

The Use of [Khat](#) (*Catha edulis*) in Yemen Social and Medical Observations

Wijdan Luqman, B.Sc., M.B.Ch.B. (Edin); and T. S. Danowski, M.D., F.A.C.P. (1975). *Annals of Internal Medicine* 85:246-249.

Catha edulis, or khat, a plant indigenous to Yemen, Ethiopia, and East Africa, has sympathomimetic and euphoriant effects. Its role in the economic, social, and political lives of people in North and South Yemen and certain clinical and psychiatric aspects are discussed.

In North and South Yemen, khat is more than a [psychotropic](#) plant. It is the basis of a life style and plays a dominant role in celebrations, marriages, and political meetings. Indeed, [withdrawal](#) from khat results in social isolation. Use of khat has increased concurrent with -the advent of modern medicine, customs, and education. One of us (W.L.) has observed the khat phenomenon both as a native and as a physician.

Khat grows best at 3000 to 6000 feet above sea level and reaches a height of 20 feet. It is seedless, and this may explain its limitation to the Yemens and nearby Ethiopia and East Africa. Though it is considered to be a thirsty plant, during droughts it grows when other crops fail. Its leaves and twigs can be harvested throughout the year.

The demand for and the price of the khat plant vary with the soil and climate in which it is grown. In South Yemen, the price of the two common varieties, the Dhali and the Yaffee-named after the areas in which they grow-is low, reflecting their lower appeal. In North Yemen, with its larger agricultural areas and numerous varieties of khat, the Taizi, Shami, Sawti, Khat al Wadi, Sharwa-with qualities dependent on the highlands where they are raised-the greater rainfall is said to have different effects. Thus, the Yaffee variety of South Yemen is believed to produce more insomnia and occasional hallucinations. Those grown in North Yemen may elicit more or less [euphoria](#), depression, and aphrodisia. These, however, are regional or personal preferences and are difficult to evaluate.

Irrespective of which variety is used, khat is an expensive habit. In 1955 the money spent on khat in the 75 square miles of the original Aden Colony

(now the capital of South Yemen) exceeded 40 million shillings (five million dollars). Most of this represented expenditures for khat imported from Ethiopia daily by air.

Khat Gatherings

Yemenite homes are constructed to provide a warm reception room for khat chewing. In keeping with the total segregation of the sexes at social functions, women are excluded. However, women do hold their own khat sessions, but they are much less frequent. At either event, the guests are distributed in accord with their familial, social, or political importance and prestige. Drafts interfere with comfort at a khat gathering, and hence the choice places are those farthest removed from the doors and windows.

The chewers lean against three or four specially made large and hard pillows. Each side of the room accommodates six to 10 persons, and occasionally up to 20. One or two communal [tobacco](#) pipes or "hubble-bubbles" stand in the center. Each consists of a tobacco bowl, a 3- or 4-foot high metal pipe, a water filter, and a 20-foot long flexible tube. The tobacco is ignited with a layer of charcoal, and the flexible tube is passed from guest to guest. Each must limit himself to a few puffs because excesses produce dizziness, tremulousness, palpitations, and severe nausea.

During such khat sessions, drinks are available, that is, cola, weak black tea, or just cold water.

IN THE CITIES AND TOWNS

Urban khat sessions usually begin soon after lunch. The chewers prefer fresh leaves, and they are therefore purchased just before or after lunch. Purchase of the leaf matches the acumen of the habitual chewer against the seller's attempts to peddle yesterday's leaf. The expert khat buyer first shakes and smells the suitably because fresh leaves do not fall off and have a characteristic odor. Arguments about price may involve shouting and pushing, but violence is rare. Once the khat has been acquired, the customer leaves with a smile of satisfaction and anticipation.

The chewing session starts with slightly euphoric behavior and a friendly sense of humor. The leaves are plucked off the twigs, chewed, and stored against one or the other cheek. The mixture of saliva and extract from the leaves is swallowed. As new leaves are taken, the cheek bulges out. The euphoric effects appear shortly after the chewing begins, suggesting absorption through the oral mucosa. The session and the friendly atmosphere last about 2 h. These are followed by a mood of zeal that lasts another 2 h, and during this interval current subjects and problems are discussed. This in turn is supplanted by a serious mood and may be accompanied by irritability.

IN THE RURAL AREAS

In the country the chewing of khat starts earlier, that is, soon after breakfast, and continues throughout the day. Even the children chew khat. The stimulant effect lightens the daily tasks. In such regions, food, education, medicine, and recreation are lacking. The anorexiant effect of khat decreases the need for the midday meal or even the evening meal and assumes a major role in day-to-day living.

Behavioral Changes

Khat-engendered abnormal behavior develops in only a minority of the users but is socially acceptable. It is at least in part dose-related and may include: [1] withdrawal in "psychotic seclusion" and solitary wandering in the bush or by the sea; [2] garrulous speech using impressive words that do not fit the context, distinguishable from schizophrenia only in that it is transient and the speaker can be made aware of its incongruity; and [3] aggressive verbal outbursts.

Religion and Khat

The Moslem faith of the Yemenites forbids intoxicants other than those prescribed for medical reasons. However, the Koran mentions only [alcohol](#), perhaps because use of khat did not become widespread until after occupation by the Ottoman Turks in the sixteenth century*.

Other countries in the Middle East impose heavy penalties equivalent to those for [opium](#) or [cannabis](#) on anyone who carries or uses khat. This is not so in Yemen, where even religious leaders may practice the habit. This may be because, in contrast to opium and cannabis, khat produces milder antisocial behavior and is more akin to amphetamine- or caffeine-type substances.

Khat as a Political Issue

In 1957 a legal ban on khat, instigated by the Adeni Political Party and a few educated politicians, was imposed in Aden in South Yemen (then the British Aden Colony). Villages bordering Aden then received thousands of visiting khat chewers daily and prospered. Meanwhile, demonstrators in favor of khat filled the streets of Aden. These demonstrations and processions were nonviolent but abusive -and reflected the agitated depression that follows the withdrawal of khat. The Adeni Party collapsed over the khat issue, and the ban was lifted in 1958. However, khat continued as a major factor in the political campaigns of Aden. Such comments as "he is anti-khat" or "pro-khat" were frequent, especially before the elections.

By September 1972 political tension had developed between North and South Yemen. The North Yemen Government then proposed a ban on khat with the hope of alleviating some of the tension in North Yemen. The radio and government media put on a massive anti-khat campaign. Nevertheless, war broke out in September 1972 but lasted only 1 week. Shortly thereafter, the anti-khat campaign died.

Clinical Implications

Fluckiger and Geroc first found an [alkaloid](#) in khat in 1887 and called it katin. Subsequent research identified five fractions, namely cathine, cathinine, cathidine, edulin, and ephedrine. Of these, cathine proved to be (+) norpseudoephedrine, and it may be the most important ingredient (1). Subsequent studies of fresh leaves have isolated another alkaloid similar to (+) norpseudoephedrine but with different chemical stability. This might be a precursor of cathine. This may explain the chewers' preference for the fresh leaf (1). It is not clear, however, if all of the active ingredients in khat have been identified or if the pharmacology of those recognized to date has

definitive application to man.

Khat also contains tannin (7% to 14% by weight in dried leaves), vitamin C (150 mg/100 g of fresh leaves), and minute amounts of thiamine, niacin, riboflavin, and carotene, as well as iron and amino acids.

Halbach (1), in his review of the pharmacology and clinical actions of khat, concluded that its effects reflected largely its sympathomimetic ingredients. He postulated that the spectrum of its actions lay between the amphetamines and [caffeine](#). This premise was based on the predominant component identified to date, that is, (+) norpseudoephedrine rather than knowledge of all of its ingredients and their pharmacologic manifestations. Also, the data cited covered a span of 2 decades and antedated the more recent identification of alpha- and beta-adrenergic receptors, blockers, and modifiers. In the absence of more definitive information, one can only cite clinical observations*† and continue with hypotheses concerning clinical disorders in the users of khat.

THE SETTING FOR A PSYCHOTROPIC AGENT

In the rural areas of North Yemen, perinatal, infant, and childhood death rates still equal or exceed 50%. Also, the life expectancy of adults is curtailed to an unknown degree. Chronic illnesses, infections, and malnutrition remain the rule rather than the exception. The revolution in 1962 was followed by 8 years of civil war, which may have at times further increased human suffering. These many burdens, the death of relatives, drought, and famine have provided an understandable setting for a euphoriant such as khat.

MENTAL AND EMOTIONAL EFFECTS

Schizophrenic behavior has been observed by one of us during and after use of khat. This disappears within several days. It may be more frequent in those with latent psychoses. Similar reactions and schizophrenia and paranoia follow chronic ingestion of amphetamines (1, 2).

The occurrence of possible long-term schizophrenic reactions to khat is difficult to assess. Health facilities are lacking, persons with psychosis are usually locked in their homes by their families, and medical opinion is only rarely sought.

Known schizophrenic patients are frequent chewers of khat. It would appear that they have more difficulty in controlling or stopping the use of khat. However, those who do quit seem to make better social adjustments and are more amenable to treatment and rehabilitation. In others, the use of khat probably aggravates the intensity of the schizophrenic problem.

Khat may interact with [drugs](#) used in therapy of other diseases and produce emotional and mental disorders; for example, when combined with niridazole-a [drug](#) used in treating schistosomiasis-severe anxiety reactions, insomnia, and even psychoses can develop. Such reactions are less frequent with niridazole alone.

Khat interferes with sleep. Most khat chewers can estimate the quantity they need to produce the desired effects without insomnia. The beginners always chew lesser quantities. Tolerance then develops, and most chronic chewers cease to experience the initial insomniac effect.

Some use khat, but only infrequently, for its insomniaproducing effect. This avoids the tolerance and enables them to work an additional hour or two at night.

Students are frequent users of khat. With improvement in education, the new generation of students favors the ban on khat even though they continue to chew the leaves before examinations. During the last campaign against khat, some writers used it to help them prepare anti-khat articles.

The side effects of khat, especially the insomnia, have led to a search for counteracting agents. Perhaps this is why the consumption of tranquilizers and alcohol has increased. So far, the end-result seems to be a decrease in side effects and not to find new effects.

WITHDRAWAL FROM KHAT

There are no physical symptoms on withdrawal of the type experienced with alcohol, [morphine](#), or the barbiturates. Abandoning the habit, however, is followed by depression. This is demonstrated by lack of interest, loss of

energy, and increased desire to sleep. The severity of depression varies and may lead to agitation and sometimes sleep disturbances. Generally, the overall effect on health is beneficial, and the former users tend to sleep better and longer. They are less prone to constipation, and they smoke less. If they drank alcohol, they now drink less, and their appetite increases.

DENTAL AND ORAL HEALTH

Dental cavities are rare among users of khat in Yemen, but this may be attributable to the low consumption of sweets, fluoride in the water, and the use of a primitive toothbrush carried on the person, rather than to khat.

Stomatitis is common among those who begin to use khat and persists with chronic use, producing local irritation and secondary infection. In both instances, the concomitant smoking of tobacco may contribute to the stomatitis. Furthermore, such stomatitis in the rural areas may be the result of vitamin deficiency.

GASTROINTESTINAL AND URINARY TRACTS

Gastritis is common among users of khat (1). It responds readily to antacids. In the few instances in which X-ray films were available and revealed ulceration, gastric ulcers exceeded those in the duodenum in frequency. An antispasmodic action of khat on the fundus and pylorus could account for the higher incidence of gastritis and gastric ulcers, but this requires documentation.

Some patients with X-ray-proven ulcers reported that khat decreased ulcer pain. Also, the frequent intake of fluids probably provided some relief. Irrespective of active ingredients in the leaves, the chewing of khat and the resultant secretion of saliva may decrease the acidity of the gastric contents.

Constipation is frequent in both North and South Yemen. It is often accompanied by hemorrhoids. It may be that khat is partially responsible for the constipation, perhaps because its tannin content has an astringent effect on the bowel (1). Irrespective of the cause, it is of interest that during the ban on khat imposed in 1957 in Aden, the sale of laxatives decreased by 90% (1). The constipation of users of khat appears to be relatively resistant

to ordinary laxatives administered in usual dosage. On the other hand, paralytic ileus has also been attributed to the ingestion of khat.

One of us has observed urinary retention that developed during use of khat by a dentist in his twenties. Hence, it is possible that khat produces hypotonia of the smooth muscle of the urinary bladder.

Cirrhosis of the liver is frequent in the natives of the two Yemens, but it is not clear that khat plays a role in its high frequency. It has been suggested that the tannin present in khat has a hepatotoxic effect (1). However, in Yemen other factors could account for the cirrhosis, including malnutrition, schistosomiasis, infectious hepatitis, and enteric diseases.

CARDIOVASCULAR SYSTEM

During a khat session, the extremities of the user feel cold and he complains of drafts, and this may be followed by palpitations and [tachycardia](#). Khat also can raise the blood pressure (1). Such increases are generally not marked, and severe [hypertension](#) is not observed. These could represent vasoconstrictor and cardiac effects due to sympathomimetic compounds in khat, but the participants also ingest caffeine and smoke tobacco. [Monoamine oxidase inhibitors](#) are not to be used with khat for the usual reasons, that is, hypertensive effects. Coronary artery disease seems to be less common in Yemen, but definitive statistics are lacking.

RESPIRATORY SYSTEM

Some users of khat report relief from asthmatics who use khat also state that theophylline taken in therapy of an attack produces tremors and palpitations, effects known to occur with ephedrine. It may be that (+) norpseudoephedrine in khat is responsible for the synergism.

ENDOCRINE ASPECTS

A staring look, or pseudoexophthalmus, is characteristic of users of khat, especially after a substantial quantity of khat has been chewed. In addition to the stare, the conjunctivae become congested and the pupils dilate (1). The chemosis is aggravated by the hot, humid, and smoke-filled

atmosphere of the khat chamber.

The overall effect of khat on diabetic patients is deleterious. The anorectic effect of khat leads to omission of the evening meal. also, the user is less likely to follow dietary advice, and the consumption of sweetened beverages with khat aggravates the hyperglycemia.

Nursing mothers in North Yemen frequently complain of poor lactation. This could be related to the use of khat. Levodopa, the precursor of [dopamine](#) and norepinephrine, is an inhibitor of prolactin secretion (3). This raises the possibility that (+)norpseudoephedrine acts on the same receptor sites. This, with the rarity of bottle-feeding and the anorectic effect of khat on the mother, interferes with the nutrition of infants.

Khat chewers claim varying effects on their sex life, but most report delay in the ejaculation phase. This is used to treat premature ejaculation. Some say that khat is an aphrodisiac. The overall potency, however, is lowered. Many khat chewers report a spontaneous secretion of spermatic fluid. This process is referred to locally as "sollass."

Khat may enhance sexual activity in the depressed person. On the other hand, khat may exacerbate or accentuate anxiety states. Many variables affect sexual behavior, and this probably accounts for at least part of the varying and conflicting effects of khat. Finally, it may or may not be true that the different varieties of khat affect sexual behavior differently.

ACKNOWLEDGMENTS: Received 1 December 1975; revision accepted 19 March 1976.

References

1. HALBACH H: Medical aspects of the chewing of khat leaves. Bull WHO 47:12-19, 1972
2. BEESON PB, McDERMOTT W (editors): Cecil-Loeb Textbook of Medicine, 13th ed. Philadelphia, W. B. Saunders Co., 1971, pp. 107-149
3. DICKEY R, STONE S: Drugs that affect the breast and lactation. Clin

Obstet Gynecol 18:95-111, 1975

Read more: <http://www.drugs-forum.com/forum/showthread.php?t=55317#ixzz2cHgiZITC>