confidence level.

Ethical Considerations

An Ethical certificate was obtained from the Researchand Ethical Committee/Institutional Review Board of Mekelle University. Informed consent was obtained from each participant to be examined.

Results

A total of 384 subjects participated in the study, among whom (47.9% were males, 28.6% were 20 years, 92.2% were Orthodox Christian and 76.6% were from an urban setting (Table 1).

Table 1. Distribution of subjects according to socio-demographic characteristics.

Variables	N	%
Sex		
Male	184	47.9
Female	200	52.1
Religion		
Orthodox	354	92.2
Muslim	30	7.8
Residence		
Urban	304	76.6
Rural	95	23.4
Age		
15 Years	81	21.1
16 Years	51	13.3
17 Years	61	15.9
18 Years	30	7.8
19 Years	51	13.3
20 Years	110	28.6

More than two-thirds of the males (n=131; 34.1%) respondents had high caries prevalence whereas, females with carious teeth were 91 (23.7%). The prevalence of caries among residents of the urban area was 56.2%, while among rural people it was 53.7%. Also, participants living in urban area were 1.78 times more prevalent for developing dental caries than those living in rural area.

Also, the mean DMFT score for the whole group was 2.50 ± 2.21. Decayed teeth (DT) were a major contributor to the DMFT; the proportion of decayed, missing, and filled teeth was 98.3%, 0.8% and 0.8%, respectively (Table 2).

Table 2. Components of DMFT Score.

DMFT Components	DMFT Score	%
Decayed (DT)	2.44 ± 2.13	98.3
Missing (MT)	0.03 ± 0.27	0.8
Filled (FT)	0.03 ± 0.2	0.8
Total	2.50 ± 2.21	100.0

Table 3 shows the relation between the frequency of sugar intake between meals and tooth decay. It implies a very significant positive correlation between the frequency of sugar consumption and dental caries.

Table 3. Association of sugar intake among the study population.

Variables		Odds Ratio (CI 95%)	p-value
Sugar Consumption	(dmft=0 versus dmft >0)	0.17	< 0.001*
Frequency of Sugar Consumption	(dmft=0 versus dmft >0)	0.48	<0.001*

*Statistically significant.

Table 4 shows the distribution of oral health knowledge among the participants. A total of 41.9% of participants cleaned their teeth once daily, while only 5.5% cleaned their teeth twice daily. Most of the participants (47.8%) used both local chew sticks and toothbrushes as oral hygiene methods. Also, 55.2% of the sample used toothpaste containing fluoride.

Table 4. Distribution of participants according to oral habits.

Questions	N	%
How Often do You Clean Your Teeth?		
Once a Month	20	5.2
2-3 Times a Month	10	2.6
Once a Week	81	21.1
2-6 Times a Week	91	23.7
Once a Day	161	41.9
Twice or More a Day	21	5.5
What do You Use to Clean Your Teeth?		
Toothbrush and Traditional Stick	180	47.1
Toothbrush Only	62	15.9
Traditional Stick	142	37.0
Do You Use a Toothbrush		
With Toothpaste	212	55.2
Without Toothpaste	172	44.8

Discussion

This study attempted to assess the prevalence and associated factors of tooth decay among patients attending Ayder comprehensive Specialized Hospital. The overall prevalence of tooth decay found was 57.80%, which was consistent with a study in Finote Selam, Ethiopia (48.5%) [7], 30.5% in Sudan [8], 37% in Kenya [9] and 21.8% in Bahirdar city, Ethiopia [10]. In this research the high prevalence of dental caries is due to the facts such as variation in study population, time of study and study characteristics. Such variations occur as it is institutional centered study and also, there might be high patient flow in health institutions compared to the community level, which specifies that there is a need to promote oral health [11].

In this research, the factors associated with the occurrence of tooth decay were socio-demographic differences, place of residence, oral hygiene status and educational status. In addition, this study showed that

the prevalence of tooth decay was more in males, 34.1% as compared to females. This finding is similar to the study done in Northern Appalachia [12]. This might be due to the fact that adult women utilize dental health care to a greater degree than men.

This study showed that patient who lived in urban had 1.78 times chance of developing dental caries than those patients who were living in rural. Similar findings were reported by recent report, which demonstrated that patients living in urban settings had more access to consume more sugary foods leading to more prevalence of tooth decay [11].

The mean DMFT values (2.50 ± 2.21) in present study were lower than the values obtained from other studies [13-15], while they were equal to study developed in India [16]. Food habits play an important role in the causation of dental caries. The introduction of refined sugar into the modern diet has been associated with increased caries prevalence. Present study evaluated the association between the sugar in diet and dental caries the patients who were divided into three groups depending upon the total number of sugar exposures/day i.e., frequently (more than 4 sugar exposures/day), moderately (2-3 sugar exposures/day) and occasionally (1 sugar exposure/day).

The findings of this study showed considerably higher caries prevalence in the sweet eating group compared to those who did not eat sweets. The findings of the present study reconfirm the importance of sugar as one of the major etiological factors, which are consistent with the previous findings [17-20]. However, some authors [21] found no significant relationship between sugar consumption and caries prevalence. The study found that tooth decay was lower among respondents who cleaned their teeth with toothpaste and toothbrush were 95 times less likely to be affected by dental caries as compared to those patients who used only a traditional stick. This finding is typically similar to the studies done in Finote Selam [7] and Bahirdar [10]. However, a study in Kenya have found that brushing habit has no significant effect on the prevalence of dental caries, which is contradictory to the results of the present study [9].

Also, the study revealed that those who used to brush twice a day had significantly less prevalence of dental caries as compared to those whose brushing habit is either once daily or not every day. In the present study, 5.5% patients had brushing habit more than once per day. However, previous authors found 16.7% of patients had the brushing habit more than once a day [22] and the overall prevalence of dental caries is less in their study as compared to the present study.

Various limitation of present study could be pointed namely, information was not obtained concerned to daily diet protocol, Oral Hygiene Index should have been used to assess oral hygiene status. Finally, only individual-level factors were addressed in this study that are concerned as factors affecting the prevalence of tooth decay among the enrolled patients,

All the visitors need to be aware that improved oral hygiene practices and reducing sugary food consumption benefits in their oral health, to prevent tooth decay, and also improves their health status. In addition, the Regional Health Bureau should incorporate oral health education in the community. The community should develop a system of routine dental visits once every six months, and there should be further study.

Conclusion

The prevalence of tooth decay was high and could predict that educational status, oral hygiene status, and place of residence were important predictors of the prevalence of dental caries among patients attending Ayder Comprehensive Hospital. Therefore, integrating oral health promotion services with other health

services at the cause root level could have a significant impact and likely to benefit the community's oral health problem. Health promotion about oral hygiene is supremely important for the prevention of the problem of tooth decay.

Authors' Contributions

BS	0000-0001-5834-500X	Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis and Supervision.
LM	0000-0003-4851-947X	Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft Preparation and Supervision.
KKG	0000-0002-3178-9513	Conceptualization, Data Curation, Formal Analysis, Writing – Original Draft Preparation, Writing – Review and Editing, Supervision.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

Conflict of Interest

The authors declare no conflicts of interest.

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