Original Article

DOI: 10.7860/JCDR/2015/16435.6964

Dentistry Section

Periodontal Health Condition and Associated Factors among University Students, Yemen

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ABSTRACT

Introduction: Studies on oral health status among Yemeni population are scarce.

Aim: This study aimed to evaluate the periodontal health among advantaged section of Yemeni society, university students, in health and non-health fields.

Materials and Methods: Periodontal health status of a sample of 360 students from dental, medical and literature faculties (120 each with equal gender distribution) at Sana`a University was evaluated by two calibrated examiners using CPI index. Data regarding tooth-brushing practices and smoking and khat chewing habits were obtained using a structured interview questionnaire.

Results: Only 45 students (12.5%) had healthy periodontium, while 113 (31.4%), 186 (51.7%) and 16 (4.4%) had bleeding, calculus and shallow pocket, respectively, with no significant differences between faculties. Females revealed significantly better periodontal health compared to males, though their bleeding score was higher. Dental and medical students and female students in general were significantly more interested in tooth-brushing and significantly less interested in practicing the deleterious habits such as smoking and khat chewing.

Conclusion: The overall periodontal health of Sana`a University students is still unsatisfactory even among students in health field. Females and students in health field revealed better periodontal health and oral health practices (tooth-brushing) in comparison to male students and those in non-health field. The negative effects of the highly prevalent smoking and khat chewing habits deserve further reliable researches and proper educational programs at the national level.

Keywords: Community periodontal index, Khat chewing, Tooth-brushing

INTRODUCTION

Epidemiological studies have shown that gingivitis and periodontitis are commonly spread diseases that show different forms of development. Such diseases may be found in every age group regardless of gender, race, education, residence and socioeconomic status [1]. However, there is a positive association between education level and periodontal health as demonstrated in many studies [2,3].

University students represent an important group of population that could be easily used for the purpose of assessing oral health status, awareness and practices among young adult and educated groups. The most important group of university students who are assumed to have perfect oral health status and oral health behaviour are dental students [4,5]. However, studies conducted among dental students showed that oral health behavior was very different between countries, which reflected different cultures and/or health education systems of those students [6,7].

In this context, khat (*Catha edulis*) chewing is a deep-rooted cultural habit in Yemen. It is a plant with amphetamine-like stimulating effect which grows in Yemen and East Africa [8]. The habit is claimed to have adverse effects on oral mucosa [9], periodontium [10] and dental hard tissues [8], however, reports are scarce and have been conflicting [11-14]. More specifically, and to the best of our knowledge, there is only one study conducted on oral health status of university students in Yemen. It evaluated the periodontal health of 90 dental students at Dhamar University, Dhamar, Yemen [15].

Therefore, the objective of the current study therefore was to assess the oral health status, through evaluating periodontal health status among students of health field (dentistry and medicine) and non-health field (literature) at Sana`a University, Sana`a, Yemen. The influences of potential risk/protective factors, including gender, faculty, educational level and tooth-brushing, khat chewing and smoking habits, were also evaluated.

MATERIALS AND METHODS

This cross-sectional study was conducted at Sana`a University, Sana`a, Yemen during the academic year 2008-2009. The study was approved by the Research and Ethics Committee, Faculty of Medicine and Health Sciences, Sana'a University, Yemen, and informed consent was obtained from the participants. The target population was students of first, third and final educational levels including faculties of dentistry, medicine and literature (sociology department). More description of the university and the study population is available elsewhere [14]. A sample size of 360 students with equal numbers of male and female students (n=20 each) from each level in each faculty were included in this study. This represented more than 20% of the target population. The power and the significance level of these two-sided assumptions were set at 85% and <0.05, respectively.

Before clinical examination, data regarding age, faculty, educational level, and tooth-brushing, smoking and khat chewing habits were recorded using a structured interview questionnaire.

Clinical examinations were conducted at the Department of Oral Medicine and Periodontology, Faculty of Dentistry, Sana`a University. The instruments, examination procedures and diagnostic criteria followed World Health Organization –Oral Health Survey (WHO-OHS) [16].

A flat mouth mirror and a WHO probe were used to examine the participants under the light of the dental unit. Periodontal health was recorded using Community Periodontal Index (CPI) [16]. The index teeth, which were examined for those aged 20 years and above were 10 teeth: 17, 16, 11, 26, 27, 37, 36, 31, 46 and 47: while only six index teeth (16, 11, 26, 36, 31 and 46) were

examined for those under 20-year-old [16]. This difference avoided over-scoring the deepened sulci associated with eruption as periodontal pockets [17]. The two examiners were pre-calibrated regarding the study measurement (CPI) through examination of 30 dental male students in two different occasions. The Kappa values of intra-examiner and inter-examiner agreement ranged between 0.86-0.92 and 0.71- 0.82, respectively.

STATISTICAL ANALYSIS

Data was analysed using PASW statistics 18 computer software program. Descriptive statistics of the mean outcomes were calculated for the study sample and subgroups (by gender, faculty, level and tooth-brushing, smoking and khat chewing habits). Categorical outcomes were analysed by Chi-Square/Fisher`s exact tests while quantitative outcomes were analysed by either t-test and ANOVA as appropriate. Nevertheless, when the assumption of normal distribution was not met, the non-parametric analogue tests were employed (Mann-Whitney U and Kruskal-Wallis H tests). A p-value of < 0.05 was considered significant.

RESULTS

The study sample was selected to be equally distributed regarding gender, faculty and educational level. The overall mean age (SD) of the students was 22.3 (4.9) years, with no significant differences between different groups. [Table/Fig-1] presents the distribution of the study sample by the practiced habits, namely tooth-brushing, khat chewing and smoking. About 76% (273 students) reported regularly brushing their teeth with significant differences according to gender and field of study ($p < 0.001$). Nearly 40% and 13% of students were khat chewers and smokers, respectively, these habits were significantly more prevalent among males than females and among literature students than medical and dental students ($p < 0.01$). Since the proportions of khat chewing and smoking among females were very low (5.6% and 0.6% respectively), the forthcoming analyses for these two grouping factors were performed only for males. The overall number (proportion) of the students with healthy periodontium was 45 (12.5%). No cases with deep pocket were recorded (score 4). However, calculus, bleeding and shallow pocket were observed in 186 (51.7%), 113 (31.4%) and 16 (4.4%) of students, respectively. The distribution was affected significantly by all grouping factors except smoking [Table/Fig-2]. Considering the ordinal nature of CPI scores, Mann-Whitney U non-parametric test revealed a significantly higher ranking of scores among smoker males.

Although more students were scored with calculus, more sextants were scored as bleeding (4.09±1.98). The overall mean number (SD) of healthy sextants, sextants with calculus and that with shallow pocket was 0.78±1.99, 1.08±1.26 and 0.05±0.25, respectively. Significantly more healthy sextants were recorded among females (1.06±2.24), non-smokers (0.62±1.83) and students who reported brushing their teeth (0.97±2.19). Fewer sextants with bleeding score were significantly recorded among dental students (3.56±2.05) as compared to other groups. However, more sextants with calculus score were recorded among dental students (1.39±1.46), males (1.42±1.23) and those who reported not brushing their teeth (1.51± 1.25) [Table/Fig-3].

	No. (%) Toothbrushing		No. (%) Khat chewing		No. (%) Smoking	
	Yes	No	Yes	No	Yes	No
Overall (N=360) Faculty (n=120 each)	273 (75.8) p<0.000	87 (24.2)	122 (33.9) p<0.000	238 (66.1)	45 (12.5) p<0.001	315 (87.5)
Dentistry	100 (83.3)	20 (16.7)	32 (26.7)	88 (73.3)	10 (8.3)	110 (91.7)
Medicine	103 (85.8)	17 (14.2)	31 (25.8)	89 (74.2)	9 (7.5)	111 (92.5)
Literature	70 (58.3)	50 (41.7)	59 (49.2)	61 (50.8)	26 (21.7)	94 (78.3)
Gender (n=180 each)	p<0.000		p<0.000		p<0.000	
Male	103 (57.2)	77 (42.8)	112 (62.2)	68 (37.8)	44 (24.4)	136 (75.6)
Female	170 (94.4)	10 (5.6)	10 (5.6)	170 (94.4)	1 (0.6)	179 (99.4)

[Table/Fig-1]: Distribution of tooth-brushing, smoking and khat chewing habits by faculty and gender
All tests were performed using Chi Square test

	Healthy	Bleeding	Calculus	Shallow pocket
Faculty (n=120 each) (p<0.017)				
Dentistry	15.8	20.8	57.5	5.8
Medicine	15	35.8	46.7	2.5
Literature	6.5	37.5	50.8	5
Gender (n=180 each) (p<0.000)				
Male	8.3	17.8	68.3	5.6
Female	16.7	45	35	3.3
Tooth-brushing$ (p<0.000)				
Yes (n=273)	15.8	35.2	45.1	4
No (n=87)	2.3	19.5	72.4	5.7
Khat Chewing among males$ (n=180) p<0.035)				
Yes (n=112)	6.3	17.9	67	8.9
No (n=68)	11.8	17.6	70.6	0
Smoking among males$ (N=180) (p=0.275)				
Yes (n=44)	2.3	13.6	77.3	6.8
No (n=136)	10.3	19.1	65.4	5.1
Levels within each faculty				
Dentistry$ (n=40 each) (p=0.615)				
First level	10	25	60	5
Third level	12.5	17.5	62.5	7.5
Final level	25	20	50	5
Medicine$ (n=40 each) (p<0.037)				
First level	12.5	40	42.5	5
Third level	20	47.5	32.5	0
Final level	12.5	40	65	2.5
Literature$ (n=40 each) (p<0.028)				
First level	0	25	70	5
Third level	12.5	37.5	40	5
Final level	7.5	50	37.5	5
Gender within each faculty				
Dentistry$ (n=60 each) (p<0.007)				
Males	10	11.7	71.7	6.7
Females	21.7	30	43.3	5
Medicine$ (n=60 each) (p<0.001)				
Males	15	20	61.7	3.3
Females	15	51.7	31.7	1.7
Literature$ (n=60 each) (p<0.000)				
Males	0	21.7	71.7	6.7
Females	13.3	53.3	30	3.3
Overall (N=360)	12.5	31.4	51.7	4.4

[Table/Fig-2]: Distribution of the study sample according to their highest CPI scores by faculty, gender and tooth-brushing, smoking and khat chewing habits
$; Exact Significance by Fisher's exact test. Where not indicated, the analysis was performed using Chi Square test

DISCUSSION

Since more than 20% of the target population was included in the present study, the sample could be claimed to be representative of this population, though the participation was voluntary. Moreover, including medical and non-medical faculties aimed to reflect the periodontal health status by different educational fields, thereby evaluating the effect of university education on periodontal health among important section of the society (university students as a whole).

	Healthy	Bleeding	Calculus	Shallow pocket
Faculty$ (n=120 each)	p=0.94	p<0.001	p<0.004	p=0.313
Dentistry	0.98 ± 2.2	3.56 ± 2.05	1.39 ± 1.46	0.08 ± 0.35
Medicine	0.9 ± 2.15	4.19 ± 2.08	0.88 ± 1.12	0.03 ± 0.16
Literature	0.46 ± 1.52	4.53 ± 1.67	0.97 ± 1.14	0.05 ± 0.22
Gender‡ (n=180 each)	p<0.008	p=0.507	p<0.000	p=0.678
Male	0.5 ± 1.66	4.02 ± 1.74	1.42 ± 1.23	0.06 ± 0.23
Female	1.06 ± 2.24	4.16 ± 2.2	0.74 ± 1.15	0.04 ± 0.28
Tooth-brushing‡	p<0.000	p=0.227	p<0.000	p=0.753
Yes (n=273)	0.97 ± 2.19	4.03 ± 2.13	0.95 ± 1.24	0.05 ± 0.26
No (n=87)	0.16 ± 0.91	4.28 ± 1.44	1.51 ± 1.25	0.06 ± 0.23
Khat Chewing among males‡ (N=180)	p=0.229	p=0.966	p=0.198	p<0.001
Yes (n=112)	0.38 ± 1.46	4.02 ± 1.67	1.52 ± 1.3	0.09 ± 0.27
No (n=68)	0.71 ± 1.95	4.03 ± 1.87	1.26 ± 1.23	0
Smoking among males‡ (N=180)	p<0.022	p=0.55	p=0.202	p=0.676
Yes (n=44)	0.14±0.9	4.16 ± 1.45	1.64 ± 1.26	0.07 ± 0.25
No (n=136)	0.62 ± 1.83	3.98 ± 1.83	1.35 ± 1.28	0.05 ± 0.22
Overall (N=360)	0.78±1.99	4.09±1.98	1.08±1.26	0.05±0.25

[Table/Fig-3]: Mean number (± SD) of sextants recorded for each CPI score by faculty, gender and toothbrushing, smoking and khat chewing habits
$; the significant difference was tested by ANOVA
‡; the significant difference was tested by t-test
SD; Standard Deviation

The CPI scores in the present study showed that only small proportion of students (12.5%) had a healthy periodontium while 51.7% and 31.4% scored calculus and bleeding, respectively [Table/Fig-2]. The periodontal status among students of Sana'a University was found to be better than that of Yemeni and Iraqi dental students [14] and Finnish dental students [18]. Moreover, this rate was much higher than that recorded for 20-24 aged Yemeni population where only 5% had healthy periodontium while 79% and 9% scored calculus and shallow pocket, respectively [13]. In contrast to this, 24.6% of Polish dental and medical students had healthy periodontium [19].

The CPI distribution, as a whole, by faculty was statistically significant. More specifically, the proportions of healthy periodontium among dental and medical students (15.8% and 15%, respectively) were significantly higher than literature students (6.5%) [Table/Fig-2]. To the best of our knowledge, this is the first study comparing periodontal health among university students by faculty. The level of oral health knowledge, attitude and behavior were found to be higher among Indian medical and para-medical students compared to that of the non-medical students. The authors attributed this to the professional education of these students [20]. In the present study, moreover, the proportion of the reported tooth-brushing was significantly higher among dental and medical students (health field students) and the prevalence of deleterious habits (smoking and khat chewing) was lower as compared with literature students. These findings might explain the lower rate of periodontal disease among dental and medical students compared with non-medical field students in this study.

Female student's revealed significantly better periodontal health compared to males even within each faculty. A similar result has been reported among Polish dental and medical students [19]. Although no gender difference was stated among Finnish dental students, males had higher proportion of healthy periodontium (40% vs. 33%) [18]. Again, the difference in toothbrushing is in favour of females in addition to smoking and khat chewing habits, which were approximately exclusive to males, might explain gender variation in periodontal health in the present study. Another possible explanation is the fact that females place more value on aesthetics and use the offered measures of dental prophylaxis more often than males do [21].

In one follow up study among dental students, the periodontal indices were found to improve gradually with progression of students' educational courses [22]. Moreover, oral health awareness and oral health practices were found to be improved with progression of educational levels [23]. In the present study, however, we did not observe any significant improvement in CPI scores with different academic levels. A similar result was found after enrolling French dental students in a periodontal course [24]. It is worth mentioning here that the design of the present study was cross-sectional rather than cohort study and therefore a sound conclusion in this regard cannot be drawn.

It is disappointing to find only 10 healthy sextants among those who scored bleeding, calculus or shallow pocket. In contrast to the CPI scores, the mean number of sextants with bleeding was higher than that with calculus; this is due to the inherited ordinal nature of the CPI index. To further clear it, any subject who has five sextants with bleeding and one with calculus would be recorded to have calculus. Accordingly, 1473 (68%) sextants with bleeding were recorded vs. 389 (18%) sextants with calculus. In contrast to our results, most of the examined sextants among Polish dental and medical students were healthy (49%) [19]. Since the effects of the various grouping factors on the mean number of sextants in each score were similar to their effects on the CPI index as a whole, the previous discussion might suffice [Table/Fig-2].

In the present study, a significant association was found between periodontal health status and frequency of tooth-brushing ($p < 0.01$), smoking ($p < 0.01$) and Khat chewing ($p < 0.05$; [Table/Fig-3]). The positive association of tooth-brushing and the negative association of smoking, with periodontal health are well-established in the literature [25]. On the other hand, the studies on periodontal effects of khat chewing are conflicting. Some stated positive effects [11,12] while some others considered it to be a risk factor [10,13-15]. In a large scale study on Yemeni Khat chewers (n= 1001), the community index of treatment needs, the clinical attachment loss and the calculus index were found significantly higher in the khat chewers [13]. In another study conducted on Yemeni Khat chewers, a positive relationship between the frequency and duration of khat chewing and severity of periodontal diseases was reported; the author found that 37.9% of persons who chew Khat on daily basis had periodontal pockets while only 18.6% of subjects who chewed once per week had such pocketing [10]. Several other studies also reported similar findings [26,27].

Nevertheless, not all studies reported an association between khat chewing and periodontal diseases [11,12,28]. In a study conducted on Yemeni males, most of whom were Khat chewers (n=115), the authors found that the non-chewers sites had significantly greater periodontal pocket depth than the chewing sides, implying a beneficial effect of khat chewing or detrimental to the collateral site [12]. Moreover, in another study conducted among khat chewers in Kenya, the authors did not find significant differences in the periodontal health condition of Khat chewers and non-chewers [28]. Some authors attributed the adverse effects of khat to the continuous mechanical trauma during chewing as well as to the chemical irritation caused by components of khat itself [26,29].

LIMITATIONS

This study has some potential limitations that should be taken in consideration. The main limitation is the fact that this cross-sectional study is a single institution study and therefore the results cannot be generalized to all University students in Yemen. Additionally, the index "CPITN" does not assess the clinical attachment loss, which is the prime criterion required to establish periodontitis. Nevertheless, despite these limitations, we believe that this study provides baseline information about oral health status among young adults in Yemen. Such information could be utilized in planning and initiating preventive oral health programs.

CONCLUSION

Oral health among Sana`a university students is still unsatisfactory, though it was relatively better among dental and medical students. Female students are more interested in tooth-brushing and hence they have better oral health. The approximately exclusive male habits, namely smoking and, to less extent, khat chewing, are associated with worse oral and periodontal health. This section of Yemeni society should be more aware of their oral health as they are considered as a model for the whole society.

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FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Aug 23, 2015**
Date of Peer Review: **Oct 15, 2015**
Date of Acceptance: **Oct 23, 2015**
Date of Publishing: **Dec 01, 2015**