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Research Paper

Severity of khat dependence among adult khat chewers: The moderating influence of gender and age

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ABSTRACT

Ethnopharmacological relevance: The escalating use of khat (*Catha edulis*) in East Africa and Arabia is a major concern for public health. Yet little is known about the impact of khat on behavior. There has been no study in the region to assess the extent to which dependence syndrome is associated with khat use in this population. Aim of the study: To examine psychometric properties of the Severity of Dependence Scale-Khat (SDS-khat), gender differences in patterns of khat use and dependence, and the extent to which age moderated the link between gender and khat dependence. Materials and methods: Two-hundred and seventy khat chewers recruited in two Yemeni cities completed face-to-face interviews asking about demographics and patterns of khat use. Validity of SDS-khat was examined by the principle component analysis and reliability of the scale was tested by Cronbach's alpha. A series of chi-square tests and analysis of variances (ANOVAs) were conducted to examine gender differences in khat use variables. Results: The results indicated that the mean age of khat chewers was 30.52 years (95% CI: 29.34, 31.70) and 52% of them were males. The SDS-khat was found to have two factors with moderate reliability. This pattern was consistent when the analysis was conducted in the entire sample and in each gender. Male khat chewers reported more symptoms related to khat dependence than female chewers. A significant gender by age interaction in SDS-khat levels ($p=0.013$) revealed a positive association between age and khat dependence in women only. Conclusion: These results provide initial support for the use of SDS-khat in the assessment of khat dependence in Yemen. Gender differences in khat use patterns and dependence observed in this study call the need for more studies carefully examining the role of gender in khat research.

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1. Introduction

Khat chewing is widely prevailed in countries of East Africa and Middle East, and is growing rapidly. The distribution of khat is also growing; it has expanded to other parts of African countries such as Rwanda, Uganda and Burundi in Africa (Numan, 2012) as well as countries and immigrant communities in Europe and Northern America (Kelly, 2011).

In Yemen, khat chewing is a habit that is integrated into social and daily living, including work, marriage ceremonies (Cox and Rampes, 2003), and social interaction (Cox and Rampes, 2003; Kassim et al., 2010). Reported motivators for using khat includes

enhancing alertness during studying in students (Zein, 1988) and relief of physical and mental stress among women (Nabuzoka and Badhadhe, 2000; Wedegaertner et al., 2010). On the other hand, public health impacts of khat chewing (Cox and Rampes, 2003; El-Wajeh and Thornhill, 2009; Al-Motarreb et al., 2010) including khat dependence (Kassim et al., 2010; Kassim et al., 2013) have been reported (al'Absi and Grabowski, 2012). Cathinone, a chemical whose structure is similar to amphetamine (Kalix, 1992), and other indigents such as cathedulins and other alkaloids (Houghton et al., 2012) have been suggested to be responsible for addictive properties of khat. Khat dependence has been tested in immigrant communities from Yemen and Somalia (Griffiths et al., 1997; Kassim et al., 2010) using the Severity of Dependence Scale (Gossop et al., 1995), and these studies found physical and psychological symptoms related to dependence. Surprisingly, however, no systematic attempt has been made to address this question in countries where khat is cultivated, legal, and socially accepted. This was one of the main goals of this study in Yemen.

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We also examined gender differences in khat dependence in light of few studies showing its role in patterns of khat use. Men tend to chew khat more often and intense than women (Nakajima et al., 2013). Women are more likely to start chewing later in their life (Ali et al., 2004; Bongard et al., 2011) after being introduced to khat chewing by their partners when married (Griffiths, 1998). Findings of these studies suggest that men and women have different trajectory of dependence to khat. However, this has never been directly tested among khat chewers in Yemen.

The purpose of this study was to assess khat dependence among adult khat chewers in Yemen. A modified version of SDS (Gossop et al., 1995) which was focused on measuring khat dependence was used (SDS-khat: Kassim et al., 2010). As this questionnaire has not been examined in Yemen, we examined psychometric properties of the scale. Another aim of this study was to examine gender differences in patterns of khat dependence. Finally, we examined the role of age in the link between gender differences and khat dependence. Based on previous research, we hypothesized that (a) SDS-khat would have one dimension; (b) male and female chewers would differ in aspects of khat chewing (e.g. SDS-khat levels); and (c) age would be positively linked with SDS-khat in women but not in men.

2. Materials and methods

2.1. Subjects and study design

A total of 401 participants were recruited in two Yemeni cities, Taiz and Sana'a, into this cross sectional study. Participant recruitment was completed in markets and shopping centers around the two cities. Eligibility criteria were: aged 18 years and above and Yemeni, chewing khat at least once a week over the last 12 months, able to speak Arabic or English, and free from any major medical and psychiatric conditions.

This study was approved by the Institutional Review Board in Taiz and Sana'a Universities, Yemen. Potential participants were informed about the volunteer nature of the study and were free to withdraw at any point from the study without consequences. Furthermore, participants were assured that their responses would be kept strictly confidential. Informed written consent was obtained from all participants prior to the interviews. The interviews that took place between September and November 2012 were conducted by trained, culturally competent interviewers. Data were collected via face-to-face interviews that lasted 30–45 min.

2.2. Measures

The Severity of Dependence Scale (Gossop et al., 1995) is a widely used scale which was developed to assess psychological dependence in illicit drug users (Gossop et al., 1995; Swift et al., 1998; Ferri et al., 2000; Tsai et al., 2012; Bastiani et al., 2013). The SDS consists of five items with each response measured on a Likert-like scale between 0 and 3, giving a total score out of 15. It focuses on the impaired loss of control over drug use, and preoccupation and anxiety about drug use (Gossop et al., 1995). While the scale has been found to have one underlying dimension (Gossop et al., 1995; Topp and Mattick, 1997; Kaye and Darke, 2002; Lawrinson et al., 2007), this has been questioned particularly when the scale was used in community samples (Swift et al., 1998; Ferri et al., 2000; Tsai et al., 2012). The predictive validity was demonstrated in relation to the need for treatment amongst drug users (Gossop et al., 1995). The bilingual (Arabic and English) version of the Severity of khat dependence (SDS-khat) (Kassim et al., 2010) was used in this study. In addition, questionnaires on demographic (age, gender and marital status), socio-economic status (level of education completed), employment

status (employed or unemployed), khat chewing behaviors (number of hours chewing per khat session, number of days chewing per week, and types of khat chewed) were collected.

2.3. Data analysis

Data were entered into Excel and managed in the Statistical Package for the Social Sciences (Version 20.0 IBM SPSS Inc., Chicago, IL, USA). Descriptive statistics were conducted to check for data adherence to assumptions of the relevant tests as well as to report sample characteristics. Psychometric properties (construct reliability and validity) of the SDS-khat were evaluated using Cronbach's alpha coefficient, the Kaiser–Meyer–Olkin (KMO) Test for the adequacy of samples to undergo explanatory factor analysis (EFA) (Kaiser, 1974), and the principle component analysis with varimax rotation to identify potential factor(s). We set the loading criterion for the factor (s) at ≥ 0.50 to facilitate interpretation of the results of EFA (Norman and Streiner, 2003). These analyses were conducted using the entire sample and in each gender. Chi-squared tests were used to examine gender differences in demographic, socioeconomic and behavioral characteristics, and responses to SDS-khat items. To ease the interpretations, the responses for SDS-khat items were collapsed into 'Not at all' and 'Sometimes/Often/Always'. Gender differences in continuous variables (e.g. number of hours chewing) were tested using parametric unpaired *T*-tests. The statistical significance test (*p*-values) was two tailed and set at $p < 0.05$. To examine the moderating role of gender and age on khat dependence, we first classified age into three groups (Group 1: 18–29 years; Group 2: 30–44 years; Group 3: 45 years and above). This categorization was based on the observation that women start khat chewing in their early twenties while men start chewing in their teens (Ali et al., 2004). Then a 2 gender (women and men) \times 3 age group analysis of variance (ANOVA) was conducted to test main and interactive effects of gender and age on SDS-khat levels. If a gender by age interaction was statistically significant, a follow-up analysis with Bonferroni correction was conducted. That is, one-way ANOVAs using age category as an independent variable was conducted in SDS-khat in each gender.

3. Results

3.1. Demographic, socio-economic and behavioral characteristics

A total of 401 individuals completed the study. Two-hundred and ninety-two identified themselves as khat chewers but 22 of them did not complete the SDS-khat. These individuals were excluded from the analysis, which lead the final sample of 270 khat chewers (male=141 and female=129). The mean age was 30.52 years (95% CI: 29.34, 31.70) with a range of 18–65 years. The majority (57%) of them were married and 66% were daily chewers (see Table 1). On visualization, the distribution of the SDS-khat scores approximated normality (mean= 5.17 (95% CI: 4.80, 5.53); median=mode=5.00 (range 0–15)). Twenty-one percent of chewers said that they do not have specific preference for type of khat they chew while 37% mentioned that they chew Mawia khat. Men reported higher scores on SDS-khat ($p=0.0005$), more days of khat chewing per week ($p=0.001$), and longer hours of chewing per day session ($p=0.001$) than women.

3.2. Responses for SDS-khat items

Items 1 and 2 of the SDS-khat were more likely to be anchored to the denial (Not at all) when analysis was conducted in the entire sample and in women only (see Table 2). In contrast, items 3–5 tended to be anchored to the acceptance (Sometimes/Often/Always) when analyzed using the entire sample and men only. Fifty-seven

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