International Scholars Journals

African Journal of Dentistry ISSN 2756-3421 Vol. 8 (7), pp. 001-007, July, 2020. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Tooth mortality in khat and non khat chewer in Sana'a Yemen

Fouad H Al- Bayaty[1]*, Nidhal A. Wahid Ali[2], Awang M Bulgiba[3], Mohd Masood[4], Saba F Hussain[4] and Mahmood Amin Abdulla[5]

[1]Department of Restorative Dentistry, Faculty of Dentistry, University Technology MARA, Malaysia.
[2]College of Dentistry, University of AL-Mustansrya, Iraq.
[3]Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Malaysia.
[4]Department of Orthdontics Dentistry, Faculty of Dentistry, University Technology MARA, Malaysia.
[5]Department of Molecular Medicine, Faculty of Medicine, University of Malaya, Malaysia.

Accepted 15 October, 2019

Many health problems of Yemen have been associated with khat. There is a wide spread belief that periodontal disease is more severe in khat chewers than non-chewers. The present investigation was designed to examine tooth mortality and the patterns of tooth loss in khat chewer and non- khat chewer in a selected population in Sana'a -Yemen. A total of 2506 individuals, 1216 males and 1290 females ranging in age from 15 to 64 years were examined. The status of every present permanent tooth was assessed. Individuals who chewed one or two times a week for five years were considered as khat chewer. Individuals with no khat chewing history or chewed less than 5 times in their lifetimes were considered as non-chewer. Female khat chewers had significantly higher teeth loss compared to other sub-groups, irrespective of whether they chewed khat or not. In the 15 to 24 age category, there was no significant difference between male khat and non- khat chewers. Female khat chewers had the highest teeth loss in this age group and it was significantly higher than any other sub-group in this age group. Male khat chewers also had significantly higher teeth loss compared to male non- khat chewers. Female khat chewers had a significantly more lower teeth loss than female non- khat chewers. Present study has shown that khat chewing is a one of the risk factors associated with teeth loss. Khat chewers had significantly higher tooth loss as compared to non khat-chewers. Female khat chewers had a significantly higher teeth loss compared to non- khat chewers (especially in age group 55 to 64). Male khat -chewers had significantly more lower teeth loss compared to other groups.

Key words: Tooth mortality, khat-chewers, khat-nonchewers, Yemen.

INTRODUCTION

Khat chewing in Yemen is almost universal in the male population, but women also practice it. It is a basic life-style, not just for special social occasions, as cele-brations, or political meeting but also as a regular daily habit (Hill and Gibson, 1987). During the last decades, due in part to air transport, the habit has spread considerably in those regions and to countries where the plant does not grow. Thus khat has been observed by customs authorities in France, United Kingdom, and United States (Hattab and Al-abdulla, 2001). It is principally used as a fresh plant material where the more succulent parts (the young shoots of the plant) are chewed till all the juice is extracted. Young fresh khat leaves are chewed and held unilaterally in the lower buccal pouch as a bolus for three hours or longer (Hattab and Al-abdulla, 2001). The average individual usually chews 50 to 100 g of khat per day whereas addicts may chew more than 300 g per day (Al-Adimi, 1998). Many health problems of Yemen have been linked to khat. It has been reported that khat has various negative effects on the brain, blood, eyes, the oral cavity and cardiovascular, gastrointestinal,

*Corresponding author. E-mail: drfouadhm@yahoo.com. Tel: 00603-55435818. Fax: 00603-55435803.

respiratory, genitourinary systems (Kennedy, 1987; Al-Habori, 2005; Hassan et al., 2007). There is a wide spread belief that periodontal disease is more severe in khat chewers than non-chewers, but the results of epidemiological investigations are inconsistent and even conflicting. Hill and Gibson (1987) examined 121 male volunteers, 16 to 36 years of age. They concluded that no evidence was found to suggest that khat chewing has any particularly detrimental oral or dental effects.

Mengel et al. (1996) studied the periodontal health status of 1001 Yemenis. The results showed that 93.9% of all probands had signs of periodontal disease; however, they could not find a casual relationship between the use of khat and periodontal disease. Al-Adimi (1998) selected 134 patients who were khat chewers. He found that 51.8% of subjects had periodontitis and 9.7% of the patients had unilateral missing teeth, which corresponded with the khat chewing side. Al-Akhali and Al-Safi (2002) studied 382 male patient 310 chewer and 72 non khat chewer. He reported that a higher loss of attachment and gingival recession in chewers than non chewers and a higher percentage of tooth lost in chewers than non chewers.

In a recent cross-sectional study, it was found that khat chewing caused loss of periodontal attachment presenting either as increased pocket depth or gingival recession (Ali, 2007). From an oral health point of view, the chewing of khat is reported to increase the risk of periodontal disease, tempro-mandibular joint click and xerostomia (Ali, 2004).

These findings are consistent with an earlier study which looked at the periodontal status of a population in Yemen. It concluded that higher khat consumption correlates with an increased detrimental effect on the periodontium using the CPITN index of periodontal treatment need (Mengel et al., 1996).

Due to the lack of oral health education, many Yemeni khat chewers do not practice any oral hygiene procedure and as a consequence, oral hygiene is generally poor. This was demonstrated by a high percentage of khat chewers who do not use a tooth brush (94%) compared to the non-chewers who do not use a tooth brush (62%) (Al-Akhali and Al-Safi, 2002). Very little information is available on patterns of tooth mortality in khat chewer and non- khat chewer**.** The present investigation was designed to examine tooth mortality and the patterns of tooth loss in khat chewer and non-khat chewer in a selected population in Sana'a -Yemen.

MATERIALS AND METHODS

The study received ethical approval from the Ethical Committee of Sana'a University, Yemen. All individuals attending at the College of Dentistry in Sana'a University and the University of Sciences and Technology, seeking different dental treatments and agreed to participate in this study after reading and signing informed consent were referred to the examiners. A total of 2506 individuals, 1216 male and 1290 female ranging in age from 15 to 64 years were examined by two examiners one from each faculty over a period of 2 years at the Departments of Periodontology.

The status of every present permanent tooth was assessed; however, third molar teeth were not included in the study due to their frequent impaction or agenesis. Reasons for missing teeth were categorized into caries, periodontal disease and trauma. A tooth was classified as requiring extraction due to dental caries when caries had so destroyed the crown that it could not be restored, if there were septic roots, or carious exposure of the pulp. A tooth was regarded as requiring extraction due to periodontal disease if it tended to satisfy the score eight criteria of Russell's PI index (Russell, 1956), namely the presence of considerable mobility according to the Miller's Mobility Index (Miller, 1950).

Prior to the intraoral examination, background information such as name, age, sex, khat chewing habits was recorded. Individuals who chewed one or two times a week for five years were considered as khat chewers. Individuals with no khat chewing history were considered non-chewers, and persons who reported that they had chewed less than 5 times in their lifetimes are also refereed to as non- chewers. Individuals who reported that they had ceased chewing for at least one year in the past were excluded. A pilot study was carried out, in which 20 subjects were examined to carry out an inter-examiner and intra -examiner calibrations.

The sample size was based on the assumption of significance level of 0.05, a power of 90%, and a difference in mean of 0.001 and within group standard deviation of 0.005. This gave a sample size of 526 in each group. As there are 4 groups based on gender and khat chewing status, the total sample size required was calculated to be 2104. The sample size eventually reached 2506 as it was felt; it was better to ensure that data was sufficient for the study. A small difference in the mean was chosen in order to conclusively test whether khat had any real influence on the outcome in question. The study stretched over 2 years to ensure that an adequate sample size was reached.

The number of teeth loss per person was calculated. This mean was calculated with 95% confidence intervals for all sub-groups used in the analysis. A statistically significant difference was obtained when the 95% confidence intervals did not overlap. This is similar to statistical testing with analysis of variance (ANOVA) with post-hoc tests at a significance level of 0.05. Normality assumptions were assessed using the Kolmogorov-Smirnov test and homogeneity of variances was tested using the Levene's test. All statistical tests were carried out using a significance level of 0.05.

RESULTS

The study sample consisted of 1216 (48.5%) male and 1290 (51.5%) female. Table 1 displays the sample breakdown by age group and gender. Overall, there was a slight preponderance of female patients seen. In the youngest age group (15 to 24), males outnumber females by 2 to 1. However, this was reversed in the next 3 age groups, that is, in the 25 to 34, 35 to 44 and 45 to 54 age groups, Female patients outnumber male patients. In the oldest age group (55 to 64) males slightly outnumbered females.

The mean total teeth loss by sex, age group and khat chewing status are displayed in Table 2. It seems that the mean teeth loss increased with age in both khat chewers and non- khat chewers. Overall, the female khat chewers had significantly higher teeth loss compared to male khat chewers, male non khat chewers and female non khat chewers groups. In the 15 to 24 age category, there was

Table 1. Breakdown of patients by age group and gender.

Age group	15-24 (%)	25-34 (%)	35-44 (%)	45-54 (%)	55-64 (%)	Total
Male	549 (66.1)	240 (42.8)	120 (24.8)	150 (44.6)	157(53.2)	1216(48.5)
Female	282 (33.9)	321 (57.2)	363 (75.2)	186 (55.4)	138 (46.8)	1290 (51.5)
Total	831(100.0)	561(100.0)	483 (100.0)	336 (100.0)	295 (100.0)	2506 (100.0)

Table 2. Total mean teeth loss by age group and gender and khat chewing status.

Age group	Male khat chewers (95% CI*)	Male non- khat chewers (95% CI)	Female khat chewers (95% CI)	Female non- khat chewers (95% CI)
15-24	0.362 (0.357, 0.367)	0.373 (0.334, 0.412)	1.286 (1.045, 1.526)	0.671 (0.637, 0.704)
25-34	1.539 (1.529, 1.549)	0.950 (0.946, 0.954)	2.563 (2.461, 2.664)	1.613 (1.518, 1.709)
35-44	3.354 (3.187, 3.522)	2.375 (1.970, 2.779)	3.359 (3.295, 3.422)	3.471 (3.422, 3.519)
45-54	4.133 (3.9187, 4.349)	7.200 (6.922, 7.479)	3.788 (3.603, 3.973)	7.276 (6.981, 7.571)
55-64	8.544 (8.177, 8.911)	8.837 (8.333, 9.342)	6.714 (6.311, 7.117)	5.969 (5.969, 5.969)
All groups	2.558 (2.367, 2.749)	2.193 (1.864, 2.522)	3.404 (3.265, 3.543)	2.862 (2.706, 3.017)

* Confidence interval.

Table 3. Mean upper teeth loss by age group and gender and khat chewing status.

Age group	Male khat chewers (95% CI*)	Male non- khat chewers (95% CI)	Female khat chewers (95% CI)	Female non- khat chewers (95% CI)
15-24	0.216 (0.203, 0.228)	0.194 (0.172, 0.216)	0.643 (0.499, 0.786)	0.242 (0.217, 0.267)
25-34	1.006 (0.979, 1.032)	0.500 (0.500, 0.500)	0.781 (0.683, 0.880)	0.840 (0.793, 0.887)
35-44	1.563 (1.527, 1.599)	1.000 (1.000, 1.000)	1.717(1.705, 1.729)	1.677(1.665, 1.688)
45-54	1.842 (1.819, 1.864)	2.800 (2.775, 2.825)	1.788(1.732, 1.842)	4.241 (4.069, 4.413)
55-64	4.272 (3.965, 4.579)	4.744 (4.418, 5.071)	3.929(3.569, 4.288)	3.156(3.156, 3.156)
All groups	1.299 (1.201, 1.395)	1.064 (0.899, 1.229)	1.637 (1.544, 1.730)	1.480 (1.391, 1.569)

* Confidence interval.

no significant difference between male khat and non-khat chewers but there was a significant difference in teeth loss between female khat chewers and the others in this age group. Female khat chewers had the highest teeth loss in this age group and it was significantly higher than any other groups.

In the 25 to 34 age group, once again, the female khat chewers had significantly higher teeth loss than all other groups in this age category. Male khat chewers also had significantly higher teeth loss compared to male non- khat chewers. There was no significant difference between male khat chewers and female non- khat chewers. In the 35 to 44 age group, male non- khat chewers had significantly lower teeth loss compared to the other groups. However, there was no significant difference between male khat -chewers, female khat chewers and female non- khat chewers.

In the 45 to 54 age group, the difference was reversed and it would appear that the khat chewers had significantly lower teeth loss compared to non- khat chewers irrespective of gender. In the 55 to 64 age group, there was no difference between khat chewers and non- khat chewers among males. Among females in this age category, khat chewers still had a significantly higher teeth loss compared to non- khat chewers. Males had significantly higher teeth loss compared to females irrespective of khat chewing status.

Table 3 displays the mean upper teeth loss by age group, gender and khat chewing status. Overall, females had more upper teeth loss compared to males and female khat chewers had significantly more upper teeth loss compared to males irrespective of whether they chew khat or not. However, female khat chewers did not have significantly more upper teeth loss compared to female non-khat chewers. In the 15 to 24 age category, female khat chewers had significantly more upper teeth loss compared to all other groups in this age category. Female non- khat chewers had significantly more upper teeth loss compared to male khat-chewers. In the 25 to 34 age category, male khat chewers had significantly more upper teeth loss compared to all other groups in this age category. Male non-khat chewers had

Table 4. Mean lower teeth loss by age group and gender and khat chewing status.

Age group	Male khat chewers (95% CI*)	Male non- khat chewers (95% CI)	Female khat chewers (95% CI)	Female non- khat chewers (95% CI)
15-24	0.146 (0.139, 0.154)	0.179 (0.162, 0.196)	0.643 (0.545, 0.740)	0.429 (0.421, 0.437)
25-34	0.533 (0.517, 0.549)	0.450 (0.446, 0.454)	1.781 (1.779, 1.784)	0.773 (0.725, 0.822)
35-44	1.792 (1.660, 1.923)	1.375 (0.970, 1.779)	1.641 (1.567, 1.716)	1.794 (1.757, 1.831)
45-54	2.292 (2.098, 2.485)	4.400 (4.096, 4.704)	2.000 (1.871, 2.129)	3.034 (2.912, 3.157)
55-64	4.272 (4.211, 4.333)	4.093 (3.915, 4.271)	2.786 (2.742, 2.829)	2.813 (2.813, 2.813)
All groups	1.259 (1.159, 1.360)	1.129 (0.958, 1.299	1.767 (1.709, 1.829)	1.382 (1.315, 1.449)

* Confidence interval.

Table 5. Teeth loss for each tooth (upper and lower combined) by gender and khat chewing status.

Tooth	Male khat chewers (95% CI*)	Male non- khat chewers (95% CI)	Female khat chewers (95% CI)	Female non- khat chewers (95% CI)
Central incisors	0.390 (0.355, 0.426)	0.360 (0.307, 0.413)	0.281 (0.265, 0.297)	0.268 (0.252, 0.284)
Lateral incisors	0.323 (0.293, 0.353)	0.209 (0.174, 0.245)	0.239 (0.219, 0.260)	0.215 (0.198, 0.232)
Canines	0.135 (0.122, 0.149)	0.150 (0.119, 0.182)	0.109 (0.099, 0.120)	0.116 (0.106, 0.127)
First premolars	0.248 (0.227, 0.269)	0.268 (0.232, 0.305)	0.349 (0.331, 0.368)	0.285 (0.265, 0.306)
Second premolars	0.331 (0.307, 0.355)	0.259 (0.211, 0.309)	0.507 (0.479, 0.534)	0.391 (.369, 0.413)
First molars	0.648 (0.607, 0.689)	0.517 (0.444, 0.589)	1.103 (1.064, 1.142)	0.953 (0.912, 0.994)
Second molars	0.483 (0.449, 0.516)	0.427 (0.358, 0.497)	0.815 (0.780, 0.850)	0.634 (0.596, 0.671)
All teeth	2.558 (2.367, 2.749)	2.193 (1.864, 2.522)	3.404 (3.265, 3.543)	2.862 (2.706, 3.017)

* Confidence Interval

significantly fewer upper teeth loss compared to other groups in this age category.

In the 35 to 44 age group, female khat chewers had significantly more upper teeth loss compared to other groups in this age category. Female non- khat chewers had significantly more upper teeth loss compared to all males irrespective of khat chewing status, indicating that the influence of gender was great. In the 45 to 54 age category, non- khat chewers had significantly more upper teeth loss irrespective of gender. In the 55 to 64 age category, female non- khat chewers had significantly fewer teeth loss compared to all other groups but there was little difference between the other sub-groups.

Table 4 displays the mean lower teeth loss by age group, gender and khat chewing status. Overall, females had more lower teeth loss compared to males. Female khat chewers had significantly more lower teeth loss compared to males irrespective of whether they chew khat or not. Female khat chewers also had significantly more lower teeth loss compared to female non- khat chewers. In the 15 to 24 age category, female khat chewers had significantly more lower teeth loss compared to all other groups in this age category. Female non-khat chewers had significantly more lower teeth loss compared to male khat-chewers, suggesting that the influence of gender in this age category was stronger than the influence of khat chewing. In the 25 to 34 age group, female khat chewers had significantly more lower teeth loss compared to all other groups in this age category. Male non- khat chewers had significantly fewer lower teeth loss compared to other groups in this age category.

In the 35 to 44 age group however, female non- khat chewers had significantly more lower teeth loss compared to female khat-chewers in this age category. However, there was little difference between female khat chewers, male khat-chewers, and male non- khat - chewers. In the 45 to 54 age category, male non- khat chewers had significantly more lower teeth loss compared to other groups. In the 55 to 64 age category, males had significantly more lower teeth loss compared to females but there was little difference between the khat-chewers and non-khat chewers.

Teeth loss of specific teeth (upper and lower combined) are displayed in Table 5. Overall, female khat chewers had significantly more teeth loss compared to other groups. Female non- khat chewers had significantly more teeth loss compared to male non- khat chewers. For central incisors, males had higher teeth loss than females. Khat chewing status does not result in any significant difference within each gender. For lateral incisors, male khat chewers had significantly more teeth loss than other groups. There was however no difference between female khat-chewers and female non- khat chewers. For

Table 6. Upper jaw teeth loss by gender and khat chewing status.

Tooth	Male khat chewers (95% CI*)	Male non- khat chewers (95% CI)	Female khat chewers (95% CI)	Female non- khat chewers (95% CI)
Central incisors	0.026(0.022, 0.030)	0.059(0.056, 0.063)	0	0.038(0.037, 0.038)
Lateral incisors	0.035(0.034, 0.035)	0.029(0.021, 0.039)	0.143(0.091, 0.195)	0.125(0.012, 0.013)
Canines	0	0	0	0.013(0.012, 0.013)
First premolars	0.017(0.014, 0.020)	0.059(0.047, 0.073)	0.143(0.104, 0.182)	0.038(0.037, 0.038)
Second premolars	0.026(0.024, 0.028)	0.015(0.010, 0.019)	0.214(0.136, 0.292)	0.025(0.025, 0.025)
First molars	0.078(0.077, 0.079)	0.029(0.028, 0.032)	0.143(0.091, 0.195)	0.079(0.052, 0.107)
Second molars	0.035(0.033, 0.036)	0	0	0.038(0.037, 0.038)
All teeth	0.216(0.203, 0.228)	0.194(0.172, 0.216)	0.643(0.499, 0.786)	0.242(0.217, 0.267)

*Confidence interval.

Table 7. Lower jaw teeth loss by gender and khat chewing status.

Tooth	Male khat chewer (95% CI*)	Male non- khat chewer (95% CI)	Female khat chewer (95% CI)	Female non- khat chewer (95% CI)
Central incisors	0	0.015 (0.010, 0.019)	0	0.063 (0.061, 0.063)
Lateral incisors	0.009 (0.008, 0.009)	0	0	0.025 (0.025, 0.025)
Canines	0	0	0	0.013 (0.012, 0.013)
First premolars	0	0.045 (0.031, 0.059)	0	0.013 (0.012, 0.013)
Second premolars	0.035 (0.032, 0.037)	0	0	0.013 (0.012, 0.013)
First molars	0.078 (0.073, 0.083)	0.059 (0.056, 0.063)	0.500 (0.409, 0.591)	0.255 (0.244, 0.265)
Second molars	0.026 (0.026, 0.026)	0.059 (0.058, 0.061)	0.143 (0.136, 0.149)	0.050 (0.049, 0.051)
All teeth	0.147 (0.139, 0.154)	0.179 (0.162, 0.196)	0.643 (0.545, 0.740)	0.429 (0.421, 0.437)

* Confidence interval.

canines, males had significantly more teeth loss than females. For first premolars to the second molars, female khat -chewers had significantly more teeth loss than other groups.

Teeth loss for each upper tooth was displayed in Table 6. Overall, female khat chewers had significantly more upper teeth loss compared to all other groups. Female non- khat chewers had significantly more upper teeth loss compared to male non-khat chewers. Males had more central incisors lost compared to females. Male non- khat chewers had more upper teeth loss than male khat -chewers. Female khat chewers had significantly more loss of lateral incisors than all other groups. There was however no difference between male khat-chewers and male non- khat chewers. For canines, only female non-khat chewers had no teeth loss. Female khat-chewers had significantly more first and second premolars loss than the other groups. Female khat -chewers had the most first molar loss. However, female non- khat chewers had more second molar loss than other groups.

Teeth loss for each lower tooth was displayed in Table 7. Overall, female khat chewers had significantly more lower teeth loss compared to other groups. Female non-khat chewers had significantly more lower teeth loss compared to male non-khat chewers. Female non-khat chewers had more loss central incisors than males. Male non-khat chewers had more lower teeth loss compared to male khat -chewers. Female non- khat chewers had significantly more lateral incisors loss than other groups. Only female non- khat chewers had no loss of canines. Male non- khat chewers had significantly more loss of first premolars than other groups. Male khat -chewers had significantly more loss of second premolars than other groups. Female khat -chewers had significantly more loss of first molars and second molars than other groups.

DISCUSSION

Evidence of the harmful effect of khat on the oral and general health is increasing. The social problems associated with its use, the level of prevalence of khat chewing among the population and its associated risk factors became important. Several reports showed that the prevalence of khat use differs according to age, gender, residence and occupation (Belew et al., 2000; Ihunwo et al., 2004; Kassim and Croucher, 2006).

Khat chewing was predominantly a male habit, however women also practice it. Female chewers deny

their habit due to social concerns (Al-hebshi and Skaug, 2005). The habit of khat chewing was widely spread in Yemen, especially among adult male. It could be considered as part of the social fabric of the community (Al-hebshi and Skaug, 2005). However, this habit whether chewed as leaf or in powder form, was not confined only to Yemen It was found in other countries especially those located at or near the African horn (El-Tahir, 1990). Sustained chewing habits are not common; it would be rare for large numbers of persons to habitually chew for a prolonged period on a regular basis (Al-hebshi and Skaug, 2005). Very little effort has been made to assess the effect of long-term exposure to khat chewing and its affect on cheek pouching or tooth loss.

Most of the reported studies were cross-sectional and did not evaluate the direct local effect of khat chewing, in addition, some of the studies examined only younger age groups.

Few reports could be found in the literature on the prevalence of tooth loss in khat chewers. A study of 134 individual done by AL-Adimi ((1998) demonstrated that 9.7% had unilateral missing teeth which correspond to the khat chewing side. Al-Akhali and Al-Safi (2002) concluded that khat chewers age groups 20 to 29, 30 to 45 and 46 to 65 had a higher percentage of tooth loss 2, 5 and 28%, respectively compared to non khat chewer irrespective of chewing side.

Unfortunately, one of the limitations in our study is that we could not correlate between the tooth loss and the side of chewing. All participants claimed that they did not concentrate on one side in chewing khat. They change chewing side alternatively; for this reason, the side of chewing was not taken into consideration in this study. In fact, a study conducted by Al-Akhali and Al-Safi (2002) on 310 khat chewers revealed that the percentages of chewers were 49% for left, 11% for right and 40% for both sides. The other limitation was that female chewers might not have given genuine answers to the questions and denied their chewing habits because of social considerations. This might have lead to underestimating the prevalence of tooth loss in khat and non khat chewer in females in this study.

To evaluate the direct local effect of khat as a local risk factor for tooth loss we excluded individuals who had ceased chewing for at least one year. However, the answers to this question are not accurate as they highly depend on subjects' memory.

In this study, tooth loss was evaluated in male and female in a wide range of age groups. To our knowledge, no earlier study was found in the literature covering this wide age range. Results are not conclusive due to sampling methods and different examination criteria, when compared to other studies. The study, however, does demonstrate that mean teeth loss increases with age in both khat chewers and non khat chewer. This finding is in accordance with what is universally accepted that the severity of tooth loss increases with increasing age. It was in agreement with many studies (Kalsbeek et al., 1998; Warren et al., 2002).

Our results have shown that male khat chewers had significantly higher teeth loss than male non khat chewers. This result may confirm what is widely believed that khat habit is deeply rooted in Yemen. A large proportion of the Yemeni population chew khat leaves on daily basis (Ali, 2007). Khat chewing usually lasted from 4 to 6 h; it may result in a number of significant oral health and medical adverse effects (Al Khader and Hashem, 2009).

This habit was an important factor in the initiation and progression of periodontal disease. This finding may be ascribed to the influence khat chewing as a local factor and to the inferior oral hygiene status. Due to lack of oral health education, many khat chewers do not practice oral hygiene procedures (Al-Akhali and Al-Safi, 2002). Oral care given low priority or even neglected by this group is linked to the exceptionally high rates of periodontal disease in Yemeni males (Rosenzweig and Smith, 1966). This finding was in agreement with a study done by Al-akhali and Al-Safi (2002). There was no significant difference between male khat chewers and female non-khat chewers; this may be due to better oral hygiene in women to keep their teeth for aesthetic purposes (Hunt et al., 1988; Hussein, 2009).

Among females in age group 55 to 64, khat chewers had a significantly higher teeth loss compared to non-khat chewers. This may reflect the effect of chewing khat; the habit was limited to old and married women as it was not socially accepted for young unmarried women to chew khat (Al-Motarreb et al., 2002). This finding was in agreement with that reported by Hassan et al. (2007) that the use of khat was significantly associated with age and gender.

Results in this study have also shown that in general, females have more lower teeth loss than males and female khat chewers have significantly more lower teeth loss compared to males irrespective of whether they chewed khat or not. The reason for this result may need further investigation. This difference between genders could be attributed to the fact that females visit dental practices more than males and periodontaly involved teeth are extracted at an earlier stage and/or due to other dental diseases or esthetic reasons.

Results in this study have illustrated that female khat chewers had a significantly more lower teeth loss than female non- khat chewers. Overall, female khat chewers had significantly more lower teeth loss compared to all other groups. This difference can be attributed to the cumulative effects of khat chewing. Teeth affected become permanently discolored and loose, and the gum becomes flaccid (opinion of an early visitor Bury, 1915) to Yemen as quoted by Kennedy (1987).

The teeth most frequently missing in the selected population examined were the second premolars. Male khat-chewers had significantly more lower teeth loss

compared to other groups. These interesting findings again enlighten the local effects of khat, in which the fresh khat leaves are chewed and held in the lower buccal pouch unilaterally in bolus for three hours or longer (Hattab and Al-abdulla, 2001). Female khat -chewers had significantly more teeth loss than other groups. Therefore, with limitation of this study, it appears that there is a casual local effect of khat represented by significant increase of tooth loss in khat chewer compare to non khat chewers. Further studies are needed to investigate the influence of other habits such as smoking and the biochemical changes in saliva.

Conclusion

Results from the present study conclude that khat chewing; a common habit among Yemeni population, is one of the local risk factors for tooth mortality. It demonstrates that khat chewers have significantly higher tooth loss as compared to non khat chewers. Male khat chewers show significantly higher tooth loss as compared to female khat chewers. Khat -chewers have significantly more lower teeth loss compared to other groups.

REFERENCES

Al Khader NL, Hashem D (2009). Prevalence of cigarette smoking and khat chewing among Aden university medical students and their relationship to BP and body mass index. Saudi J. Kidney Dis. Transplant., 1(5): 862-866.

Al-Adimi AA (1998). Use of oral social habits in Yemen. J. Coll. Dent. Univ. Baghdad., 3: 41-49.

Al-Akhali MS, Al-Safi (2002). The Periodontal health status of the qat chewers in Yemen-Sannaa. MS Thesis. College of Dentistry, Baghdad University, pp. 35-44.

Al-Habori M (2005). The potential adverse effects of habitual use of Catha edulis (qat). Expert Opin. Drug Saf., 4: 1145-1154.

Al-hebshi N, Skaug N (2005). KHAT [Catha edulis] – an updated review. Addiction Biol., 10: 299-307.

Ali AA (2007). Qat habit in Yemeni society. A causative factor for oral periodontal diseases. Int. J. Environ. Res. Public Health, 4: 243-247.

Ali AA, Al-Sharab AK, Aguirre JM, Nahas R (2004). A study of 342 oral keratotic white lesions induced by qat chewing among 2500 Yemeni. J. Oral Pathol. Med., 33: 368-372.

Al-Motarreb A, Baker K, Broadley KJ (2002): Khat: pharmacological and medical aspects and its social use in Yemen. Phytother. Res., 16: 403-413.

Belew M, Kebede D, Kassaye M, Enquoselassie F (2000). The magnitude of khat use and its association with health, nutrition and socio-economic status. Ethiop. Med. J., 38(1): 11-26.

El-Tahir K (1990). Narcotics and manifesting drugs. King Saud University press, pp. 86-95.

Hassan NA, Gunaid AA, Murray-Lyon IM (2007). Qat (Catha edulis): health aspects of qat chewing. East Mediterr. Health J., 13: 706-718.

Hattab FN, Al-abdulla N (2001). Effect of qat chewing on general health. Dental News., 8: 33-35.

Hill, Gibson (1987). The oral and dental effects of qat chewing. Oral Surg. Oral Med. Oral Pathol., 63: 433-436.

Hunt RJ, Hand JS, Kohout FJ, Beck JD (1988). Incidence of tooth loss among elderly lowans. AJPH., 78: 1330-13321.

Hussein MA (2009) Prevalence of Khat chewing in college and secondary (high) school students of Jazan region, Saudi Arabia. Harm Reduction J., 6: 11:11.

Ihunwo AO, Kayanja FI, Amadi-Ihunwo UB (2004). Use and perception of the psychostimulant, khat (catha edulis) among three occupational groups in south western Uganda. East Afr. Med. J., 81(9): 468-73.

Kalsbeek H, Truin GJ, Rossum GM, Rijkom HM, Poorterman JT, Verrips GH (1998). Trends in caries prevalence in Dutch adults between 1983 and 1995. Caries Res., 32: 160-165.

Kassim S Croucher R (2006). Khat chewing amongst UK resident male Yemeni adults: an expl. stud. Int. Dental J., 56: 97-101.

Kennedy J (1987). The flower of paradise. D. Reidel publishing company, Nather-Land., 89: 201-244.

Mengel R, Elgenbrodi M, Schunmann T, Flores-deJacoby L (1996). Periodontal status of a subject sample of Yemen. Clin Periodontal., 23: 437-443.

Miller SC (1950). Textbook of periodontia. 3rd ed. Philadelphia: Blakiston.

Rosenzweig K, Smith P. (1966). Periodontal health in various ethnic groups. J. Periodont. Res., 1: 250-259.

Russell AL (1956). A system of classification and scoring for prevalence surveys of periodontal disease. J. Dent. Res., 35: 350-359.

Warren JJ, Watkins CA, Cowen HJ, Hand JS, Levy SM, Kuthy RA (2002). Tooth loss in the very old: 13-15-year incidence among elderly lowans. Commun. Den. Oral Epidemiol., 30: 29-37.