EFFECTS OF KHAT CHEWING ON SEXUAL OFFENSES IN YEMENI MALE POPULATION

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ABSTRACT

BACKGROUND: Khat (Catha Edulis Forsk) is an evergreen shrub found growing wild or cultivated in the east of a region extending from Southern Africa to the Arabian Peninsula. Khat leaves contain 3 main alkaloids: s-α-aminopropriophenone, norpseudoephedrine and norephedrine. Catha Edulis is relatively unstable and decomposes within few days of picking thus, only freshly picked leaves have the full efficacy. In Yemen, khat chewing is a habit deeply rooted in the socio-cultural traditions. Khat and its alkaloid affect male sexual potency therefore it has been used as an aphrodisiac in ancient times.

SUBJECTS AND METHODS: the study was conducted on 100 Yemeni males with an age range 15-30yrs old. It was done over a period of 20 months. Informed consents were obtained before the interviews. RESULTS: it was observed that 88.1% of child molesters and 100% of rapists chewed Khat compared to 10% of controls which was statistically significant (P=0.000). Frequency of chewing also showed a significant relationship (p=0.000) with both types of sexual offenses. Consuming khat prior to the offense shows significant difference (71.2% of child molesters versus 100% of rapists, P=0.021). Regarding the offenders’ perceptions of khat chewing, 37.3% of child molesters versus 66.7% of rapists claimed khat for the offense (P=0.039). Consumption prior to the offense shows significant difference (61.8% of adolescent versus 91.3% of adult sex offenders, P=0.002). Another significant variable is the claimed khat for the offense (32.7% of adolescent versus 54.3% of adult sex offenders, P=0.003). CONCLUSION: khat was found to be strongly correlated with sexual offences.

KEYWORDS: Khat, Catha Edulis, S-cathinone, Sexual offences, Yemen.

INTRODUCTION

Khat (Catha Edulis Forsk) is an evergreen shrub found growing wild or cultivated in the east of a region extending from Southern Africa to the Arabian Peninsula. Khat plantations occupy scarce arable land, and compete, for example, with coffee for the well-irrigated terraces. The habit of khat chewing has prevailed for centuries in this part of the world, being cited in certain ancient texts. Khat use is highly prevalent in East African and Middle Eastern countries, in particular the Yemen (Kalix and Braenden, 1985; Cox and Rampes, 2003; Manghi et al., 2009).

The earliest scientific report on khat in the West was in the eighteenth century when the botanist Peter Forskal identified the plant in Yemen and called it C. Edulis (Feyissa and Kelly, 2008). There are several names for the plant, depending on its origin: chat in Ethiopia, qat in Yemen (Alem et al., 1999), qaad/jaad in Somalia,
miraa in Kenya (Patel, 2000), mairungi in Uganda (Ihunwo et al., 2004), Muhulo in Tanzania, Hagigat in Hebrew (Bentur et al., 2007), cat, catha, gat, tohai and muraa (Fasannade et al., 2007). Dried leaves of khat are known as Abyssinian or Arabian tea (WHO, 2006). These many names attest to the widespread and presumably fairly old knowledge of C. Edulis by native people of Eastern and South-Eastern Africa. However, the most common name is khat (Alem et al., 1999).

According to Kalix (1988, 1992), 3 main alkaloids are present in khat leaves: s-α-aminopropriophenone (s-cathinone), norpseudoephedrine (cathine) and norephedrine. There are also small amounts of ethereal oil, sterols and triterpenes, together with 5% proteins with an insignificant nutritional value. Ascorbic acid is also present (Raman, 1983; Hoffman and Al’Absi, 2010). They also contain tannin (7–14% by weight in dried leaves) and minute amounts of thiamin, niacin, riboflavin, iron and amino acids. Apart from tannin, these substances are unlikely to contribute to the biological effect of khat (Kalix, 1988, 1992).

S-cathinone is relatively unstable and decomposes within few days of picking or if the leaf is dried into norpseudoephedrine and norephedrine which are slowly absorbed and are excreted unchanged within about 24 hours. Thus, only freshly picked leaves have the full efficacy (Brenneisen et al., 1986). The major metabolites of S-cathinone after ingestion are R,S-norephedrine and R,R-norpseudoephedrine, which have weaker sympathomimetic activities and central stimulant properties (Kalix, 1988, 1992; Hoffman and Al’Absi, 2010).

Limited studies were done on its effects on the sexual behavior with conflicting results, with some investigators suggesting that khat increases sexual desire, can be used as an aphrodisiac and may treat premature ejaculation (Islam et al., 1990). In contrast, alternative findings suggest that it may have the opposite effect, and may result in sexual impairment (WHO, 1980). Islam et al. (1990), reported loss of libido and decreased semen output. In addition, deleterious effects on semen parameters including sperm morphology have been observed in khat addicts, especially chronic consumers (Mwenda et al., 2006). Sexual impairment, inability to sustain erection, loss of libido and spermatorrhea has also been reported by Mohammed and Engidawork (2011), as well as, inhibiting spermatogenesis and affecting testosterone levels (Nyongesa et al., 2008).

In Yemen, khat chewing is a habit deeply rooted in the socio-cultural traditions and its use is socially sanctioned and even prestigious. A khat chewing session may last 3-7hrs (Al-Motarreb et al., 2002) and it may occur alone or in groups (Banjaw and Schmidt, 2005). People chew its fresh leaves daily on regular basis mainly in the afternoon, although some people start chewing in the morning. Many factors play a role in the extension of its use as easy transportation (from village to city), availability of cheap khat making it affordable. People also believe that it helps them work more effectively, particularly manual work, as it increases their energy and alertness (Al-Motarreb et al., 2010).
Khat chewing is commonly practiced by high school and university students as well as some sector of the male population (Belew et al., 2000). Also religious scholars used to chew it to become alert during the night time to study religious science (Al-Motarreb et al., 2002). Euphoria, alertness and CNS stimulation induced by cathinone (the main active constituent derived from khat chewing), makes this habit popular among large numbers (Al-Attas, 1981). A study conducted by Taffa et al. (2002) in Addis Ababa, Ethiopia, revealed that engagement in sexual activity among young people was associated with khat consumption and alcohol use.

This habit, however, has been reported to have adverse effects on various body systems. Recently, it has become a real national problem in Yemen and many people (particularly physicians), believe that khat can damage health and have grave social, financial and medical consequences (Manghi et al., 2009). There is now growing concern of its health effects worldwide (Pantelis et al., 1989; Cox and Rampes, 2003; Al-Habori, 2005; Hassan et al., 2007).

Number of individuals who chew khat in the general population is mainly anecdotal; however, surveys have been performed to determine the exact incidence of khat chewing among specific cohorts. Seventeen years ago, Kalix, (1996) mentioned 6 million chewers daily. Laswar and Darwish, (2009) observed that khat chewing among male medical students in Aden University increased from 35-90% over the 5 years of training. In college and high school students of Jazan region of Saudi Arabia aged between 15-25 years, 37.7% of males and only 3.8% of females chewed khat (Ageely, 2009), while in Addis Ababa, Ethiopia, 15.9% of a sample of 4001 men regularly chewed khat (Tesfaye et al., 2008). There is evidence that khat use in Ethiopia is more prevalent in ethnic communities with a tradition of khat use but it is now becoming an everyday drug for the general population (Alem and Shibre, 1997; Belew et al., 2000).

While early reports indicated greater prevalence in men than in women, recent reports have shown sharp increases in khat use by women in some countries, including Yemen (Hoffman and Al’Absi, 2010). Its prevalence in Western countries appears to be restricted to the immigrant communities from Eastern countries (Griffiths, 1998; Manghi et al., 2009). In the UK, 75 male Yemeni adults reported chewing up to 3 bundles weekly of which 39% were assessed as dependent (Kassim and Croucher, 2006). It is also an emerging problem in Australia (Stefan and Mathew, 2005). It is illegal in the USA, Canada and many European Countries including Denmark, Finland, Ireland, France, Germany, Switzerland, Norway and Sweden (Al-Motarreb et al., 2010).

**SUBJECTS AND METHODS**

**Design:** this thesis is based on retrospective data concerning bad habits especially khat chewing and criminological data.

**Participants:** it was conducted on 100 males from Republic of Yemen with an age range 15-30 years old. Participants were informed that the study was confidential and voluntary. Informed consents were obtained before the interviews. They were divided into 2 groups:
The 1st group \(\rightarrow\) consists of 80 males convicted of sexual offences taken from different Yemeni custodies and prisons.

The 2nd group \(\rightarrow\) consists of 20 males (controls) selected from Yemeni schools and universities.

Glossary:
- Recidivists \(\rightarrow\) offenders who commit more than one sexual offence (Myers et al., 2005).
- Non-recidivists.
- Child molesters \(\rightarrow\) offenders who commit any sexual contact with a person who is not of legal age of consent, generally below 16 years of age (Strassberg et al., 2012)
- Rapists \(\rightarrow\) offenders who commit an assault upon any individual with the intent to commit penetrative sexual acts without the victim’s permission (Fisher and Beech, 2004)
- Child \(\rightarrow\) from 4-12 years of age (Feigelman, 2011).
- Adolescents \(\rightarrow\) from 13-19 years of age (Cromer, 2011).
- Adults \(\rightarrow\) 20-60 years of age.

Period of the study: Done over a period of 20 months (from October 2011 to May 2013).

Procedures: Interviews and reviewing official documents regarding age, chewing khat and frequency of its chewing (daily, intermittent or never), timing of the consumption (prior or during the offence), significance of khat on sex offenders and if khat was claimed for the offence and if the offender offered khat to the victim.

Statistical analysis: Data analysis was performed using a Statistical Program for the Social Services (SPSS), version 15.0 for Windows (SPSS Inc., Chicago, Illinois). Categorical data were expressed as percentages and numbers. Variables were compared with Pearson chi-square \(\left(x^2\right)\) that is statistically significant at \(p<0.05\) and high significance at \(p<0.005\).

RESULTS
Subjects were compared according to khat chewing and frequency of its chewing.

Table (1): Child molesters, rapists and controls were compared regarding effect of khat chewing on sexual offenses.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Child molesters</th>
<th>Rapists</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Chewing khat</td>
<td>52</td>
<td>88.1</td>
<td>21</td>
</tr>
<tr>
<td>Frequency of chewing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Daily</td>
<td>32</td>
<td>54.2</td>
<td>18</td>
</tr>
<tr>
<td>• Intermittent</td>
<td>20</td>
<td>33.9</td>
<td>3</td>
</tr>
<tr>
<td>• Never</td>
<td>7</td>
<td>11.9</td>
<td>0</td>
</tr>
<tr>
<td>Consumption prior offense</td>
<td>42</td>
<td>71.2</td>
<td>21</td>
</tr>
<tr>
<td>Consumption during the offense</td>
<td>40</td>
<td>67.8</td>
<td>15</td>
</tr>
<tr>
<td>Claimed khat for the offense</td>
<td>22</td>
<td>37.3</td>
<td>14</td>
</tr>
</tbody>
</table>

*Chi-square statistics \(\rightarrow\) significant when \(P < 0.05\) and highly significant when \(P < 0.005\).
Table (1) compares child molesters and rapists concerning the relation between khat chewing and the sexual offense. No significant difference was observed as regards chewing Khat prior or during the offense. On the other hand, it was observed that the frequency of khat chewing differed significantly between child molesters and rapists (54.2% of child molesters versus 85.7% of rapists chewed khat daily, 33.9% of child molesters versus 14.3% of rapists chewed khat intermittently and 11.9% of child molesters versus 0% of rapists never consumed khat, \( P = 0.03 \)) (figure 1). Consuming khat prior to the offense shows significant difference (71.2% of child molesters versus 100% of rapists, \( P = 0.021 \)). Regarding the offenders’ perceptions of khat chewing, 37.3% of child molesters versus 66.7% of rapists claimed that khat was responsible for the offense (\( P = 0.039 \)). As seen in the previous table, offenders’ perceptions for the effects of these substances on their behavior, about 1.7% of child molesters compared to 23.8% of rapists claimed illegal substances for the offense (\( P = 0.001 \)).

Table (2): Number, percent and significance of khat on sex offenders.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Adolescents</th>
<th>Adults</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=34</td>
<td>N=46</td>
<td></td>
</tr>
<tr>
<td>Chewing khat</td>
<td>27 79.4%</td>
<td>46 100%</td>
<td></td>
</tr>
<tr>
<td>Frequency of chewing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Daily</td>
<td>8 23.5%</td>
<td>42 91.3%</td>
<td></td>
</tr>
<tr>
<td>• Intermittent</td>
<td>19 55.9%</td>
<td>4 8.7%</td>
<td></td>
</tr>
<tr>
<td>• Never</td>
<td>7 20.6%</td>
<td>0 0</td>
<td></td>
</tr>
<tr>
<td>Consumption prior offense</td>
<td>21 61.8%</td>
<td>42 91.3%</td>
<td></td>
</tr>
<tr>
<td>Consumption during the offense</td>
<td>23 67.6%</td>
<td>32 69.6%</td>
<td></td>
</tr>
<tr>
<td>Claimed khat for the offense</td>
<td>11 32.4%</td>
<td>25 54.3%</td>
<td></td>
</tr>
</tbody>
</table>

*Chi-square statistics \( \rightarrow \) significant when \( P < 0.05 \) and highly significant when \( P < 0.005 \).

As seen in table (2), no differences are observed between adolescent and adult sex offenders regarding khat consumption during the sexual offense. The habit of chewing differed significantly between adolescent (79.4%) compared to adult offenders (100%). Also, chewing frequency showed significant difference (23.5% adolescent versus 91.3% adult offenders chewed daily, whereas 55.9% of adolescent versus 8.7% of adult offenders chewed intermittently, \( P = 0.000 \)).
**Table (3):** Frequency distribution of khat chewing in recidivist and non-recidivist sex offenders.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Recidivists</th>
<th>Non-recidivists</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Khat chewing</td>
<td>13</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>Frequency of chewing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>11</td>
<td>84.6</td>
<td>39</td>
</tr>
<tr>
<td>Intermittent</td>
<td>2</td>
<td>15.4</td>
<td>21</td>
</tr>
<tr>
<td>Never</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Consumption during the offense</td>
<td>9</td>
<td>69.2</td>
<td>46</td>
</tr>
<tr>
<td>Claiming khat for the offense</td>
<td>5</td>
<td>38.5</td>
<td>31</td>
</tr>
</tbody>
</table>

*Chi-square statistics → significant when P < 0.05 and highly significant when P < 0.005.

A comparison between recidivist (convicted ≥ 2 times for sex offense) and non-recidivist offenders regarding khat chewing is seen in table (3). Results show no significant difference between the 2 types of offenders as regards khat chewing, its frequency, and consumption prior and during the offense as well as claiming khat for the offense.

**DISCUSSION**

A significant proportion of sexual offenders suffer from substance use disorders which is more prevalent in rapists than in child molesters (Birkler et al., 2012). Nature of the relationship between substance abuse and the sexual offense is complex and confounded with several factors (dose, experience with the substance, social setting, personality factors, subjective expectancy of the substance effects, brain disorders). Acute and long-term abuse effects play a contributive but not a primary causal role in the offense (Briken et al., 2009). Substance abuse and intoxication may also be used as an excuse for engaging in antisocial behavior, including sexual offenses (Mitchell and Beech, 2011).

In our study, Khat chewing was found to be strongly correlated with sexual offenses, where 91.3% of the offenders consumed khat. Rapists consumed khat more than child molesters and adult offenders used khat more than the young. Furthermore, nearly 50% of the offenders claimed that they were under the influence of khat at the time of the offense. The study conducted by Beckerleg (2009a, b) in East Africa which was based on khat discourses and sex stated that khat caused sexual desire and violence. In Uganda, the use of khat was associated with increased sexual desire. The Ugandan claim that it makes people sexually active and violent and likely to commit rape, they also claim that it is usually linked to ‘idling’ and lethargy (Ihunwo et al. 2004; Beckerleg, 2009a,b; Golfax et al. 2010).

Ugandan officials (police and district officers) focused on khat as a cause of sexual violence. The discussion is particularly acute in Kabarole District in the Western region, one of the main growing areas. Police,
local government officials and civil society groups have united in their negative views about the effects of khat (Klein et al., 2009):

- Khat is a dangerous drug used by criminals who stay awake at night to commit robberies.
- Consumers are prone to commit rape and defilement (a catch-all term covering sex with underage girls and actual pedophilia) because of chewing effects.
  - It makes people violent.
  - Used by ‘idlers’ making people non-productive.
  - Mixed with cannabis and distilled liquor leading to dangerous results in behavior, violence, crime and uncontrolled sex (Beckerleg, 2009a, b).

There are contradictory reports regarding the association of khat chewing and sexuality. Khat has been reported to be used as an aphrodisiac (Krikorian, 1984; Giannini et al., 1992; Bentur et al., 2007; Feyissa et al., 2008). Similarly, in females, khat chewing has been reported to increase sexual desire. Recently, it was reported that a capsule containing illicit cathinone have been marketed in Israel as a stimulant and an aphrodisiac drug (Bentur et al., 2007).

Kebede et al. (2005) reported that the use of khat, alcohol and other substances is significantly and independently associated with risky sexual behavior among young people. Khat is primarily used for its stimulant effect. Users report that Khat intake results in increased energy levels and alertness, improves self-esteem, creates a sensation of elation, enhances imaginative ability and the capacity to associate ideas, it also improves communication abilities. It has not yet been associated with alteration of rational decision-making and has not been shown to increase risk-taking behavior (Warfa et al., 2007).

Previous literature reviews show that there are scant data on the long-term relationship between the psychostimulant plant (khat) abuse and aggression, despite traditional claims that prolonged abuse may influence behavioral characteristics of individuals leading to violence (Cox and Rampes, 2003). However, there have been reports of khat-induced aggressive verbal outbursts and violent behavior in the past (Giannini and Castellani, 1982). Recently, in a community based study in Somalia, there was evidence of disruption and violent behavior amongst chronic khat users (Odenwald et al., 2005). Offenders, generally have aggressive behavior (Mitchell and Beech, 2011), and khat-enhanced aggressive behavior similar to amphetamine.

CONCLUSION AND RECOMMENDATIONS

From this study, khat was found to be strongly related to sexual offences. Therefore its use must be prohibited and it should be considered as a drug of abuse.

REFERENCES


تأثير مضغ الفم على الإعتداءات الجنسية عند الذكور في اليمن

الفم هو نبتة دائمة الخضرة تنمو بريا أو تتم زراعتها في شرق المنطقة الممتدة من جنوب إفريقيا إلى شرق الجزيرة العربية. وتحتوي أوراق الفم على ثلاث مواد شبه قلية، وهي: ألفا-نورفينورنورفينون، و نورنورلافورادين، و نورافيدرين. و لكن هذه الفم مثمرة مستقرة نسبيا حيث تتحمل في غضون أيام قليلة من فطنتها، ولذلك تمكن الفاعلية الكاملة في الأوراق حديثة القطف. وفي اليمن، يعد مضغ الفم عادة متصلة بشكل كبير في التقاليد الاجتماعية والثقافية. و يؤثر أوراق مشتملة على الفم الجنسية للذكور، ولذلك كان يستعمل كمنشط جنسي في الزمن القديم.

تم عمل هذه الدراسة على 100 ذكر يمني، تتراوح أعمارهم بين 15-30 سنة، وذلك لمدة 20 شهر، بعد الحصول على موافقة المشاركين قبل إجراء الإستبانات.

و قد بين أن 88,1% من المتعشرين بالأطفال و 100% من المتعشرين قد قامو بمضغ أوراق، و ذلك مقارنة ب10% من المجموعة الضابطة، وهي نتيجة ذات دالة إحصائية (p=0.000). و قد أظهر معدل تكرار مضغ أوراق علاقة إحصائية ذات دالة (p=0.000)، مع نواع الإعتداءات الجنسية.

و قد أظهر إستعمال أوراق قبل القيام بالإعتداء فارقا واضحا (71,2% من المتعشرين بالأطفال مقابل 100% من المتعشرين، p=0.021). و فيما يتعلق بإطار المتعشرين عن مضغ أوراق، فقد أكد 37,3% من المتعشرين بالأطفال و 66,7% من المتعشرين علاقة بالإعتداء (p=0.039).

و قد بين تناول أوراق قبل الإعتداء ارتفاعا واضحا (61,8% من المراهقين مقابل 91,3% من المتعشرين الجنسين البالغين، p=0.002). و يظهر منغبر آخر ذو دالة، وهو إدعاء تناول أوراق مع الإعتداء، حدوثه في 32,7% من المراهقين في مقابل 54,3% من المتعشرين الجنسين البالغين، (p=0.003).

و بذلك يتبين أن تناول الفم مرتبط إرتباطا وثيقا بالإعتداءات الجنسية.