RESEARCH ARTICLE

ASSOCIATION BETWEEN CHRONIC KHAT (CATHA EDULIS) CHEWING AND PLASMA LIPID PROFILE AMONG ADULT MALES FROM AL SHUAIB DISTRICT DHALA GOVERNURATE.YEMEN

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Abstract

This study aims to investigate the association between chronic khat chewing (5 to 30 years duration) and dyslipidemia among healthy males in Al Shuaib District. One hundred participants from different villages agreed to complete the study with us. In this cross sectional study sample objects 230 males were selected randomly and divided according to ages and chewing khat duration, into four groups each (n= 20) and a control group of (n=20) non khat chewers. Data were obtained using a questionnaires and fasting blood sample collected and examined for lipid profile measurements including levels of total cholesterol TC, triglyceride TG, low density lipoprotein cholesterol (LDL-C) and high density lipoprotein cholesterol (HDL-C). The mean levels of TC in groups D (179.5mg/dl) and E (180mg/dl) was higher significantly than control group subjects (156mg/dl). levels of HDL decreased in khat chewers; D and E groups (44.5mg/dl and 41mg/dl) respectively compared to the control group (46.4mg/dl). On the other hand, the average LDL increased in the D and E subject groups (103.4mg/dl) and (112.4mg/dl) respectively compared with control 93.8mg/dl. There was a higher dyslipidemia among subjects of khat chewing groups than non khat chewers. There is a significant association between chronic khat chewing and dyslipidemia especially the decrease in HDL-C level was the main lipid variable followed by TG level. The imbalanced lipid profile might be due to genetic factor or social dietary habits, besides wide spread use of pesticides during cultivation of khat plant which have toxicity in area of study.

Keywords: Chronic, Dyslipidemia, Khat chewing, Lipid profile.

Introduction

The plant (Catha edulis- Forsk), commonly known as khat, qat, chat or mirra, [1] is a shrub or small to medium sized evergreen tree that belongs to the Celastraceae family. It is cultivated as a bush or small tree, mainly in Yemen and East African Countries [2,3]. Some oral traditions claim that khat originated from Yemen, however the literature indicates that khat originated from Ethiopia, expanded to Yemen [4] and other parts of the world such as Somalia, Sudan, South Africa and Madagascar, Afghanistan and Turkestan [5]. Chewing khat is a social and cultural habit practiced by Yemeni and East African peoples [6].

The tender, reddish-green leaves and the young shoots are chewed for several hours daily to get the desired effects Orlien et al 2018. Generally, people chew khat for its stimulant effects on CNS and reducing fatigue and restore mental and physical activity [7].

The chemical properties of khat are now well documented; the active agent responsible for the physical and mental effects observed is cathinone or alpha aminopropiophenone. When the leaves, which contain the psychoactive substance, cathinone are chewed and the juice is ingested, it produces stimulation of the CNS in man analogous to the stimulation produced by amphetamine [8,9]. Many different compounds are found in khat including alkaloids, terpenoids, flavonoids, sterols, glycosides, tannins, amino acids, vitamins and minerals [6,10-12]. Khat chewing nowadays has become an epidemic over many regions in Yemen from the old to young males and urban and rural places [13]. Moreover, many adolescents have low knowledge towards adverse effects of khat chewing. Though khat chewing has become a common practice among high school, college and university students in Yemen, few studies have assessed the prevalence and associated factors.

Khat chewing is not only a social habit, it also chewed
for other purposes such as relieving tiredness, fatigue and depressed feelings, students for focusing and stay alert. [14]. In Yemen and some east African countries some reported statistics showed that 80% to 90% of adult male consume khat on daily bases [15] Among all cardiovascular diseases (CVD) dyslipidemia is one of the most important factors that might lead to CVD worldwide [13]. The occurrence of dyslipidemia in old age results in high risk of CVD [15].

The consumption of Khat can cause various physiological and socio-economic impacts, which have put a control on its use by several countries. There are a huge number of studies reporting the psychological and physiological effects of khat on different body systems, available data exploring khat effects on lipid profile are insufficient. Taking into consideration that several millions of people globally chew khat on daily basis, it is likely that khat adverse health effects including effects on body systems such as CNS, digestive system, cardiovascular system and reproductive and endocrine systems. lipid profile of khat chewers is disturbed. Chronic consumption of Khat disrupting lipid profile including total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol and triglycerides were not widely well studied.

Al-Shuaib District is located, according to astronomical (UTM) geographical coordinates, between latitudes 13.46° - 13.54° north of the equator, and between longitudes 44.48° - 45.5° east of Greenwich, and it is one of the districts of Al Dhalea Governorate of Yemen. Al Shuaib represents 8% of the total area of Al-Dhalea Governorate, which has an area of about (4,356) km2. Khat plants are widely cultivated and most citizens are working in the fields of khat.

The study aimed to examine the possible association between chronic khat consumption (duration between 5 to 30 years) in healthy adult Yemeni males who come from different villages of Al-Shuaib District, and their lipid profiles.

Materials and Methods

Study population

This study was a cross sectional study carried out during November 2020 to May 2021. All subjects came from different villages of Al Shuaib District. A total of 230 adult males aged between (18 to 60) years old has a history of years of khat chewing participated in this study. Out of this number only 100 males volunteers agreed to complete the study.

Collection of data

First, the questionnaire forms were distributed among participants. The questionnaire provides the necessary demographic data (age, sex, and residence) healthy males khat chewers and non-khat chewers, who had no chronic diseases (hypertension, diabetes mellitus, renal or liver diseases) and those who agreed to complete the study were included. Participants who are taking prescribed medications affecting lipid profiles were excluded. A total of 230 subjects were included in this step of the study. After analyzing the questionnaires, only 100 males fit the inclusion criteria, and agreed to complete the study. Participants were informed by the author via mobile phone to fast for 10 to 12 hours before collecting the blood samples. After the blood samples were obtained, the collected samples were transferred to the central laboratory (Al-Waleed laboratory in Al-Awabil region), further analysis were processed in a centrifuge and appropriately stored until further analyses. The blood samples were analyzed for lipid profile measurements including levels of total cholesterol (TC), triglycerides (TGs), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C).

According to the National Cholesterol Education Program-Adult Treatment Panel III criteria, [16]: dyslipidemia is defined if one or more of the following situations are noted:

Hypertriglyceridemia (TG levels 150 mg/dl), hypercholesterolemia (TC level 200 mg/dl), high LDL cholesterol (LDL cholesterol level 130 mg/dl), and low HDL cholesterol (HDL cholesterol level <40 mg/dl in males).

Statistical analysis

The data were analyzed statistically using the software package of the Statistical Package for the Social Sciences (SPSS) version 23 for windows. The T-test was used to compare parameters mean ± SD, they were compared in one way, analysis of variance or unpaired "t". The statistical tests were examined for significance at the level of P 0.05.

Results

Results of the current study showed (Table 2., Fig.2) the mean levels of total cholesterol (TC) in the blood increased in groups D (179.5mg/dl) and E (180mg/dl) significantly (p < 0.05) compared to the control group. As well as in (Table3, Fig.3) showed that levels of HDL in the blood decreased in the D and E groups (44.5mg/dl and 41mg/dl) respectively compared to the control group (p < 0.05) with a statistical significance p =0.012 in subjects of group E.

On the other hand, (Table4, Fig.4). Showed the average LDL cholesterol concentration in the serum of khat consumers decreased in groups A and B but not statistical significance p value was >0.05. But in group E the level of LDL increased (E 112.4mg/dl) with statistical significance p < 0.05.
While in (Table 5) the level of triglycerides TG in the blood of all subject groups showed an increase in subjects of group A (188.6 mg/dl) which was statistically significant p<0.05 compared with non-khat chewers control, the same was true for other members in study groups B, D and E: (233.1 mg/dl), (175.4 mg/dl) and (188.5 mg/dl) respectively.

Table (1): the study groups and average years of khat chewing.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Age</th>
<th>Average years of chewing khat</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24.5±3.14</td>
<td>5.1</td>
</tr>
<tr>
<td>B</td>
<td>34.85±3.1</td>
<td>12.8</td>
</tr>
<tr>
<td>D</td>
<td>44.45±3.1</td>
<td>21.8</td>
</tr>
<tr>
<td>E</td>
<td>54.45±3.1</td>
<td>29.5</td>
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Table (2): Statistical analysis of cholesterol serum level in study groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean± SD</th>
<th>± SE</th>
<th>t-value</th>
<th>p-value</th>
<th>Sign*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>20</td>
<td>156.000</td>
<td>17.35087 3.87977</td>
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<td></td>
<td></td>
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<tr>
<td>(18-39)Yrs</td>
<td>A</td>
<td>20</td>
<td>154.050 22.9495451 313167</td>
<td>0.303</td>
<td>0.763</td>
<td>N**</td>
</tr>
<tr>
<td>(30-39)Yrs</td>
<td>B</td>
<td>20</td>
<td>168.900 32.116407 7.18145</td>
<td>1.580</td>
<td>0.125</td>
<td>N</td>
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<tr>
<td>(40-49)Yrs</td>
<td>D</td>
<td>20</td>
<td>179.500 34.410077 6.9432</td>
<td>2.727</td>
<td>0.010</td>
<td>S***</td>
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<td>(50-60)Yrs</td>
<td>E</td>
<td>20</td>
<td>180.1000 42.978459 6.1027</td>
<td>2.325</td>
<td>0.025</td>
<td>S</td>
</tr>
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</table>

Sign*: Significant
S***: Significant at P< 0.05
N**: Non Significant

Fig. (2): Mean of serum cholesterol

Table (3): Statistical analysis of HDL serum level in study groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean± SD</th>
<th>± SE</th>
<th>t-value</th>
<th>p-value</th>
<th>Sign*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>20</td>
<td>46.45±2.03647</td>
<td>0.27371</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(18-29)Yrs</td>
<td>A</td>
<td>20</td>
<td>49.30±4.03647</td>
<td>0.27371</td>
<td></td>
<td></td>
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<tr>
<td>(30-39)Yrs</td>
<td>B</td>
<td>20</td>
<td>46.50±4.03647</td>
<td>0.27371</td>
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<tr>
<td>(40-49)Yrs</td>
<td>D</td>
<td>20</td>
<td>44.50±4.03647</td>
<td>0.27371</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(50-60)Yrs</td>
<td>E</td>
<td>20</td>
<td>41.00±4.03647</td>
<td>0.27371</td>
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</tbody>
</table>

Sign*: Significant
S***: Significant at P< 0.05
N**: Non Significant

Fig. (3): Mean of serum HDL

Table (4): Statistical analysis of LDL serum level in study groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean± SD</th>
<th>± SE</th>
<th>t-value</th>
<th>p-value</th>
<th>Sign*</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>(18-29)Yrs</td>
<td>A</td>
<td>20</td>
<td>85.40±3.14</td>
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<td>B</td>
<td>20</td>
<td>84.60±3.14</td>
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<tr>
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<td>D</td>
<td>20</td>
<td>103.45±3.14</td>
<td>3.11471</td>
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<td></td>
</tr>
<tr>
<td>(50-60)Yrs</td>
<td>E</td>
<td>20</td>
<td>112.40±3.14</td>
<td>3.11471</td>
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</tr>
</tbody>
</table>

Sign*: Significant
S***: Significant at P< 0.05
N**: Non Significant
increased serum levels of TC and LDL-C in khat chewers (n=283) than non khat chewers (n=77). [13]. While a study on rabbits fed with khat caused significance reduction in plasma cholesterol TC throughout 6 months. [20]. Our results revealed a decrease in HDL-C among chronic khat chewers is consistent with a study in 2009 [21], and in agreement with a recent study showed HDL-C was low in 83% of khat chewers versus 75.3% in non khat chewers [13]. In the contrary to our study, one study in Yemen demonstrated higher fasting plasma level of HDL-C by 15% in khat users [20]. Our study showed significant increase in serum TG-C level, which is consistent with one Yemeni study in 2003, showed increased level of fasting TG in khat chewers than non khat chewers 92.77+49.26mg/dl versus 85.15 +36.73mg/dl (20) and inconsistent with another study showed significant decrease in TG levels by 30% and 36.7% after chewing 200gm and 400gm of khat leaves [22].

Chronic khat chewers males have high risk of cardiovascular diseases because of lipid imbalances which might be of several reasons; stressful conditions due to current civil war and political crises that has driven adult males to khat chewing sessions to escape life stresses, dietary habits and less sport activities besides the application of a variety of pesticides that heavily used in khat plant cultivation and its risk of liver damage, smoking cigarette. Serum HDL-C variations might be genetically related [23].

The advantages of this study is that it was carried out during war conflicts and gives an important health indicator and baseline data on lipid profile abnormalities among khat chewers in Al Shuaib district and health authorities in Al Dhala Governorate.

**Conclusion**

There are concerns about health hazards related to the consumption of Khat. This study demonstrates abnormal lipid profile of khat chewers in Yemen and in the region. Low HDL-C was the main lipid variable followed by hypertriglyceridemia among Yemeni male chewers. Genetic factors, war conditions, physical inactivity, and low-fat traditional Yemeni diets are considered the determinants of such findings. khat chewing is considered a significant economic and health problem in Yemen that needs specialized programmes to help people to stop and reduce the habit of khat chewing and cultivation of lands.

**Ethical Consideration**

Ethical approval of carrying out this study was obtained from the Ethical Scientific Research Committee University of Aden (Rec-57-2019). A consent approval by volunteers after they were given a full explanation about the purpose of the study.
References


Objective: This study was aimed at investigating the relationship between the chronic use of catha edulis and plasma lipid profile among adult males from Al Shuaib Dhala Governorate. Yemen. 

Methods: The study included 100 male volunteers, who were selected from the population of Al Shuaib district. They were divided into five groups based on their age and duration of khat use. The control group consisted of 20 males who did not use khat at all.

Results: There was a significant increase in total cholesterol (P<0.05) in groups D and E compared to the control group. HDL-C levels showed a significant decrease in groups D and E compared to the control group. LDL-C levels showed a significant increase (P<0.05) in groups D and E compared to the control group. Triglycerides (TG) levels were significantly higher in all participants of groups D and E compared to the control group.

Discussion: The results of this study indicate that the chronic use of khat is associated with an abnormal lipid profile, which can increase the risk of developing cardiovascular diseases. The findings of this study suggest that further research is needed to investigate the effects of khat use on the lipid profile and to develop effective interventions to reduce the health risks associated with khat use.

Keywords: Chronic, Plasma Lipid profile, Khat chewing, Adult Males.