IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 2 Ver. V (Feb. 2016), PP 69-75
www.iosrjournals.org

Assessment of Gingival Health Status among a Group of Preclinical and Clinical Dental Students at Thamar University, Yemen

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Abstract:
Objective: *To assess the gingival health status among preclinical and clinical Yemeni dental students.*
Materials and Methods: *This cross-sectional study was conducted on preclinical and clinical students at Thamar University. The self-reported oral health behavior of dental students with their actual gingival status was evaluated. One hundred and ninety five volunteers (115 male and 80 females with mean age (21.71 $\pm$1.72) who participated in this study completed the self-reported questionnaire. Subsequently a clinical examination for their gingival conditions was assessed. The clinical examination for the participants comprised plaque index, gingival index, gingival bleeding index, and calculus index.*
Results: *The findings of this study showed that, the gingival health status was poor among dental students with no significant difference between preclinical and clinical students (P> 0.05). Females had better oral and gingival health status than males with significant differences (P< 0.05). The relationship between Khat chewing and smoking with gingival bleeding and calculus deposits was significant (P< 0.05).*
Conclusion: *Preclinical and clinical dental students showed poor gingival health status. It is recommended that the educational programs and preventing dentistry curriculum should be modified in order to improve oral health care level among Yemeni dental students.*
Keywords: *Gingival health, Oral hygiene, Khat chewing, Preclinical and clinical dental students, Yemen.*

I. Introduction

Gingivitis is the most common oral health problem worldwide in both adults and children. It is an inflammatory lesion of the gingival tissues which usually precedes periodontitis. This disease has been shown to be treatable and reversible. If this Lesion was left without treatment, it can progress in susceptible host into periodontitis which is characterized by irreversible loss of periodontal attachment and it can lead to tooth/teeth loss [1-3]. Preventing gingivitis, in the individual patient or in the whole population, is still the first step toward preventing periodontitis [4]. Dental biofilm plays a major role in gingivitis. According to Mariotti [5] the characteristics of dental plaque-induced gingivitis are: biofilm present at gingival margin; change in gingival color; change in gingival contour; sulcular temperature change; increase gingival exudate; bleeding upon provocation; absence of attachment loss; absence of bone loss; and histological change. Therefore, optimum control of the dental plaque is important factor in preventing the periodontal disease as well as it is essential part when treating these diseases [6]. However, motivating the patient, which includes informative knowledge about the initiating causes for inflammatory periodontal changes, is important preliminary procedure for optimum plaque control [7]. Acquiring knowledge, attitudes and good practices related to dental health and prevention of oral diseases must be obtained during the training period for dental students to be qualified dentists [8]. Having a good oral self-care and preventive knowledge is important behavior of dental students and play important role in their practicing careers by encouraging an interest in maintaining the oral health of their patients [9]. The dental students are expected to be a good example of positive oral health attitudes and behavior to their patients, families, and community.

Some previous studies indicated that the oral attitudes and behavior among preclinical and clinical dental students are different. Furthermore, oral health attitudes and behavior among dental students were vary in different countries and different cultures [10-12]. The status of oral health was found to be different among male and female dental student. Researchers have found that females were better than males in engaging oral hygiene behavioral measures and their oral health was also better [13, 14].

The dental care in Yemen does not have the same intuitive quality of life dimension as the general health care among most people. Moreover, most of Yemeni population are using some of social habits that may increase the tendency of gingival and oral diseases such as: Khat chewing and smoking. Despite some reports revealed that prevalence of periodontal disease among Yemeni population is still higher compared to other countries [15, 16], the baseline data on oral health status and periodontal condition in Yemen are still not

available. Consequently, this study was aimed to assess the gingival health status among a group of preclinical and clinical dental students at Thamar University, in Dhamar city, Yemen.

II. Materials And Methods

A cross-sectional study was conducted on preclinical and clinical dental students at Thamar University, Dhamar city, Yemen. The study subjects comprised of 195 students (115 males and 80 females) aged from 19-25 years with mean age (21.71±1.72). The distribution of the students according to the study level was 119 preclinical (1^{st}, 2^{nd}, and 3^{rd} levels) students and 76 clinical (4^{th} and 5^{th} levels) students. The study was approved by Research and Ethics Committee, Faculty of Dentistry, Thamar University. All participants were informed about the purpose of the study and a written consent form was obtained. The study was divided into two sections: Questionnaire and Clinical examination.

The self-reported questionnaire used in this study was adapted from previous studies [16, 17]. Questionnaire included the following: 1) Personal data: case number, age, sex, and academic year. 2) Habits: tooth brushing, frequency of tooth brushing [once/day, twice/day, and three times/day], smoking, frequency of smoking [Light smoker (< 5 cigarettes per a day), Moderate smoker (6-10 cigarettes per a day) and Heavy smoker (> 10 cigarettes per a day)], Khat chewing and frequency of Khat chewing [(< 5 years), (6-10 years) and (> 10 years)].

The clinical examination was carried out by the first author (specialist in periodontology). The data were collected while the student was seated in a dental chair with professional light. Indices investigated for gingival status were: plaque index (PI), gingival index (GI), gingival bleeding index (GBI), and calculus index (CI). Plaque and gingival scores were measured on a scale of (0-3) according to [18, 19], while the gingival bleeding index, which introduced by Ainamo and Bay (1975), was performed through gentile probing of the orifice of the gingival crevice. If bleeding occurred within 10 second a positive finding was recorded and the number of positive sites was recorded and then expressed as a percentage of the number of sites examined. The amount of calculus deposits was assessed by the Calculus Surface Index (CSI). The presence or absence of supra- and/or sub-gingival calculus was determined by visual or tactile examination using a mouth mirror and dental explorer [20]. Both plaque and gingival indices were measured by the use of a periodontal probe (Williams no.14) and a mouth mirror.

All returned forms were coded by a single operator and the data were checked and entered into a personal computer. Data were analyzed using Statistical Package for Social Science (SPSS) program (version 21; IBM Inc., Chicago. IL). Frequencies, Means, Standard deviations were obtained. Chi-squared test was utilized to check the significance of differences between the measured variables. Regression analysis was used to analyze the relationship between the self-reported questionnaire variables with the recorded scores. A P-value of < 0.05 was considered significant while the marginal error was set to 5% with 95% confidence interval.

III. Results

The Distribution of the study participants is presented in (Figure 1 and Table 1). Of the participants, (58.97%) were males while females were (41.03%). Preclinical students were more than clinical students (61.03%, 38.97% respectively). Among all participants, (91.8 %) responded positively to tooth brushing while (8.2%) responded negatively. Tooth brushing was more in female subjects (98.8%) than in males (86.1%) with significant difference (P= 0.001) while no significant difference was found between preclinical (90.8%) and clinical students (92.1%) (P= 0.480). Frequency of tooth brushing was in favor of brushing once per a day followed by twice per a day then three times per a day (65.13%, 23.59%, and 2.56% respectively). Only (13.33%) of participants reported to smoke with significant difference (P= 0.001) between male (22.6%) and female (0.0%). However, no significant difference (P= 0.433) was found between preclinical (12.6%) and clinical students (14.5%). Khat chewing among the participants was (47.18%) with significant difference (P= 0.001) between males (75.7%) and females (6.3%) while the difference between preclinical and clinical students was not significant (P= 0.086). No significant differences between the durations of Khat chewing as well as between the smoking levels were found. Therefore, these results were neglected in the calculations.

Figure 2 shows the recorded scores. With regard to plaque deposits, majority of the participants had one or two plaque scores (54.36%, 41.54% respectively) while in gingival index, most participants had score one (65.64%) followed by score two (26.67%). Gingival bleeding was recorded in (63.08%) while calculus presented in (37.44%) of the participants.

A significant difference (P= 0.001) was observed between males and females with regard to the plaque deposits [(52.2% and 3.5%) in male subjects for score2 and score3 respectively, while it was (26.3% and 0%) in female subjects for the same scores. However, score1 recorded from plaque deposits was higher in females in comparison with males (71.3% and 42.6% respectively). The relationship between this clinical record with gender was not significant (P= 0.185). Score0 for gingival index was more frequent in female subjects than in male subjects (13.8% and 3.5% respectively) with significant relationship between gender and gingival index

(P= 0.001) . The bleeding index was more frequent in male subjects than in females (30.4%) for score0 and (69.6%) for score1 in males compared with (46.3%) for score0 and (53.8%) for score1 in females with significant difference (P= 0.02). Calculus index was different significantly among both genders (P= 0.001) with significant relationship with gender (P= 0.001).

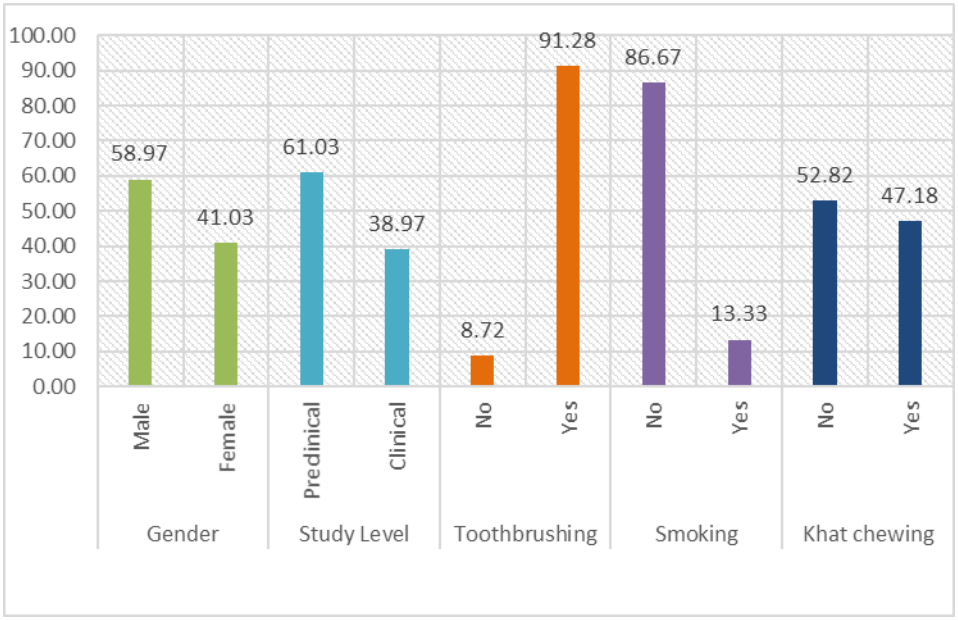

Figure 1: Responses to the questionnaire among the participants

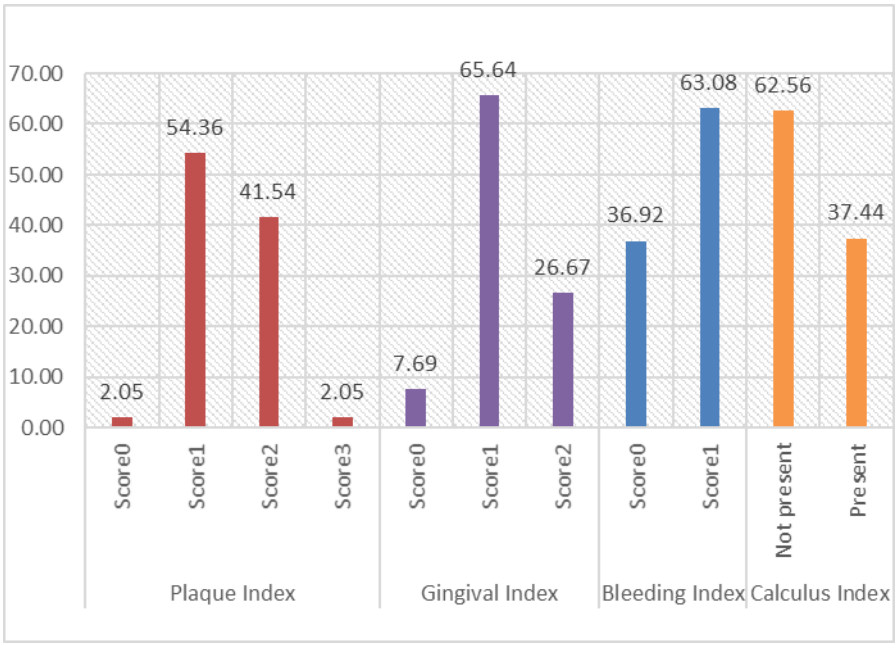

Figure 2: Distribution of the recorded scores among the participants

Regarding the study level, preclinical and clinical students were different significantly in relation to the gingival bleeding index (P< 0.05). The relationships between preclinical and clinical students with recorded scores were significant with gingival index and bleeding index (P= 0.033, P= 0.010 respectively) but not significant with plaque index and calculus index (P= 0.682, P= 0.493 respectively). Tooth brushing, smoking,

and Khat chewing were also not significant with the study level (P= 0.080, P= 0.430, P= 0.086 respectively). (Table1).

Table 1: Distribution of Toothbrushing, Smoking, and Khat Chewing by Gender and Study Level (%)

		Toothbrushing		Smoking		Khat Chewing	
		No	Yes	No	Yes	No	Yes
Gender	Male (n=115)	13.9%	86.1%	77.4%	22.6%	24.3%	75.7%
	Female (n=80)	1.3%	98.8%	100.0%	0.0%	93.8%	6.3%
Sig.		0.001		0.001		0.001	
Study Level	Preclinical (n=119)	9.2%	90.8%	87.4%	12.6%	57.1%	42.9%
	Clinical (n=76)	7.9%	92.1%	85.5%	14.5%	46.1%	53.9%
Sig.		0.48		0.433		0.086	

All tests were performed using χ^2 test.

As shown in Table 2, there were significant differences in frequencies of the recorded scores among subjects regarding Khat chewing (P< 0.05). The relationship between Khat chewing with the recorded scores was found significant (P< 0.05) in three records (gingival index, bleeding index, and calculus index) while it was not significant (P> 0.05) with plaque index.

Table 2: Distribution of the recorded scores by the questionnaire variables (%)

		Plaque Index				Gingival Index			Bleeding Index		Calculus Index	
		0	1	2	3	0	1	2	0	1	0	1
Gender	Male(n=115)	1.7%	42.6 %	52.2 %	3.5%	3.5%	56.5%	40.0 %	30.4%	69.6 %	50.4 %	49.6 %
	Female(n=80)	2.5%	71.3 %	26.3 %	0.0%	13.8 %	78.8%	7.5%	46.3%	53.8 %	80.0 %	20.0 %
Sig.		0.001				0.001			0.018		0.001	
Study Level	Preclinical(n=119)	2.5%	53.8 %	40.3 %	3.4%	9.2%	69.7%	21.0 %	43.7%	56.3 %	63.0 %	37.0 %
	Clinical (n=76)	1.3%	55.3 %	43.4 %	0.0%	5.3%	59.2%	35.5 %	26.3%	73.7 %	61.8 %	38.2 %
Sig.		0.390				0.067			0.01		0.493	
Tooth brushing	No (n=17)	0.0%	0.0%	76.5 %	23.5 %	0.0%	23.5%	76.5 %	5.9%	94.1 %	5.9%	94.1 %
	Yes (n=178)	2.2%	59.6 %	38.2 %	0.0%	8.4%	69.7%	21.9 %	39.9%	60.1 %	68.0 %	32.0 %
Sig.		0.001				0.001			0.003		0.001	
Smoking	No(n=169)	2.4%	58.0 %	37.3 %	2.4%	8.9%	68.0%	23.1 %	40.2%	59.8 %	65.7 %	34.3 %
	Yes(n=26)	0.0%	30.8 %	69.2 %	0.0%	0.0%	50.0%	50.0 %	15.4%	84.6 %	42.3 %	57.7 %
Sig.		0.020				0.008			0.010		0.020	
Khat Chewing	No(n=103)	3.9%	62.1 %	34.0 %	0.0%	13.6 %	75.7%	10.7 %	44.7%	55.3 %	73.8 %	26.2 %
	Yes(n=92)	0.0%	45.7 %	50.0 %	4.3%	1.1%	54.3%	44.6 %	28.3%	71.7 %	50.0 %	50.0 %
Sig.		0.004				0.001			0.013		0.001	

All tests were performed using χ^2 test (Linear by Linear & Contingency).

Significant relationships were found between tooth brushing with all recorded scores (P< 0.05) but, un-expectedly, this relationship was negative. Plaque deposits score2 and gingival index score3 were significantly higher (69.2%, 37.3% respectively) among smokers than non-smokers (50.0%, 23.1% respectively). Likewise, the gingival bleeding was higher (84.6%) in smokers than in non-smokers (59.8%) with significant difference (P< 0.05). It was also observed that calculus deposits were significantly more in smokers (57.7%) than in non-smokers (34.3%). The relationship between smoking and recorded scores was significant regarding, plaque index, bleeding index, and calculus index (OR= 1.29, P= 0.03; OR= 3.70, P= 0.01; OR= 2.61, P= 0.02 respectively) whereas it was not significant with gingival index (OR= 1.22, P= 0.08) (Table 3).

Table 3: Relationship between recorded scores with the questionnaire variables

	Plaque Index[§]		Gingival index[§]		Bleeding Index[Ŧ]		Calculus Index[Ŧ]	
	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.
Gender	0.872	0.185	0.882	0.201	0.508	0.018	0.254	0.001
Study Level	0.970	0.682	1.165	0.033	2.173	0.010	1.052	0.493
Toothbrushing	0.439	0.000	0.596	0.000	0.094	0.003	0.029	0.001
Smoking	1.286	0.030	1.215	0.077	3.703	0.010	2.610	0.020
Khat Chewing	1.058	0.575	1.306	0.006	2.049	0.013	2.815	0.001

[§] test was performed using regression analysis; [Ŧ] test was performed using χ^2 test.

IV. Discussion

The aim of this study was to evaluate the gingival health status among preclinical and clinical dental students at Faculty of Dentistry, Thamar University, Yemen. This dental school is one of five dental schools in Yemen which are financially supported by the government and accept students from all over the country and from different socioeconomic classes based on their high secondary school performance. The dental curriculum of these faculties is approximately similar. The prevalence of gingivitis and periodontitis among Yemeni population is considered high in comparison with that found in other countries [15, 16]. This is might related to the lower socioeconomic level and the absence of educational programs about the importance of oral hygiene and prevention of oral and periodontal diseases [16]. Needless to say that there is a high expectation toward Yemeni dental students to be a positive example for their society regarding oral and periodontal health as adequate knowledge and good practice of oral self-care among dental students will reflect on their community. Moreover, Clinical dental students are suggested to be better in their oral and periodontal health status than the preclinical students.

The current study showed a high percentage (91.28%) of the participants who had attended to brushing their teeth but the frequency of tooth brushing were different as there were only 2.56% brushed their teeth three time daily and 23.59% brushed their teeth twice daily while 65.13% brushed once a day . Therefore, this high percentage of tooth brushing among the participants did not exhibit optimal oral cleanliness of entire sample. Although, the relationship between tooth brushing and all recorded scores was an inverse relationship [(OR= 0.44, P= 0.00) with plaque deposits; (OR= 0.59, P= 0.00) with gingival index; (OR= 0.09, P= 0.003) with gingival bleeding; and (OR= 0.029, P= 0.001) with calculus deposits, respectively] but the subjects who reported tooth brushing showed better gingival health status than the participants who did not use tooth brushing with significant difference (P< 0.05) (Table 2). This result agrees with other previous studies [21] indicating that the tooth brushing habit plays an important role in the improvement of the oral hygiene level and prevention of gingival inflammation.

Females in both preclinical and clinical levels reported better oral health behavior than males and the recorded scores were also less with significant difference (P< 0.05). These findings are in agreement with previous studies [13, 14]. A possible explanation for this might be related to the variances in the physiological and psychological behaviors between males and females. These differences may possibly reflected on their oral health behaviors [22]. Moreover, females are usually more aesthetically conscious and would thus be more worried about visiting the dentist. High frequencies of plaque index (score1, 54.36%), gingival index (score1, 65.64%) and positive gingival bleeding (63.08%) were recorded while calculus deposits (score1) were found in 37.44% of the participants. These findings indicated a poor oral hygiene and signifying high level of gingival inflammation among the preclinical and clinical dental students

The gingival health status among preclinical and clinical dental students un-expected as there were no significant differences (P> 0.05, Table 2) between both of them with regard to the recorded scores. In addition, there were no significant differences between preclinical and clinical students regarding toothbrush, Khat chewing, and smoking. These findings disagree with other previous studies [23, 24], which reported that the oral health attitudes becomes better in clinical dental students. However, this result agrees with an earlier study [17] indicating the importance of adequate knowledge and theoretical teaching in preventive dentistry for dental students. It is somewhat difficult to explain these findings but it might be related to the increased stress among the clinical dental students as the clinical requirements load increase at the last two academic years [25]. Such stress may result in negatively effect on the oral hygiene status and oral self-care practices of the dental students [26].

Poorer oral hygiene and higher measured scores among participants who reported Khat chewing were observed. The relationship between Khat chewing and recorded scores was significant [(OR= 1.31, P= 0.01) for gingival index; (OR= 2.05, P= 0.01) for bleeding index; and (OR= 2.82, P= 0.001) for calculus deposits, respectively (Table 3)]. This result may indicated that Khat chewer subjects are more likely to have gingival inflammation, gingival bleeding tendency and calculus deposits more than non Khat chewers. These findings

are agreed with previous study which indicated that, Khat chewing has a negative effect on oral hygiene and periodontal condition in form of gingival inflammation and recession due to chronic irritation [27]. Furthermore, researchers have reported that, chewing of Khat was associated with a higher prevalence of gingival bleeding and deterioration of periodontal condition [28, 29]. No significant relationship was found between Khat chewing and plaque index (OR= 1.06, P= 0.58). This might due to the duration period of khat chewing as many hours daily with mechanical friction of khat leaves on the occlusal and buccal surfaces of the teeth may lead to removal or deceasing of dental plaque accumulation. Unfortunately, Khat chewing habit becomes more extended recently among Yemeni society including universities and secondary schools students. This might explain why there was no significant difference between preclinical and clinical students regarding Khat chewing.

Although smoking was only reported by 13.33% of the participants, these subjects showed more gingival bleeding and calculus deposits than non-smokers with significant difference ($P< 0.05$). This results is agreed with other previous study which reported that, more gingival bleeding among smokers may related to the produce of peripheral vasoconstriction which preceded by vasodilation. This effect is probably related to the degree of inhalation of smoking and the rate of nicotine absorption [30]. The relationship between smoking and recorded scores was significant [(OR= 1.29, P= 0.03) for plaque index; (OR= 3.71, P= 0.01) for bleeding index, (OR= 2.61, P= 0.02) for calculus index, respectively]. Some reports revealed more calculus formation in smokers than in non-smokers. This may be due to the increased salivary flow rate as a result of an increased calcium concentration in fresh saliva in smokers following smoking [31]. Other previous studies [32-33] which measured dental plaque in smokers and non-smokers has found more plaque deposits in smokers. This is might related to the major factor leading to greater plaque accumulation in smokers is inadequate oral hygiene. Therefore, tooth brushing habits in smokers tend to be less favorable than in non-smokers.

V. Conclusion

Within the limitation of this study, the following conclusion can be drown:

- Oral hygiene and gingival health status among Yemeni dental students was unsatisfactory.
- No significant difference was found between preclinical and clinical dental students regarding oral self-care practice which negatively affected their gingival health condition.
- Females showed better oral self-care and gingival health than males.
- Gingival bleeding and calculus accumulation increased significantly with Khat chewing and smoking.

More emphasis should be placed on the preventing dentistry curriculum in order to improve the oral health care level among Yemeni dental students.

References

[1] Jenkins WM and Papapanou PN. "Epidemiology of periodontal disease in children and adolescents", J Periodontol 2000; 26:16-23.
[2] Burt, B.; Research, Science and Therapy Committee of American Academy of Periodontology. Position paper: epidemiology of periodontal diseases. J Periodontol 2005; 76:1406-19,
[3] R. C. Williams, "Understanding and managing periodontal diseases: a notable past, a promising future", J Periodontol 2008; 79:1552-9.
[4] Loe, H. The Gingival Index, the Plaque Index and the Retention Index Systems. J Periodontol 1967; 38:610-6.
[5] Mariotti A. Dental plaque-induced gingival diseases. Ann Periodontol 1999; 4:7-19.
[6] G. T. Terèzhalmy, R. D. Bartizek, A. R. Biesbrock, "Plaque removal efficacy of four types of dental floss," J Periodontol 2008; 79:245-51.
[7] Nettleton S., "Understanding dental health beliefs: an introduction to ethnography" Br Dent J 1986; 161:145-7.
[8] Bertolamic C. Rationalizing the dental curriculum in light of current disease prevalence and patient demand for treatment: form vs. content. J Dent Educ 2001; 66:1203-8.
[9] Al-Zarea BK. Oral Health Knowledge of Periodontal Disease among University Students. Int J Dent. 2013; Volume 2013, Article ID 647397, 7 pages.
[10] Polychronopoulou A, Kawamura M, Athanasouli T . Oral self-care behavior among dental school students in Greece. J Oral Sci 2002; 44:73-8.
[11] M. Kawamura, E. Honkala, E. Widstrom and T. Komabayashi, "Cross-cultural differences of self-reported oral health behaviour in Japanese and Finnish dental students", Int Dent J 2000; 50:46-50.
[12] Kawamura M, Yip HK, Hu DY, et al. A cross-cultural comparison of oral attitudes and behaviour among freshman dental students in Japan, Hong Kong and West China. Int Dent J 2001; 51:159-63.
[13] Ostberg AL, Halling A, Lindblad U. Gender differences in knowledge, attitudes, bevavior and perceived oral health among adolescents. Acta Odontol Scand 1999; 57:231-6.
[14] Kassak KM, Dagher R, Doughan B. Oral health and lifestyle correlates among new undergraduate university students in Lebanon. J Am Coll Health 2001; 50:15-20.
[15] Ali AA. Qat Habit in Yemen Society: A Causative Factor for Oral Periodontal Diseases. Int J Environ Res Public Health. 2007; 4:243-7.
[16] Amran AG, Ataa MAS. Statistical analysis of the prevalence, severity and some possible etiologic factors of gingival recessions among the adult population of Thamar city, Yemen. RSBO (Online). 2011; 8:305-13.
[17] Amran AG, Alhajj MN, Madfa AA. Social Characteristics and Oral Self-care Practices Associated with Periodontal health status among a Sample of Yemeni Dental Students. IOSR-Journal of Dental Medical Sciences. 2015; 14:28-35
[18] Silness J, Löe H. Periodontal disease in pregnancy. Acta Odontol Scand. 1964; 22:121.
[19] Loe H, Silnese J. Periodontal disease in pregnancy. I. Prevalence and severity. Acta Odont Scand. 1963; 21:533-51.

[20] Ainamo J, Bay I. Problems and proposals for recording gingivitis and plaque. Int Dent J. 1975; 25:229-35.
[21] Dhaifullah E, Al-Maweri SA, Al-Motareb F, Halboub E, Elkhatat E, Baroudi K, et al. Periodontal Health Condition and Associated Factors among University Students, Yemen. J Clin Diagn Res. 2015; 9:30-3.
[22] Quasem D, Al-omari and Abed Al-Hadi Hamasha. Gender-Specific Oral Health Attitudes and Behavior among Dental Students in Jordan. J Contemp Dent Pract. 2005; 6 1:107-14
[23] Glavind L, Löe H. Errors in the clinical assessment of periodontal destruction. Periodontol Res. 1967; 2:180-4.
[24] Kawamura M, Iwamoto Y, Wright FA. A comparison of self-reported dental health attitudes and behavior between selected Japanese and Australian students. J Dent Educ. 1997; 61:354-60.
[25] Kawamura M, Spadafora A, Kim KJ, Komabayashi T. Comparison of United States and Korean dental hygiene students using the Hiroshima university-dental behavioural inventory(HU-DBI). Int Dent J. 2002; 52:156-62.
[26] Al-Sowygh ZH, Alfadley AA, Al-Saif MI, and Al-Wadei SH. Perceived causes of stress among Saudi dental students. King Saud University J Dent Sci. 2013; 4:7-15
[27] Reners M, Brecx M. Stress and periodontal disease. Int J Dent Hyg. 2007; 5:199-204.
[28] Hala A. Al-Juboury, Oral health status among a group of dental students in Yemen J Bagh Coll Dentistry; 2006; 18:60-2.
[29] Hill, C. M.; Gibson, A.: The oral and dental effects of qat chewing. Oral Surg Oral Med Oral Pathol Oral, Radiol Endod 1987; 63:433-6.
[30] Ali AA. Qat habit in Yemen society: a causative factor for oral periodontal diseases. Int J Environ Res Public Health. 2007; 4:243-7.
[31] Martinez-Ganut P, Lorac A, Magan R. Smoking and periodontal disease severity. J Clin Periodontol 1995; 22:743-9.
[32] Albandar JM, Streckfus CF, Adesanya MR, Winn DM. Cigar pipe, and cigarette smoking as risk factors for periodontal disease and tooth loss. J Periodontol 2000; 71:1874-81.
[33] Macgregor IDM. Toothbrushing efficiency in smokers and non-smokers. J Clin Periodontol 1984; 11: 313-20.

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