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Original Research Article

Evaluation of Factors Associated with Dental Appointment and Oral Health Status among Degree College Students in Bangalore City: A Cross-Sectional Study

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Abstract: Oral health is important for well-being and chronic disease prevention. Dental treatment needs are commonly unmet among young adults. It is therefore important to evaluate the factors associated with dental services among young adults. A cross sectional study was conducted among 400-degree college students of aged18-25 years in Bangalore city. Data collected included sociodemographic variables, dental visits and diet history. WHO oral health proforma-2013 was used to assess oral health status. Descriptive and analytical statistics were done using Chi square test and multivariate linear regression. A p value of <0.05 was considered as significant. Mean age of the study participants was 19.97±1.4 years. The proportion of participants visited dentist was 37 %. Majority visited less than a year for pain, filling of teeth, removal of teeth. Less than fifty percent of the participants reported consumption of snack and sugar more than two times daily. The overall prevalence of dental caries and gingivitis were found to be 49 % and 49.25 % respectively. Socioeconomic status, state of teeth and dry mouth were associated with dental visits, caries experience and gingivitis. Multivariate linear regression showed significant association between frequency of cleaning teeth, dental visit, consumption of coffee with sugar or sweets/candy, socioeconomic status and dental visit with dental caries experience and education of Head of family, total family income, frequency of cleaning tooth method of brushing, frequency of snacking, frequency of sweet consumption and dental visit were significantly associated with gingival bleeding. Education, income and socioeconomic status were found to be associated with dental visit which in turn was associated with dental caries and gingivitis among degree college students. Hence there is a need to conduct oral health education programs and improve access for dental health care.

Keywords: Dental visits, Dental anxiety, Health education, Quality of Life, Young adults.

INTRODUCTION

Oral health is a vital component of general health. The main dental diseases, caries and periodontal diseases, are largely preventable and significant progress has been made globally in reducing them amongst child populations. However, socioeconomic differences in the utilization of dental services by adults still exist in many countries. There are also other barriers to seeking regular dental care, including dental fear and dental anxiety and availability of dental services [1].

Despite reductions in pain associated with dental visits and an increased awareness by dentists of the importance of building trusting relationships, dental fear and dental anxiety still is the central aspect of a cycle of dental disadvantage [2]. Dental anxiety is related to age, gender, educational qualification, socio economic status, culture and

varies from person to person. Identifying dentally anxious patients is crucial for management and treatment outcome [3]. Dental anxiety might also affect the patient-dentist relationship and obscure proper diagnosis of the actual dental problem [4]. Preventive dental visits have been recommended for detecting treatment needs and for the early detection of oral diseases [1].

Degree students are in transition to adulthood and this new, independent life situation may affect their health behavior such as eating habits, smoking and regularity of dental care [5]. Previous studies [5-28] have investigated oral health behaviour [20-22, 24, 26] oral hygiene awareness [25] dental anxiety [6-17] dental attendance [6, 18, 19] dental neglect [23] and oral health status [23, 27, 28] and service quality [6]. However, factors affecting utilization of dental services among young adults are not clear.

Therefore, a cross-sectional study was conducted with the objectives to evaluate factors associated with dental visits and oral health status among degree college students in Bangalore city.

MATERIALS AND METHODS

This cross-sectional study was conducted from November 2018- October 2020 among Degree College students in Bangalore city. A protocol of the intended study was approved by the Institutional Ethical Committee and Review Board. This study was carried out in accordance with the ethical standards of World Medical Association for human experimentation 2008 version of Helsinki Declaration [29]. Necessary permission was obtained from the Principals of Degree colleges before conducting the study. Written informed consent was obtained from the participants after explaining the purpose clearly and they were assured about the voluntary nature and confidentiality of the study. The investigator was trained and calibrated in the Department of Public Health Dentistry. [The Kappa co-efficient value (k) for intra examiner reliability was 0.80-0.90].

Sample size was estimated based on the proportion of subjects visiting dentist (47 - 60 %) from the previous literature [28,29]. Using the formula, P=proportion of dental visit (50%); $Z_{\alpha/2}$=1.96 at 95% confidence interval; E=margin of error (10 %); Statistical power =80%

$$N = \frac{Z_{\alpha/2}^2 * p(1-p)}{E^2} \qquad N = \frac{(1.96)^2 * 0.5(0.5)}{(0.05)^2} = 384.16.$$ Sample size rounded off to 400

List of colleges were obtained from the website of Bangalore university [30] and RGUHS [31]. From this list one college from medical, nursing, engineering and other degrees was selected randomly. Students aged between 18-25 years with equal number of male and female were included in this study. Physically and mentally challenged students and conditions that makes assessment of oral health difficult were excluded. In each college students who fulfilled the eligibility criteria and gave informed consent were recruited from different years of the study. Hence a total of 400-degree college students from various degree colleges in Bangalore city were included in this study. Socio economic status was assessed using Kuppuswamy scale [32].

The study tool consisted of a structured proforma: General information of the participants regarding demographic profile (age, gender and socioeconomic status); oral health behavior (dental visits including participants frequency, reason for the dental visits and treatment received, oral hygiene practices, personal habits related to consumption of tobacco products and sugary foods or drinks [33]; oral self-care (oral hygiene practices, Self-rated oral health). Pre-validated Modified Dental Anxiety Scale [34,35] (MDAS) was used to assess dental anxiety of the participants and pre-validated service quality scale [36,37] (SERVQUAL) was used to assess service quality. World Health Organization (WHO) oral health assessment form for adult - 2013 was used for clinical assessment of oral health status [33].

Data were collected from study participants at respective colleges during college hours. General information was recorded by investigator through interview. Self-administered questionnaire was distributed to the participants after giving instructions. Participants were seated on a comfortable chair and were clinically examined and recorded by a single calibrated investigator under natural light using autoclaved instruments. Sufficient numbers of autoclaved instruments were taken for day to day examination. Data were entered in an MS excel format. The statistical analysis was done with the statistical package for social science (SPSS) version 16 software package (IBM Corporation, SPSS Inc., Chicago, IL, USA). Socio economic status was assessed using Kuppuswamy scale [32]. Income was updated for Aug 2020 using all India's Average Consumer Price Index for Industrial workers (CPI-IW=338, Base years 2001) [36]. The Kuppuswamy's socioeconomic status scale

revised for the current years using real-time update tool [37].

In order to perform bivariate analysis, independent variables were dichotomized: Sociodemographic factors were dichotomized based on median score; Age was dichotomized into < 20 years and ≥ 20 years; education into < high school and ≥ high school; total family income into ≤Rs 13031 and >Rs 13031; SES into ≤ upper and >lower. Behavioural factors like dental visits were dichotomized into yes/no. Dependent variables like dental caries experience was dichotomized into DMFT=0 and DMFT≥1; gingival bleeding into present or absent based on clinical condition.

Descriptive analysis, comparing mean (SD) and percentage (proportion) was done by continuous and ordinal data respectively. The Chi-square test was done for assessing the differences between categorical variables and to determine the association of sociodemographic and behavioural factors like age, education, SES, dental visit patterns. Multivariate linear regression was performed with caries experience and gingival bleeding as dependent variables. A $p < 0.05$ (95% Confidence Interval) was considered statistically significant.

RESULTS

Mean age of the participants was found 19.97±1.4; [Males-20.19±1.6 and Females-19.09±1.03]. Majority of the parents of the participants had low income, seven years of duration of education, performed semiskilled/skilled jobs and belonged to lower middle class (Table 1).

About 37 % of the participants had visited a dentist. Regarding duration since last visit: 62.2 % participants visited less than a year; 24.3 % between 1-5 years and 13.5 % more than 5 years. The reasons for last dental visit were: pain [44.5 %]; filling of teeth [8.3 %]; removal of teeth [45.9 %] or other reasons [1.3 %] (Table 2).

Almost all participants (96 %) used tooth brush and 4 % used finger for cleaning the teeth. Majority of the participants (79.5 %) performed horizontal method; 11.5 % vertical method; 6.5 % circular method and 2.5 % were unaware about method of brushing. Most of them (96 %) used tooth paste and 4 % used tooth powders material for cleaning the teeth. Most of them (84.5 %) brushed once daily and 15.5 % twice daily. All the participants brushed before meal. Majority (84.4 %) of the participants changed their brush in 3-6 months. One hundred participants (25 %) used tongue cleaner; 1.5 % used oral mouth rinse.

According to state of teeth, 54 % participants rated as good; 40.75 % average and 5.25 % rated poor. Based on state of gums: 7 % participants rated as very good; 53 % good; 37.25 % rated average and 2.75 % rated poor state of gums. Majority of the participants did not experience any difficulty in biting food (70 %), dry mouth (67 %), embarrassment due to appearance of teeth (79 %) and avoided smiling because of teeth (78 %).

Regarding snacking per day: 53 % of the participants snacked more than twice and 47 % less than twice. (Figure 1). According to consumption of sugar; 44.5 % consumed sugar more than twice and 38 % consumed sugar in between meal (Figure 2).

Based on consumption of sugar: 37 % of the participants consumed sweets/candy several times a day; 29.5 % of the participants consumed tea with sugar every day and 24.5 % of the participants consumed coffee with sugar every day.

Based on MDAS scale: 59.5 % participants would not feel anxious; 32.75 % slightly anxious; 7.25 % fairly anxious and 0.5 % would feel very anxious about sitting in the waiting room for treatment. Majority 51 % of the participants would not feel anxious; 24.5 % slightly anxious; 19.5 % fairly anxious; 4 % very anxious and 1 % would feel extremely anxious about to have a tooth drilled. Most of the 41.75 % participants would not feel anxious; 25.25 % slightly anxious; 23.5 % fairly anxious; 7 % very anxious and 2.5 % would feel extremely anxious about to have a local anesthetic injection in their gum (Table 3).

Mean score of SERVQUAL scale was 5.38±0.73 for tangible; 6.08±0.76 for reliability; 5.22±0.64 for responsiveness; 5.25±0.59 for assurance and 6.83±0.89 for empathy.

Over all 49 % participants had dental caries experience out of which 23 % were males and 26 % were females. Mean number of DT was 0.61±0.79; MT 0.21±0.40; FT 0.25±0.47; and DMFT was 1.14±1.11.

Overall prevalence of gingivitis was found 49.25 % out of which25.25 % were male and 24 % were females. Mean number of teeth with gingival bleeding was 2.54±1.06. Periodontal pockets were present in 41.5 % of the participants. Among participants with periodontal condition 33.5 % had shallow pockets and 8 % had deep pockets. Mean number of teeth with shallow pocket (4-5 mm) was 1.09±0.78 and mean number of teeth with deep pocket (≥6 mm) was 0.25±0.17. Loss of attachment was 0-3 mm among 321 (80.25 %) participants; 68 (17 %) had 4-5 mm of loss of attachment and 11 (2.75 %) had loss of attachment 6-8 mm.

Overall 15 % participants needed no treatment; 8 % needed preventive or routine

treatment; 56 % needed prompt treatment (including scaling) and 21 % needed immediate (urgent) treatment due to pain or infection of dental and/or oral origin.

The proportion of participants visiting a dentist were 14.25 % and 22.75 % below and above the age of 20 years respectively and the association between age and dental visits was not significant (p=0.46); 22.5 % and 14.5 % participant's parents completed high school education or above and below high school respectively and the association between education and dental visits were found to be significant (p<0.01); 25.5 % and 11.5 % participants had family income Rs 13031 or above and below Rs 13031 respectively and the association between family income and dental visits were found to be significant (p<0.01); 28.5 % and 8.5 % participants belonged to upper class and lower class respectively and the association between SES and dental visits were found to be significant (p<0.01).

Among those who visited a dentist; 11.25 % had dental caries experience; among those who did not visit a dentist; 37.75 % had dental caries experience. Among those who visited a dentist; 14.25 % had gingival bleeding; among those who did not visit a dentist; 35 % had gingival bleeding (Table 4).

Frequency of cleaning teeth (B=-0.821), dental visit (B=0.502), consumption of coffee with sugar (B=0.342), consumption of sweets/candy (B=0.450), SES (B=0.347) and dental visit (B=0.052) were significantly associated with dental caries experience with moderate level of prediction (R=0.434) and explain 18.8 % (R^2=0.188) of the variability of dental caries experience (Table 5).

Education of Head of family (B=-0.518), family income (B=-0.251), frequency of cleaning tooth (B=-1.403) method of brushing (B=-0.438), frequency of snacking (B=1.030), frequency of sweet consumption (B=1.055) and dental visit (B=0.635) were significantly associated with gingival bleeding with low level of prediction (R=0.052) and explain 4.7 % (R^2=0.047) of the variability of gingivitis.

Table-1: Association between sociodemographic factors and dental visits among study participants

Sociodemographic factors	Yes (N=148)	No (N=252)	p value
Age (year)			
Below 20	57 (14.25)	107 (26.75)	0.46
20 & above	91 (22.75)	145 (36.25)	
Gender			
Male	78 (19.5)	122 (30.5)	0.46
Female	70 (17.5)	130 (32.5)	
Education			
High school and above	90 (22.5)	74 (18.5)	0.01*
Below high school	58 (14.5)	178 (44.5)	
Income			
Above Rs 13031	102 (25.5)	138 (34.5)	0.01*
Rs 13031 & below	46 (11.5)	114 (28.5)	
SES			
Upper	114 (28.5)	95 (23.75)	0.01*
Lower	34 (8.5)	157 (39.25)	

* Statistically significant, Chi-square test

Table-2: Number and percentage of study participants according to dental history

Dental visit N=400, n (%)	
Yes	148 (37)
No	252 (63)
Duration since last visit (months) (N=148)	
< 1 Years	92 (62.2)
Years	36 (24.3)
> 5 Years	20 (13.5)
Reason for last dental visit (N=148)	
Pain	66 (44.5)
Filling of teeth	12 (8.3)
Removal of teeth	68 (45.9)
Others	2 (1.3)

Chi-square test

Table-3: Association between response to MDAS scale and dental visit among study participants

	Yes (N=148)	No (N=252)	p value
If you went to your Dentist for treatment tomorrow, how would you feel?			
Not anxious	110 (27.5)	203 (50.75)	0.16
Anxious	38 (9.5)	49 (12.25)	
If you were sitting in the waiting room (waiting for treatment), how would you feel?			
Not anxious	76 (19)	162 (40.5)	0.01*
Anxious	72 (18)	90 (22.5)	
If you were about to have a tooth drilled, how would you feel?			
Not anxious	60 (15)	144 (36)	0.01*
Anxious	88 (22)	108 (27)	
If you were about to have your teeth scaled and polished, how would you feel?			
Not anxious	109 (27.25)	199 (49.75)	0.26
Anxious	39 (9.75)	53 (13.25)	
If you were about to have a local anesthetic injection in your gum, above an upper back tooth, how would you feel?			
Not anxious	42 (10.5)	125 (31.25)	0.01*
Anxious	106 (26.5)	127 (31.75)	

* Statistically significant, Chi-square test

Table-4: Association of DMFT and gingivitis with dental visit among study participants

	Yes (N=148)	No (N=252)	p value
Caries experience			
DMFT=0	103 (25.75)	101 (25.25)	0.01*
DMFT≥1	45 (11.25)	151 (37.75)	
Gingivitis			
No	91 (22.75)	112 (28)	0.01*
Yes	57 (14.25)	140 (35)	

* Statistically significant, Chi-square test

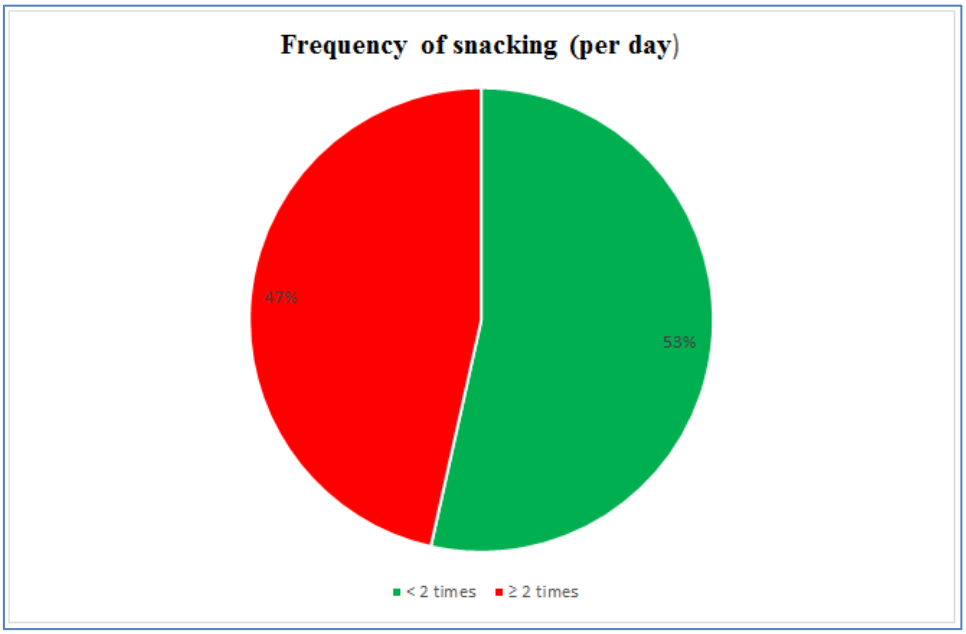

Fig-1: percentage of study participants according to frequency of snacking per day

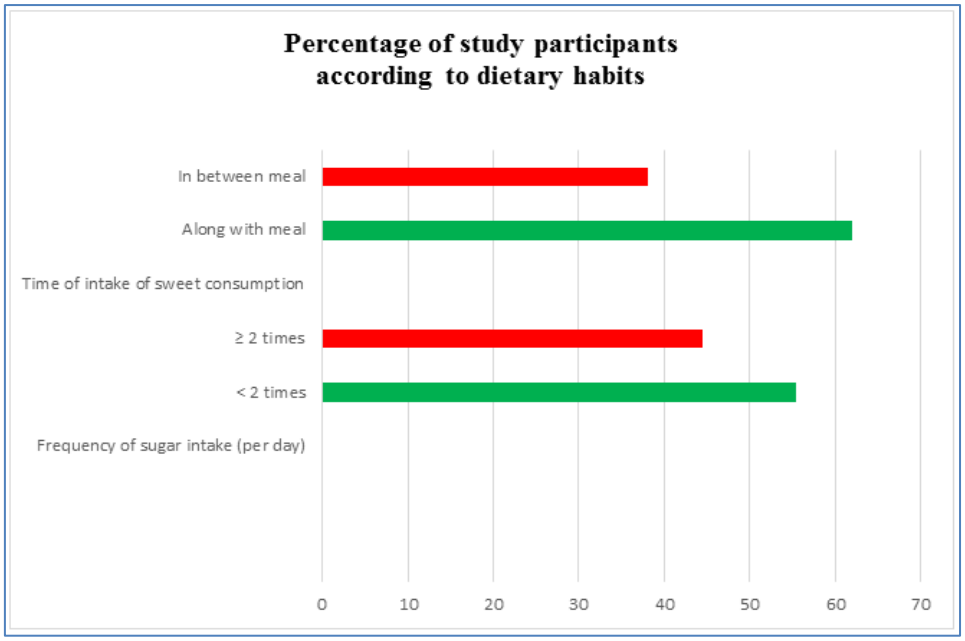

Fig-2: percentage of study participants according dietary habits

Table-5: Multivariate linear regression with DMFT as a dependent variable

	B	β	P value	95 % CI (B)		R	R^2	Adjusted R^2	R^2Change	p value
Constant	0.587		0.240	-0.394	1.567	0.434	0.188	0.176	0.008	0.044*
Frequency of cleaning teeth	-0.821	-0.266	0.000*	-1.130	-0.513					
Dental visit	0.502	0.217	0.004*	0.165	0.839					
Coffee with sugar	0.342	0.152	0.002*	0.123	0.561					
Sweets/candy	0.450	0.141	0.006*	0.127	0.773					
SES	-0.347	-0.155	0.002*	-0.572	-0.123					
Difficulty in Chewing	0.291	0.110	0.044*	0.008	0.574					
Reason for visit	0.052	0.146	0.050	0.000	0.103					

* Statistically significant

DISCUSSION

Oral health is an integral part of general health and wellbeing to be maintained throughout life time. The oral health status of a population is usually determined by the presence or absence of dental caries and periodontal disease as well as the level of oral hygiene found in the population. This is due to the fact that dental caries and periodontal disease are the commonest oral disease of public health importance identified among general population [21]. Oral hygiene and dental visits are the principal factors responsible for the actualization of healthy mouth.

Dental caries is very important public health problem, and it remains the most common and widely spread disease affecting all age groups including young adults in developed and developing countries. Studies reported in literature present age group that ranged from 17-33 years [5-26] with mean age of 19-24 years [5, 8, 10-14, 17, 18, 22, 26]. Age group considered in this study was 18-25 years. Mean age of the present study participants were 19.9±1.4 years which is in line with the earlier studies [5, 8, 10-14, 17, 18, 22, 26].

Earlier studies included parents with less than university education [22, 23] income between 1-2 lakh [23] or equal distribution in high or low-income categories [26] in the current study majority of the parents had about seven years of education performed semi-skilled/skilled jobs earned low income and belonged to lower middle class.

Ten to seventy percent of participants had visited a dentist in earlier studies [18-20, 22, 23] In the current study one third of participants visited to dentist which is in accordance with the earlier studies [18-20,23] Possible explanations for low dental visit might be that there is no tradition of

visiting a dentist or there is increased fear and anxiety of dental treatment [40] or only those who have problems with their teeth seek dental care [41] In some earlier studies majority of the participants had visited a dentist since either less than a year [22,24] or more than a year [25]. Majority of study participants in present study had visited a dentist since less than a year which is in line with the few earlier studies [22, 24]. The reasons for dental visit were problem oriented [6, 18, 21, 25] curative [25] or routine [18, 24, 25] in earlier studies Similar reasons were observed.

A lot of factors influence oral health including oral hygiene measures. A higher proportion of participants in earlier studies were using toothbrush [18,21] and toothpaste [18,21,24,25] for cleaning the teeth. Majority of the participants in the current study using toothbrush and toothpaste for cleaning the teeth which is in accordance with the few earlier studies [18,21,24,25]. Most of the participants in earlier studies used vertical [18,20] or horizontal [19] method for cleaning their teeth. Higher proportion of participants in this study used horizontal method for cleaning their teeth which is similar to one earlier study [19]. Few earlier studies reported brushed once daily [19,21,25] or twice daily [20,22,24] Majority of the participants in current study brushed once daily which indicates inadequate practice of oral hygiene measures that is in accordance with the few earlier studies [19,21,25]. All of the participants reported brushing of teeth before meal [22]. Majority of participants in earlier studies changed their toothbrush within 1-3 month [19, 20]. In the current study majority changed their toothbrush between 3-6 months which is similar to an earlier study [21] and contrary with couple of earlier studies [19, 20]. Only few participants used tongue cleaners, mouth rinse [18-21, 24] in conjunction with toothbrush and toothpaste which is in contrast with few earlier studies [18-21, 24].

Self-assessment data are useful in determining the health needs of the population and identifying the target groups. This data provides reasonably valid estimates of the status of teeth or gums. In current study majority of the participants rated good state of teeth and gums which is in line with an earlier study [22]. Most of the participants did not experience any difficulty in biting food, dry mouth, embarrassment due to appearance of teeth and avoided smiling because of teeth or oral health related symptoms.

More than fifty percent of participants consumed sugar less than twice which is similar to an earlier study [22]. Most of the participants consumed sugar along with meal. Less than fifty percent of the participants reported consumption of snack more than two times daily. Almost all the participants reported consumption of sweet/candy once a week to several times a day. Most of the participants reported consumption of tea/coffee with sugar several times a month to every day.

The Corah dental anxiety scale is shown to be a reliable tool for use in dental offices or research projects for measuring anxiety of dental procedures. Humphry's, Morrison and Lindsay (1995) provided a modified scale (MDAS) [34,35] from the original Corah Dental Anxiety Scale. In this study most of the participants reported that they would not feel anxious about going to dentist for treatment tomorrow, about sitting in the waiting room for treatment, about to have a tooth drilled, about to have their teeth scaled and polished and about to have a local anesthetic injection in their gums and some of them reported slightly to very anxious which is similar to few previous studies [5-17, 24].

The SERVQUAL Model is an empiric model first published in 1985 by a team of academic researchers, by Zeithaml, Parasuraman and Berry to compare service quality performance with customer service quality needs. It is used to do a gap analysis of an organization's service quality performance against the service quality needs of its customers. In this study, 148 out of 400 participants visited dentist. Majority of the participants rated good and some of them rated poor service qualities under tangible, reliability, responsiveness, assurance and empathy domain.

Earlier studies have reported prevalence of caries that ranged 10-100 % [16, 17,19, 20, 24, 28]. In the current study overall prevalence of caries was found 49 % which is similar to earlier studies [16, 17, 19, 20, 24, 28]. Earlier studies reported mean DMFT score ranging from 1.09±0.3-2.69±1.53 [23, 27, 28]. In current study DMFT score was 1.14±1.11 which is similar to an earlier study [23].

Gingivitis associated with dental plaque affects the protective tissues of the teeth and may lead to the development of a wide range of clinical signs and symptoms, such as bleeding, bad breath, edema, redness and gingival enlargement. Gingivitis is codified as the most familiar oral disease in children and teenagers. Almost half of the participants had gingival condition.

Periodontal pockets present in more than forty percent of the participants with shallow pockets in one third of them. More than eighty percent of the participants had loss of attachment of 0-3 mm. In current study based on intervention

urgency it was found that majority of the participants needed prompt treatment.

Among demographic variables, education of father, total family income and socioeconomic status was associated with dental visits, DMFT and gingivitis. State of teeth and dry mouth were associated with dental visits, DMFT and gingivitis whereas status of gums was associated with dental visits and gingivitis. Difficulty in biting, felt embarrassed and avoided smiling because of teeth were associated with DMFT and gingivitis. Difficulty in chewing food was associated with DMFT.

Going dentist for treatment tomorrow was associated with DMFT. Sitting in the waiting room for treatment was associated with dental visits and DMFT. About to have a tooth drilled and about to have a local anesthetic injection in their gum was associated with dental visits, DMFT and gingivitis. About to have their teeth scaled and polished was associated with DMFT and gingivitis.

Frequency of snacking, frequency of sugar intake and time of intake of sweet was association with DMFT and gingivitis. Consumption of sweets and candy and tea/coffee with sugar was association with DMFT. Dental caries experience and gingivitis was association with dental visits.

Frequency of cleaning teeth, dental visit, and consumption of coffee with sugar, consumption of sweets/candy, SES, difficulty in chewing food and reason for visit were found to be significant predictor of dental caries experience with moderate level of prediction and explain the low-level variability of dental caries experience.

Education of Head of family, family income, frequency of cleaning tooth, method of brushing, frequency of snacking, frequency of sweet consumption and duration since last visit were found to be significant predictor of gingivitis with low level of prediction and explain the low-level variability of gingivitis.

Limitation

This study has certain limitations. The cross-sectional study design does not allow assessment of causality between study variables. Socio economic status, dental health behavior, oral hygiene and dietary practice, dental anxiety and service quality were assessed using questionnaire. Hence bias pertaining to questionnaire study could be present. Increasing awareness and knowledge about oral health, regular dental education, and incorporating dental knowledge into university curriculums can aid in eliminating the fear of dentistry among degree college students.

CONCLUSION

Dental caries experience and gingivitis were associated with dental visits. SES of family, state of teeth/gums, experience of dry mouth and dental anxiety was associated with dental visits. Frequency of cleaning the teeth, SES of family, frequency of sugar intake and snacking, method of brushing was found to be associated with increased dental caries risks and gingivitis in degree college students. Oral health education and promotion is required to improve oral hygiene practices, dietary patterns and preventive visits among young adults. Emphasis should be placed on efforts to secure and reinforce stable dental visits patterns among young adults.

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