

KHAT CHEWING AND SMOKING EFFECT ON ORAL MUCOSA: A CLINICAL STUDY

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Summary: Khat (*Catha Edulis Forskal*) is widely cultivated in Yemen and East of Africa. The habit of chewing tender leaves and twigs of khat is deep-rooted in Yemen. Our study investigates the chronic khat chewing and smoking effect on oral mucosa. The sample (n=79) consists of two main groups, khat chewers (n=54) and control groups (n=25). Khat chewers group is divided into 4 subgroups according to duration of khat chewing and smoking habit. The control group is divided into 2 subgroups according to smoking habit. Whitening with mild corrugation, frictional keratosis and frictional keratosis with mild or sever corrugation were the clinical findings. One hundred percent of clinical findings were present on buccal mucosa of chewing side of both smokers and non-smokers whatever the duration of khat chewing period. On the vestibular and mucobuccal fold mucosa, (100 % and 73.3 %) and (60 % and 43.7 %) of the khat chewers group had clinical findings on chewing side of smokers and non-smokers according to khat chewing duration respectively. There was clinical relationship between these lesions and khat chewing, but not smoking. Khat chewing causes oral white lesions on the chewing side and it is found that smoking, clinically, does not exacerbate such lesions.

Key words: Khat; *Catha Edulis Forscal*; Smoking; White lesion; Frictional keratosis

Introduction

Khat chewing is a deep-rooted habit in Yemen. It was exclusively adult males' habit (17), but it begins to spread among females (4, 15) and children (4). World Health Organization estimated that 70 % to 90 % of men, 30 % to 50 % of women and 25 % of children in Yemen chew khat daily (23). In two separated studies Ali A estimated the prevalence of khat chewing habit in Yemen to be 60.5 % and 61.12 % respectively (2, 3).

According to individual authors' observations, khat chewing causes stomatitis that might be secondarily infected (9, 17, 20). It also causes periodontitis, teeth discoloration and xerostomia (9, 17).

There are wide differences in the published epidemiological studies about the effect of khat chewing on oral cavity. Concerning its dental effect, Hill CM and Gibson A (1987) claimed reduced dental caries among khat chewers (13). Others concluded increased dental carie, especially the cervical ones, teeth staining and attrition in addition to their mobility (5, 22). Regarding its effect on periodontium, it causes gingivitis, periodontitis, periodontal pocket formation and gingival recession (2, 5, 22). On contrary, other authors proved positive effects of khat chewing, namely less loss of clinical attachment and less pocket depth on the chewing side compared to non-chewing side (13, 21)

and less plaque and calculus indices among khat chewers compared to non-chewers (14).

The aim of this study is to investigate, clinically, the effect of chronic khat chewing on oral mucosae (other than gingiva) and to see if cigarette smoking has additive effect.

Material and method

The study sample consists of 79 Yemeni subjects divided into two main groups, chronic khat chewers (n=54) and control (n=25). The chronicity of khat chewing was defined to be not less than 5 years since starting the habit, not less than 5 days per week and not less than 4 hours per day. The selection criteria of the subjects are male (due to traditional difficulties in finding female sample), systemic diseases-free, no chronic drugs or alcohol users, no shamma (smokeless tobacco) users, do not complain oral mucosal symptoms or use removal dental appliance. For khat chewers, they should chew khat on one side only.

The khat chewers group was subdivided according to chewing duration and smoking into six subgroups, Khat chewers for 5-15 years and non-smokers (n=16, mean age=27.1), Khat chewers for 5-15 years and smokers (n=15, mean age=28.5), Khat chewers for more than 15 years and non-smokers (n=10, mean age=37.6), Khat chewers for more than 15 years and smokers (n=13, mean age=36.8).

The control group was subdivided according to smoking habit into two subgroups: Non-smokers (n=15, mean age =31.9), Smokers (n=10, mean age=28.2).

A comprehensive oral mucosal clinical examination (8, 10) was done by two examiners for both sides (chewing and non-chewing sides regarding khat chewers group and right and left sides regarding control group). The following were the clinical findings the two examiners agreed on and consequently recorded.

1. Whitening: a pale white mucosal color without rough surface on palpation. This is the first stage of keratosis (7).
2. Frictional keratosis: a patch or dens white plaque of rough surface on palpation (7).
3. Mild corrugation: mucosal foldings that disappear on gentle stretching while the subject is relaxed.
4. Sever corrugation: mucosal foldings that do not disappear on gentle stretching while the subject is relaxed.

Statistical analysis was performed by using the SPSS computer program. Differences were considered statistically significant at $p < 0.05$ by using chi-squared (χ^2) test.

Results

The mean age of the subjects was 32.35 years (range 18–71 years). The clinical findings, whatever their types, confined primarily on buccal mucosae, alveolar and mucobuccal fold mucosae and to lesser extent on retromolar pad mucosae. There were no khat chewing-specific findings on the tongue, palate or floor of the mouth.

The percentages of clinical findings on the buccal mucosae of the control subgroups, non-smokers and smokers, were 0 % and 10 % respectively and representing one case of whitening. On contrary the percentages of the clinical findings on the buccal mucosae of the chewing sides of khat chewers subgroups, non-smokers and smokers, were 100 % and 100 % respectively and 15 % and 28.6 % respectively on the non-chewing sides.

The types of these clinical findings on the chewing sides of non-smokers varied according to the duration of khat chewing habit, less or more than 15 years, between whitening (31.3 % and 10 % respectively), whitening with mild corrugation (25 % and 50 % respectively) (Fig. 1), frictional keratosis (25 % and 10 % respectively) (Fig. 2) and frictional keratosis with mild corrugation (18.8 % and 30% respectively). These findings were less varied on the non-chewing sides of the same subgroups where only 18.8 % and 0 % respectively of whitening and 0 % and 10 % respectively of whitening with mild corrugation were present.

Similarly, the types of the clinical findings on the chewing sides of the smokers varied according to the duration of khat chewing habit, less or more than 15 years, between whitening with mild corrugation (20 % and 23.1 % respectively), frictional keratosis (13.3 % and 7.7 % respectively), frictional keratosis with mild corrugation (66.7 % and 46.2 % respectively) and frictional keratosis with sever corrugation (0 % and 23.1 % respectively). These findings were less va-

ried on the non-chewing sides of the same subgroups where only 33.3 % and 7.7 % respectively of whitening and 0 % and 7.7 % respectively of frictional keratosis were present.

There was no statistically significant difference when comparing the frequency of the clinical findings between right and left sides of the control subgroups, smokers and non-smokers, ($p > 0.05$) while the difference was statistically significant between chewing and non-chewing sides of khat chewers subgroups ($p = 0.000 - 0.002$). There was no statistically significant difference, regarding to frequency of the clinical findings, when comparing smokers and non-smokers of different subgroups and also when comparing khat chewing duration, less or more than 15 years ($p > 0.05$). The statistical difference was highly significant ($p = 0.000$) when comparing chewing sides of khat chewers with both sides of control group whatever the smoking habit was. On the other hand, no statistical difference was found between non-chewing sides of khat chewers and both sides of control group ($p > 0.05$) whatever the smoking habit was.

The second main site, even to less extent, that the khat chewing-specific findings were confined to was the vestibular and mucobuccal fold mucosae where (100 % and 73.3 %) and (60 % and 43.7 %) of the khat chewers had clinical findings on chewing side of smokers and non-smokers according to khat chewing duration respectively whereas only 6.7 % (one case) of clinical findings were present on non-chewing side of smoker and khat chewer for less than 15 years. The statistical differences that were found when comparing the frequency of clinical findings on buccal mucosae of different subgroups (according to different variables) equally applied to the frequency of clinical findings on vestibular and mucobuccal fold mucosae.

A 75.9 % of khat chewers group were chewing khat on the left side.

Discussion

Chronic khat chewing causes white lesions that range between whitening, as the least effect seen clinically, to frictional keratosis with sever corrugation, as the worst effect seen clinically. These lesions confined primarily to buccal mucosa and to less extent to vestibular and mucobuccal fold mucosae. The way of khat chewing, accumulation of khat bolus against buccal and vestibular mucosae, illustrates why the clinical findings are nearly exclusively confined to these mucosae and this is in agreement with Gorsky M *et al* (11). There is no statistical difference between smokers and non-smokers regarding presence of such lesions as Gorsky M *et al* concluded (11). The statistical differences between chewing and non chewing sides of either smokers or non smokers and the low or absence of clinical findings in the control group, smokers or non smokers equally, confirm such conclusion. Such lesions could be attributed to the continuous friction of khat against mucosae during khat chewing sessions. The chemical composition of khat might play a role. This explanation is in agreement with previous



Fig. 1: Whitening with mild corrugation of the buccal mucosa on the khat chewing side.



Fig. 2: Frictional keratosis of the buccal, vestibular and mucobuccal fold mucosae on the khat chewing side.

studies (2, 3, 5, 11, 22). These lesions intensify with increased duration and frequency of khat chewing (3).

In this study we aimed to evaluate the chronic khat chewing effect on oral mucosa and not the prevalence of khat-induced oral lesions as other authors did (2, 3, 13). That is why the percentages of the frequency of the clinical findings in this study were high compared to 22.4 % (3), 23.5 % (2) and 50% (13) in the mentioned studies. Other non-epidemiological studies revealed close percentages to ours, namely 77 % (22) and 83 % (11). Regarding the types of clinical findings, this study disagrees with other studies that diagnosed them as khat related leucoplakia (11) or true leucoplakia (2, 3). World health organization defined leucoplakia as a white lesion that can not be diagnosed clinically or histologically as any other lesion and can not be attributed to a well defined cause (6).

The corrugation can be attributed to continuous stretching of muscular and collagen fibers during khat chewing sessions. It is found that khat chewing causes facial asymmetry due to hyperplasia of masseter muscle on the chewing side (5, 22).

Al-Hebshi NN and Skaug N (1) mentioned that 67 % of khat chewers chew on the left side. This is close to the result of this study, 75.9 %, and that might be explained as habitual.

Conclusion

Chronic khat chewing causes oral white lesions that confined to the chewing side of the mouth and it is found that smoking, clinically, does not exacerbate such lesions.

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