

**The effect of Qat chewing on periodontal tissues and buccal mucous membrane**

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**Abstract:**

Qat leaves usually chewed during social and cultural gathering where the chewing practice may take up 5 hours. In the past, qat chewing habit was socially normalized among Yemeni adult male only, but, recently the habit spread to include a high percentage of females and even children. The purpose of this study is to assess the effects of qat chewing on periodontal tissues (gingival recession and pocket depth) in addition to buccal ulcerative lesions in the oral side of chewing with a sample of 200 Yemeni men over 20 years of age, who have been chewing qat for more than one year. They have been studied for the effects of qat on the chewing side compared with the opposite side that is not used for chewing. Results: The study shows that the longer qat chewing duration the prevalence of both gingival recession and periodontal pocket increased. Reversely, individuals with a history of less than five-year duration of chewing show almost a lower frequency of both gingival recession and periodontal pocket.

The prevalence of the gingival recession and periodontal pocket are significantly more in the side of chewing. The study reveals that 56 out of 76 (73.7%) smokers are suffering from gingival recession, with a highest rate of the recession is recorded with those who have a history of smoking for more than 16 years. Only 24 cases (12%) show clinical ulcerative lesions on the buccal mucosa and there are no findings suspicious for pre-malignant or malignant changes. Discussion: This study demonstrates a relationship between qat chewing and periodontal diseases, attributed to chronic local mechanical. However, the study recommends further studies including longitudinal clinical inspections, biopsies of the tissue changes of qat chewers and the effects of chemicals used to accelerate the growth of the qat.

## **Introduction:**

Qat, (Khat) plant (*Catha edulis*) (Figure 1) is a tree belongs to family Celastraceae frequently cultivated in certain areas of East Africa and the Arabian Peninsula. The leaves of the qat plant contain alkaloids structurally related to amphetamine. They are chewed daily by a high proportion of the adult population in Yemen for the pleasant mild stimulant effect<sup>(1)</sup>.

Early clinical observation suggested that qat had amphetamine-like properties. Subsequent chemical analysis confirmed that the fresh leaves contain a number of compounds, including phenylalkylamine compounds (Alkaloids) such as norpseudoephedrine (Cathine) and alpha aminopropiophenone (Cathinone)<sup>(2)</sup>. Qat leaves also contain considerable amounts of tannins (7%-14% in dried material), vitamins, minerals and flavonoids<sup>(3)</sup>.

Chewing qat for longer times causes stomatitis followed by secondary infection. These might be related to mechanical strain on the cheek and other oral tissues as well as chemical irritation of the mucosal surfaces. A high rate of periodontal diseases and low rate of dental caries have been observed among male Yemeni qat chewers<sup>(4,5)</sup>. Universal attrition, temporomandibular joint pain and increased periodontal pocket depth on the Khat chewing side compared with the non-Khat chewing side. They also increased keratosis on the buccal mucosa<sup>(6)</sup>.

Despite millions in Yemeni community chew qat, the proportion of the population with severe periodontal disease in Yemen was reported to be significantly lower than in countries with high level of dental care<sup>(7)</sup>. However, qat chewing causes many lesions to the supporting structures of the teeth, namely gingivitis, periodontal pocket formation, gingival recession, tooth mobility and tooth mortality<sup>(8, 9)</sup>. The same result was reported by Al-Akhali<sup>(10)</sup> who demonstrated that there was gingival recession in the qat chewing side more than in the non-chewing side with high significant difference. Also he found that the duration of qat chewing had a high significant effect on probing pocket depth and gingival recession.

Al-Shawaf and Nartey<sup>(11)</sup>, reported two cases showed extensive oral mucosal ulceration with areas of hyperkeratosis associated with qat chewing.

The purpose of the present study is to assess the effects of qat chewing on the periodontal tissues (gingival recession and pocket depth) in addition to buccal ulcerative lesions in the side of chewing.



Figure1. Qat leaves

### **Subject and Methods:**

A total of 211 Yemeni male qat chewers from Thamar city were examined for gingival recession, periodontal pocket, and buccal ulcerative lesion between January and March 2008, in the Faculty of Dentistry, University of Thamar.

Individuals included in this study were only those who provided a history of qat chewing on one side of the mouth for at least one year and older than 20 years. Thus, 11 out of 211 patients were excluded because they had a history of chewing on both sides of the mouth. The rest 200 patients each underwent a personal interview and the examiner filled for each case with a full intraoral clinical examination with questions regarding their smoking habit, Qat chewing habit, duration of the chewing (by years), and the side of chewing.

A clinical examination for periodontal pocket, gingival recession, and evaluation of the buccal mucosa for any ulcerative lesion were performed, using standard dental office lighting, mouth mirror and periodontal probe.

The side of chewing in this study represents the study side, whereas, the opposite side of the mouth which is not used for qat chewing, served as the control side.

SPSS 13 computer program has been used for data analyses besides using Chi-Square test for analyses with  $P= 0.05$  as a value that will be considered as significant.

### **RESULT:**

This study has been conducted on 200 Yemeni male qat chewers. All of them are from Thamar city. Table 1 shows the age and qat chewing in groups cross tabulation. The results clarify that the gingival recession increased with

age Table 2. The mean age was 38.54±10.7 years, with a range from 20 to 61 years (average=41 years).

**Table 1: Age grouped \* duration of qat chewing in groups cross tabulation**

age grouped	duration of Qat chewing in groups				Total
	1-5	6-10	11-15	16 through highest	
20-29	27	19	0	0	46
30-39	1	27	15	12	55
40-49	0	6	20	37	63
50-59	0	0	2	26	28
60 thru highest	0	0	1	7	8
Total	28	52	38	82	200

**Table 2:**

**age grouped \* gingival recession Crosstabulation**

			gingival recession		Total
			no	yes	
age grouped	20-29	Count	32	14	46
		% within age grouped	69.6%	30.4%	100.0%
	30-39	Count	24	31	55
		% within age grouped	43.6%	56.4%	100.0%
	40-49	Count	19	44	63
		% within age grouped	30.2%	69.8%	100.0%
	50-59	Count	1	27	28
		% within age grouped	3.6%	96.4%	100.0%
	60 thru highest	Count	0	8	8
		% within age grouped	.0%	100.0%	100.0%
Total		Count	76	124	200
		% within age grouped	38.0%	62.0%	100.0%

One hundred thirty-four (67%) are left side chewers and sixty-six (33 %) were right side chewers. The duration of qat chewing ranges from 1 to 40

years, and there was no difference in the mean frequency of chewing duration between the smokers and non-smokers, with a mean of 15.7 +8.8 years, and the persons were chewing qat at least 3-5 hours daily for 5 to 7 days a week.

Tables 3 and 4 illustrate the relations between duration of qat chewing with both gingival recession and periodontal pocket. The study shows that wheresover the qat chewing duration extend to longer time the prevalence of both gingival recession (Figure 2) and periodontal pocket increased. Whereas individuals with a history of less than five years duration of chewing show almost lower frequency of both gingival recession and periodontal pocket.



Figure 2. Gingival recession in Qat chewers

**Table 3:**

**duration of qat chewing in groups \* gingival recession Crosstabulation**

			gingival recession		Total
			no	yes	
duration of qat chewing in groups	1-5	Count	22	6	28
		% within duration of qat chewing in groups	78.6%	21.4%	100.0%
	6-10	Count	32	20	52
		% within duration of qat chewing in groups	61.5%	38.5%	100.0%
	11-15	Count	10	28	38
		% within duration of qat chewing in groups	26.3%	73.7%	100.0%
	16 through highest	Count	12	70	82
		% within duration of qat chewing in groups	14.6%	85.4%	100.0%
Total		Count	76	124	200
		% within duration of qat chewing in groups	38.0%	62.0%	100.0%

**Table 4:****duration of qat chewing in groups \* pocket Crosstabulation**

			pocket		Total
			no	yes	
duration of qat chewing in groups	1-5	Count	20	8	28
		% within duration of qat chewing in groups	71.4%	28.6%	100.0%
	6-10	Count	32	20	52
		% within duration of qat chewing in groups	61.5%	38.5%	100.0%
	11-15	Count	12	26	38
		% within duration of qat chewing in groups	31.6%	68.4%	100.0%
	16 through highest	Count	24	58	82
		% within duration of qat chewing in groups	29.3%	70.7%	100.0%
Total		Count	88	112	200
		% within duration of qat chewing in groups	44.0%	56.0%	100.0%

The calculated Chi-square of the relation between duration of qat chewing and gingival recession was 52.9,  $df = 3$ , and  $P = 0.00$ . The same analysis result for the relation between chewing duration and periodontal pocket was 24.6,  $df = 3$ , and  $P = 0.00$ . Both conditions reveal that the duration of qat chewing in relation with gingival recession and periodontal pocket has a significant effect.

One hundred thirty-four out of 200 individuals were reported as a left side qat chewers, from which 66 persons show gingival recession on the same side of chewing (study side), 18 persons were have recession on both sides, 50 persons did not suffer recession in any side, and recession was not recorded in the right side (control side). With regard to the right side chewers (66 persons), 22 patients were with recession in the chewing side (study side), 2 patients showed recession on the left side (control side), 16 patients were suffering bilateral gingival recession, and 26 patients were without gingival recession, Table 5.

**Table5:****side of qat chewing \* side of recession Crosstabulation**

			side of recession				Total
			no	left	right	bilateral	
side of qat chewing	left	Count	50	66	0	18	134
		% within side of qat chewing	37.3%	49.3%	.0%	13.4%	100.0%
	right	Count	26	2	22	16	66
		% within side of qat chewing	39.4%	3.0%	33.3%	24.2%	100.0%
Total		Count	76	68	22	34	200
		% within side of qat chewing	38.0%	34.0%	11.0%	17.0%	100.0%

The calculated Chi-Square 75.5,  $df = 3$ , and  $P = 0.00$  mean that there is a close relation between the qat chewing and gingival recession in the side of chewing.

A number of seventy-six (38%) individuals were cigarette smokers; with a mean duration of smoking 12.4 +7.7 years. The present study reveals that 56 out of 76(73.7%) smokers are suffering gingival recession, with a highest rate of the recession were recorded with those having a history of smoking for more than 16 years. Table 6.

**Table 6:****duration of smoking in groups \* gingival recession Crosstabulation**

			gingival recession		Total
			no	yes	
duration of smoking in groups	1-5	Count	10	16	26
		% within duration of smoking in groups	38.5%	61.5%	100.0%
	6-10	Count	6	6	12
		% within duration of smoking in groups	50.0%	50.0%	100.0%
	11-15	Count	4	8	12
		% within duration of smoking in groups	33.3%	66.7%	100.0%
	16 through highest	Count	0	26	26
		% within duration of smoking in groups	.0%	100.0%	100.0%
Total		Count	20	56	76
		% within duration of smoking in groups	26.3%	73.7%	100.0%

The calculated Chi-Square was 15,  $df = 3$ , and  $P=0.02$  is also significant.

Regarding the ulceration related to the same side of qat chewing, only 24 cases out of 200(12%) show clinical ulcerative lesions on the buccal mucosa, all cases (ulcerative) has a short history and the ulcers were intermittent, however, the ulcers were not examined under the microscope in order to give the definitive diagnosis for each of these ulcerative lesions.

### **Discussion:**

The habit of qat chewing in Yemen is widely spread among Yemeni population. In the past, qat chewing habit was restricted among Yemeni adult male only, but recently the habit spread to include a high percentage of females and even children.

In this study, the human sample of those having the same level of oral hygiene index are detected in order to represent the effect of qat chewing on the gingival tissue, pocket depth, and any buccal ulcerative lesions. Also peoples with bilateral qat chewing habit were excluded to compare between qat chewing side (study side) and non-chewing side as a control side.

Our study has shown that 124 persons (62%) of qat chewers have gingival recession more than those who have no gingival recession with high statistical significant difference. This result may be due to the pressure effect of qat leaves on the gingival tissues <sup>(10)</sup>. Also the present study reveals that, the gingival recession in the qat chewing side was more than in the non-chewer sides, with significant deferens, this may related to the mechanical trauma and pressure of qat chewing on the gingival tissues <sup>(9,10)</sup>.

There is close relation between the long duration of qat chewing and increased incidence of gingival recession, this may be due to the increasing of trauma and pressure of qat chewing on the gingival tissue <sup>(8,9)</sup>.

Our study shows that, there is no significant different between smokers and non-smokers in relation to gingival recession among the qat chewers.

Regarding to probing pocket depth, the present study shows that, the number of qat chewers having probing pocket depth more than 3mm ( 112 cases =56%), which is more than the qat chewers who have probing pocket depth less than 3mm (88 cases = 44%), with a significant different.

There is strong relationship between long duration of qat chewing and increased pocket depth. This may explain the loss of attachment caused by mechanical trauma of qat chewing habit <sup>(6,9,10)</sup>.

Association between qat chewing and oral malignancy is still speculated <sup>(12)</sup> but this has not been proven. Kennedy et al, <sup>(13)</sup> who examined the oral



cavity of 706 qat users in Yemen, reported that no oral malignancies were found. This has been also noticed in this study based on the clinical appearance, where no lesions to be clinically suspicious for malignancy or premalignancy, because all ulcerative cases were intermittent from the history taken from the patients as well as these lesions not associated with other more serious clinical features such as long standing ulcers or regional lymph node involvement. However, this might be related to mechanical strain on the cheek and other oral tissue. Moreover, it is believed that the chemicals such as fertilizers, pesticides, and fungicides which are applied to soil by the farmers in order to increase the production of qat may also contribute to the development of oral white lesions. The same conclusion has been reported by Meir et al, <sup>(14)</sup>

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