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RESEARCH BRIEF

The impact of qat (*Catha edulis* Forsk) chewing frequency on status of chronic periodontitis

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Abstract

Background: Chronic periodontitis occurs due to the reaction between bacterial components of dental plaque and the humoral and cellular host immune productions, such as cytokines and inflammatory mediators. **Aim:** The aim of this study is to evaluate the impact of qat (*Catha edulis* Forsk) chewing frequency on the status of chronic periodontitis. **Materials and Methods:** A total of 30 patients with chronic periodontitis were selected for this study and they were divided on the basis of qat chewing habits frequency into three equal groups, i.e., non qat chewing group (control group), qat chewing once daily and qat chewing twice daily. Plaque index (PLI), gingival index (GI), and Clinical attachment loss (CAL) were recorded. Gingival biopsies were obtained from selected site for assessing histopathological changes. The data were collect and analyzed by ANOVA test. **Results:** There were significant differences in PLI, GI, and CAL between qat chewing patients groups compared to non qat chewing patients group (control group). Histopathological study showed increased inflammatory cells in qat chewing patients groups compared to non chewing patients group. **Conclusion**: There was increased severity of chronic periodontitis with increased frequency of qat chewing habit daily there is a significance differences in clinical and histopathological findings between the patients in Group II and Group III (study groups) compared to Group I (control group). **Clinical Significance:** The current study reveal that the severity of chronic periodontitis may be increased with increased qat chewing frequency due to its traumatic effect on periodontal tissues.

Keywords: Chronic periodontitis, clinical attachment loss, dental plaque, frequency, plaque index, qat chewing

Introduction

Chronic periodontitis is chronic inflammation in the supporting tissues of the teeth created by particular bacteria, leading to destruction of periodontal tissues with periodontal pocket or gingival recession formation or both.[1]

Bacterial colonization and development on supra- and subgingival tooth surfaces cause chronic inflammatory reactions in periodontal tissues.[2]

Various researches have shown varieties in the number or potentially thickness of lymphocyte subpopulations and in the quantity of plasma cells in various phases of chronic periodontitis. While T lymphocytes are the main chronic inflammatory cells in the early stage of periodontal diseases, B lymphocytes and plasma cells are the main chronic inflammatory cells in the advanced stage of periodontal diseases.[3]

Furthermore, lymphocytes, monocytes, and neutrophils were detected in healthy gingival specimens. The counts of monocytes, lymphocytes, and neutrophils were 2-3%, 1-2%, and 95-97%, respectively. Increased quantities of leukocytes were detected in chronic gingivitis. The results of this research revealed that there was a significant difference between chronic gingivitis and healthy gingival tissues.[4]

Qat is a *Catha edulis* naturalistic stimulating plant that is widespread culturing in Yemen and other countries in East of Africa. The small shoots and soft leaves of qat are chewed to gain energizing and euphoria effects.[5] Furthermore, at is a small evergreen tree that has leaves with an aromatic odor, slightly sweet, and with astringent taste. It is a strong plant, seedless, and culturing in different environments both on ground and at high altitudes. Qat is plant that is reaped during the year to gain constant funding.[6]

Recently, a cross-sectional study discovered that qat chewing caused destruction of periodontal tissues which was clinically observed as gingival recession and/or periodontal pocket formation.[7] In another study, on oral health which was conducted by Al-Sharabi (2002), he found that qat chewing is a risk factor of temporomandibular joint click, xerostomia, and periodontal disease.[8]

These results agree with the previous studies on periodontal status among Yemenis using the community periodontal index of treatment needs index of periodontal treatment need which concluded that there is increased periodontal destruction with increased qat chewing habit.[9] Hence, this study was designed to evaluate the impact of qat (*C. edulis* Forsk) chewing habits frequency of chronic periodontitis.

Materials and Methods

Patients selection

A total of 30 patients with chronic periodontitis and without systemic diseases were selected from Outpatients Clinics of Periodontics at the College of Dentistry, King Khalid University. For participation in this study a consent of patent was taken in the begining of patients interview and and they were divided according to qat chewing habits frequency into three equal groups, i.e., non qat chewing group (control group), qat chewing habit once daily, and qat chewing habit twice daily, all in the age groups ranging between 25 and 50 years. Patients with qat (*C. edulis* Forsk) chewing history since 1 year or more were considered in the study groups and the patients with no history qat (*C. edulis* Forsk) chewing at any time in their lives were considered as a control group.

Periodontal examination

Plaque index (PLI) of Silness and Loe[10]

The index was assessed the dental plaque accumulation according to index criteria:

0 - No plaque.

1 - A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen *in situ* only after application of disclosing solution or using the probe on the tooth surface.

2 - Moderate accumulation of soft deposits within the gingival pocket, or the tooth, and gingival margin which can be seen with the naked eye.

3 - Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.

Gingival index (GI) of Loe and Silness[11]

The index was assessed the severity of gingivitis and its location in four possible areas the gingival tissues according to index criteria:

0 - Normal gingiva.

1 - Mild inflammation, slight change in color, slight edema, and no bleeding on probing.

2 - Moderate inflammation, redness, edema and glazing, and bleeding on probing.

3 - Sever inflammation, marked redness and edema, ulceration, and tendency toward spontaneous bleeding.

Clinical attachment loss (CAL) were recorded [Figure 1]

Histopathological investigation

Biopsies were taken and transferred to a bottle containing 50% formo-alcohol (50 mL of 10% formalin and 50 mL of alcohol) and kept for 24 h for fixation. Slides were prepared by a standard histological technique using hematoxylin and eosin stain. All the slides were viewed under compound microscope attached with a micrometer scale at ×20 (objective) magnification to which a camera was attached. Four views of each slide were then photographed with the scale adjusted for each photograph. These photographs were the transferred to a computer and were assessed. Numbers of inflammatory cells were evaluated [Figure 2].

Statistical analysis

All data were collected and analyzed by ANOVA test to test the changes of study samples according to qat (*C. edulis* Forsk) chewing frequency.

Figure 1: Clinical examination

Figure 2: Periodontal findings

Results

Table 1 summarize patient distribution according daily frequency of qat chewing habit. In Group II there were increased in patients qat (*C. edulis* Forks) chewing history 6-10 and 11-15 years and more than 1-5 and >15 years compared to Group III where there were increases in patient number had qat (*C. edulis* Forks) chewing history 6-10 and >15 years and more than 11-15 and >15 years.

The clinical finding is summarized; in Table 2 and Figure 3, there were significance differences between Groups II and III in PLI, GI, and CAL compared to Group I ($P < 0.05$).

There were increases in PLI and GI value in the control group, compared to the study group, due to the self-cleaning during qat (*C. edulis* Forsk) chewing; but PLI and GI were more value in Group II more than Group III due to increased daily frequency and self-cleaning of qat chewing. On the other hand, the CAL value was higher in study group patients than control group patients due to the traumatic effect of qat (*C. edulis* Forsk) chewing against periodontal tissues, and it was more in Group III than Group II due to increased qat chewing daily frequency in Group III more than Group II. In Table 3 and Figure 4, there was increased chronic inflammatory cell numbers in control group patients more than study groups, due to increased amount of bacterial plaque, but it was more in Group II than Group III patients.

Discussion

Qat chewing habit is a common in disintegration of oral health. Oral hygiene problems such as gingival hemorrhage, halitosis, trouble with mouth-opening and swallowing, traumatic effect, and the burning sensation in the soft tissues were more frequent among qat chewers than non qat chewers,[12] in addition there was association between qat chewing habit and increase of gingival bleeding according to Hill and Gibson study.[13] The poor status of periodontal tissues and oral mucosa among of qat chewers was due to the hardness of the qat and friction impact of qat chewing habit.[14] On the other hand, alkaloids content and presence of pesticides in the leaves of qat may cause halitosis and gingival hemorrhage in addition to gingival pigmentation and teeth staining in the chewing side due to the effect of chemical components in the qat leaves.

This study indicated deterioration of periodontal tissues among qat chewers with increased qat chewing daily frequency compared to non-chewers patients (control). PLI and GI were more in control group than study groups due to the self-cleaning and they decreased with increased qat chewing habit daily frequency of qat chewing habit whereas CAL were more prevalent among chewers than nonchewers and it increased with increased qat chewing habit daily frequency due to the traumatic effect of qat chewing habit.

Table 1: Distribution of daily frequency qat (*Catha edulis* Forsk) chewing habit

Study groups	Qat chewing habit duration (year)			
	1-5 (%)	6-10 (%)	11-15 (%)	>15 (%)
Group II	2 (20)	3 (30)	3 (30)	2 (20)
Group III	2 (20)	3 (30)	2 (20)	3 (30)

Table 2: Mean±SD of clinical parameters

Groups	PLI	GI	CAL
Group I (control)	1.44±0.22	1.9±0.41	2.8±0.29
Study groups			
Group II	1.3±0.23	1.77±0.11	3.51±0.84
Group III	1.06±0.45	1.06±0.52	5.08±0.47

PLI: Plaque index, GI: Gingival index, SD: Standard deviation, CAL: Clinical attachment loss

Table 3: The mean±SD of number of chronic inflammatory cells

	Group I	Group II	Group III
Number chronic inflammatory cells	91.07±3	88.35±6.3	75.51±4.7

SD: Standard deviation

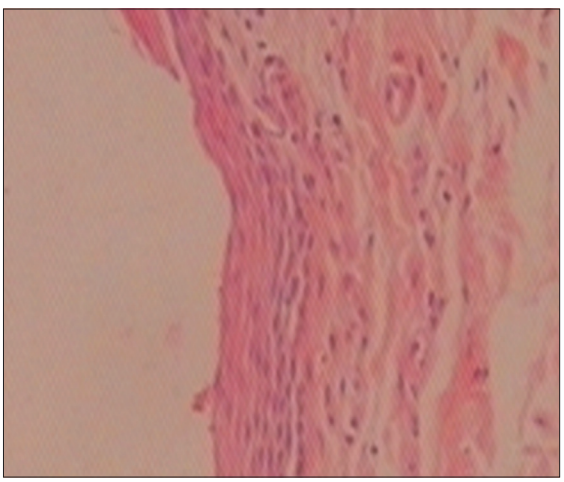

Figure 3: Histopathological investigation

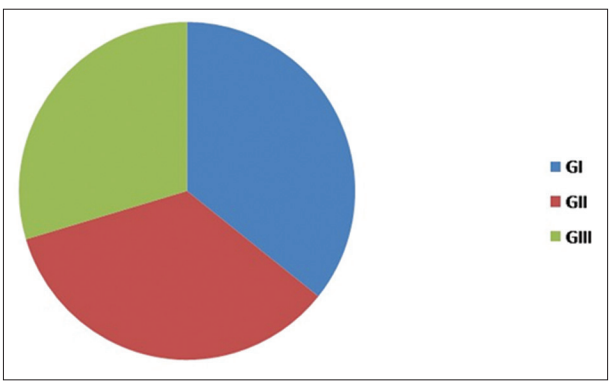

Figure 4: Number of chronic inflammatory cells

Periodontal diseases histological samples contain mostly neutrophils and lymphocytes but lymphocytes predominate in the established chronic lesion, the amount of plasma cells and B cells are more in the advanced lesion.[15]

The pesticides in qat leaves may be cytotoxic to periodontal fibroblasts and hence, intensify previous inflammatory periodontal disease and also disable periodontal reattachment.[16] Nicotine metabolites in smoking with qat chewing can increase in the periodontium and their influence such as vasoconstriction, and weakness of polymorphs, and macrophages. The quantities of neutrophils in blood stream are higher, and their migration through capillary walls due to tobacco utilize.[17]

In the study that was conducted by Ali *et al.* on 40 oral mucosal biopsies were taken from the buccal mucosa on the side preferred for qat chewing; 20 biopsies were taken from the opposite side and 10 biopsies from the buccal mucosa of a non qat chewing control group there were histopathological changes in oral mucosa induced by qat chewing, these changes showed no evidence of malignancy.[18] Furthermore, in another researches, there were histopathological changes in the oral mucosa associated with qat chewing such as hyperkeratosis, abnormal rete ridges, and acanthosis without carcinogenic changes.[19] In our study, there were increased in number of chronic inflammatory cells in non qat chewers patients groups samples compared to chewers patients samples, but the number of chronic inflammatory cells were more in Group II than Group III may be due to the impact of tobacco smoking with qat chewing habit.

Conclusion

Based on the results of this study it was concluded that there was increase in PLI and GI in control group patients than study groups due to the self-cleaning of chewing habits against dental plaque. In the study groups, there was increased in CAL more than control group patients due to the mechanical influences of qat chewing habits against periodontal tissues, and there were increase in number of chronic inflammatory cells in control group more than study groups due to increased PLI in control group.

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