INFLUENCE OF KHAT CHEWING AND TOBACCO SMOKING ON ORAL AND DENTAL STRUCTURES.

INVESTIGATOR: KAMAGY HUDSON OCHIENG, BDS III
UNIVERSITY OF NAIROBI.

SUPERVISORS:

Internal. Dr, L. Gathece.
Faculty of Dental sciences
University of Nairobi.

External. Dr, E. Dimba.
Faculty of Dental Sciences
University of Nairobi

Duration of study: Jan-Feb 2005
Cost of study: Ksh 4370.
Sources of funds: self

A research proposal submitted in partial fulfillment of the Bachelor of Dental Sciences Degree, University of Nairobi, 2004.
SUMMARY
Khat is an indigenous plant whose leaves are mostly chewed to produce euphoric effects. These contain cathionone, which acts as a psychostimulant at the level of the CNS. The medical effects mostly associated with khat chewing include; anorexia, infertility, insomnia and easy irritability. The dental effects commonly associated with khat chewing include, enamel staining, stomatitis, dental caries and periodontal breakdown. However, these complications are relative, and mostly depend on the researcher.

Most khat chewers have been found to smoke tobacco. This contains nicotine which is also a neuro-stimulant and also cause medical problems like respiratory failure and heart ailments. Tobacco also contains specific nitrosamines which have been closely associated with oral carcinomas. Scanty literature currently exists on whether the use of both substances increases their potency and their oral and dental effects.

This cross-sectional retrospective study will then be conducted in Eastleigh Estate in Nairobi to determine the oral and dental effects of khat and tobacco and also to determine if there use together has any correlation to their side effects.

The results of this study may then be used in the planning of oral health care programmes and oral health care campaigns to educate the public on these harmful effects of khat and tobacco.
CHAPTER 1.

1.1 Introduction.
Khat (Qat, *catha edulis, Forsk celestraccae*) is a shrub indigenous to Yemen and certain parts of East Africa. It grows best at between 4000 and 7000 feet above sea level. The leaves contain the natural amphetamine cathinone, whose reinforcing euphoric and psychostimulant effects are the main causes of Khat addiction. Khat is usually consumed by means of chewing, although it is also smoked in some regions of the world. Chewing of Khat produces mild to moderate sympathomimetic effects eg increased respiration, increased body temperatures, blood pressure, heart rate and mydriasis. The CNS effects include- euphoria, alertness, insomnia, anorexia and at higher doses, hyperactivity, and excessive talking. These effects are similar to those seen in amphetamine intoxication.

Some of the medical problems associated with heavy use of Khat include gastritis, mucosal stomatitis, constipation and in men, spermatorrhoea and impotence. The incidence of psychiatric morbidity is also reported to increase among those who excessively use Khat.

The localised effects of Khat chewing on oral and dental tissues include tooth decay, enamel staining, oral ulcerations, leukoplakia and dental attrition. Tobacco on the other hand contains nicotine, which is another highly addictive substance. The presence of tobacco specific nitrosamines in cigarette smoke contributes to the development of lung cancer, atherosclerotic cardiovascular diseases, periodontal and oral cancers among others. Passive smoking causes primarily an irritant effect and other problems associated with active smoking. The use of tobacco has also been established as the principal cause of oral leukoplakia which is a premalignant oral lesion. It has been noted that the percentage of population that smokes is on the decline in the developed countries possibly due to stringent regulations governing tobacco usage. However the reverse is true in developing countries where the practice is fast spreading even to the younger populations. The same trend also applies to Khat which was initially mainly used by the Muslim populations, but currently even the non-Muslim communities widely use it. However Muslims were found to be at higher risk of Khat chewing and smoking tobacco since chewing Khat is a traditional Muslim habit.
The chemicals contained in these two substances thus greatly contribute to their easiness of addiction and this pose a major economic burden and a health risk to their users in both the developed and the developing countries. In Kenya, scanty information currently exists on the effects of Khat chewing and cigarette smoking on the oral and dental tissues. This study will therefore focus on these effects on the dental structures.

Adequate primary Health approaches would then be able to be instituted to educate the general public about the adverse effects of these substances and proper preventive measures undertaken to reduce the prevalence and incidences of their deleterious effects of khat and tobacco.

1.2 Literature Review.

There was scarcity of literature on Khat and tobacco use because few studies have been done.

John et al (1998) and Adugua et al in Ethiopia stated the medical effects of smoking which included cardiovascular diseases, irritation of the oral mucosa, lung cancer, and periodontal degradation. The results showed an increase in the prevalences especially in Ethiopia and this, they thought, could have been due to the non-stringent regulations on the use of tobacco.

In a study done by Luqman and Danowski, they postulated that the concordant smoking of tobacco, poor diet and vitamin deficiencies may probably contribute to chronic irritation of the oral mucosa with subsequent super-imposed infections which they described as ‘common’.

A case controlled study done in a Kenyan rural community by Macigo et al (1998), tobacco smoking was found to increase the risk for oral leukoplakia development and this they found to be almost the same for those who smoke the filtered or non filtered cigarettes. In another case controlled study by macigo et al (1996) done in Meru District-Kenya, they found that smoking of unprocessed tobacco (Kiraiku) and smoking cigarettes to be the most significant in oral leukoplakia development. They however found beer, chillies and khat to be insignificant in causing the pathology.
Dhadphale et al (1988) studied the incidences of psychiatric morbidity amongst the khat chewers and reported an increase in the same in individuals who had used Khat for long periods of time ¹

In Kenya a study by Guantai et al (1982) revealed that most Khat chewers waste a lot of man-hours on the leisure and as drivers, are more likely to cause road traffic accidents ⁹

The current widespread Khat chewing and tobacco use is evidenced in the study done by Cacagnetti et al and Acuda et al. This, they wrote, has infiltrated to the non-muslim communities who initially were not identified with chewing khat ⁴,⁵

In a study done by Faunce et al (1985), chronic use of Khat was associated with tooth decay and gross staining of the enamel. ²

Stomatitis, esophagitis, and gastritis were all reported as side effects of Khat in a study done by Halbach et al. ¹⁰.

Results from the study done by Hill et al (1987), showed low caries rate and an inverse relationship between the periodontal pocket depth and the chewing side. They highlighted some evidence of TMJ dysfunction and oral mucosal changes such as hyperkeratosis and localised stomatitis. They also indicated that oral carcinomas developed at the same side where Khat bolus was kept and that about 50% of Khat chewers developed teeth attrition and keratosis of the oral mucosa. ³ They however did not find a possible association between this phenomenon and oral cancer, but results of other studies by Sankaranarayanan et al with smokers and betel-nut chewers show that keratosis of the buccal mucosa is a pre-cancerous lesion and that 2-12% of individuals with such lesions develop oral cancer. ¹³

However, Rosenzweig et al (1966) suggested a raised incidence of periodontal disease among Khat chewers, and in a study done by Speculand et al (1982) TMJ problems were not found to be common in developing countries ¹⁵, however Rao et al reported incidences of more than 20% in an Indian rural population ¹⁶. This study therefore will seek to clarify the effects of Khat chewing and tobacco use on the oral and dental structures.
CHAPTER TWO

2.1 STATEMENT OF PROBLEM.

The chewing of Khat and smoking of tobacco have been found to have effects which range from medical- Dental to economic, and their use have recently been noted to be on the incline especially among the youth. Since few studies on the effects of these substances on the oral structures have been conducted, this study will focus on the oral effects of Khat and tobacco.

2.2 JUSTIFICATION.

The results of the study may then be used in the formulation of policies regarding the use of these substances with regard to restrictions in their circulation to the youth. Adequate Oral health-care programmers may also be instituted with special emphasis educating the public on the harmful effects of Khat and tobacco smoking.

2.3 OBJECTIVES

Main objective
To determine the effects of Khat chewing and tobacco use on oral and dental structures and any possible interactions / synergistic effects in Khat and tobacco- induced oral problems.

Specific objectives
i) To investigate the effects of Khat chewing on oral structures.
ii) To investigate the effects of tobacco smoking on oral structures.
iii) To correlate the habitual use of tobacco and Khat to possible adverse effects on oral and dental structures.

2.4 HYPOTHESIS

i) 60% of all Khat chewers and tobacco users suffer from oral and dental problems.
ii) Attrition of the teeth presents the greatest dental effect of Khat chewing.
iii) The use of both Khat and tobacco increases their oral and dental effects.
2.4 STUDY VARIABLES

Socio- demographic variables
i) Age.
ii) Sex
iii) Education level.
iv) Religion

Independent variables
i) Duration of use of Khat
ii) Quantity of Khat and tobacco used

Dependent variables
i) Oral soft tissue lesions
ii) Oral hard tissue lesions

CHAPTER THREE.

3.1 Materials and methods

Study area: Eastleigh estate on the outskirts of Nairobi’s CBD (Central Business District). This serves as the residential area for population of Somalis who are some of the chief users/ traders of Khat in Kenya. East Leigh also has an integration of other tribes and thus will likely show the general representative trends.

Study population: will include respondents from East Leigh estate who will meet the inclusion criteria.

Inclusion criteria:
   i) Residents of East Leigh estate.
   ii) Khat chewers and tobacco users.
   iii) Those who will consent to the study.

Exclusion criteria:
   i) Mentally handicapped persons.
   ii) Non- Khat chewers and tobacco users.
   iii) Those who will not consent to the study.

Study design: This will be a cross-sectional study.
Sample size:

\[ n = \frac{Z^2 P(1-P)}{C^2} \]

Taking a confidence level of 95%, a Z value of 1.96 and a prevalence of 25%, whereby:

- n-sample size
- Z-level of probability
- P-prevalence value
- C-confidence levels

\[ n = 1.96^2 \times 0.25(1-0.25) \times (1-0.95)^2 \]

= 288

3.2 DATA COLLECTION INSTRUMENTS
The data will be collected using a questionnaire combined with an Oral examination form. The tools which will be used will include dental mirrors, tongue depressors, disclosing tablets, dental probes and explorers.

3.3 DATA ANALYSIS
This will be done both manually and by a computer and presented in form of tables and graphs.

3.4 PROBLEMS ANTICIPATED.
  i) Financial constrains.
  ii) Limited time.

3.5 ETHICAL ISSUES
Ethical clearance will be obtained from KNH Ethical Committee. The data collected will be treated with absolute confidentiality and only willing respondents will be allowed to participate in the study.

3.6 PROPOSED BENEFITS
This study would assist in the formulation of primary health care programmes, which would entail the preventive and treatment modalities to be availed to those, affected by the use of Khat and tobacco.
References


INFLUENCE OF KHAT CHEWING AND TOBACCO USE ON DENTAL STRUCTURES.

Questionnaire

1. DEMOGRAPHIC DATA.

Serial number ..................................................
Sex: M F
Age: ........ (yrs)
Religion: ..................
Level of education: ........ (Primary) (Secondary) (Tertiary)

2. HABITS.

(i) Have you ever smoked cigarettes? (Yes) (No).
(ii) Have you ever chewed Khat? (Yes) (No).
(iii) Are you currently smoking cigarettes? (Yes) (No).
(iv) Are you currently chewing Khat? (Yes) (No).

If yes-
(v) How long have you been chewing Khat?
   a) Less than one year. d) 11-15yrs
   b) 1-5yrs e) 16-20yrs
   c) 6-10yrs f) 20+yrs

(vi) How often do you chew Khat in a week?
   a) Daily c) Less than 3 times
   b) Twice d) More than 3 times

(vii) What amount of Khat do chew per day?
   a) Less than 1 bandari c) 2 bandaris
   b) 1 bandari d) More than 2 bandaris

(viii) Which side do you usually use for chewing? a) Left b) Right

(ix) For how long have you used/ smoked tobacco?
   a) Less than 1 yr d) 11-15yr
   b) 1-5yr e) 16-20yr
   c) 6-10yr f) 20+yr

(x) What type of tobacco do you use?
   a. Filter cigarettes
   b. Non-filter cigarettes
   c. Chewing tobacco
d. Snuff
e. Traditional tobacco
f. Others (specify)..............

(xi) What amount of tobacco do you use per day?
   a. Light smoker 1-10 sticks
   b. Moderate smoker 11-20 "

xvii
c. Moderately heavy smoker 21-40 "
d. Heavy smokers >40 "
e. Chewed tobacco/ Snuff (amount)................times/day.

(xii) Do you experience any of the following health problems?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Troubled sleeping</td>
<td>Yes</td>
</tr>
<tr>
<td>b)</td>
<td>Weight loss</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>Appetite loss</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>Feeling paranoid</td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>Feeling depressed</td>
<td></td>
</tr>
<tr>
<td>f)</td>
<td>Mood swings</td>
<td></td>
</tr>
<tr>
<td>g)</td>
<td>Feeling anxious</td>
<td></td>
</tr>
<tr>
<td>h)</td>
<td>Feeling easily annoyed</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Hallucinations</td>
<td></td>
</tr>
</tbody>
</table>

(xiii) Do you experience any of the following dental problems?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>General sensitivity of teeth</td>
<td></td>
</tr>
<tr>
<td>ii.</td>
<td>Holes on teeth</td>
<td></td>
</tr>
<tr>
<td>iii.</td>
<td>Loosening of teeth</td>
<td></td>
</tr>
<tr>
<td>iv.</td>
<td>Teeth loss</td>
<td></td>
</tr>
<tr>
<td>v.</td>
<td>Bleeding/ itching gums</td>
<td></td>
</tr>
<tr>
<td>vi.</td>
<td>Bad breath</td>
<td></td>
</tr>
<tr>
<td>vii.</td>
<td>Bad taste</td>
<td></td>
</tr>
<tr>
<td>viii.</td>
<td>Change in tooth colour</td>
<td></td>
</tr>
<tr>
<td>ix.</td>
<td>Jaw joint problems</td>
<td></td>
</tr>
<tr>
<td>x.</td>
<td>Ulcers in the mouth</td>
<td></td>
</tr>
<tr>
<td>xi.</td>
<td>Wearing- off of teeth</td>
<td></td>
</tr>
<tr>
<td>xii.</td>
<td>Others (specify).........</td>
<td></td>
</tr>
</tbody>
</table>

3. EXAMINATION.

(i) Soft tissues:

<table>
<thead>
<tr>
<th></th>
<th>0- No abnormality.</th>
<th>1- Staining of tissues(extrinsic).</th>
<th>2- Leukoplakia/ hyperkeratinisation.</th>
<th>3- Erosions/ulcerations</th>
<th>4- Stomatitis</th>
</tr>
</thead>
</table>

(ii) Plaque Scores (using the Simplified Oral Hygiene Index by Green and Vermillion). Debrid is removed with the side of the probe along the tooth.

Criteria

<table>
<thead>
<tr>
<th></th>
<th>0-No debr or stains on the tooth surface</th>
<th>1-Soft debr covering the gingival margin.</th>
<th>2-Soft debr covering 1/3-2/3 of the tooth surface</th>
<th>3-Soft debr covering &gt; 2/3 of the tooth surface.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>F 16</th>
<th>11</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L 16</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>F 46</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>L 46</td>
<td>31</td>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Mean</th>
</tr>
</thead>
</table>

(iii) Calculus score (using the Oral Hygiene index-Calculus component).
Criteria
0- No calculus
1- Supragingival calculus covering not more than 1/3 of tooth surface.
2- Supragingival calculus covering 1/3-2/3 of tooth surface
3- Supragingival calculus covering more than 2/3 of the tooth or having a continuous band of subgingival calculus.

Charting

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th></th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>16</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>L</td>
<td>16</td>
<td>11</td>
<td>26</td>
</tr>
</tbody>
</table>

Total...... Mean......

iv) DMFT (Kleus and Palmer)

Criteria
0- sound tooth
1- -Decayed tooth (D)
   ✓ Cavity on accessible tooth surface that is visible to the naked eye.
   ✓ When probing if there is resistance in withdrawal of the probe in an inaccessible tooth surface
   ✓ Colour change at the interproximal surface under marginal ridges and when surface probe enters a cavity with certainty.
   ✓ If there is a temporary filling.
   ✓ Filled tooth with primary or secondary caries.

2- Missing (M)
   ✓ Evidence that tooth was lost or removed due to dental caries.
   ✓ Carious tooth to be extracted immediately after examination.

3- Filled (F)
   ✓ Filling due to dental caries and there is no evidence of new caries formation

Charting

<table>
<thead>
<tr>
<th>28</th>
<th>27</th>
<th>26</th>
<th>25</th>
<th>24</th>
<th>23</th>
<th>22</th>
<th>21</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>37</td>
<td>36</td>
<td>35</td>
<td>34</td>
<td>33</td>
<td>32</td>
<td>31</td>
<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
</tr>
</tbody>
</table>

D= decayed. M= missing. F= filled

vii) Other relevant oral findings (specify)...........................................
..............................................................................................................
Proposal Development.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT COST (Ksh)</th>
<th>UNITS</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foolscaps</td>
<td>2.50</td>
<td>80</td>
<td>200.00.</td>
</tr>
<tr>
<td>Internet services</td>
<td>2 per minute</td>
<td>200</td>
<td>400.00</td>
</tr>
<tr>
<td>Typing and printing</td>
<td>1200</td>
<td>-</td>
<td>1200.00</td>
</tr>
<tr>
<td>Data Collection Forms</td>
<td>3</td>
<td>150</td>
<td>450.00</td>
</tr>
</tbody>
</table>

Report Development

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT COST (Ksh)</th>
<th>UNITS</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foolscaps</td>
<td>2.50</td>
<td>80</td>
<td>200.00</td>
</tr>
<tr>
<td>Internet Services</td>
<td>2 per minute</td>
<td>200</td>
<td>400.00</td>
</tr>
<tr>
<td>Typing and Printing</td>
<td>1500</td>
<td>-</td>
<td>1500.00</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
<td>300.00</td>
</tr>
</tbody>
</table>

**TOTAL** 4730.00