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Original Article

Prevalence and Predictors of Khat Chewing among Students of Jazan University, Jazan, Kingdom of Saudi Arabia

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ABSTRACT

Introduction: Khat chewing is a public health problem in Saudi Arabia, particularly in Jazan as it is prevalent among the population and socially not rejected in spite of its negative impact on health; physically and socially.

Purpose: To assess the prevalence and determinants (predictors) of khat chewing among the students of Jazan University, and to find out the characteristics of that habit among them.

Materials and Methods: A cross-sectional study was conducted. 1500 students had been included in the study. Data were collected through a self-administered pretested questionnaire. Data analysis was performed using SPSS version 20 software program.

Results: The overall prevalence of khat chewing among the students of Jazan University was found to be 30.3%, but it was higher among males (43.3%) than females (13%) with significant statistical differences ($P < 0.001$).The prevalence significantly higher among students of non-health related colleges at 37.6% than among those of health-related colleges at 22.4% ($P < 0.001$). Multivariate analysis revealed that smoking status of the student, khat chewing of the student's friend, khat chewing of the student's father, khat chewing of the student's brother and gender of the student are significant independent predictors for khat chewing among students of Jazan University.

Conclusion: The khat chewing is a prevalent habit among the university students in Jazan so a comprehensive, multi-directional and long-term intervention plan is needed, the plan may include: Educational, social and recreational programs. However, critical revision of this interventions and services is highly recommended.

Key words: Cross-sectional study, Habit, Jazan, Khat chewing, Multivariate analysis, Predictors, Prevalence, Saudi Arabia

INTRODUCTION

Khat (*Catha edulis*) is a small tree that grows in the southern and eastern African countries and in the southwest of the Arabian Peninsula. It originated in Ethiopia and extended to other African and Asian countries as it grows in Somalia, Uganda, Zimbabwe, Kenya, Malawi, Afghanistan, the Congo, Tanzania, Madagascar, Zambia, and Yemen.[1-3]

The impact of khat on health is thought that it is related to cathinone and cathine, which are amphetamine-like substances. Cathinone is a serotonin secretion inducer in central nervous system (CNS), and facilitates dopaminergic and noradrenergic transmission and is responsible for the sympathomimetic syndrome that observed after consumption of khat.[4]

It was reported that chewing of khat has multiple systematic effects such as: Cardiovascular (tachycardia, extrasystole, transient conjunctival and facial congestion, and elevated blood pressure).[5-7] Respiratory system (increased respiration).[7] Gastrointestinal (stomatitis, oesophagitis, gastritis, anorexia constipation, and risk factor for duodenal ulcer).[6-9] Genitourinary (spermatorrhoea, increasing in libido and by chronic use impotence could occur).[2,8-10] CNS (euphoria, insomnia, migraine and cerebral edema after khat intake, particularly with old age

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and susceptible individuals).[2,7,11] However, there are many case reports suggested a possible association between chewing of khat and mental disorders such as manic psychosis, hypomania, episodes of psychosis, aggressive behaviors, homicide and suicide among chewers.[12-14] Findings of other studies revealed a significant association between khat use and different mood and behavior changes.[6,15,16] While the khat-advisory council stated that there are evidences suggested that khat chewing is not a cause for psychosis.[17]

There were contradictory and different options whether there is an association between khat use and the occurrence of physical or psychic dependence or not.[1,2,18,19] Several studies found that khat use is associated with social and public health problems in addition to wasting of considerable time.[1,12,20-24]

Although the negative impacts of khat use and the legal restriction, the chewing habit is prevalent among Jazan population and that may be due to: First, Jazan region is adjacent to Yemen, where khat is cultivated, which helped in its availability via border smuggling. Second, khat chewing is considered as a tool for social interactions among Jazan individuals.[25]

Few studies have investigated patterns and characteristics of khat chewing among school and university students in Jazan,[1,26-29] and that reflects the importance of this work which aimed to assess the prevalence of khat chewing among Jazan University students and to investigate the different determinants and predictors associated with that habit among them.

MATERIALS AND METHODS

A cross-sectional study was conducted in Jazan University in Saudi Arabia to assess the prevalence and determinants (predictors) of Khat chewing among the university students during the period from September to December 2016. The target population was Jazan University students who satisfied the inclusion and exclusion criteria.

Inclusion and Exclusion Criteria

Inclusion criteria were; all students belong to Jazan University and willing to participate in the study. No exclusion criteria.

The calculated sample size for this study was 1609 students. This was based on the following assumption: 50% estimated prevalence rate of khat chewing among Jazan University students ($\varpi = 0.5$). The margin of error selected was 2.5% with a 95% confidence level, population size is 30000 (Jazan University Deanship of student affairs, 2016) and 10% for nonresponse.

A multistage stratified random sampling technique was used in selection and enrolment of students from health-related and non health-related colleges of the university. After conduction of the first stage of the technique, the randomly chosen colleges were; (1) Two health-related colleges (medicine and applied medical sciences), (2) two non health-related colleges (science and engineering). Then in the second stage, the stratification had been done according to the total number of the students in each college, i.e., each college was represented in the sample according to its weight. Pre-designed validated questionnaire was used in the collection of data, this questionnaire formed mainly of items about Sociodemographic and khat chewing. Sociodemographic data were classified during the study analysis as follow: Age (<20, 20-, 22-, ≥24 years), gender (male, female), marital status (single, married, divorced, and widow), residence (rural, urban), education of father and mother (illiterate, primary, intermediate, secondary, and university education). Khat chewing items included mainly the characteristics and the pattern of the habit.

The data were analyzed using the Statistical Package for Social Science (SPSS version 20, IBM, Chicago, USA). Chi-square test was used to compare categorical data, and multivariate analysis was conducted using logistic regression model 18 to determine the predictors of khat chewing. $P < 0.05$ was used as indicators of statistically significant differences. Approval from the deans of the related colleges had been taken. Ethical consideration was considered after approval of the Research Ethics Office (IRB) of Jazan Faculty of Medicine to ensure confidentiality and privacy of the collected data and obtaining free written informed consent.

RESULTS

The response rate for the survey was 93.2% (1500 from the target of 1609 participants). As shown in Table 1, the majority (95.2%) of the participants was <24-year-old, while 57%, 84.6%, and 48.5% of them were males, singles, and belonged to health-related colleges, respectively. The distribution of the sample regarding residence showed that 53.2% and 46.8 % of them were from urban and rural areas, respectively. Distribution of education of respondents' fathers and mothers showed that 36.2% and 8.0% of fathers and mothers, respectively, were university educated, while 20.0% and 45.9% of them, respectively, were illiterates. It is also observed that distribution of family monthly income showed that 20.7% and 46.6% of respondents had family monthly income <5000 and ≥10,000 Saudi Riyal, respectively.

The prevalence of khat chewing among the university students. As observed in Table 2 was 30.3% (95% confidence interval [CI]: 28.0 –32.6) and was higher among males 43.3% (95% CI: 40.4-46.6) than females 13.0% (95% CI: 10.6-15.8) and the difference was statistically significant ($P < 0.001$). However, the prevalence was significantly higher among students of non health-related colleges 37.6% (95% CI: 34.3-41.1) than that among students of health-related colleges 22.4% (95% CI: 19.5-25.6) ($P < 0.001$). It is also observed that the prevalence of khat chewing among the students who live in rural areas 37.3% (95% CI: 33.8-41.0) was higher than the prevalence among students of urban areas 24.1% (95% CI: 21.2-27.1) and the difference was statistically significant ($P < 0.001$).

Table 3 shows the characteristics and pattern of khat chewing among males and females of khat chewers. The majority 54.8% of females and 38.4% of males chew khat at their houses, and the difference between males and females regarding khat chewing site was statistically significant ($P < 0.05$). It is also shown that 57.0% and 16.7% of males and females, respectively, get the khat directly from the sellers, while 26.8% and 41.7% of them, respectively, get it from friends and the difference between them was statistically significant ($P < 0.001$). 62.7% and 69.0% of males and females, respectively, started khat chewing at age (>15-year-old), and the distribution of both males and females regarding the age of onset was statistically insignificant ($P > 0.05$). It is also observed that 59.5% and 29.8%

Table 1: General characteristics of the respondents

Characteristics	Students *n*=1500 (%)
Age (years)	
<20	181 (12.1)
20-	688 (45.9)
22-	558 (37.2)
≥24	73 (4.8)
Gender	
Male	855 (57.0)
Female	645 (43.0)
Marital status	
Single	1269 (84.6)
Married	187 (12.5)
Divorced	44 (2.9)
Residence	
Rural	702 (46.8)
Urban	798 (53.2)
Colleges that respondents belong to	
Health-related	727 (48.5)
Non health-related	773 (51.5)
Academic year	
First	350 (23.3)
Second	250 (16.7)
Third	300 (20.0)
Fourth	350 (23.3)
Fifth	150 (10.0)
Sixth	100 (6.7)
Education of father	
Illiterate	243 (20.0)
Primary	401 (11.0)
Intermediate	321 (8.8)
Secondary	142 (24.0)
University educated	393 (36.2)
Education of mother	
Illiterate	688 (45.9)
Primary	442 (29.5)
Intermediate	96 (10.2)
Secondary	153 (6.4)
University educated	121 (8.0)
Family monthly income in Saudi Riyal	
<5000	310 (20.7)
5000-10,000	490 (32.7)
≥10,000	700 (46.6)

of males and females, respectively, chew khat at weekends only and their distribution according to the frequency of khat chewing per week was statistically significant ($P < 0.001$).

Table 4 and Figure 1 show the possible reasons of khat chewing as reported and had been thought by the khat users were; habituation 39.6 % (43.5% of males, 22.6% of females), the need to change mood 45.8% (43.0% of males, 58.3% of females), Anxiety 4.2% (4.3% of males, 3.6% of females), and Stress 10.4 % (9.2% of males, 15.5% of females). Moreover,

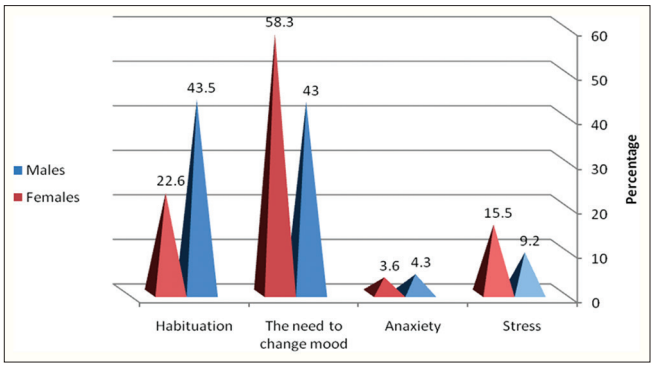

Figure 1: The suggested reasons of khat chewing according to the gender of the chewers

the difference between males and females regarding the causes of khat users was statistically significant ($P < 0.05$).

Table 5 shows the multivariate logistic regression analysis which illustrated that the most important independent predictors of khat chewing among the participated sample were smoking status of the student (odds ratio [OR] = 9.6, $P < 0.001$), khat chewing status of the student's friend (OR = 7.1, $P < 0.001$), khat chewing status of the student's father (OR = 4.7, $P < 0.001$), khat chewing status of the student's brother (OR = 4.6, $P < 0.001$), and participant's gender (OR = 4.5, $P < 0.001$).

DISCUSSION

This study was conducted to assess the prevalence of khat abuse among Jazan University students, and to find out the most important factors and predictors influencing khat chewing among the students in Jazan region. A study conducted in Jazan, found that the overall prevalence of khat abuse among the students of higher education reaches 23.1% (38.5% for males and 2.1% for females).[29] 8 years ago, the prevalence of current Khat chewing among university students in Jazan was 15.2% among males[30,31] in spite of the efforts done by government and non governmental organization, these study findings revealed that the overall prevalence of khat chewing among Jazan University students was 30.3% (43.3% for males and 13.0% for females) as shown in Table 2, and in comparison with the previous studies we conclude that the prevalence of khat chewing in this study is higher, and that could be explained by the following: Although trading of khat is illegal and prohibited in Saudi Arabia, and a new deterrent strict legal system was implemented since 2006, it has been guessed that it has no effect, as there is an obvious increasing trend in khat chewing among university students, and it may be due to the availability and accessibility of khat and easiness to be gotten. However, Jazan region has direct borders with Yemen and the Red Sea where it faces Ethiopia, Somalia, and Kenya where production and trading of khat are legal.[32] That leads to increase the possibility of smuggling through the borders and make it not easy to be controlled.

However, khat is cultivated in Faifa Mountains in Jazan, and although the governmental program for prohibition of expansion in cultivation of khat and establishment of an authority for Faifa Development under the supervision of the Ministry of Interior since 1978 to control cultivation of khat and enhance people to cultivate alternative crops, such as coffee and fruit trees.[28,29]

Table 2: Prevalence of khat chewing among the studied sample

Characteristics	Khat chewers		Non-khat chewers		*P* value
	n (%)	95% CI	*n* (%)	95% CI	
Gender					
Male	370 (43.3)	40.0-46.6	485 (56.7)	53.4-60.0	0.000
Female	84 (13.0)	10.6-15.8	561 (87.0)	84.2-89.4	
χ^2=159.41					
Type of colleges that respondents belong to					
Health-related	163 (22.4)	19.5-25.6	564 (77.6)	74.4-80.5	0.000
Non health-related	291 (37.6)	34.3-41.1	482 (62.4)	58.9-65.7	
χ^2=41.14					
Residence					
Rural	262 (37.3)	33.8-41.0	440 (62.7)	59.0-66.2	0.000
Urban	192 (24.1)	21.2-27.1	606 (75.9)	72.9-78.8	
χ^2=31.12					
Total	454 (30.3)	28.0-32.6	1046 (69.7)	67.4-72.0	

CI: Confidence interval

Table 3: Characteristics and pattern of khat chewing among the khat users

Characteristics	*n* (%)			*P* value
	Male	Female	Total	
Site of khat chewing				
My house	142 (38.4)	46 (54.8)	188 (41.4)	0.003
My friend's house	91 (24.6)	19 (22.6)	110 (24.2)	
Public place	68 (18.4)	3 (3.6)	71 (15.6)	
Other place	69 (18.6)	16 (19.0)	85 (18.7	
Is it easy to get khat?				
Yes	315 (85.1)	70 (83.3)	385 (84.8)	0.678
No	55 (14.9)	14 (16.7)	69 (15.2)	
What is your source of khat?				
Sellers	211 (57.0)	14 (16.7)	255 (49.6)	0.000
Another person buy it to me	53 (14.3)	31 (36.9)	84 (18.5)	
I take some from friends	99 (26.8)	35 (41.7)	134 (29.5)	
Others	7 (1.9)	4 (4.7)	11 (2.4)	
Age of onset of khat chewing in (years)				
<10	25 (6.8)	7 (8.4)	32 (7.0)	0.341
10-15	113 (30.5)	19 (22.6)	132 (29.1)	
>15	232 (62.7)	58 (69.0)	290 (63.9)	
Khat chewing frequency per week				
Every day	23 (6.2)	4 (4.8)	27 (5.9)	0.000
More than one day	54 (14.6)	6 (7.1)	60 (13.2)	
Weekends only	220 (59.5)	25 (29.8)	245 (45.0)	
No definite time	73 (19.7)	49 (58.3)	122 (26.9)	
Which time do you prefer to chew khat during the day?				
At noon	37 (10.0)	59 (70.2)	96 (21.1)	0.000
After noon	27 (7.3)	7 (8.4)	34 (7.5)	
At night	306 (82.7)	18 (21.4)	324 (71.4)	
Who do you chew khat with?				
Family	29 (7.8)	17 (20.2)	46 (10.1)	0.000
Relatives	77 (20.8)	33 (39.3)	110 (24.2)	
Friends	259 (70.0)	21 (25.0)	280 (61.7)	
Alone	5 (1.4)	13 (15.5)	18 (4.0)	
Total	370 (100.0)	84 (100.0)	454 (100.0)	

The outcomes of such program need to be evaluated as khat are still cultivated in Faifa.

The prevalence of khat chewing among the students of health-related colleges (22.4%) in this study as observed in Table 2 is similar to the reported prevalence of current khat chewing (22.3%) among medical and paramedical students in Ethiopia.[33] And to that prevalence (20.4%) among the students which reported in Uganda.[34] The khat chewing in this study is significantly higher among males (43.3%) than females (13.0%) as previously mentioned, and it is also significantly higher among rural (37.3%) than urban (24.1%) residents, so the findings are similar to those which were reported previously in Jazan and Ethiopia.[29,31,35]

Regarding the characteristics and the pattern of khat chewing among the university students, the process is not regulated by any mechanism such as religious, traditional, and moral mechanisms. It is socially acceptable and with socializing practice; only 4.0% of users chew khat alone, while the rest practice that with their friends, relatives, and family members.[29,36,37]

As shown in Table 3 the findings of this study revealed that female khat chewing characteristics and pattern is significantly different from male chewers regarding the partners during khat session, khat source, place, and chewing time. Females tend to chew khat more with family and relatives, get it from another person or friends, and chew it at home at the noon time, while males chew khat more frequently with friends, buy it, and chew it at houses of their friends and public places at night.[29,36,37] Identification of the different patterns of khat chewing is essential for planning of community interventional programs for prevention and control of khat use.

The drug abuse in different communities with different social and cultural background has nearly the same etiological theories: Social, enhancement, coping, and conformity.[38-40] Social motives include using the drug to have fun with friends and killing the time. Enhancement motives include reasons such as getting or experiencing the excitement.[38-40] The drug use to cope includes the use of the drug to forget about problems, countering the psychosocial distress, uncertainty about the future and past trauma.[29,41] Conformity reasons include drug intake to fit in with a peer group.[38-40] However, these study findings as shown in Table 4 and Figure 1 demonstrated that people chew khat for similar causes: When they need to change their mood (49%), as a social habituation (39.6%) and feel stressed (15.5%).

There are many other reported reasons for khat users, as some people such as: Drivers use it to keep them awake, students use it to keep them alert, farmers use it to delay their fatigue, it can be used as a traditional healer, it was used to improve sexual activity, and in general, it is usually used in social recreation.[29,42,43]

Regarding the most important predictors and risk factors of khat chewing, this study demonstrated (Table 5) that the most significant factors were students' smoking status, friend using khat, father using khat, brother using khat, and male in gender. Similar and matched factors are also reported in 2013 in a study conducted in Jazan.[29]

The main strength of this study is that it assessed the prevalence of khat chewing and identified the characteristic (pattern) of khat use as well as the determination of its risk factors among the university students in Jazan that it explored a very foundational aspect of preventive medicine which should continually be developed. The fact that the students represented the health-related and non health-related colleges of the only university in Jazan makes our findings more generalizable.

Table 4: Causes of khat chewing regarding the gender of khat users

Causes	*n* (%)			*P* value
	Male	Female	Total	
Habituation	161 (43.5)	19 (22.6)	180 (39.6)	0.003
The need to change mood	159 (43.0)	49 (58.3)	208 (45.8)	
Anxiety	16 (4.3)	3 (3.6)	19 (4.2)	
Stress	34 (9.2)	13 (15.5)	47 (10.4)	
Total	370 (100.0)	84 (100.0)	454 (100.0)	

Table 5: Multivariate logistic regression analysis of factors associated with khat chewing

Variables	OR	95% CI	Significant
Gender			
Female (Ref.)	4.5	3.04-6.62	0.000
Male			
Residence			
Urban (Ref.)			
Rural	0.8	0.55-1.12	0.178
Education of father			
University educated (Ref.)			
Illiterate	1.6	0.88-2.75	0.128
Primary	1.2	0.65-2.17	0.588
Intermediate	0.8	0.52-1.36	0.488
Secondary	0.5	0.33-0.87	0.011
Smoking status of the student			
No (Ref.)			
Yes	9.6	6.68-13.94	0.000
Khat chewing status of the student's friend			
No (Ref.)	7.1	5.10-9.87	0.000
Yes			
Smoking status of student's friend			
No (Ref.)			
Yes	0.8	0.58-1.16	0.253
Khat chewing status of the student's father:			
No (Ref.)	4.7	2.95-7.37	0.000
Yes			
Khat chewing status of the student's brother:			
No (Ref.)	4.6	2.51-8.35	0.000
Yes			
Feeling stressed			
No (Ref.)			
Yes	0.25	0.14-0.44	0.000

OR: Odds ratio, CI: Confidence interval

Limitations of the Study

The limitations are those of bias in answering the questions and accuracy of recall of information. Furthermore, a collection of data about khat chewing was relatively easy and attainable as it is socially acceptable, while, it was not easy to collect data about other associated risky behaviors such as sexual behavior and drinking alcohol.

CONCLUSION

The prevalence of khat chewing is high among the university students in Jazan, and that reflects the social acceptability of that habit, and the availability of khat even it is illegal in Saudi Arabia. So law enforcement only will not be enough for prevention and control of khat use in Jazan. A comprehensive, multi-directional and long-term intervention plan is needed, the plan may include: Educational, social, and recreational programs. However, critical revision of this interventions and services is highly recommended. The social intervention programs should target the change of the community norms and traditions regarding khat use, while recreational programs should focus on making alternatives and creating opportunities for youth.

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REFERENCES

1. Mahfouz MS, Rahim BE, Solan YM, Makeen AM, Alsanosy RM. Khat chewing habits in the population of the Jazan region, Saudi Arabia: Prevalence and associated factors. PLoS One 2015;10:e0134545.
2. Numan N. The green leaf: Khat. World J Med Sci 2012;7:210-23.
3. Balint G, Balint EE. On the medico-social aspects of khat (*Catha edulis*) chewing habit. Hum Psychopharmacol Clin Exp 1994;9:125-8.
4. Kalix P, Khan I. Khat: An amphetamine-like plant material. Bull World Health Organ 1984;62:681-6.
5. Kennedy JG. The Flower of Paradise: The Institutionalized Use of the Drug Qat in Northern Yemen. Dordrecht, Holland: D. Reidel Publishing Company; 1987.
6. Luqman W, Danowski TS. The use of khat (*Catha edulis*) in Yemen. Social and medical observations. Ann Intern Med 1976;85:246-9.
7. Halbach H. Medical aspects of the chewing of khat leaves. Bull World Health Organ 1972;47:21-9.
8. Cox G, Rampes H. Adverse effects of khat: A review. Adv Psychiatr Treat 2003;9:456-63.
9. Kalix P. Khat: A plant with amphetamine effects. J Subst Abuse Treat 1988;5:163-9.
10. Margetts EL. Miraa and myrrh in East Africa-clinical notes about *Catha edulis*. Econ Bot 1967;21:358-62.
11. Nencini P, Ahmed AM, Elmi AS. Subjective effects of khat chewing in humans. Drug Alcohol Depend 1986;18:97-105.
12. Pantelis C, Hindler CG, Taylor JC. Use and abuse of khat (*Catha edulis*): A review of the distribution, pharmacology, side effects and a description of psychosis attributed to khat chewing. Psychol Med 1989;19:657-68.
13. Odenwald M, Neuner F, Schauer M, Elbert T, Catani C, Lingenfelder B, *et al.* Khat use as risk factor for psychotic disorders: A cross-sectional and case-control study in Somalia. BMC Med 2005;3:5.
14. Yousef G, Huq Z, Lambert T. Khat chewing as a cause of psychosis. Br J Hosp Med 1995;54:322-6.
15. Schopen A. Tarekh al khat in Yemen Arab Republic, (Khat history in Yemen Arab Republic), Khat in Yemeni Life. Yemen: Sana'a Centre for Yemeni Studies; 1981. p. 178-9.
16. World Health Organization. Dependence WHOECoD. WHO Expert Committee on Drug Dependence. World Health Organization Technical Report Series. Vol. 1. Geneva: World Health Organization; 2003. p. 915.
17. Khat A. Assessment of risk to individual and communities in the UK. Advisory Council on the Misuse of Drugs. London: British Home Office; 2005.
18. Kennedy JG, Teague J, Fairbanks L. Qat use in North Yemen and the problem of addiction: A study in medical anthropology. Cult Med Psychiatry 1980;4:311-44.
19. Kalix P. Khat: Scientific knowledge and policy issues. Br J Addict 1987;82:47-53.
20. Ageely HM. Health and socio-economic hazards associated with khat consumption. J Family Community Med 2008;15:3-11.
21. Dalu A. Impact of long term consumption of khat on public health. Sidama Concern 2000;5:15-6.
22. Mion G, Oberti M, Ali AW. Hypertensive effects of qat. Med Trop (Mars) 1998;58:266-8.
23. Alem A, Shibre T. Khat induced psychosis and its medico-legal implication: A case report. Ethiop Med J 1997;35:137-9.
24. Gough S, Cookson I, Mayberry J, Morgan G, Perkin E. Khat-induced schizophreniform psychosis in UK. Lancet 1984;323:455.
25. Gatter P. Politics of Qat: The Role of a Drug in Ruling Yemen. Wiesbaden: Ludwig Reichert Verlag; 2012.
26. Alsanosy RM, Mahfouz MS, Gaffar AM. Khat chewing habit among school students of Jazan region, Saudi Arabia. PLoS One 2013;8:e65504.
27. Mahfouz MS, Alsanosy RM, Gaffar AM. The role of family background on adolescent khat chewing behavior in Jazan Region. Ann Gen Psychiatry 2013;12:16.
28. Ageely HM. Prevalence of Khat chewing in college and secondary (high) school students of Jazan region, Saudi Arabia. Harm Reduct J 2009;6:11.
29. Alsanosy RM, Mahfouz MS, Gaffar AM. Khat chewing among students of higher education in Jazan region, Saudi Arabia: Prevalence, pattern, and related factors. Biomed Res Int 2013;2013:487232.
30. Elsanosi R, Bani I, Ageely H, Milaat W, El-Najjar M, Makeen A, *et al*. Socio-medical problem of the habituation of Khat chewing in Jazan region in Southern Saudi Arabia. Eur J Sci Res 2011;63:122-33.
31. Milaat A, Bani I, Ageely H, El-Naggar M. Assessment of Health Risk Factors and Social Problems Associated with Khat Use in Jazan Region. Jazan, Saudi Arabia: King Abdulaziz University; 2006.
32. Dhaifalah I, Santavý J. Khat habit and its health effect. A natural amphetamine. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub 2004;148:11-5.
33. Zein ZA. Polydrug abuse among Ethiopian university students with particular reference to khat (*Catha edulis*). J Trop Med Hyg 1988;91:71-5.
34. Ihunwo AO, Kayanja FI, Amadi-Ihunwo UB. Use and perception of the psychostimulant, khat (*Catha edulis*) among three occupational groups in south western Uganda. East Afr Med J 2004;81:468-73.
35. Alem A, Kebede D, Kullgren G. The prevalence and socio-demographic correlates of khat chewing in Butajira, Ethiopia. Acta Psychiatr Scand Suppl 1999;397:84-91.
36. Odenwald M, Warfa N, Bhui K, Elbert T. The stimulant khat - Another door in the wall? A call for overcoming the barriers. J Ethnopharmacol 2010;132:615-9.
37. Al Khader NL, Darwish H. Prevalence of cigarette smoking and khat chewing among Aden university medical students and their relationship to BP and body mass index. Saudi J Kidney Dis Transplant 2009;20:862.
38. Newcomb MD, Chou CP, Bentler PM, Huba G. Cognitive motivations for drug use among adolescents: Longitudinal tests of gender differences and predictors of change in drug use. J Couns Psychol 1988;35:426.
39. Cooper ML. Motivations for alcohol use among adolescents: Development and validation of a four-factor model. Psychol Assess 1994;6:117.
40. Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. Clin Psychol Rev 2005;25:841-61.
41. Dupont HJ, Kaplan CD, Verbraeck HT, Braam RV, van de Wijngaart GF. Killing time: Drug and alcohol problems among asylum seekers in the Netherlands. Int J Drug Policy 2005;16:27-36.
42. Gelaw Y, Haile-Amlak A. Khat chewing and its socio-demographic correlates among the staff of Jimma University. Ethiop J Health Dev 2004;18:179-84.
43. Wedegaertner F, al-Warith H, Hillemacher T, te Wildt B, Schneider U, Bleich S, *et al.* Motives for khat use and abstinence in Yemen - A gender perspective. BMC Public Health 2010;10:735.

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