



ASSESSING THE IMPACT OF KHAT CHEWING HABIT ON THE PERIODONTAL TISSUE STATUS AMONG DENTAL OUTPATIENT AT JIMMA UNIVERSITY SPECIALIZED HOSPITAL, DENTAL CLINIC

**BY
SEID NURHUSSEN
(DENTAL INTERN)**

A RESEARCH PAPER TO BE SUBMITTED TO THE STUDENT RESEARCH PROGRAM, DEPARTMENT OF DENTISTRY, COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICAL DENTISTRY (DMD)

JUN, 2013

JIMMA, ETHIOPIA

JIMMA UNIVERSITY
COLLEGE OF MEDICAL SCIENCE AND PUBLIC HEALTH
DEPARTMENT OF DENTISTRY
ASSESSING THE IMPACT OF KHAT CHEWING HABIT ON THE
PERIODONTAL TISSUE STATUS AMONG DENTAL OUTPATIENT AT
JIMMA UNIVERSITY SPECIALIZED HOSPITAL,DENTAL CLINIC

ADVISORS: - Dr. AbebeTeka(OMFS Resident)

Jun, 2013

JIMMA, ETHIOPIA

ABSTRACT

BACKGROUND: - Chat (*Catha edulis*) is a natural stimulant from the *Catha edulis* plant, found in the flowering evergreen tree or large shrub of Celastraceae family, which grows mainly in Yemen, Ethiopia, Somalia, Kenya, Saudi Arabia, and at high altitude areas in South Africa and Madagascar. The habitual use of chat renders a certain influence on mental health and physical status of human being. On the oral cavity it has got different effects such as TMJ problem and attrition due to continuous mastication for a long period of time. On the periodontal tissue it can cause gingival recession (GR) clinical attachment losses (CAL).Khat chewing has also related with oral cancers and may have allergic reaction to the gingiva or plasma cell gingivitis.

OBJECTIVES: -to assess the impact of khat chewing on the periodontal tissue status among the dental outpatient at JUSH.

METHODS:-cross sectional study was conducted by convenient sampling technique. A total of 92 subjects (73.91male and 26.09% female) were involved. Socio demographic data was collected using well designed questionnaire and clinical data on periodontal, oral hygiene, gingival bleeding, and burning sensation in the soft tissue; halitosis and ulceration in the oral cavity were collected to evaluate periodontal condition. Manual data analysis and Chi-square test were employed.

RESULT:-The majority of khat chewers had poor oral hygiene in 48(52.17%). The percentage of gingival recession 57 (61.95%) were higher than others periodontal variable. About 70 (76.08%) of the subject complained gingival bleeding. Furthermore, 60 (65.21%) of chewers had halitosis and 48(52.17%) had burning sensation of soft tissue. Similarly, ulcers on oral mucosa were present in about 22 (23.91%) and xerostomia in about 25 (27.17%) of khat chewers.

CONCLUSION:-There does appear to be relationship between effect of khat chewing on periodontal tissue and oral hygiene status.

Key terms: -khat, *Catha edulis* and periodontium

ACKNOWLEDGEMENT

First of all I would like to thank the supreme Lord Allah (SWA) for helping me to attain such a success, and I would like to express my deepest & heartfelt thanks to my advisers Dr Abebe Teka for his valuable and priceless advice & support in preparing & modification this paper. My gratitude also goes to Jimma University that provided me opportunity to perform this research.

TABLE OF CONTENTS

CONTENTS	PAGE
ABSTRACT	III
TABLE OF CONTENTS.....	V
LIST OF TABLES	VII
LIST OF ABBREVIATIONS.....	VIII
CHAPTER ONE	1
1. Introduction.....	1
1.1 Background.....	1
1.2 Statement of the problem	4
CHAPTER TWO	6
2.1 LITERATURE REVIEW	6
2.2 Significance of the study.....	11
CHAPTER THREE	12
3.1. General objective	12
3.2 Specific objectives	12
CHAPTER FOUR.....	13
4. Methods and materials	13
4.1 Study Area and study period.....	13
4.1.1. Study area.....	13
4.1.2. Study period	13
4.2. Study Design.....	13
4.3. Population	13
4.3.1. Source population	13
4.3.2. Study Population.....	13
4.4 Sample size determination and sampling technique	14
4.4.1 Sample size	14
4.4.2. Sampling technique.....	14
4.5. Inclusion and exclusion criteria	14
4.5.1. Inclusion criteria	14
4.5.2 Exclusion criteria	14
4.6 Measurement variables	15
4.7. Data collection process and instrument	15

4.7.1. Data collection technique.....	15
4.7.2. Instrument	15
4.8. Data analysis	15
4.9. Data quality control.....	15
4.10. Ethical consideration.....	16
4.11 Limitation.....	16
4.12. Operational definition	17
4.13 Dissemination of findings	18
CHAPTER FIVE	19
RESULTS	20
CHAPTER SIX.....	24
DISCUSSION	24
CHAPTER SEVEN	27
7.1 CONCLUSION AND RECOMMENDATION.....	27
7.2 CONCLUSION.....	27
7.3 RECOMMENDATION	28
REFERENCES	29
ANNEX-I.....	36

LIST OF TABLES

Table 1 Socio-demographic characteristic of khat chewer dental outpatients of JUSH; Dental Clinic, 2013.G.C.....	18
Table 2.Chat chewing practice among dental outpatients of JUSH; Dental Clinic, 2013.G.C	19
Table 3.the distributions of smoking habit of khat chewers, dental outpatients of JUSH; Dental Clinic, 2013.G.C	21
Table 4. Periodontal variable in among chat chewer dental outpatients of JUSH; Dental Clinic, 2013.G.C	22
Table 5. the distribution of duration of start of chat chewing and complaints of dental outpatients of JUSH; Dental clinic, 2013GC.....	23

Graph

<u>Table 1.oral hygiene status of chat chewer dental outpatients of JUSH; Dental Clinic, 2013.G.C...</u>	21
--	----

LIST OF ABBREVIATIONS

BOP: - Bleeding up on probing

CAL: - Clinical attachment loss

CBE:-Community Based Education

CPITN: - Community periodontal index and the treatment needs

GR: - Gingival Recession

OSCC: - Oral squamous cell carcinoma

CHAPTER ONE

1. Introduction

1.1 Background

Khat (*Catha edulis*) is a natural stimulant from the *Catha edulis* plant, found in the flowering evergreen tree or large shrub of the Celastraceae family, which grows mainly in Ethiopia, Kenya, and Yemen and at high altitude areas in South Africa and Madagascar (1).

The plant is known by different names in different countries: Khat in Ethiopia, Qat in Yemen, Mirra in Kenya and Qaad or Jaad in Somalia, but in most of the literature it is known as Khat. In khat growing countries, the chewing of khat leaves for social and psychological reasons has been practiced for many centuries and its use has been gradually expanded to many countries worldwide (1,2).

Modern users report that chewing khat gives increased energy levels, alertness and confidence, a sense of happiness, better thinking capacity and creativity, facilitation of communication ability, enhanced imaginative ability and the capacity to associate ideas. For some, chewing khat is a method of increasing energy and elevating mood in order to improve their work performance (3).

The active ingredient of khat responsible for its psycho stimulant effect is an alkaloid chemical known as cathinone, which is structurally and chemically similar to d-amphetamine, and cathine, a milder form of cathinone. Cathinone is a highly potent stimulant, which produces sympathomimetic and central nervous system stimulation analogous to the effect of amphetamine. Fresh leaves contain both ingredients; those left unrefrigerated beyond 48 hours would contain only cathine, which explains users' preference for fresh leaves. Khat loses its potency after 48 hours. The results of various *in vivo* and *in vitro* experiments indicate that the substance could be considered as a "natural amphetamine" (1,4).

In Ethiopia, khat is commonly used for social recreation. Occupational groups such as motor vehicle drivers, truck drivers, who

chew khat during long distance driving, to keep awake, also use it under a variety of other conditions. A significant number of students chew khat to be alert especially during examination periods. There is also specific usage of khat by the special sections of the community: craftsmen and farmers use khat to reduce physical fatigue and traditional healers to heal ailments(5,6).

Although khat has an extreme social nature (individual feelings of sociability in social gatherings), it influences physical and psychological functions. Its psychic influence depends on its active ingredients that have astimulating and euphoric effect. And the medical and psychosocial effects of khat chewing depend on its capacity to lead to dependency (addiction) and to specific physical and behavioral effects, including socio economicconsequences for individuals and the community (7).

A common effect of khat use is insomnia, a condition that the users sometimes try to overcome with sedatives or alcohol. The withdrawal symptoms after prolonged khat use seem to be limited, however, to lethargy, mild depression, slight trembling and recurrent bad dreams. An important consideration is that, khat use may endanger health in that the resulting anorexia leads to malnutrition and thereby to increased susceptibility to infectious diseases (5).

The recent sharp increase in khat consumption may not only affect the health of individuals but could also have serious socio-economic consequences for the countries involved. The potential adverse effect is diversion of income for the purchase of khat, resulting in neglect of the needs of the family, leading to family discord and divorce. Furthermore, in countries where its use is substantial, it may negatively affect the economy since productivity is reduced in quantity and quality as the result of absenteeism and after-effects of the drug (8).

Prevention of drug/substance abuse presents a complexproblem to educators, public health authorities and law enforcement agencies in Ethiopia. Lack of awareness of the problem of drug/substance abuse

on the part of lawmakers who could enforce preventive measures seems at the root of the difficulties in dealing with it. To assist policy formation for coping with all forms of drug abuse in specific risk groups and the general population of Ethiopia, epidemiological studies are needed to identify risk groups and patterns of drug use behavior (9).

The present study was thus undertaken to determine the prevalence and socio-demographic picture of khat chewing and its correlates among the staff of technical in Jimma Hospital and the academic staff of Jimma University so that it can be used as a baseline for subsequent study in teaching institutions.(9)

1.2 Statement of the problem

Adverse effects of chat chewing on oral-dental tissues were first observed 50 years ago with inflammatory change (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 has been observed among Yemeni male qat chewers. Mouth dryness, common following qat chewing, might be due to the sympathomimetic effect of Cathinone and/or to excess secretion of saliva during chewing(6).

As a consequence of its mode of consumption khat affects the oral cavity and the digestive tract . A high frequency of periodontal disease has been suggested as well as gastritis and chronic recurrent subluxation and dislocation of the temporomandibular joint(5).

In the recent cross sectional study it was found chat chewing cause loss of periodontal attachment present either an increased pocket depth or gingival recession. From an oral point of view, chewing of chat is proposed to increase the risk factor of periodontal disease, temporomandibular joint click and xerostomia.(7)

Studies show that there is strong relationship between chat chewing and oral cancers. Most squamous cell carcinoma of of studied patient was located on the buccal mucosa and lateral side of the tongue. Even though there is no significant relationship between chat chewing and oral leukoplakia recent oral keratocytic lesion (precancerous) and plasma cell gingivitis (allergic reaction to chat) can be seen.(9)

Recently a cross sectional hospital study based among Yemeni chat and non-chat chewers has confirmed that qat chewing caused many lesions to the supporting structures of the teeth, namely gingivitis, periodontal pocket formation, gingival recession, tooth mobility and tooth mortality. Qat chewing caused clicking and pain in the temporomandibular joints and led to attrition and staining of teeth and cervical caries particularly among crystallized sugar consumers. Qat chewing results in mouth dryness, enlargement of salivary glands, inflammation and folding of the parotid papilla at the site of qat chewing. Qat chewing also caused obvious facial asymmetry.(7)

Studies show that there is strong relationship between chat chewing and oral cancers. Most squamous cell carcinoma of studied patient was located on the buccal mucosa and lateral side of the tongue. Even though there is no significant relationship between chat chewing and oral leukoplakia recent oral keratocytic lesion (precancerous) and plasma cell gingivitis(allergic reaction to chat) can be seen(9).

In a house-to-house survey held in 1997, 1200 adults from a rural Ethiopian community were interviewed to determine the prevalence of khat chewing and to find associations with health, social functioning, and economic well being. Prevalence of khat use was 32%. Significant associations of khat use were found with physical illness, injuries, undernutrition, and mental distress. Mental distress was higher among frequent and daily users and among those who chewed khat for more than two years. In addition, sleep disturbances were significantly higher among khat users than among non-users. Social functioning, economic well-being, and problem drinking were not associated with khat use (18).

CHAPTER TWO

2.1 LITERATURE REVIEW

The habit of chewing chat leaves dramatically increasing in the world but most commonly chewed in the south west part of Arabian Peninsula and east African countries like Ethiopia, Djibouti, Kenya, Somalia, Tanzania and Uganda(3).

The study that was conducted in Yemen found the result incidence of gingival bleeding was significantly higher in khat-chewers than in non-chewers, and more chewers (58%) had halitosis. About 23% of chewers complained of difficulty in mouth-opening, as compared with only about 1% of non-chewers. Furthermore, 10% of chewers had difficulty in swallowing solid food, whereas none of the non-chewers had this problem. A burning sensation in the soft tissues was also found in a higher proportion of khat-chewers than in non-chewers. Similarly, ulcers on the oral mucosa were present in about 7% of chewers, as compared to 0.5% of non-chewers(7).

In Yemen the different oral hygiene measures practiced routinely by the khat-chewers and non-chewers. The data show that quite a large number of khat-chewers (88%) and non-chewers (91%) used paste regularly for maintenance of oral hygiene. However, 9% of chewers did not use toothpaste, as compared to 5% of non-chewers. There was no significant difference between khat-chewers and non-chewers with respect to oral hygiene measures used. About 49% of non-chewers had good oral hygiene status, as compared to only about 15% of khat-chewers. The oral hygiene status of non-chewers was significantly better than that of chewers. Poor oral hygiene status was also realized in a higher proportion of khat-chewers (18%) than in non-chewers (11%).(7)

A case report revealed chat induced plasma cell gingivitis which disappears after discontinuation of chat chewing. This case report also indicates possible synergistic effects of chat in development of OSCC of the floor of the mouth plus relevance of good social history to the patient's ethnic background (3).

In a recent cross-sectional study it was found that chat chewing caused loss of periodontal attachment presenting either as an increased pocket depth or gingival recession. From the context of oral health, chewing chat increases the risk of periodontal disease, temporomandibular joint click and dry mouth(5)

A result obtained from one study indicates that chat chewing increased the prevalence or levels of a number of periodontal health-associated species of bacteria, while it did not influence and, in some cases, decreased those of periodontal pathogens. It is concluded that chat chewing does not seem to induce a microbial profile that would put the periodontium at risk of developing disease. It rather favours the presence of species that are compatible with periodontal

health. This may be due to selective antimicrobial properties of chat. It has also tannin with cariostatic properties (6)

Chat leaves are generally placed in the mouth in the lower distal mucobuccal fold and are chewed during social-cultural gatherings, creating a noticeable pouch, where the duration of chewing may usually last up to several hours at a time (13).

There are so many literatures on chat but only four investigated the effect of chat chewing on periodontal health. Epidemiological investigation on possible association between chat and periodontal disease reported conflicting results. Two studies indicated no detrimental effect and suggested beneficial influence on the periodontium but a large study concluded that chat chewers had more clinical attachment loss than non-chewers a finding that was significant only for 12-24 years age groups one of these studies in addition showed a lower prevalence of caries among khat chewers. The effect of khat on oral mucosa includes frictional keratosis, genotoxicity and possible malignancy. Chewing khat also favours gingival recession because during chat chewing those with prolonged mastication and this prolonged mastication will lead to gingival recession.(3)

From August to September 1991, the periodontal status of 1001 Yemenites representing age groups 12-14, 15-19, 20-24 & 35-44 years was recorded and evaluated with performance of CPITN the calculus index and clinical attachment level the impact of chewing chat, the leaves of cultivated alkaloid shrubs of using the traditional chewing stick for oral hygiene purposes when investigated. The results show that 69% of youngs (13-29) years had healthy periodontal tissue, whereas BOP & calculus were registered in 33-44 years age group. 84.5% have shallow pocketing and 12.5% had deep pocketing. Clinical attachment level and calculus index revealed, age related attachment loss and calculus formation. Oral hygiene aids have also an influence on periodontal status with tooth brushing providing more efficient hygiene than using stick. WHO efforts directed toward prophylaxis programs to be intensified(3)

Study in Yemen shows, An effect of khat-chewing on the periodontium, i.e., the occurrence of periodontal pockets, gingival lesions and gingival recession, was observed clinically. Periodontal pockets, occurrence of gingival lesions, as well as gingival recession also had a higher incidence in khat-chewers than in nonchewers. Gingival recession was present in about 51% and 26% of chewers and non-chewers, respectively. On the other hand periodontal pocket was present in about 55% of chewers and 31% non-chewer, respectively. Gingival lesion was present in about 6% of chewers and 1% non-chewer, respectively. Logistic regression analysis also showed significant odds ratios for these conditions for chewers as compared with non-chewers. This analysis showed that khat-chewers are at higher risk for the various conditions studied, irrespective of sex, indicating a causative role of khat in periodontal diseases(7).

A study conducted to determine the periodontal status of a population in the Yemen, concluded that higher chat consumption correlates with an increased detrimental effect on the periodontium using the Community periodontal index and the treatment needs (CPITN). Conversely, a microbiological based study, which looked at periodontal bacteria in sub- and supragingival bacteria, concluded that chat chewing is not detrimental to the periodontium, whilst a further study found no significant clinical difference in oral hygiene between chat chewers and non chat chewers(2).

Whilst chat in itself is considered to be non-cariogenic, the high consumption of sugary drinks and concomitant use of sugar tablets to counteract the bitter taste of chat can lead to cervical caries. A further case report highlights the possible synergistic effect of chat in the development of OSCC(oral squamous cell carcinoma) of the floor of the mouth. These case reports highlight the importance of eliciting a good social history relevant to the patient's ethnic background on initial presentation of any intraoral changes(11).

One of the most important considerations from an oral health point of view is the relationship between chat chewing and the development of oral cancer (OSCC) and pre-malignant lesions. Chat chewing has been associated with an increased rate of oral cancer. Soufiet *al.* speculated that there may be a link between chat chewing and oral malignancies. In some of the cases in the study, the malignant lesion developed at the site where the chat bolus was held. All subjects in this small retrospective study were non-smoking chat chewers. A further retrospective survey undertaken in the Yemen looked at 649 cases of primary malignant tumours.(14,17)

Even though this study found that OSCC was the most prevalent of all cancers (18.3%) occurring in this group, there was a significant occurrence of simultaneous tobacco consumption in these patients. This makes it difficult to deduce the precise role played by chat in the high prevalence of OSCC. Furthermore, the presence of dietary deficiencies, from a low fruit and vegetable intake, may predispose towards the development of oral cancers and this was not taken into consideration. However, this study correlates well with the findings of another study that found the practice of chat chewing was prevalent in patients with head and neck OSCC in Southern Arabia (9).

One study found that half of chat chewers develop oral leukoplakias. This becomes a significant finding if we are led to believe that such lesions become cancerous in 2-12% of these patients as concluded in some studies. In contrast, Macigoet *al.* undertook a relative risk assessment, looking at the association between oral leukoplakia and use of tobacco, alcohol and chat in Kenya and concluded there was no association between oral leukoplakia and chat, whereas chat chewing, as mentioned above, has been reported to induce oral

keratotic white lesions, but unlike tobacco use and chewing of betel nut, no direct association between the white oral mucosal lesions in chat users and development of oral malignancy was identified. Studies focusing on other socio-cultural practices showed that the prevalence of oral cancer and other precancerous lesions such as oral leukoplakia in the Yemen was related to shammah use (traditional smokeless tobacco), which is a widely practised habit in the population that also use chat(17).

Ali *et al.* looked at histopathological changes in oral mucosa induced by chat chewing. Forty oral mucosal biopsies were taken from the buccal mucosa on the side preferred for chat chewing; 20 biopsies were taken from the opposite side and ten biopsies from the buccal mucosa of a non chat chewing control group. Even though histopathological changes were seen in the oral mucosa on the chewing side, these changes showed no evidence of malignancy. Another study also reported histopathological changes in the oral mucosa associated with chat chewing. These included acanthosis and hyperkeratosis but no evidence of carcinoma.(13)

The simultaneous use of tobacco consumption is a confounder in many of these studies. However, there are some studies where oral white lesions were found in chat chewers who were not smokers. Indeed the prevalence of such lesions and their severity correlated with duration and frequency of chewing, suggesting a possible dose response relation, as seen in other risk factors for oral white lesions, such as areca nut use(13,17).

The effect of a common habit among Yemeni population on the periodontal status was investigated. This cross-sectional study was done on 2500 Yemenis with mean age 27.01 years (1818 males and 682 females). Among these 1528 were chat chewers and 972 were non-chewers. Detailed questionnaire and pre-designed scoring system for the periodontal status were employed for each case. Study results indicated that out of 972 non-chewers 116(12%) had periodontal pocketing and 18 (1.9%) cases had gingival recession. On the other hand, out of 1528 chewers, 468 (31.8%) had periodontal pockets and 98 (6.4%) with gum bleeding, $p < 0.05$. These effects were found to increase with increased frequency and duration of chewing. It was concluded that habit of chat can cause damage to the periodontal ligament as pocketing and gum recession(12).

A cross sectional study was conducted in January 2001 in the four colleges found in North West Ethiopia. The study revealed 13.1 % life time prevalence rate of cigarette smoking and 26.7 % life time prevalence rate of chat chewing . The current prevalence of cigarette smoking was found to be 8.1 % and that of chat chewing 17.5 %. Forty six (31.7 %) of the life time smokers and 134 (45.6 %) of the life time chewers started smoking and chewing while they were senior secondary school students. Lung diseases including lung cancer were mentioned as health risk of cigarette smoking by 904 students(8) .

To study the association of chat chewing with the occurrence of oral cancer, the frequency of oral cancer among whole body cancers and the patients' histories of tobacco consumption and chat chewing were examined in Yemen where chat chewing has been most popular. All primary malignant tumors listed in the surgical pathology files at Al-Thawra Hospital, University of Sana'a, in the year 2004 were analyzed, and the patients' histories of tobacco consumption and chat chewing were examined. A total of 649 cases of primary malignant tumors (348, 53.6% males and 301, 46.4% females) were extracted (8). Oral cancer was the most frequent body cancer in both males (17.2%) and females (19.6%). Squamous cell carcinoma (SCC) was the most frequent oral cancer (84%), and the tongue (42%), gingiva (23%) and buccal mucosa (20%) were the most common sites. Among the 119 patients with oral cancer, information on chewing habits and smoking was obtained in 92 patients (77.3%). There were 70 tobacco chewers (76.1%), 55 chat chewers (59.8%), and 22 smokers (23.9%). Simultaneous chewing of tobacco and chat was found in 48 cases (52.2%). The present survey has disclosed for the first time that oral SCC is the most frequent cancer in this study area in Yemen, and that the high relative frequency of oral SCC may be related to the habits of chewing tobacco and chat (14).

2.2 Significance of the study

The consumption of the stimulant leaf chat (*Catha edulis* Forsk) is widespread in several countries of East Africa and the Arabian Peninsula. The leaf comes from a small evergreen shrub that can grow to the size of a tree. Young buds and tender leaves are chewed to attain a state of euphoria and stimulation.

High doses and chronic use of chat can cause more serious adverse neurological, psychiatric, cardiovascular, dental, gastrointestinal and genitourinary effects. Besides damaging health, chat has adverse socio-economic consequences effects on many other aspects of life including the loss of thousands of acres of arable land and billions of hours of work.

In Jimma, data concerning on impact of chat chewing is minimal. This seems no much concern is not given for this condition.

This study will provide base line information on impact of chat chewing practice on the periodontal tissue. This will help to identify the problem chat cause on health periodontal tissue and to prevent it. The purpose of this study is to describe briefly the adverse consequences of habitual chewing of chat on periodontal tissue, and help to educate the general public.

High doses and chronic use of chat can cause more serious adverse neurological, psychiatric, cardiovascular, dental, gastrointestinal and genitourinary effects. Besides damaging health, chat has adverse socio-economic consequences effects on many other aspects of life including the loss of thousands of acres of arable land and billions of hours of work. The purpose of this study is to describe briefly the adverse consequences of habitual chewing of chat on periodontal health, and help to educate the general public

CHAPTER THREE

3.1. General objective

To assess the impact of chat chewing practice on the periodontal tissue status among medical out patients at JUSH in Jimma town, Southwest part of Ethiopia.

3.2 Specific objectives

1. To determinethe impact of chat chewing and smoking on periodontal tissue
2. To determine the impact of chat chewing habit on oral hygiene status.
3. To assess sign and symptoms associated with chat chewing practice.
4. To determine chat chewing pattern by sex, religion and ethnic group of dental outpatient.

CHAPTER FOUR

4.Methods and materials

4.1 Study Area and study period

4.1.1. Study area

The study was conducted in Jimma University Specialized Hospital at dental clinic in Jimma town located southwestern part of Ethiopia which is 356km away from the capital, Addis Ababa. It serves for more than 12 million inhabitants of Southwest Ethiopia.

Jimma town has an average altitude of 1760meters above sea level with woynadega climate condition. Its temperature ranges from 11°C to 30°C.It is also an area where cash crop products like coffee produced. And according to the National Population and Housing Census of Central Statistical of Jimma town of 2007G.C. the population of Jimma town is 162,300.

4.1.2. Study period

The study period was from may 8 to Jun 4 2013

4.2. Study Design

A cross-sectional study design was implemented to achieve the objective of this study.

4.3. Population

4.3.1. Source population

The source populations were all dental outpatients who had chat chewing habit at JUSH dental clinic.

4.3.2. Study Population

The study population was all sampled dental out patient

4.4 Sample size determination and sampling technique

4.4.1 Sample size and Sampling technique

Non-probability Convenience sampling technique was used for the study.

4.5. Inclusion and exclusion criteria

4.5.1. Inclusion criteria

- Those outpatients that can hear and speak
- Those study units that happen to be available during data collection Period
- Those chat chewing patients >18 years who is attending JUSH dental clinic.

4.5.2 Exclusion criteria

- Those study units that do not happen to be available during data collection period.
- Those outpatients with hearing and speaking problem.
- Those patients below 18 years old.
- The patient who don't have chat chewing habit.

4.6 Measurement variables

- I. Dependent variable
 - Periodontitis
 - Gingival bleeding
 - Clinical attachment loss
 - Other soft tissue lesions
 - Oral hygiene
 - Gingival recession
 - Halitosis

II. Independent variables

- Age
- Sex
- Ethnicity
- Employment
- Religion
- Educational level
- Chat chewing
- Smoking

4.7. Data collection process and instrument

4.7.1. Data collection technique

Data was collected by a qualified dental intern and five other collaborative data collectors (students who are preparing themselves to take qualification for dental internship) using structured questionnaire which is prepared in English language and used to gather data from the patient. Then the questionnaire was filled by viewing their oral cavity to assess their periodontal status.

4.7.2. Instrument

The instruments used for dental examination were mouthmirror, explorer and curved probe.

4.8. Data analysis

After accomplishment of data collection, the data was analyzed manually. A result was tabulated in relevant tables. After analysis chi-square test was used to assess significance of association between variables.

4.9. Data quality control

Proper explanation was given to data collectors and they are supervised during data collection time and the collected data was handled properly. The data was checked for consistency and accuracy.

4.10. Ethical consideration

An official letter was written by Jimma university CBE office as an ethical approval for the conduct of the study and sent to JUSH, dental clinic. After the permission, the purpose of the study was explained politely for the patient and dental clinic staff. Data collection was started after participants gave written consent.

4.11 Limitation

- ✓ Lack of enough previous studies in the area with similar subjects for comparison
- ✓ Shortage of graduated probe

4.12. Operational definition

1. Amphetamine: - Group of sympathomimic drugs that have marked stimulant action of central nervous system alleviating fatigue and producing feeling mental alertness and well being.
2. Calculus: -is adherent coated or calcifying mass that forms on the surface of teeth and dental appliance.
 - i. Supra gingival: Coronal to the free margin of gingival.
 - ii. Sub gingival : Apical to the FMG (Free margin of gingiva)
3. Cathaedulis:-A scientific name given to khat
4. Clinical attachment loss:-is the distance between the base of the pocket and a fixed point on the crown (cement enamel junction) and measured in mm.
 - a. Mild: 1-2 mm attachment loss, Bop
 - b. Moderate; 3-4 mm attachment loss, Bop
 - c. severe:- 4-6 mm attachment loss, Bop
5. Gingival recession :- measured in mm from CEJ to the marginal gingival of each tooth
6. Khat:- Stimulant leaf known by scientific name “chata-edulis
7. Periodontal pocket depth’s the distance between the base of the pocket and the gingival margin.
8. Periodontal tissue:-tissues around the tooth
9. Stoma:- Oral cavity

10. Sub gingival calculus: - is calculus located below the crest of marginal gingival and only detected by probe.
11. Supra gingival calculus:-is the calculus located coronal to the gingival margin and visible in the oral cavity.
12. Furcation involvement
 - Class- I : Insertion of periodontal probe until the level of the concavity of root trunk
 - Class II : Until the furcation area between the roots
 - Class III: The whole access of furcation area
13. Tooth mobility:-
 - Class I- moves 0.5 -1mm
 - Class II- Moves 1-2mm
 - Class III- Moves > 2mm
14. Oral debris- soft foreign matter on the surface of the teeth that consists of bacterial plaque material and food debris.
15. Oral hygiene index:- Determine by debris index and calculus index
 - Excellent:- no debris and calculus present
 - Good:- soft debris and calculus covering not more than one third of the tooth surface being examined, or the presence of extrinsic stains with out debris regardless of surface area covered
 - Fair:-soft debris and supra gingival calculus covering more than two third of the exposed tooth surface or the presence of individual flecks of sub gingival calculus around the cervical portion of the teeth.
 - Poor: - supra gingival calculus and soft debris covering less than two third of the exposed tooth surface or a continuous heavy band of sub gingival calculus covering around the cervical portion of teeth.

4.13 Dissemination of findings

This research was disseminated to Jimma university SRP office and college of public health and medical sciences and to the department of dentistry.

CHAPTER FIVE

RESULTS

A total of on (92) subjects with khat chewing habit were interviewed and examined their periodontal status with the response rate of $92/95 \times 100 = 96.84\%$. The prevalence of khat chewing in study area was $\frac{92 \times 100}{600} = 15.333\%$. Majority of the patients, 68 (73.91%) were males and 24 (26.09%) were female with male to female ratio of 2.83 to 1. Majority of the patients were in the age range of 31-40 years 53 (45.65%) followed by greater than 23 years (25%) followed by 21-30 years 17 (18.47%) and 11-20 years 10 (10.88%). The majority of the patients were Muslim, 58 (63.04%) followed by Orthodox 15 (16.30%), Catholic 8 (8.69%) and protestant 5 (5.43%). Their place of origin was urban, 56 (60.86%), semi urban 20 (21.76%) and rural 16 (17.98%) and most of them were remarried 78 (64.46%). About 67 (72.82%) of the patients were literate and 25 (27.18%) of them were illiterate. The majority of the patients were merchants, 40 (43.48%) followed by farmers, 27 (29.35%), students 14 (15.22%), government employees 8 (7.60%) and others 3 (3.25%) respectively. Regarding their annual income 5001-10000 birr 44 (47.83%), followed by 1200-5000 21 (22.83%), less than 1200 27 (22.31%), and greater than 10,000 birr 12 (13.04%) respectively. (Table 1)

Table 1. Socio-demographic characteristic of khat chewer dental outpatients of JUSH; Dental Clinic,from may 8 jun 4 2013.G.C

Demographic characteristics		Frequency	%
Sex	Male	68	73.91
	Female	24	26.09
	Total	92	100
Age	11-20	10	10.88
	21-30	17	28.47
	31-40	42	45.65
	>40	23	25
	Total	92	100
Religion	Muslim	58	63.04
	Orthodox	15	13.30
	Protestant	5	5.43
	Catholic	8	8.69
	Others(specify)	6	6.54
Total	92	100	
Place of origin	Urban	56	60.86
	Semi-urban	20	21.74
	Rural	16	18.0
	Total	92	100
Ethnicity	Oromo	51	55.43
	Amhara	16	17.91
	Tigray	10	10.86
	Other(Specify)	15	16.30
	Total	92	100
Marital status	Single	27	29.35
	Married	65	70.65
	Total	121	100
Educational status	Illiterate	25	27.18
	Literate	67	72.82
	Total	92	100
Occupational status	Student	14	15.22
	Farmer	27	29.35
	Government employer	8	7.6
	Merchant	40	43.47
	Other(Specify)	3	3.26
	Total	92	100
Household annual income in birr	<1200 birr	15	16.3
	1200-5000 birr	21	22.83
	5001-10000 birr	44	47.83
	>10000 birr	65	13.04

Concerning khat chewing practice, the frequency of daily khat chewers were 35 (38.04%) and 2-3 days per week 25 (27.17%) and once a week 18 (19.56%). Since the p value=0.000, $\chi^2=20.2$ and DF=3 there was significant association between frequencies of khat chewing and male sex. The majority of khat chewers started to chew khat for greater than 2 years 68(75.91%) and 6month-2 years 24 (26.09%). There was no significant association between duration of khat chewing and sex with the p value=0.32, $\chi^2=0.96$ and DF =1. (Table2)

Table 2. Chat chewing practice among dental outpatients of JUSH; Dental Clinic, 2013.G.C

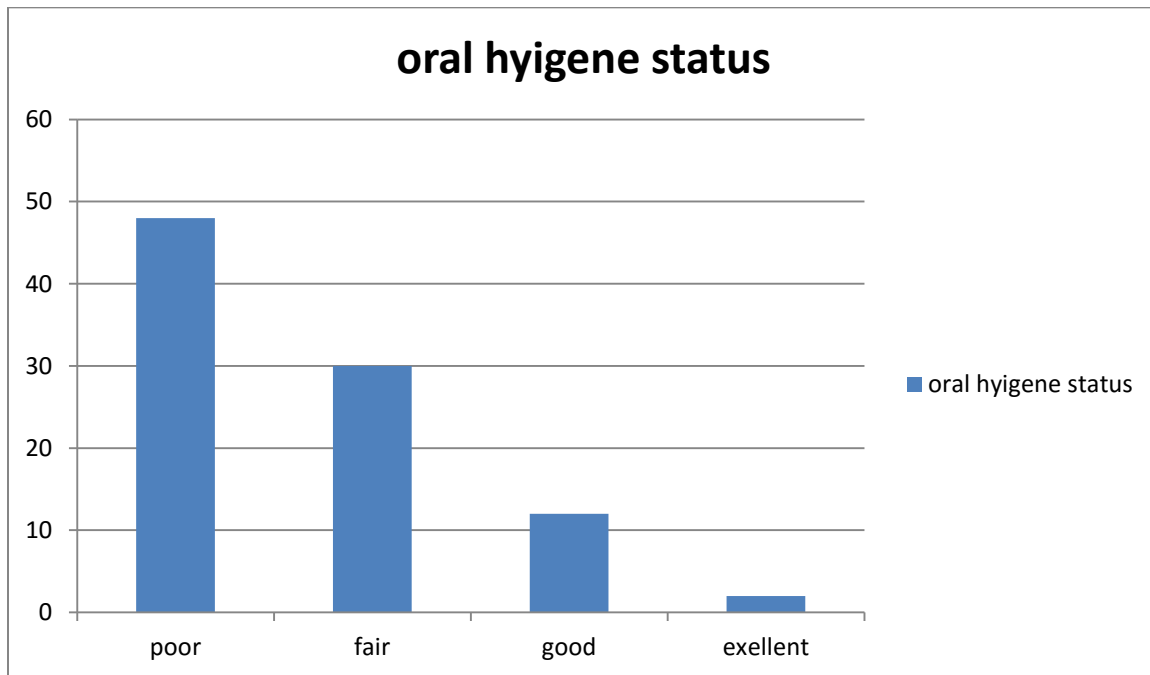
Frequency of chewing	Male	%	Female	%	Total no	P=0.000 $\chi^2=20.2$ Df=3
Daily	34	28.1	4	3.31	31.40	
2-3 days per week	23	19	5	4.13	23.14	
Once a week	16	13.22	11	9.09	22.31	
Occasionally	12	9.92	16	13.22	23.14	
Total	85	70.24	36	29.75	99.99	
Duration of start of khat chewing						P=0.326 $\chi^2=0.964$ Df =1
6month-2 years	21	17.35	10	8.26	25.61	
>2 years	69	57.02	21	17.35	74.37	
Total	90	74.37	31	25.61	99.98	

About 60 (65.22%) of khat chewers were smokers only 32 (34.88%) were non smokers. Out of these smokers 50(83.33%) were male and 10(16.67%) were female patients. After chi square calculation $p=0.069$, $\chi^2=3.31$ and DF=1 this shows that there was no significant association between male sex and smoking habits. (Table 3)

Table 3.the distributions of smoking habit of khat chewers, dental outpatients of JUSH; Dental Clinic, 2013.G.C

Sex	Smokers (%)	Nonsmokers (%)	Total	P= 0.069 X ² =3.31 DF= 1
Male	50(54.34)	18(19.56)	68	
Female	10(10.88)	14(15.21)	24	
Total	60(65.22)	32(34.88)	92	

Categorization of oral hygiene status was based on the clinical finding of calculus and food debris on teeth surface. The oral hygiene status of study population was poor oral hygiene 48 (52.17%), Fair oral hygien30 (32.6%) and good oral hygiene 12 (13.04%) and excellent 2(2.17) (Graph 1)



graph1.oral hygiene status of chat chewer dental outpatients of JUSH; Dental Clinic, 2013.G.C

Diagnosis of periodontal disease was based on clinical parameters; like gingival recession, Tooth mobility, furcation involvement and clinical loss of attachment. 57 (61.95%) of the patients had gingival recession, 32 (34.78%) tooth mobility in different severity with 18 (19.56%) class I, 9 (9.78%) class II and 5 (5.43%) class III. Similarly in 32 (32.61%) patients there were different stages of furcation involvement with 12(13.04%) class I, 10 (10.88%) class II and 8 (8.67%) class III. 58 (63.04%) patients had clinical attachment loss in different stage 30 (32.60%) mild, 18(19.56%) moderate and 8(10.88%) severe. (Table5)

Table4. Periodontal variable in among chat chewer dental outpatients of JUSH; Dental Clinic, 2013.G.C

Periodontal status	Response	Frequency	%
Gingival recession	Yes	57	61.95
	No	35	38.05
	Total	92	100
Tooth mobility	Class I	18	19.58
	Class II	9	9.78
	Class III	5	5.43
	No	60	65.21
	Total	92	100
Furcation involvement	Class I	12	13.04
	Class II	10	10.88
	Class III	8	8.89
	No	62	67.39
	Total	92	100
Clinical loss of attachment	Mild	30	32.6
	Moderate	18	19.56
	Severe	10	10.86
	No	34	36.98
	Total	92	100

Regarding the complaint of the subject, 70 (76.09%) had gingival bleeding and 60 (65.21%) had halitosis. Furthermore about 48(52.17%) of khat chewers had burning sensation of soft tissue. This was explained by patients as avoidance spice food after chewing khat. The other complains was ulceration on the oral mucosa which account about 22 (23.91%) patients and xerostomia 25 (27.17%). After chi square calculation the p value =0.52, $X^2=3.77$ DF=1. There was no significant association between complaint and duration of start of khat chewing. (Table 6)

Table 5. The distribution of duration of start of chat chewing and complaints of dental outpatients of JUSH; Dental clinic, 2013GC

Complaints of participants	Response	Duration of start of khat chewing		Total	P=0.052 $X^2=3.77$ Df =1
		6month-2yrs (%)	>2yrs		
Gingival bleeding	Yes	28	42	70	
	No	14	8	22	
	Total	42	50	92	
Halitosis (bad odor)	Yes	23	37	60	
	No	21	11	33	
	Total	44	48	92	
Burning sensation of soft tissue	Yes	17	31	48	
	No	32	12	44	
	Total	49	43	92	
Ulceration	Yes	6	16	22	
	No	38	32	70	
	Total	44	48	92	
Xerostomia	Yes	9	16	25	
	No	39	28	66	
	Total	48	44	92	

CHAPTER SIX

DISCUSSION

This study revealed a number of interesting and relevant findings. Most of khat chewers started to chew a khat for greater than 2 years 68 (75.91%) and the rest were 24 (26.09%) found between 6month-2years interval with 15.33% prevalence of khat chewing. A cross sectional study was conducted in January 2001 in the four colleges found in North West Ethiopia. The study revealed 26.7 % prevalence of chat chewing. 40 (43.47 %) of were merchant while they were students 14 (15.22). In our study there was low prevalence rate of khat chewing due to this study was done on the dental out patients while the above study done in college student.

The oral hygiene status populations were poor 48 (52.17%). About 30(32.6%) of khat chewers had fair oral hygiene status and 12(13.04%) had good oral hygiene. Research done in Yemen reported that the khat chewers' oral hygiene status were 60 (18%) poor, 226(67%) fair and 50(15%) good (54). The difference may be due to study setting and the oral hygiene measures used by the subject. Furthermore research done in Yemen reported that The oral hygiene status of non-chewers was significantly better than that of chewers. Poor oral hygiene status was also realized in a higher proportion of khat-chewers (18%) than in non-chewers (11%) and About 49% of non-chewers had good oral hygiene status, as compared to only about 15% of khat chewers . The oral hygiene status of non-chewers was significantly better than that of chewers.

The means of cleaning of teeth were mefakiya 51(55.43). about 28(30.43) of chat chewers they use tooth paste ,10(10.87) only rinse by water and 3(3.27) other means of cleaning. Research done in yemen reported that different oral hygiene measures practiced routinely by the khat-chewers and non-chewers. The data show that quite a large number of khat chewers (88%) and non-chewers (91%) used paste regularly for maintenance of oral hygiene. However, 9% of chewers did not use toothpaste, as compared to 5% of non-chewers. There was no significant difference between khat-chewers and non-chewers with respect to oral hygiene measures used.

This study results indicated that many effect of khat on periodontal tissue such as gingival recession in 57 (61.95%), teeth mobility in 27(29.35%), furcation involvement in 15 (16.31%) and clinical loss of attachment in 58(63.04%). The finding of this study is in agreement with the finding of the study done by Aiman A. Ali in Yemen (12). The similarity was due to the both study done in dental clinic.

Other study by Abdulwahab and Al-kholani reported that about 170 (51%) of khat chewers had gingival recession and 180 (55%) of khat chewers had clinical loss of attachment. There are so many literatures on chat but only four investigated the effect of chat chewing on periodontal health. Epidemiological investigation on possible association between chat and periodontal disease reported conflicting result. Two studies indicated no detrimental effect and suggested beneficial influence on the periodontium but a large study concluded that chat chewers had more clinical attachment loss than non-chewers. Chewing khat also favour gingival recession because during chat chewing those with prolonged mastication and this prolonged mastication will lead gingival recession. (3) Logistic regression analysis also showed significant odds ratios for these conditions for chewers as compared with non-chewers. This analysis showed that khat-chewers are at higher risk for the various conditions studied, irrespective of sex, indicating a causative role of khat in periodontal diseases (7). In Our study the value of gingival recession and clinical loss of attachment was higher compared to other study because of our study population oral hygiene status was poor and due to the study area setting as well as the knowledge of oral health is low in our study participants. Other study indicated that loss of periodontal attachment and greater calculus formation had also been reported in khat chewers (57). Hill et al, reported a higher prevalence of attachment loss in older age (55), suggesting that age could be a factor affecting such changes (55, 57). Furthermore, khat containing pesticides might be cytotoxic to periodontal fibroblast and thus, exacerbate pre-existing periodontal disease as well as impair periodontal attachment (54).

In addition to this, khat chewers had different complain such as 70 (76.08%) with gingival bleeding, 60 (65.21%) with halitosis, 48 (52.17%) with burning sensation of soft tissue, 22 (23.91%) with ulceration and 25 (27.17%) with xerostomia. Research done by Abdulwahab and Al-kholani reported that 134 (40%) with gingival bleeding, 196 (58%) with halitosis, 94 (28%) burning sensation of soft tissue, 22 (7%) with ulceration and 34 (10%) with xerostomia (54). Regarding gingival bleeding, halitosis and burning sensation of soft tissue were higher in percentage this was may be due the oral hygiene status of the subject was poor and setting of study area was different. Concerning ulceration and xerostomia their value also higher compared with other study this is may be due to different chemical profile in the khat leave may cause different effect in oral cavity. The study done in Yemen indicated that khat contain different chemical depending on environment and climate conditions the chemical profile of khat leaves differ. In the Yemen Arab Republic, about 44

different types of khat exist originating from different geographic areas of the country. Its taste varies from one kind to another and depends on the tannic acid content. Khat leaves have an astringent taste and have an aromatic odour. The young leaves are slightly sweet (19, 20). Furthermore the study reported that the hardness of the khat leaves and friction mechanism with mucosal tissues might act as a predisposing factor in the occurrence of ulcers among chewers. These ulcers usually observed at the khat chewing sites only. Clinically, this type of ulcers is characterized by burning like lesions (54).

CHAPTER SEVEN

7.1 CONCLUSION AND RECOMMENDATION

7.2 CONCLUSION

- Khat chewing can be a risk factor for periodontal disease.
- Khat chewing can affect oral hygiene of the patient and which in turn can deteriorate periodontal tissue status.
- The oral hygiene status and duration start of khat chewing can affect periodontal tissue status.
- Gingival bleeding and halitosis are highly associated with khat chewing practice.
- The synergistic effects of khat chewing and smoking are high on periodontal tissue status.

7.3 RECOMMENDATION

- The findings of this study support the need for health education and promotion programs to increase awareness of the khat chewing problem in population by government.
- Positive long term life style change must be encouraged and facilitated like physical exercise should be established early in the life since khat chewing habit tends to start in child hood and progress into adult hood by Ethiopian sport commissions.
- Mass media must be involved to raise public awareness on real impact of khat chewing habit on socio-economic, oral health including and systemic health problems.
- Future studies are needed to investigate the effect of different pesticides that used to facilitate rapid growing of khat on oral and general health by Biochemist, medical and dental professional.
- Also i would like recommend for CBE office to initiate others case control study must be done in community by post graduate dental student regarding the impact of khat on periodontium.

REFERENCES

1. http://www.kcl.ac.uk/kis/schools/life_%20sciences/health/pharmacy/resgrps/cogres.html
2. Nordal A. Khat: pharmacognostical aspects. *Bull Narc* 1980;**32**:51-64.
3. N.N Alhebshi and N.Skaug. Effect of khat chewing on 14 selected periodontal bacteria in sub and supra gingival plaque of young male population ECDD 2006.
4. Dawit Abebe, Asfaw Debella, Amare Dejene, et al - chat chewing habit as a possible risk behaviour for HIV infection: A case-control study Jigsaw. K cigarette smoking and khat chewing among college students in north west Ethiopia, *Ethiopia j. health del* 2002 **16**:0-17
5. Bailint GA gebrekidan, H, balint E. Catha-edulis an international social medical problem with considerable implication Ethiopia *pred.j*1991:68:555-561
6. *British dental journal*
7. (<http://www.natural.com/bdj/journal/206/nl/full/sj.Bdj.2008.1122.html>)
8. Nezar al hebshi - Chat & oral microbiota; drug information online *drugs.com*, 2005
9. Y. A. M. El-Wajeh & M. H. Thornhill - Qat and its health effects *British Dental Journal* 206, 17 - 21 (2009)
10. Aiman A. Ali - Qat Habit in Yemen Society: A Causative Factor for oral Periodontal diseases , *International Journal of Environmental Research and Public Health* 2007, **4** ; 243-247
11. Yigzaw Kebede, Cigarette smoking and chat chewing among college students in North West Ethiopia , Department of Community Health, Gondar College of Medical Sciences, Ethiopia
12. Sawair FA, Al-Mutwakel A, Al-Eryani K, Al-Surhy A, Maruyama S, Cheng J, Al-Sharabi A, Saku T. High relative frequency of oral squamous cell carcinoma in Yemen: qat and tobacco chewing as it's a etiological background. *Int J Environ Health Res.* 2007

13. Kalix P. Pharmacological properties of the stimulant khat. *PharmacolTher* 1990;48:397-416.
14. Kennedy JG, Teague J, Rokaw W, Cooney E. A medical evaluation of the use of qat in North Yemen. *SocSci Med* 1983;17:783-793.
15. Kummoona R. Surgical reconstruction of the temporomandibular joint for chronic subluxation and dislocation. *Int J Oral MaxillofacSurg* 2001;30:344-348.
16. Belew M, Kebede D, Kassaye M, Enquoselassie F. The magnitude of khat use and its association with health, nutrition and socio-economic status. *Ethiop Med J* 2000;38:11-26.
17. Geisshusler S, Brenneisen R. The content of psychoactive phenylpropyl and phenylpentenylkhatamines in *Catha edulis*Forsk. of different origin. *J Ethnopharmacol* 1987;19:269-277.
18. Al Motarreb A, Baker K, Broadley KJ. Khat: pharmacological and medical aspects and its social use in Yemen. *Phytother Res* 2002; 16:403-413.
19. Cox G, Rampes H. Adverse effects of khat: A review. *AdvPsychiatrTreatm* 2003; 9:456-463.
20. Nencini P, Ahmed AM. Khat consumption: a pharmacological review. *Drug Alcohol Depend* 1989; 23:19-29.
21. Kalix P, Braenden O. Pharmacological aspects of the chewing of khat leaves. *Pharmacol Rev* 1985; 37:149-164.
22. Kite GC, Ismail M, Simmonds MS, Houghton PJ. Use of doubly protonated molecules in the analysis of cathedulins in crude extracts of khat (*Catha edulis*) by liquid chromatography/serial mass spectrometry. *Rapid Commun Mass Spectrom* 2003; 17:1553-1564.
23. Kalix P, Geisshusler S, Brenneisen R. The effect of phenylpentenyl-khatamines on the release of radioactivity from rat striatal tissue prelabelled with [3H]dopamine. *J Pharm Pharmacol* 1987; 39:135-137.
24. Kalix P, Geisshusler S, Brenneisen R. Differential effect of phenylpropyl- and phenylpentenyl-khatamines on the release of radioactivity from rabbit atria prelabelled with 3H-noradrenaline. *Pharm ActaHelv* 1987; 62:332-334.

25. Review of the pharmacology of khat. Report of a WHO advisory group. *Bull Narc* 1980; 32:83-93.
26. Brenneisen R, Geissshusler S. Psychotropic drugs. III. Analytical and chemical aspects of *Catha edulis* Forsk. *Pharm Acta Helv* 1985; 60:290-301.
27. Toennes SW, Harder S, Schramm M, Niess C, Kauert GF. Pharmacokinetics of cathinone, cathine and norephedrine after the chewing of khat leaves. *Br J Clin Pharmacol* 2003; 56:125-130.
28. Widler P, Mathys K, Brenneisen R, Kalix P, Fisch HU. Pharmacodynamics and pharmacokinetics of khat: a controlled study. *Clin Pharmacol Ther* 1994; 55:556-562.
29. Hassan NAGM, Gunaid AA, El Khally FMY, Murray-Lyon IM. The subjective effects of chewing Qat leaves in human volunteers. *Ann Saudi Med* 2002; 22:34-37.
30. Elmi AS. The chewing of khat in Somalia. *J Ethnopharmacol* 1983; 8(2): 163-76.
31. Al-Bekairi AM, Abulaban FS, Qureshi S, Shah AH. The toxicity of *Catha edulis* (Khat). A review. *Fitoterapia* 1991; 62(4): 291-300.
32. Giannini AJ, Miller NS, Turner CE. Treatment of khat addiction. *J Subst Abuse Treat* 1992; 9(4): 379-82.
33. Al Motarreb A, Briancon S, Al Jaber N, Al Adhi B, Al Jailani F, Salek MS, et al. Khat chewing is a risk factor for acute myocardial infarction: a case-control study. *Br J Clin Pharmacol* 2005; 59(5): 574-81.
34. Nencini P, Ahmed AM, Elmi AS. Subjective effects of khat chewing in humans. *Drug Alcohol Depend* 1986; 18(1): 97-105.
35. Halboub E, Dhaifullah E, Abdulhuq M. Khat chewing and smoking effect on oral mucosa: a clinical study. *Acta Medica (Hradec Kralove)* 2009; 52(4):155-8.
36. Alsharabi AK. Oral and para-oral lesions caused by takhzeen Al-Qat. [Thesis]. Khartoum: Khartoum University; 2002.
37. Hassan NA, Gunaid AA, El Khally FM, Murray-Lyon IM. The effect of chewing Khat leaves on human mood. *Saudi Med J* 2002; 23:850-853.
38. Halbach H. Medical aspects of the chewing of khat leaves. *Bull World Health Organ* 1972; 47:21-29.

39. Pantelis C, Hindler CG, Taylor JC. Khat, toxic reactions to this substance, its similarities to amphetamine, and the implications of treatment for such patients. *J Subst Abuse Treat* 1989;6:205-206.
40. Dhadphale M, Mengech A, Chege SW. Miraa (*Catha edulis*) as a cause of psychosis. *East Afr Med J* 1981;58:130-135.
41. Pantelis C, Hindler CG, Taylor JC. Use and abuse of khat (*Catha edulis*): a review of the distribution, pharmacology, side effects and a description of psychosis attributed to khat chewing. *Psychol Med* 1989;19:657-668.
42. Critchlow S, Seifert R. Khat-induced paranoid psychosis. *Br J Psychiatry* 1987;150:247-249
43. Dhadphale M, Omolo OE. Psychiatric morbidity among khat chewers. *East Afr Med J* 1988;65:355-359.
44. Kalix P. Khat: scientific knowledge and policy issues. *Br J Addict* 1987;82:47-53.
45. Odenwald M, Neuner F, Schauer M, Elbert T, Catani C, Lingenfelder B, Hinkel H, Hafner H, Rockstroh B. Khat use as risk factor for psychotic disorders: a cross-sectional and case-control study in Somalia. *BMC Med* 2005;3:5.
46. Giannini AJ, Castellani S. A manic-like psychosis due to khat (*Catha edulis*Forsk.). *J ToxicolClinToxicol* 1982; 19:455-459.
47. Jager AD, Sireling L. Natural history of Khat psychosis. *Aust N Z J Psychiatry* 1994; 28:331-332.
48. Giannini AJ, Castellani S. A manic-like psychosis due to khat (*Catha edulis*Forsk.). *J ToxicolClinToxicol* 1982; 19:455-459.
49. Alem A, Shibre T. Khat induced psychosis and its medico-legal implication: a case report. *Ethiop Med J* 1997; 35:137-139.
50. Stefan J, Mathew B. Khat chewing: an emerging drug concern in Australia? *Aust N Z J Psychiatry* 2005; 39:842-843.

51. Numan N. Exploration of adverse psychological symptoms in Yemeni khat users by the Symptoms Checklist-90 (SCL-90). *Addiction* 2004; 99:61-65.
52. Abdulwahab and Al.kholani. Influence of khat chewing on periodontal tissue and oral hygiene, *Dental Research journal* (vol 7, No-1, winter-spring).
53. Hill CM, Gibson A. The oral and dental effects of q'at chewing. *Oral Surg Oral Med Oral Pathol* 1987; 63(4): 433-6.
54. Al-Bekairi AM, Abulaban FS, Qureshi S, Shah AH. The toxicity of cathaedulis (Khat). A review. *Fitote-rapia* 1991; 62(4): 291-300.
55. Anerud A, Loe H, Boysen H. The natural history and clinical course of calculus formation in man. *J ClinPeriodontol* 1991; 18(3): 160-70.

ANNEX-I

JIMMA UNIVERSITY

STUDENT RESEARCH PROGRAMME

**Questionnaire to assess the periodontal status of chat chewer dental outpatients of JUSH,
Dental Clinic, 2013G.C.**

I. Socio-demographic data

1. Age:
2. Sex: Male Female
3. Religion Muslim Orthodox
Catholic Protestant
Other specify _____
4. Place of origin Urban Simi urban
Rural her specify _____
5. Ethnicity Oromo Amhara
Tigre Other specify _____
6. Educational status Illiterate read and write
Primary
Highschool
Higher education
7. Occupational status Students Farmer
Daily labour Merchant Government employer
Other (specify) _____

- d. Gingival bleeding
 - e. Xerostomia
8. Do you have smoking habit? a) Yes b) No
9. If yes for Q. no 6 how many cigarettes per day.
- a. Less than 10 cigarettes daily.
 - b. More than 10 and less than 20 cigarettes daily.
 - c. More than 20 cigarettes daily.
 - d. Ex-smoker(a person who left smoking for more than 1 year)
10. For how long did you smoke?
- a. Less than ten years
 - b. Ten to twenty years
 - c. More than twenty years
11. Did you smoke water pipe a. Yes b. No
12. Do you smoke during chat chewing? a) Yes b) No
13. Do you think that chat chewing has bad impact on your oral cavity? A) Yes b) no

II. General oral health

1. Do you clean your teeth?
- Yes
- No
2. If yes, what do you use to clean your teeth
- Mefakia (stick) Charcoal Toothbrush
- Only rinse with water other specify
3. How frequently do you clean your teeth?
- Once a day after each meal
- More than once a day irregularly
- Every other day once time per week
4. If you frequently clean your teeth, how do you do it(brushing technique)?
- Top to bottom (vertical) Mixed

Sideways (Horizontal)

5. When do you clean your teeth?

Morning only at meal before going to bed

Irregular morning and before going to bed

6. Do you have gum bleeding during brushing? Yes No

IV. Oral examination

1. Does the client have natural teeth?

Yes No

2. Oral hygiene

a. Poor

b. fair

c. Good

3. CPI

a. Code I (No bleeding, No calculus, No pathological pocket)

b. Code II (bleeding on probing, no calculus, no pathologic pocket)

c. Code III(presence of calculus (sub or supra gingival) with or without bleeding, No pathologic pocket)

d. Code IV (pathological pocket of 4-5 with or without bleeding and calculus)

e. Code V (pathologic pocket of 6mm or more with or without bleeding and calculus)

4. Calculus index

1817161514	131211212223	2425262728
------------	--------------	------------

4847464544	434241313233	3435363738
------------	--------------	------------

5. Oral debris

1817161514	131211212223	2425262728
4847464544	434241313233	3435363738

6. Gingival recession

1817161514	131211212223	2425262728
4847464544	434241313233	3435363738

7. Tooth mobility

1817161514	131211212223	2425262728
4847464544	434241313233	3435363738

8. Furcation involvement of molar tooth

181716	262728
484746	363738

