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Correlates of Concurrent Khat and Tobacco Use in Yemen

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Abstract

Background—Habitual substance use poses public health threat. This is a growing concern in countries where one or more substances are commonly used. Many individuals in Middle Eastern and East African countries use khat (*Catha edulis*), a stimulant often accompanied by smoking. However, few systematic attempts have been made to characterize patterns of concurrent khat and tobacco use.

Objectives—To examine correlates such as gender and patterns of khat and tobacco use in concurrent users and khat-only users.

Methods—This study used a cross-sectional design with a face-to-face interview method including 151 (74 women) concurrent users of khat and tobacco and 141 (76 women) khat-only users in Yemen. Data collection was completed in 2012. Analysis of variance (ANOVA) and logistic regressions were conducted to examine gender and khat use group differences in use patterns.

Results—Reported frequency and intensity of khat use were greater in men than in women. Men and women khat users used different tobacco products and beverages while using khat. Khat use was more frequent in concurrent users relative to khat-only users. Earlier age of onset of khat use was associated with greater number of cigarettes smoked during a typical khat session. Approximately 70% of concurrent users reported initiating khat use prior to tobacco use.

Conclusions/Importance—The results provide support for gender differences in khat and tobacco use, differences in khat use pattern between concurrent users of khat and tobacco and khat-only users, and positive associations between khat and tobacco use.

Keywords

khat; *Catha edulis*; smoking; tobacco; gender; amphetamine

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Declaration of Interest

The authors report no conflicts of interest in this study.

1. Introduction

Habitual substance use elevates risks for chronic diseases that increase the rate of morbidity and mortality. In East African and Middle Eastern countries, khat (*Catha edulis*) is widely available (Cox & Rampes, 2003). Khat is an evergreen shrub which grows in countries in East Africa and the Arabic Peninsula. Chewing fresh leaves is the most common mode of consumption (Al-Motarreb, Baker, & Broadley, 2002). Khat is often called a natural amphetamine because the chemical structure of cathinone, one of main constituents of khat, is similar to that of amphetamine (Feyissa & Kelly, 2008; Kalix, 1990). Acute effects include euphoria, flow of ideas, and increased alertness, which is followed by depressed mood, anxiety, and insomnia (Balint, Falkay, & Balint, 2009; Brenneisen, Fisch, Koelbing, Geissshusler, & Kalix, 1990; Cox & Rampes, 2003; Griffiths et al., 1997; Hassan, Gunaid, El-Khally, & Murray-Lyon, 2002). While long-term effects of khat has yet to be determined, studies show its associations with cardiovascular diseases (Al-Motarreb et al., 2005; Ali et al., 2011), psychotic symptoms (Odenwald et al., 2005), impaired cognitive functions (Hoffman & al'Absi, 2013b), and altered stress response (al'Absi et al., 2013). Khat use has been expanded to countries in Europe (Bongard, Nakajima, & al'Absi, 2015; Griffiths et al., 1997; Kassim, Islam, & Croucher, 2011) and Australia (Douglas, Boyle, & Lintzeris, 2011; Feigin, Higgs, Hellard, & Dietze, 2012; Stefan & Mathew, 2005) by immigrant populations from East Africa and Middle East.

Khat is often accompanied by smoking. Positive associations between the two substances have been reported (see also Kassim, Jawad, Croucher, & Akl, 2015 for a review). In one study on males only (Kassim et al., 2011) more than half of daily smokers who chew khat reported that they smoke to increase effects of khat. Another study found that reported hours of khat use per session was greater in concurrent khat and tobacco users relative to khat-only users (Nakajima et al., 2013). It is possible that khat and tobacco use interactively impact neurobiological systems associated with drug reward and addiction. Research also suggest the role of gender differences in khat and tobacco use. One study found that whereas the rate of cigarette smoking while khat chewing was higher in men than in women, the rate of shisha smoking while chewing was higher in women than their counterparts (Nakajima et al., 2013).

Correlates of concurrent khat and tobacco use have not been well defined. For example, research on gender differences in khat and tobacco use is very few because these substances have been traditionally considered male's behavior. Hence, most studies on khat have included men only. Only one study reported gender differences in khat and tobacco use (Nakajima et al., 2013). However, results of this study were limited by a relatively small and homogeneous sample.

The current study aimed to expand the prior work (Nakajima et al., 2013) by increasing diversity and size of the sample, and by collecting additional information to examine correlates of khat and tobacco use. Based on previous research, we hypothesized that men would report more frequent khat and tobacco use than women. We also predicted that concurrent users would report more intense khat use than khat-only users. It was also expected that reported age of first exposure to khat chewing would be earlier than tobacco

use. This hypothesis was based on a wide availability and accessibility of khat in Yemen, where this study was conducted, as well as recent evidence showing khat use as a gateway to tobacco use (Kassim, Rogers, & Leach, 2014).

2. Material and methods

2.1 Participants

Participants were recruited in universities, markets, and communities in Taiz and Sana'a, Yemen (age range: 18–65 years old). The current study used a cross-sectional design, and data were collected over two months in 2012. Of 401 individuals who completed the study, 151 (74 women) reported using khat and tobacco and 141 (76 women) reported using khat-only. Ninety-two individuals reported not having used khat and tobacco regularly in their life. Data from these individuals are reported elsewhere (Nakajima et al., 2014). Tobacco-only users ($n = 17$) were also excluded due to the small sample size. Eighty percent of the present sample was recruited in Taiz. There was no difference in the rate of concurrent users and khat-only users across the two sites ($p = .46$). Participants read and signed an informed consent form which was approved by the research ethical committee at Taiz or Sana'a university.

2.2 Procedure

Data collection was completed via face-to-face interview format. After obtaining consent, trained research staff asked questions regarding demographics (e.g., age, length of education), khat chewing (e.g., age started chewing khat/first exposure, hours of chewing per typical session, drinks consumed while chewing) and tobacco use (e.g., the number of cigarettes per typical day, quit attempt in the past).

2.3 Data analysis

Gender differences, khat group differences, and gender differences as a function of khat use in patterns of khat use were analyzed by a series ANOVAs and logistic regressions, including gender (men, women) and khat use group (concurrent users of khat and tobacco, khat-only users) as between-subject factors using the entire sample (142 men and 150 women). Gender differences in tobacco use variables were analyzed by one-way ANOVAs, logistic regressions and chi-square tests among concurrent users (77 men and 74 women). Demographic variables were analyzed using 2 group $\times$ 2 gender ANOVAs and logistic regressions. Linear and logistic regression models were conducted to test linkages between khat and smoking variables. To examine whether concurrent users started khat chewing first or smoking first, differences in reported age at the onset of chewing and smoking were calculated. A chi-square test was conducted to test gender differences in this measure. P values less than .05 were considered statistically significant. SPSS version 19 (IBM Corp., Armonk, NY) was used for data analysis.

3. Results

3.1 Sample characteristics

Mean age of the current sample was 31 years ($SD = 9.8$) and did not differ by group or by gender ($ps > .05$; see Table 1). Men had higher education levels than women ($F(1, 251) = 28.8, p < .001$). Fifty-nine percent said they were married, and this was comparable across groups and gender. Sixty percent of the sample reported that they were unemployed. While the status did not differ as a function of khat use group, men were more likely to be employed than women ($OR = 4.83$; 95% $CI = 2.34, 9.98$; $p < .001$).

3.2 Gender differences in patterns of khat use

Seventy-seven percent of men reported daily khat use while less than half of women reported regular use ($OR = 2.29$; 95% $CI = 1.12, 4.54$; $p < .001$; see Table 1). Reported age of onset of khat chewing was earlier in men than in women ($F(1, 288) = 75.9, p < .001$). Reported number of hours of khat chewing per typical session ($F(1, 287) = 33.0, p < .001$) and days of khat sessions per typical week ($F(1, 287) = 22.3, p < .001$) were greater in men than in women. Seventy three percent of men and 52% of women said they had thought about quitting khat at least once in the past ($OR = 3.57$; 95% $CI = 1.62, 7.89$; $p < .005$). More men (61%) than women (39%) reported that they suffered from physical symptoms after khat cessation ($OR = 2.25$; 95% $CI = 1.14, 4.44$; $p < .05$).

Gender differences were found in items consumed while chewing khat. The rate of drinking soda was greater in women (72%) than in men (60%; $OR = 0.44$; 95% $CI = 0.22, 0.90$; $p < .001$). In concurrent khat and tobacco users, 90% of men reported cigarette smoking while chewing; however, this was not the case in women (18%; $OR = 39.9$; 95% $CI = 15.5, 102.7$; $p < .001$). In contrast, 84% of women reported waterpipe use but this rate was much lower in men (12%; $OR = 0.03$; 95% $CI = 0.01, 0.07$; $p < .001$).

3.3 Gender differences in patterns of tobacco use

Seventy-three percent of men and 4% of women reported daily cigarette use ($OR = 12.0$; 95% $CI = 2.39, 60.2$; $p < .005$; see Table 1). Waterpipe use was more common in women (95%) than in men (9%; $OR = 0.01$; 95% $CI = 0.002, 0.02$; $p < .001$). Reported number of cigarettes smoked per day ($F(1, 86) = 4.07, p < .05$) and while khat chewing ($F(1, 87) = 10.5, p < .005$) were greater in men than in women. Men (94%) more than women (59%) reported that they had thought about quitting smoking ($OR = 10.2$; 95% $CI = 3.66, 28.3$; $p < .001$).

3.4 Group differences in patterns of khat use

Reported age of onset of khat use ($F(1, 288) = 8.61, p < .005$) was earlier, and number of hours spent in chewing per session ($F(1, 287) = 14.2, p < .001$) was greater in concurrent users than in khat-only users (Figure 1). The rate of drinking coffee while chewing was lower in concurrent users (20%) than in khat-only users (33%; $OR = 0.38$; 95% $CI = 0.18, 0.80$; $p < .05$) while the rate of consuming energy drinks while khat use was higher in concurrent users (26%) than in khat-only users (14%, $OR = 2.76$; 95% $CI = 1.16, 6.55$; $p < .05$). No group $\times$ gender interactions was found in these measures ($ps > .05$).

3.5 Associations between khat chewing and tobacco smoking

Earlier exposure to khat use was associated with earlier age of onset of tobacco use ($r = .47$, $p < .001$) and greater number of cigarettes smoked while khat chewing ($r = -.28$, $p < .01$; see Figure 2). Earlier age at the start of smoking was related to greater number of days of khat sessions per week ($r = -.28$, $p < .01$). Intention to quitting smoking was associated with increased likelihood of having a thought (OR = 6.94; 95% CI = 2.78, 17.4; $p < .001$) or an attempt to quit khat chewing (OR = 5.10; 95% CI = 1.46, 17.8; $p < .05$). Having an attempt to quit smoking was related to elevated chance of an attempt to quit khat use (OR = 4.04; 95% CI = 1.86, 8.76; $p < .001$).

3.6 Differences in reported age of first exposure to khat and tobacco

The variable indicating differences in reported age at the start of chewing and smoking were not obtained from fifty-six (37%) individuals. This might have been related to confusion in the question about smoking. Those who smoked waterpipe but not cigarettes did not answer to this question. In those who responded to this question ($n=95$), approximately 70% reported being exposed to khat prior to smoking (see Figure 3). Gender was not associated with this distribution.

4. Discussion

This study found gender differences in khat and tobacco use patterns. Men started khat chewing earlier than women, and men chewed and smoked cigarettes more frequently and intensely than women. Men more than women reported thoughts about quitting khat and tobacco use as well as symptoms when stop chewing khat. Men were more likely to smoke cigarettes while chewing khat relative to women. Women were more likely to drink soda and smoke waterpipe during a typical khat session relative to men. These findings are novel and confirm our hypothesis that the pattern of concurrent khat and tobacco use is gender-dependent (Nakajima et al., 2013). The gender differences may be linked with social and cultural norms. Khat use is more socially accepted in men than in women (Cox & Rampes, 2003). Cigarette smoking among women is stigmatized (Maziak, Asfar, & Mock, 2003) and waterpipe use is more accepted than cigarettes in Middle East (Hammal, Mock, Ward, Eissenberg, & Maziak, 2008). In addition, women may consume soda and use flavored waterpipe to mitigate bitter taste of khat. This is consistent with data in which bitter taste was raised as one reason for not chewing khat among women (The World Bank, 2007). Taken together, gender differences in khat and tobacco use patterns may be associated with sociocultural and biological determinants.

This study found differences in khat use patterns between concurrent users of khat and tobacco and khat-only users. Reported age of onset of khat use was younger, and hours spent in chewing per session was longer in concurrent users than in khat-only users. These suggest intense khat use in smokers relative to nonsmokers. We also found that having a thought about or an attempt to quit one substance (khat and/or tobacco) was associated with a thought or an attempt to quit the other. This suggests difficulty in quitting khat and/or smoking in this group of individuals. The addictive process related to khat and tobacco use may differ in men and women. We found positive linkages between khat and cigarette use in

men, and khat and shisha use in women. Cigarettes and waterpipe have different characteristics including chemical exposure and mode of consumption (e.g., puff topography). Future research should elucidate psychopharmacological mechanisms of these forms of tobacco smoking and khat chewing.

This study found positive associations between khat and tobacco use in concurrent users. The younger participants started chewing, the younger they started smoking and the more they smoked while chewing khat. Similarly, the younger they started smoking, the more khat sessions they held per week. These findings are consistent with prior work (Nakajima et al., 2013) showing positive linkages between the number of cigarettes smoked in a khat session and khat use patterns (number of hours spent chewing khat, number of khat session per typical week, number of years of khat use). Although long-term health consequences of a combined use of khat and tobacco have not been systematically investigated, the current findings suggest that concurrent khat and tobacco use possesses elevated health risks than khat use alone. Smoking is a leading cause of preventable death and is strongly tied to various diseases (Eriksen, Mackay, & Ross, 2012). Concurrent khat and tobacco use is associated with altered psychophysiological stress response (al'Absi et al., 2014) and impaired cognitive performance (Hoffman & al'Absi, 2013a; Nakajima, Hoffman, & al'Absi, 2013). More research is needed to elucidate effects of habitual khat and tobacco use on systems mediating the negative health consequences.

This study provides initial support for the hypothesis that khat use serves as an entry point to tobacco use (Kassim, Rogers, & Leach, 2014). Approximately 70% of concurrent users reported that they started (or were exposed to) khat chewing prior to cigarette smoking while only about 10% mentioned the opposite. While we did not directly ask whether khat promoted the initiation of tobacco use, our data suggest the possibility that khat use serves as a gateway to tobacco use. Khat is widely available in Middle Eastern countries and is used for social reasons. As observed in this study, on average men and women spent 5 hours a day 5 days a week chewing khat, and consumed various things during the khat session. Khat use may increase the likelihood of exposure to and experimentation of tobacco. This hypothesis has never been tested directly. Future studies should investigate psychological and social dynamics and conditions associated with initiation of khat chewing and smoking. Such effort may contribute to the development of effective prevention programs.

Findings of this study are limited by the use of a cross-sectional design. A longitudinal assessment of khat and tobacco use is important to examine the link between khat and tobacco use. Because khat and tobacco use is influenced by social and cultural factors, the current study should be replicated in other communities and countries where khat is available. The current findings are based on face-to-face interviews, which could be influenced by biases due to retrospective memory limitations and social desirability. Finally, since we used a convenience sampling method it is possible that the sample did not represent the entire population. For example, participants in our study were not low educated people. Thus, findings of this study may represent khat and tobacco use patterns among this group but may not fully represent the use patterns of people with low education.

In conclusion, this study found that frequency and intensity of khat use were greater in men than in women. Men and women chewers reported using different tobacco products and beverages while chewing khat. Concurrent users of khat and tobacco reported more frequent khat use than khat-only users. Earlier age of starting khat use was associated with greater number of cigarettes smoked while chewing. The majority of concurrent users reported initiating khat use prior to tobacco use. The role of psychosocial determinants in khat and tobacco use are yet to be determined. Such effort should reduce public health burdens associated with these substances.

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References

- al'Absi M, Khalil NS, Al Habori M, Hoffman R, Fujiwara K, Wittmers L. Effects of chronic khat use on cardiovascular, adrenocortical, and psychological responses to stress in men and women. *Am J Addict*. 2013; 22(2):99–107. DOI: 10.1111/j.1521-0391.2013.00302.x [PubMed: 23414493]
- al'Absi M, Nakajima M, Dokam A, Sameai A, Alsoofi M, Saem Khalil N, Al Habori M. Concurrent tobacco and khat use is associated with blunted cardiovascular stress response and enhanced negative mood: a cross-sectional investigation. *Hum Psychopharmacol*. 2014; 29(4):307–315. DOI: 10.1002/hup.2403 [PubMed: 24706595]
- Al-Motarreb A, Baker K, Broadley KJ. Khat: pharmacological and medical aspects and its social use in Yemen. *Phytother Res*. 2002; 16(5):403–413. [PubMed: 12203257]
- Al-Motarreb A, Briancon S, Al-Jaber N, Al-Adhi B, Al-Jailani F, Salek MS, Broadley KJ. Khat chewing is a risk factor for acute myocardial infarction: a case-control study. *Br J Clin Pharmacol*. 2005; 59(5):574–581. [PubMed: 15842556]
- Ali WM, Al Habib KF, Al-Motarreb A, Singh R, Hersi A, Al FH, ... Al SJ. Acute coronary syndrome and khat herbal amphetamine use: an observational report. *Circulation*. 2011; 124(24):2681–2689. [PubMed: 22155995]
- Balint EE, Falkay G, Balint GA. Khat - a controversial plant. *Wien Klin Wochenschr*. 2009; 121(19–20):604–614. [PubMed: 19921126]
- Bongard S, Nakajima M, al'Absi M. Khat chewing and acculturation in East-African migrants living in Frankfurt am Main/Germany. *J Ethnopharmacol*. 2015; 164:223–228. DOI: 10.1016/j.jep.2015.01.034 [PubMed: 25655998]
- Brenneisen R, Fisch HU, Koelbing U, Geissshusler S, Kalix P. Amphetamine-like effects in humans of the khat alkaloid cathinone. *Br J Clin Pharmacol*. 1990; 30(6):825–828. [PubMed: 2288828]
- Cox G, Rampes. Adverse effects of khat: a review. *Advances in Psychiatric Treatment*. 2003; 9:456–463.
- Douglas H, Boyle M, Lintzeris N. The health impacts of khat: a qualitative study among Somali-Australians. *Med J Aust*. 2011; 195(11–12):666–669. [PubMed: 22171861]
- Eriksen, M.; Mackay, J.; Ross, H. The Tobacco Atlas. 4. New York, NY: World Lung Foundation; 2012. (Reprinted from: NOT IN FILE)
- Feigin A, Higgs P, Hellard M, Dietze P. The impact of khat use on East African communities in Melbourne: a preliminary investigation. *Drug Alcohol Rev*. 2012; 31(3):288–293. DOI: 10.1111/j.1465-3362.2011.00312.x [PubMed: 21463373]
- Feyissa AM, Kelly JP. A review of the neuropharmacological properties of khat. *Prog Neuropsychopharmacol Biol Psychiatry*. 2008; 32(5):1147–1166. [PubMed: 18561890]
- Griffiths P, Gossop M, Wickenden S, Dunworth J, Harris K, Lloyd C. A transcultural pattern of drug use: qat (khat) in the UK. *Br J Psychiatry*. 1997; 170:281–284. [PubMed: 9229038]

- Hammal F, Mock J, Ward KD, Eissenberg T, Maziak W. A pleasure among friends: how narghile (waterpipe) smoking differs from cigarette smoking in Syria. *Tob Control*. 2008; 17(2):e3. [PubMed: 18375726]
- Hassan NA, Gunaid AA, El-Khally FM, Murray-Lyon IM. The effect of chewing Khat leaves on human mood. *Saudi Med J*. 2002; 23(7):850–853. [PubMed: 12174239]
- Hoffman R, al'Absi M. Concurrent use of khat and tobacco is associated with verbal learning and delayed recall deficits. *Addiction*. 2013a; 108(10):1855–1862. DOI: 10.1111/add.12260 [PubMed: 23714286]
- Hoffman R, al'Absi M. Working memory and speed of information processing in chronic khat users: preliminary findings. *Eur Addict Res*. 2013b; 19(1):1–6. DOI: 10.1159/000338285 [PubMed: 22948202]
- Kalix P. Pharmacological properties of the stimulant khat. *Pharmacol Ther*. 1990; 48(3):397–416. [PubMed: 1982180]
- Kassim S, Islam S, Croucher RE. Correlates of nicotine dependence in U.K. resident Yemeni khat chewers: a cross-sectional study. *Nicotine Tob Res*. 2011; 13(12):1240–1249. [PubMed: 21937753]
- Kassim S, Jawad M, Croucher R, Akl EA. The Epidemiology of Tobacco Use among Khat Users: A Systematic Review. *BioMed Research International*. 2015
- Kassim, S.; Rogers, N.; Leach, K. *BMC Public Health*. Vol. 14. England: 2014. The likelihood of khat chewing serving as a neglected and reverse 'gateway' to tobacco use among UK adult male khat chewers: a cross sectional study; p. 448
- Maziak W, Asfar T, Mock J. Why most women in Syria do not smoke: can the passive barrier of traditions be replaced with an information-based one? *Public Health*. 2003; 117(4):237–241. [PubMed: 12966743]
- Nakajima M, al'Absi M, Dokam A, Alsoofi M, Khalil NS, Al HM. Gender differences in patterns and correlates of khat and tobacco use. *Nicotine Tob Res*. 2013; 15(6):1130–1135. [PubMed: 23197767]
- Nakajima M, Dokam A, Kasim AN, Alsoofi M, Khalil NS, al'Absi M. Habitual khat and concurrent khat and tobacco use are associated with subjective sleep quality. *Prev Chronic Dis*. 2014; 11:E86.doi: 10.5888/pcd11.130234 [PubMed: 24854237]
- Nakajima M, Hoffman R, Al'absi M. Poor Working Memory and Reduced Blood Pressure Levels in Concurrent Users of Khat and Tobacco. *Nicotine Tob Res*. 2013; 16(3):279–287. DOI: 10.1093/ntr/ntt139 [PubMed: 24078758]
- Odenwald M, Neuner F, Schauer M, Elbert T, Catani C, Lingenfelder B, ... Rockstroh B. Khat use as risk factor for psychotic disorders: a cross-sectional and case-control study in Somalia. *BMC Med*. 2005; 3:5. [PubMed: 15707502]
- Stefan, J.; Mathew, B. *Aust N Z J Psychiatry*. Vol. 39. Australia: 2005. Khat chewing: an emerging drug concern in Australia?; p. 842-843.
- The World Bank. World Bank Report, Report No. 39738-YE. 2007. Yemen-towards qat demand reduction.
- U.S. Department of Health and Human Services. A Report of the Surgeon General. Atlanta, GA: 2014. The Health Consequences of Smoking: 50 Years of Progress.

(A)

(B)

Figure 1.

Differences in patterns of khat use between concurrent users of khat and tobacco and khat-only users. (A) Reported age when started khat chewing was earlier in concurrent users than in khat-only users. (B) Reported hours of khat chewing per typical session was greater in concurrent users than in khat-only users.

(A)

(B)

Figure 2.

Associations between khat chewing and tobacco smoking variables. (A) Earlier age when started khat chewing was associated with earlier age of onset of smoking. (B) Earlier age when started khat chewing was associated with greater number of cigarettes smoked during a khat session.

Figure 3. Proportion of concurrent smokers who reported initiating khat use first, khat and tobacco use at the same age, and tobacco use first. Gender was not associated with the distribution of data.

Table 1

Gender differences in demographic characteristics, and khat and tobacco use.

	Concurrent users of khat and tobacco		Khat-only users	
	Women (n=74)	Men (n=77)	Women (n=76)	Men (n=65)
Demographics				
Age (years)	31.5 (1.1)	30.8 (1.1)	31.8 (1.1)	28.1 (1.2)
Education (years) ^f	12.3 (0.6)	14.8 (0.5)	12.4 (0.5)	15.7 (0.5)
Married (%)	62.2	48.1	65.8	60.0
Employed (%) ^f	25.7	54.5	23.7	60.0
Khat use				
Age started chewing ^{f,g}	18.4 (0.6)	13.9 (0.6)	20.9 (0.6)	14.8 (0.6)
Daily khat use (%) ^f	48.6	85.7	46.1	66.2
Length/session (hours) ^{f,g}	5.1 (0.2)	6.1 (0.2)	3.7 (0.2)	5.6 (0.3)
Days of use per week ^f	4.8 (0.2)	6.4 (0.2)	5.0 (0.2)	5.7 (0.3)
Thought about quitting (%) ^f	45.9	64.5	57.9	83.1
Tried quitting (%)	31.1	26.3	34.2	33.8
Items consumed while chewing (%)				
Water	95.9	98.7	90.8	98.5
Soda ^f	68.9	61.8	75.0	56.9
Coffee ^g	18.9	21.1	38.2	26.2
Energy drinks ^g	27.0	25.0	11.8	16.9
Cigarettes ^f	17.6	89.5	n/a	n/a
Waterpipe ^f	83.8	11.8	n/a	n/a
Have symptoms after use (%) ^f	41.9	65.8	35.5	55.4
Tobacco use				
^a Age started smoking	19.6 (1.1)	17.4 (0.5)	n/a	n/a
Daily cigarette use (%) ^f	3.8	72.7	n/a	n/a
Waterpipe use (%) ^f	94.6	9.1	n/a	n/a

	Concurrent users of khat and tobacco		Khat-only users	
	Women (n=74)	Men (n=77)	Women (n=76)	Men (n=65)
^b Cigarettes per day ^f	10.8 (3.5)	18.3 (1.3)	n/a	n/a
^c Water pipe heads per day	1.4 (0.1)	1.1 (0.2)	n/a	n/a
^d Cigarettes while khat chewing ^f	5.9 (2.6)	14.8 (1.0)	n/a	n/a
^e Water pipe while khat chewing	2.2 (0.1)	2.3 (0.4)	n/a	n/a
Thought about quitting (%) ^f	58.6	93.5	n/a	n/a
Tried quitting (%)	35.7	49.4	n/a	n/a
^d I use my first tobacco product (%)				
When I wake up	16.7	15.6	n/a	n/a
After breakfast	25.0	44.2	n/a	n/a
Before noon	8.3	5.2	n/a	n/a
Afternoon	8.3	3.9	n/a	n/a
Only when chewing khat	41.7	31.2	n/a	n/a

Unless indicated in percentage, entries show mean and standard error of the mean.

^a Seventy-seven men and 18 women answered this question.

^b Seventy-seven men and 11 women answered this question.

^c Seventy women and 7 men answered this question.

^d Seventy-seven men and 12 women answered this question.

^e Sixty-eight women and 7 men answered this question.

^f Gender difference was significant.

^g Khat group difference was significant.