

REVIEW

Khat: A widely used drug of abuse in the Horn of Africa and the Arabian Peninsula: Review of literature

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INTRODUCTION

Khat or *Catha edulis*, is a flowering plant most commonly found in countries of the African Horn and the Arabian Peninsula. Khat chewing goes far back in history and has always been a kind of tradition in some of these countries.¹ Khat contains an alkaloid, cathinone, an amphetamine-like stimulant believed to cause excitement, loss of appetite, and euphoria.² Khat is therefore classified by the World Health Organization as a possible drug of abuse but with less addictive potential than alcohol or tobacco.³ Khat has been targeted by many anti-drug organizations around the globe and is outlawed in Qatar. However it is legal and widely used in the nearby country of Yemen. Despite all the obstacles and severe legal consequences on any attempt to smuggle in the plant to Qatar, patients may still present with one of the complications of Khat abuse (Figure 1).

The earliest description of Khat in western literature was in 1697 by the French Barthélémyd'Herbelot de Molainville when he travelled to Yemen, he specifically said (translated) "[It] is made with a seed which is unknown to us, which has been forbidden by the doctors of the law in the province of Yemen where it originated...because it is too strong, and affects the brain".⁴ However it was not until 1975 that the Laboratories of the United Nations first discovered that cathinone was the biochemically-active ingredient of Khat.⁵

In this article we present a short review of this plant as an example of a drug of abuse that is particularly common and is relatively over-used in the Middle East and North Africa mainly Somalia, Djibouti, and Kenya. As Yemen has the largest population in the world consuming Khat, most of the information presented and discussed in this paper concerns that country (Figure 2).



Figure 1. Khat chewing.

METHODS

A comprehensive review of literature scanned all published peer-reviewed articles and relevant data using the MEDLINE database. The MeSH used included ("cathinone"[Supplementary Concept] AND "Public Health"[MeSH]). The keywords used for this study were ("Khat", "Khat in Qatar", and "Khat in Middle East"). Related citations were also used. Google search was used to find newspaper articles, stories, and informal reports about Khat use in the region.

PHARMACOLOGY AND EFFECTS OF KHAT ON HEALTH

As an amphetamine-like substance, cathinone is majorly a sympathomimetic drug. It works through stimulating the autonomic sympathetic nervous system, commonly known as the 'fear-flight' response. Khat effects are similar to those of cathinone of comparable dosage (0.8 mg/kg and 0.5 mg/kg respectively). Maximum plasma concentration of cathinone are attained



Figure 2. Khat plant.

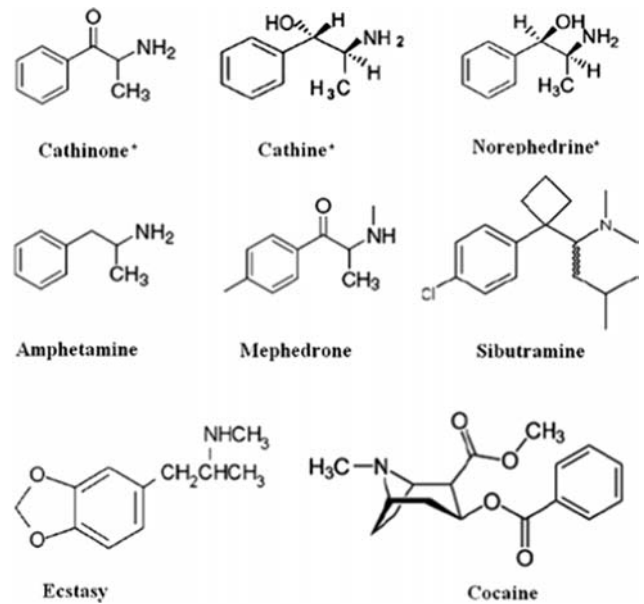


Figure 3. Structure of active constituents of Khat (cathinone, cathine, and norephedrine) in comparison with other drugs of abuse.

127 minutes after first use of Khat, with average elimination half-life of 260 minutes (Figure 3).⁶

Acute effects of Khat chewing usually involve increased alertness, increased blood pressure, and heart rate along with a decreased appetite.⁷ Cathinone also tends to have some behavioural effects probably through other mechanisms of action in the brain; these effects involve: excitation, increased locomotor activity, and stereotyped behaviour.⁸ Even though Khat is an amphetamine, it has some interesting differences compared to other prototypical amphetamines such as Methamphetamines. Khat differs in terms of tolerance, toxicity, and dependence properties. For example Khat does not cause physical dependence, and withdrawal is characterised by only a mild depression and hypotension.⁸ In a survey of consultant psychiatrists and addiction experts, Khat was described as causing the least physical harm among substances of abuse. However it was also described to cause more dependence than anabolic steroids and alkyl nitrites.³ Table 1 shows the results of the study of Khat harm. A summary of the short-term effects of Khat chewing is shown in Table 2.

Acute effects of Khat have been reported to be similar to crack cocaine or methamphetamine.¹⁰ Confusion and disorientation occur as transient phenomena, which can be associated with psychosis.¹¹ It has been suggested that the sympathetic arousal is higher in acute Khat intoxication than in chronic use, a feature that might be helpful in distinguishing between the two causes.¹² Therapeutically, Khat intoxication is similar to amphetamine intoxication with the exception of lower bioavailability because cathinone extraction by chewing is delayed by the mastication process.²

Table 1. Dependence and physical harm scores for use of Khat.³

Effect	Score
Mean physical harm	0.5
Acute harm	0.3
Chronic harm	1.2
Intravenous harm	0
Mean dependence	1.04
Pleasure	1.6
Psychological	1.2
Physical	0.3
Mean social harm	0.85
Intoxication	0.7
Social harm	1.1
Health-care costs	0.8

All scores are out of 3.

Chronic use of Khat results in increased risk for several diseases. These include cardio-vascular, gastro-intestinal, genito-urinary, obstetric and other diseases. Results of human studies of the most common diseases are listed in Table 3. Chronic use of Khat may produce withdrawal but it is usually mild and is characterised by only a mild depression and hypotension.⁸

PREVALENCE OF KHAT

The exact number of people worldwide who use Khat is not known²⁷ but is estimated to be from 5 to 10 million, predominately in Yemen, Somalia and Ethiopia.²⁷ Khat is widely used in Yemen, even by children. The prevalence is higher in males than in females. Studies have estimated prevalence to be 80% for males, and 50% for females in the capital Sana'a at age fifteen and above.²⁸ Also between 15 – 20% of children under age 12 are daily consumers of Khat.²⁹ Those consumers usually spend most of the day buying and chewing Khat, and that is severely affecting working hours and the national income in general, and the family and society in particular.¹⁷

Cultivation also has increased sharply over the past decades in many countries,^{30,31} making Khat a global commodity. This has happened despite efforts to ban it. The reason could be is that Khat as a plant (unlike coca leaves for instance) is not under governmental control in many countries.³² Khat leaves are being smuggled by air travel to the USA and Europe, selling for 300 – 500 USD a kilo.³³ In 1999 – 2000 Khat was exported to different countries for a total worth of \$55 million.³⁴ In UK, about 7 metric tons of Khat is estimated to travel through

Heathrow Airport each week, originating from Yemen, Ethiopia, and Kenya.³⁵

In Yemen, Khat contributed to about 30% of the GDP during the early 1980s (i.e. the pre-oil production era).³⁶ Yemeni Khat though is not legally exported and brings no economic gains for the country from the outside worlds.

In October 2005 the WHO sent out a questionnaire to 67 countries in order to globally assess the level of the problem. Only nine countries confirmed knowledge of Khat abuse happening in their countries with the highest prevalence of 20% in Kenya. Twenty five claimed no abuse and the remainder denied any knowledge of the issue.⁹

Cultivation, selling, or even casual chewing of Khat is prohibited in Qatar. Most of the Gulf countries, have a zero tolerance policy towards smuggling drugs of abuse. No data about the use of Khat in Qatar or other Gulf countries could be found.

DISCUSSION

Khat research is still far from sufficient to answer questions about its addictive qualities and long term health, economic, and social consequences. One critical limitation of Khat prevalence studies is the illegal status of this substance in the region and the reluctance of self-reporting.

Khat is still a part of the cultural identity of people in Yemen, Somalia, and Kenya. The western world is also facing the problem which has increased dramatically with globalisation, immigration, the development of air travel

Table 2. The short-term and long-term effects of Khat on human health.⁹

Short-term effects
• Relief of fatigue, increased alertness, reduced sleepiness
• Mild euphoria and excitement; improved ability to communicate, loquacity
• Tachycardia, hypertension
• Moderate hyperthermia
• Mydriasis, blurred vision
• Anorexia, dry mouth
• Constipation (supposedly due to tannins, but amphetamines may also cause constipation)
• Psychotic reactions at high doses
• Irritability and depressive reactions at the end of a Khat session
• Lethargy and sleepy state (next morning)

Table 3. Some of the common risks associated with Khat in humans.

System	Increased risk
Cardiovascular system	Myocardial infarction ¹³ , Hemorrhoids ¹⁴
Gastro-intestinal system	Gastritis ¹¹ , gingivitis ¹⁵ , dislocation of the Temporomandibular joint ¹⁶
Hepato-biliary system	Liver disease ¹⁷
Genito-urinary system	Spermatozoa malformations and reduced count ¹⁸ , impotence ¹⁹
Obstetric effects	Low birth weight, stillbirths ^{19,20}
Metabolic and endocrine effects	Diabetes mellitus ²¹
Malignancy	Oral keratosis ²² , oral malignancy ²³ , head and neck malignancy ²⁴
Central nervous system	Psychological dependence ²⁵ , lethargy, mild depression, slight trembling and recurrent bad dreams ⁷ , psychosis ²⁶

and the unfruitful attempts at controlling international crime. The U.S. federal agencies, for example, seized more than 30 metric tons of Khat in a 6 month period during 2002.³⁷

Cultivation of Khat is also a profitable business in poor countries like Yemen and Ethiopia (Yemen ranked at 88 according to the World Bank GDP list). It brings profit to many people involved in cultivation, production, selling, and smuggling the plant. It also brings revenue to the government in countries like Ethiopia where about 90% of production is exported.³⁴

At the family level, the use of Khat and the amount of money being spent on it is detrimental especially for the poor. In the 1980s it was estimated that about 10% of the population was suffering from economic crisis because of Khat.³⁶ Furthermore, Khat use poses a burden on the public health systems due to the increased risk of many diseases associated with its use. It could increase the health care cost in countries already struggling with the national budget.

In order to better assess the socioeconomic problems associated with Khat, multinational studies at the population level are required. These studies should be

embraced by governments and international law organizations to better fight the problem. Awareness of the harmful effects of Khat should also be raised especially in countries where high prevalence is observed. These campaigns should focus on teaching people that even though chewing Khat is a long-standing tradition, it does not mean it is right or good. Overall Khat is creating public health and economic problems in poor countries that are already way behind in development. The western world is also tasting the flavor of the problem through globalisation and international smugglers exporting the plant worldwide. In order to better assess the problem we need more studies at the population level and in many countries from different regions. These studies should then be embraced by governments and international law organizations to better fight the problem. Awareness of the harmful effects of Khat should also be raised especially in countries like Yemen and Kenya. These awareness campaigns should focus on teaching people that even though chewing Khat is a long-standing tradition, it does not mean it is right or beneficial.

REFERENCES

1. Drake PH. Khat-chewing in the Near East. *Lancet*. 1988 Mar 5;1(8584):532 – 533.
2. Kalix P. Khat: a plant with amphetamine effects. *J Subst Abuse Treat*. 1988;5(3):163 – 169.
3. Nutt D, King LA, Saulsbury W, Blakemore C. Development of a rational scale to assess the harm of drugs of potential misuse. *Lancet*. 2007 Mar 24;369(9566):1047 – 1053.
4. Krikorian AD. Kat and its use: an historical perspective. *J Ethnopharmacol*. 1984;12: 115 – 178.
5. United Nations. Etude sur la composition chimique du Khat: recherche sur la fraction phenylalkylamine. UN document MNAR/11/1975.
6. Widler P, Mathys K, Brenneisen R, Kalix P, Fisch HU. Pharmacodynamics and pharmacokinetics of Khat: a controlled study. *Clin Pharmacol Ther*. 1994 May;55(5):556 – 562.
7. Al-Motarreb A, Baker K, Broadley KJ. Khat: pharmacological and medical aspects and its social use in Yemen. *Phytother Res*. 2002 Aug;16 (5):403 – 413.

8. Halbach H. Medical aspects of the chewing of Khat leaves. *Bull World Health Organ.* 1972;47(1):21 – 29.
9. World Health Organization (WHO) Expert Committee on Drug Dependence. Assessment of Khat (*Catha edulis* Forsk). http://www.who.int/medicines/areas/quality_safety/4.4KhatCritReview.pdf. Accessed January 11, 2012, Published 2006.
10. Patel NB. Mechanism of action of cathinone: the active ingredient of Khat (*Catha edulis*). *East Afr Med J.* 2000 Jun;77(6):329 – 332, Review.
11. Kennedy JG, Teague J, Rokaw W, Cooney E. A medical evaluation of the use of qat in North Yemen. *Soc Sci Med.* 1983;17(12):783 – 793.
12. McLaren P. Khat psychosis. *Br J Psychiatry.* 1987 May;150:712 – 713.
13. Ali WM, Al Habib KF, Al-Motarreb A, Singh R, Hersi A, Al Faleh H, Asaad N, Al Saif S, Almahmeed W, Sulaiman K, Amin H, Al-Lawati J, Al Bustani N, Al-Sagheer NQ, Al-Qahtani A, Al Suwaidi J. Acute coronary syndrome and Khat herbal amphetamine use: an observational report. *Circulation.* 2011 Dec 13;124(24):2681 – 2689.
14. Al-Hadrani AM. Khat induced hemorrhoidal disease in Yemen. *Saudi Med J.* 2000 May;21(5):475 – 477.
15. Marker P, Krogdahl A. Plasma cell gingivitis apparently related to the use of Khat: report of a case. *Br Dent J.* 2002 Mar 23;192(6):311 – 313.
16. Kummoona R. Surgical reconstruction of the temporomandibular joint for chronic subluxation and dislocation. *Int J Oral Maxillofac Surg.* 2001 Aug;30(4):344 – 348.
17. Chapman MH, Kajihara M, Borges G, O'Beirne J, Patch D, Dhillon AP, Crozier A, Morgan MY. Severe, acute liver injury and Khat leaves. *N Engl J Med.* 2010 Apr 29;362(17):1642 – 1644.
18. Hakim LY. Influence of Khat on seminal fluid among presumed infertile couples. *East Afr Med J.* 2002 Jan;79(1):22 – 28.
19. Mwenda JM, Arimi MM, Kyama MC, Langat DK. Effects of Khat (*Catha edulis*) consumption on reproductive functions: a review. *East Afr Med J.* 2003 Jun;80(6):318 – 323.
20. Abdul Ghani N, Eriksson M, Kristiansson B, Qirbi A. The influence of Khat-chewing on birth-weight in full-term infants. *Soc Sci Med.* 1987;24(7):625 – 627.
21. Elhadrani AM, AlHoot MA. An association between Khat and diabetes. *Egypt J Surg.* 2000;19(1):16 – 19.
22. Hill CM, Gibson A. The oral and dental effects of q'at chewing. *Oral Surg Oral Med Oral Pathol.* 1987 Apr;63(4):433 – 436.
23. Kassie F, Darroudi F, Kundi M, Schulte-Hermann R, Knasmüller S. Khat (*Catha edulis*) consumption causes genotoxic effects in humans. *Int J Cancer.* 2001 May 1;92(3):329 – 332.
24. Nasr AH, Khatri ML. Head and neck squamous cell carcinoma in Hajjah, Yemen. *Saudi Med J.* 2000 Jun;21(6):565 – 568.
25. Kalix P. Pharmacological properties of the stimulant Khat. *Pharmacol Ther.* 1990;48(3):397 – 416.
26. Odenwald M, Neuner F, Schauer M, Elbert T, Catani C, Lingenfelder B, Hinkel H, Haßfner H, Rockstroh B. Khat use as risk factor for psychotic disorders: across-sectional and case-control study in Somalia. *BMC Med.* 2005 Feb 12;3:5.
27. Mateen FJ, Cascino GD. Khat chewing: a smokeless gun? *Mayo Clin Proc.* 2010 Nov;85(11):971 – 973, Erratum in: *Mayo Clin Proc.* 2011 Feb; 86(2):168.
28. Basunaid S, Van Dongen M, Cleophas TJ. Khat abuse in Yemen: a population-based survey. *Clin Res Regul Affairs.* 2008;25:87 – 92.
29. The World Bank: World Bank Report. Yemen-towards qat demand reduction. Report No. 39738-YE 2007.
30. Hassan NAGM, Gunaid AA, Abdo-Rabbo AA, Abdel-Kader ZY, Al-Mansoob MAK, Awad AY, Murray-Lyon IM. The effect of Qat chewing on blood pressure and heart rate in healthy volunteers. *Trop Doctor.* 2000;30:107 – 108.
31. Numan N. Exploration of adverse psychological symptoms in Yemeni Khat users by the Symptoms Checklist-90 (SCL-90). *Addiction.* 2004 Jan;99(1):61 – 65, Erratum in: *Addiction.* 2006.
32. Wedegaertner F, al-Warith H, Hillemacher T, teWildt B, Schneider U, Bleich S, Breitmeier D. Motives for Khat use and abstinence in Yemen – a gender perspective. *BMC Public Health.* 2010 Nov 27;10:735.
33. Operation Somalia Express: Largest Khat enforcement ever. DEA News Release 2006.

34. Lemessa D. *Khat (Catha edulis): botany, distribution, cultivation, usage and economics in Ethiopia*. Addis Ababa: UN-Emergencies Unit for Ethiopia; 2001.
35. Al-Hebshi NN, Skaug N. Khat (*Catha edulis*) – an updated review. *Addict Biol.* 2005 Dec;10 (4):299 – 307.
36. Kennedy JG. The agriculture and economics of qat. Kennedy JG. *The flower of paradise: the institutionalized use of the drug qat in North Yemen*. Dordrecht: D. Reidel; 1987b:133 – 175.
37. US Department of Justice; National Drug Intelligence Center. Intelligence Bulletin: Khat (*Catha edulis*). Intelligence Bulletin 2003. Product No. 2003-L0424-002. Published May 2003. <http://www.justice.gov/ndic/pubs3/3920/mdex.htm>. Accessed January 26, 2012.
38. Balint EE, Falkay G, Balint GA; Khat A. Khat – a controversial plant. *Wiener Klin Wochenschrift.* 2009;121:604 – 614.