

**KHAT (*CATHA EDULIS*): ACADEMIC, HEALTH AND PSYCHOSOCIAL
EFFECTS ON “MATURE” STUDENTS**

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ABSTRACT

The leaves of the plant khat (*Catha edulis*) are commonly chewed in certain countries of East Africa and the Arabian Peninsula. Chewing of khat leaves has a deep-rooted religious and socio-cultural tradition and has a peculiarity of certain influences on the physical, physiological and psychosocial well-being of those involved in the habit of chewing the leaves. The objective of this study was to investigate psychosocial, academic and health implications and reasons for students' involvement in khat chewing habit. A cross-sectional survey of students aged 22 years and above was studied; Five hundred and twenty eight subjects participated. They were summer school students of Jimma University, Ethiopia. A self structured questionnaire was used in data collection on the socio-demographic, academic, economic and health effects of khat. Results clearly indicated that males dominated in chewing khat (63.52%); 54.9% of khat chewers were Muslims; 46.3% of the students reported focus and concentration on their studies as the reason for chewing khat. Insomnia was the major health problem indicated by 50% of the students; while 71% of the study participants reported being more sociable following khat chewing. Self acclaimed positive academic achievements were reported by 89% of the participants but there were no reported significant effects on objective academic results. It was concluded that to gain concentration and focus was the main reason for students' khat chewing habit. However, there was no evidence of subjective academic achievement.

KEY WORDS: Khat; *Catha edulis*; academic achievement; health effects; mature students; socioeconomic factors; religion.

INTRODUCTION

Khat (*Catha edulis* Forsk) belongs to the family of plants Celastraceae (moonseed). It is an evergreen tree (Figure 1) which grows at high altitudes extending from East to South-

ern Africa as well as Afghanistan, Yemen and Madagascar (Krinikorian, 1984; Kennedy, 1987). The earliest scientific report concerning khat was in the eighteenth century by the botanist Peter Forskal (Baasher, 1980; Al-Hebshi & Skaug, 2005). The chewing of khat leaves

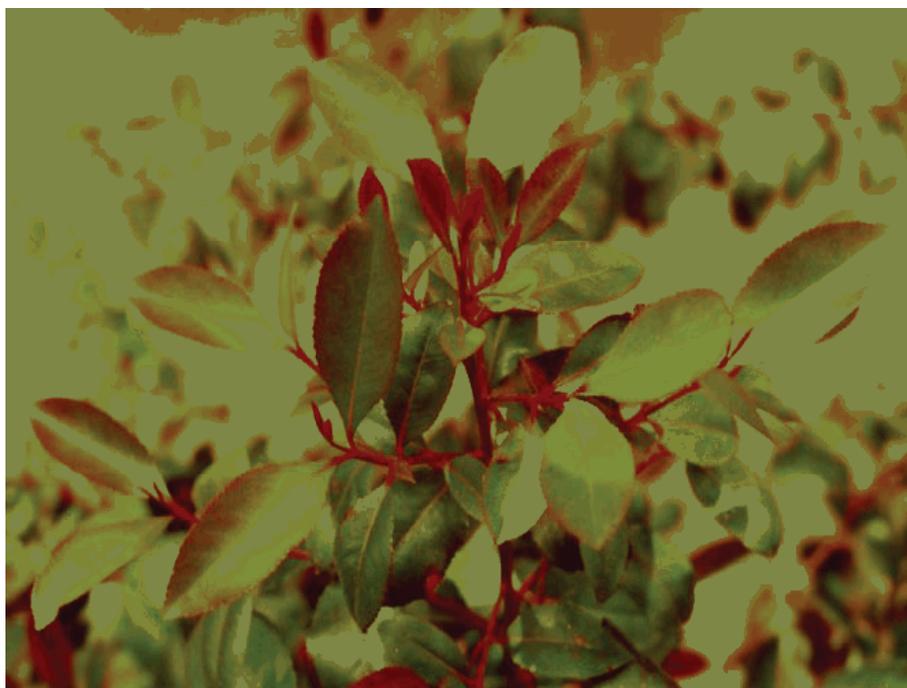


Figure 1. Young *khat* shrub

is common in certain countries of East Africa and the Arabian Peninsula. The khat plant is known by a variety of names, such as *qat* in Yemen, *chat* in Ethiopia, *jaad* in Somalia and *miraa* in Kenya and Tanzania. Other names are marungi, catha, cat, gaad, African salad, tohai, bushman's tea, and flower of paradise; in most western literature it is referred to as khat (Baasher, 1980; Al-Hebshi & Skaug, 2005; Elmi, 1983; National Drug Intelligence Center, 2007).

Historically, khat has been used for medical purposes (Kennedy, Teasue, Rokaw & Cooney, 1983) as well as an aphrodisiac (Krinikorian, 1984; Margetts, 1967), though it was also used for recreational purposes (Kennedy, 1987). It is most used for its stimulant effects (Baasher, 1980). The chewing of khat leaves has a deep rooted socio-cultural tradition (Kalix & Braenden, 1985). It is usually chewed in company (Kennedy, 1987; Elmi, 1983), but may be used by individual to enhance their working capacity (Kennedy, 1987; Elmi, 1983; Kennedy, et al, 1983). The principal features of the "khat experience" are described as increased

level of alertness, ability to concentrate, confidence, friendliness, contentment and flow of ideas (Kennedy, 1987). Khat contains the alkaloids norephedrin, cathine and cathinone. Norephedrin and cathine do not contribute significantly to the psycho-stimulant action; however, they probably are of importance for the sympathomimetic effects on the autonomic nervous system. The constituent that is mainly responsible for the stimulant qualities and the dependence producing effects of khat is cathinone. Cathinone has a similar mechanism of action as amphetamine therefore it is considered as a natural amphetamine (Brenneisen, Fisch, Koelbing, Geissshusler & Kalix, 1990; Geissshusler & Brenneisen, 1987; Kalix, 1996).

Khat is usually chewed at special social gatherings, but is also used frequently during work by labourers, craftsmen, farmers and students to get mental alertness, to be less sleepy and reduce physical fatigue (WHO Advisory Group, 1980; Peters, 1983). Interestingly, studies have also reported a strong association between khat chewing habit and high educa-

tional level (Alem, Kebede & Kullgren, 2007; Al-Hebshi, & Skaug, 2005). Many studies (Ihunwo, Kayanja & Amadi-Ihunwo, 2004; Ayana, Sherief & Tekli, 2002; Zein, 1983) have reported the use of khat by college and university students and proposed that the reasons for chewing by students are to get mental alertness, to work hard in their academic endeavors and to get good grades, though not all studies agree with these reasons (Mekonnen, Makonnen & Gebre-Tsadik, 1998).

Many studies have reported increased prevalence of khat chewing in various communities (Ayana, Sherief & Tekli, 2002; Ataly, Kebede & Kullgren, 1999), occupations (Ihunwo, Kayanja & Amadi-Ihunwo, 2004; Kebede, 2002; Peters, 1983) and among students (Ihunwo et al, 2004; Adugna, Jira & Molla 1994; Cox & Rampes, 2003). Also, various controversial reports have been made on khat concerning health (Ihunwo et al, 2004; Toennes, Harder, Schramm Niess & kauert, 2003; Murugan, Burkhill, Williams, Padley & Murray-Lyon, 2003; Nencini & Ahmed, 1989); psychosocial implications (Hassan, Gunaid, El Khally & Murray-Lyon, 2002; Alem & Shibre, 1997; Stefan & Mathew, 2005); economic effects (Advisory Council on the Misuse of Drugs, 2005; Feyisa & Aune, 2003; Balint & Balint, 1994; Kalix, 1994), academic achievement (Ihunwo et al, 2004; Widler, Mathys, Brenneisen, Kalix & Fisch, 1994), moral implications and the legality of khat (Elmi, 1983; Goudie, 1987). More so, there have been many controversial statements concerning the use of this substance (Abbink, 1992; Weir, 1985; Varisco, 1986; Ministry of Information and National Guidance, 1983; Cassanelli, 1986; Abbink, 1992; National Drug Intelligence Center, 2007; Kalix, Geissshuster & Brenneisen, 1987; Smith, 1994; Beekhuis, 1996; Nencini, Ahmed & Aminconi, 1984). However, few studies have systematically investigated the reasons for khat use, including psychosocial and economic, and the health implications on students who are socially and economically independent. Therefore, the purpose of this study was to determine the reasons and implications of khat chewing by “mature” students.

Mature students are defined as summer school students, aged 21 or over at the start of their course. For the purpose of this study, only students aged 22 years and above (from second year) were included.

METHOD

Study design and sampling: A cross-sectional survey using convenient sampling was conducted during the summer school of Jimma University, Jimma, Ethiopia, between August and September 2008. Summer students (second year and above) served as participants in the study.

Instrument: The instrument for data collection was a self-structured questionnaire developed by the investigators. The questionnaire sought information on, demographic characteristics, chewing and non-chewing habit, academic reasons for khat chewing, self reported cumulative grade point aggregate (CGPA), health, economic and psycho-social implications of khat chewing. Prior to the actual test, a pilot survey was conducted. The essence of the pilot test was to refine the technical and administrative procedures of the test. The pilot study involved 50 students (30 users and 20 non users of khat) with age range between 22 and 45 years (mean and SD of 32.23 and 7.52 years). The questionnaire was administered at an interval of one week using test-retest correlation (Spearman rank order) coefficient method. A reliability coefficient of 0.898 was obtained for the whole instrument in the pilot study.

Ethical consideration: Consent was obtained after having explained the purpose of the study and having reassured them that the collected information will remain confidential.

Administration of the Instrument: The investigators administered the questionnaires 610 volunteer students (400 chewers and 210 non chewers). All the ‘Shai bet’ (local cafés) around Jimma University were visited and the questionnaires were distributed to participants on sight. Students, particularly summer students, are fond of these cafés, where they read, discuss, chew khat, smoke cigarette and

take coffee or tea. The questionnaires were retrieved as soon as they were fully responded to. This made it possible to collect data from 328 (82%) chewers and 200 (95%) non chewers.

Data Analysis: The coded responses on the questionnaire were then entered on the computer general purpose coding forms. They were analyzed using Statistical Package for the Social Sciences (SPSS) (Windows Version 15.0 Chicago IL, USA). The results were presented with the use of mean, standard deviation (SD) and simple percentages (%). Student's t test and Chi square (X^2) test were used to determine the association between variables of interest. A probability level of 0.05 or less was used to indicate statistical significance.

RESULTS

A total of 528 subjects participated in the study (with age range of 22-50 years; mean± SD of 26.93 ± 5.98 years), out of which 296 were male chewers (mean age ± SD: 27.97 ± 6.81years) and 32 were female chewers (mean age± SD; 27.75± 6.94 years). There were one hundred and seventy male (mean age ± SD: 24.80±2.46years) and 30 female (mean age ± SD: 27.80±7.17years) non-chewers.

The proportions of male and female chewers were 63.52% and 51.61%, respectively, showing that males were more likely to be chewers than females. All participants (100%) who chewed khat were chronic chewers (> 2years). The majority (171 or 52%) of the participants were single, 145 (44%) married, and 12 (4%) divorced. The age groups of the subjects were 22-30 years (78%); 31-40 years (12%); 41-50 years (10%). The majority were Muslims (54.9%), followed by Christians (39%) and no religion (6.1%).

Table 1. Reasons for khat chewing habit (N=328)

Reasons for khat chewing	n (%)
Longer reading/delay fatigue	84 (25.6)
Assimilation	8 (2.4)
Concentration and focus	152 (46.3)
Flow of ideas	44 (13.4)
Memory	24 (7.3)
No reason (for fun of it)	16 (4.9)

The majority of the students (46.3%) reported that the reason for chewing khat was to have focus and to have concentration in their studies. Detailed reasons for chewing khat are depicted in Table 1. Table 2 shows that about 89% reported that khat has helped them to achieve their academic aims so far. However, results showed no significant difference ($t=.063$, $p=.802$) in CGPA between chewers (mean± SD=2.67±0.48) and non chewers (mean± SD=2.65±0.48) at $p < 0.05$.

The majority of the subjects (52%) reported that khat chewing does not adversely affect their health, while about 48% complained that it does affect their health. Lack of sleep (insomnia) when needed was the major health problem reported by 50% of the khat chewers. The majority (71%) of the participants reported being more sociable following khat chewing and about 40% were socially indifferent after chewing khat. Most (84.1%) of the participants took coffee in addition to khat chewing, followed by alcohol (79.3%), while smoking (30.5%) was least combined with khat chewing. Khat chewing was significantly associated with other habits such as smoking and alcohol use ($X^2= 454.228$, $p = 0.0001$).

Generally, the majority (87.8%) of the students considered khat chewing to be ethically

Table 2. Khat chewing, academic, health and psychosocial implications (N=328)

Variables	Yes n (%)	No n (%)	Indifferent n (%)	Total N (%)
Academic achievement with khat chewing	292 (89.9)	32 (9.8)	4 (1.2)	328 (100)
Khat chewing ethically moral?	288 (87.8)	36 (11)	4 (1.2)	328 (100)
Health unpleasant symptoms	171 (47.9)	171 (52.1)	-	328 (100)

moral, 11% considered it as unethical, while 1.2% remained indifferent. In the oldest age group (41-50), 87.5% and about 79.7% of the youngest age group (22-30) reported khat chewing to be ethically moral. About 50% of the middle age group (31-40) considered khat chewing as ethically moral. In terms of gender differences, 75% of the female student participants considered khat chewing to be immoral and unethical. There was a significant association between age group and reasons ($X^2 = 333.582, p = 0.0001$); age group and ethical-moral ($X^2 = 21.822, p = 0.0001$) for chewing khat, and also, between gender and moral-ethical ($X^2 = 98.647, p = 0.0001$).

DISCUSSION

Many studies have reported increased prevalence of khat chewing in various communities, occupations and among students. Also, various controversial reports have been made on khat concerning health, psychosocial implications, economic effects, academic and moral implications, and the legality of khat. More so, there have been many controversial statements for banning, unbanning, recognition and castigation of the use of khat. However, few studies have actually sought the personal opinions of mature students who are socially and economically independent.

This study found that more male participants (63.52%) reported using khat than female participants (51.61%), which is in agreement with several other reports (Cassanelli & Numan, 2006; Alem, Kebede & Kullgren, 1997; Cassanelli, 1986). A study conducted by Eshetu and Gedif (2006), reported an increased frequency of chewing khat among male university students. Alem and Shibre (1997) has reported a relationship between khat chewing with economic frustration and boredom. That report is in agreement with result of the present study in which about 90% of chewers reported that khat was adversely affecting their economic status.

In the present study, the majority (46%) of the student reported chewing khat was to gain

concentration and focus followed by 25.6% for longer reading ability and to delay fatigue and tiredness. Other studies (Peters, 1983; Ayana et al, 2002) have reported that students chew khat to get less sleepy and get mental alertness, especially during examinations. Khat chewing for concentration and focus by students as reported by this study might be due to the feeling of hope, optimism and success which motivate the students to concentrate and focus, leaving behind any boredom or frustration whatsoever. According to Cox and Rampes (2003) khat chewing gives an atmosphere of concentration, cheerfulness, optimism and a general sense of well-being, though these feelings may disappear after chewing ceases.

In this study, a majority of the participants reported that khat has helped them so far to achieve their academic aims. However, there was no significant effect of khat on CGPA of chewers as compared to non-chewers. This report by chewers is not surprising; increased concentration, focus and reading periods as reported in this study could result in euphoria and a sense of better performance. It has been reported that khat through one of its major chemical contents, cathinone, has direct stimulatory effects on the brain (particularly, the cerebral cortex) and spinal cord (Widler et al, 1994). However, the result of the present study did not show any significant association between khat chewing and academic performance. This disparity in findings might be due to the effect of different dosages and frequency of khat usage.

The results of this study also indicate that the majority (87.8%) of the students accepted khat chewing as ethically moral. This finding might not be unconnected to family, religion, socio-cultural tradition and upbringing of the students. Khat is widely grown and used in Ethiopia; it's chewing is a social and a culture-based activity. It is said to enhance social interaction, playing a role in ceremonies such as weddings. In fact to some Muslims, khat is known as "the flower of paradise", it is also called the 'leaf of Allah' (Carmichael, 2000; Carmichael & Gebissa, 2004). Some religious leaders are also involved in the habit

of khat chewing, and high incidence of khat chewing has been reported among University teachers, including parents and other highly placed people in the society (Alem & Shibre, 1997; Awas, Kebede & Alem, 1999) who are role models to these students from childhood. A study conducted by Adugna, Jira and Molla (1994) reported the incidence of khat chewing amongst learners in secondary school, and the most frequent users were also in the age group of 15 to 22 years. It is expected that students who grew up with khat from birth and/or started using khat at an early age, coupled with the social and academic benefit they derived from khat will likely concur with the morality of khat chewing.

However, there was a significant association ($p < 0.05$) between gender and reported morality of khat chewing; most of the female chewers (75%) considered khat chewing morally unethical. Cox and Rampes (2003) reported that khat generally seems less appealing to women. According to Barnes (2008), Many Somali women living in the UK apparently support the ban, which they hope will stop their men and male children from being idle and jobless.

The majority (71%) of the participants were government employed; also, about 90% reported that khat chewing was adversely affecting their economic situations. This finding concurs with several other reports (Cox & Rampes, 2003; Adugna et al. 1994; Dhaifalaha, 2004) that regular khat use has negative economic impact on the chewers. Fekade, Challi and Tadesse (1994) and Kalix and Khan (1984) estimated that about one-third of all wages were spent on khat. Many men secure their daily portion of khat at the expense of vital needs, indicating dependence.

Khat usage was significantly associated ($p < 0.05$) with religion; the majority of users in this study (55%) were Muslims and about 39% were Christians. This finding supports the reports of many previous studies (Alem, Kebede & Kullgren, 1997; Eshetu & Gedif, 2006; Awas, Kebede & Alem, 1999; Adugna, Jira & Molla 1994) that khat chewing is associated with Islam. Previously, khat chewing

was limited to the low land areas of Ethiopia, where the Muslim population predominates. Muslims chew khat to obtain maximum concentration levels during prayer, to keep awake during nightlong prayer and for socialization purposes (Griffiths, 1998; Kalix, 1990; Ayana et al, 2002). However, due to its psychostimulation and other perceived beneficial effects (particularly on academic activities), it is widely taken by a large segment of students and the society at large. A majority of the students reported that socialization (71%) was the main extra-academic reason for chewing khat, while about 11% reported being calm during and following khat sessions and 11% remained indifferent. About 40% reported being indifferent if they did not chew khat, while about 27% were depressed and about 25% reported being aggressive if not able to chew.

In this study, khat chewing was significantly and positively associated with coffee and alcohol use and negatively associated with smoking. About 84% took coffee with chewing; 79% drank alcohol after khat chewing. Concerning tobacco, about 30% smoked while chewing or after chewing. This finding is in agreement with several previous studies on coffee (Zein, 1983); alcohol (Zein, 1983 Eshetu & Gedif, 2006); and contradict studies on smoking (Zein, 1983 Eshetu & Gedif, 2006; Gunaid, El Khally, Hassan & Murray-Lyon, 1999) with khat chewing.

Following khat chewing, the majority (52%) of the subjects reported no health symptom, while about 48% reported various health symptoms. Among the symptoms, insomnia (50%) was the major associated health problem, followed by indigestion and constipation (27%), depression (16%), reduced sexual urge and difficulties maintaining erection (6%). This finding on health symptoms correlated well with several other reports on insomnia (Ihunwo, Kayanja & Amadi-Ihunwo, 2004; Hassan, Gunaid, El Khally & Murray-Lyon, 2003; Alem & Shibre, 1997); constipation (Hassan, et al., 2003; Mwenda, Arimi, Kyama & Langat, 2003); depression (Halbach, 1972; Hassan et al., 2003) and reduced urge and erection (Al-Motarreb, Baker & Broadley,

2002; WHO, 2006). Ihunwo et al, (2004) and Al-Motarreb et al. (2005) reported a contrary finding that increased sexual desire was the most predominant effect experienced by khat chewers. However, there was a significant association ($p < 0.05$) between the frequency of khat chewing and health problems. Various studies (WHO, 2006; Al-Motarreb et al., 2005) have reported similar dose response effect of khat on health.

Based on the findings of the present study, the followings are hereby recommended: (1) Khat chewing habit seems not to constitute any academic benefit. However, there is a need for further qualitative and quantitative experimental studies to further investigate the effect of khat chewing on academic achievement and health, particularly among students before a conclusive statement could be made on khat chewing; (2) the need clearly exists for studies investigating the effect of varied doses and long term effects of khat chewing on humans.

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