

## The Green Leaf: Khat

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**Abstract:** The leaves of the plant khat (*Catha edulis*) are commonly chewed in Arabian Peninsula and certain countries of the East Africa. The leaves of which are chewed for largely cultural and stimulant reasons. In this paper, a review of the scientific literatures on the relationship between khat use and psychosis and potentiality of dependence. To understand khat use, it is needed to discuss khat phenomenon through khat sitting to give a more real impression of the khat sitting at the level of the place, participants and social activity. Scientific papers quoted in this paper were identified by Pub Med, cross referencing missing references from the bibliographies of relevant papers.

**Key words:** Khat • Qat • Cathinone • Psychosis • Addiction

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### INTRODUCTION

The use of drugs or natural psychoactive substances seems to be an almost universal phenomenon and highly volatile community concern. Of approximately 4,000 plant-derived psychoactive substances about 60 have been in constant use in different forms, somewhere in the world, throughout history (e.g. coca, tea, coffee, tobacco, cannabis, opium, khat and alcohol). Khat (qat, kat) is a major cultural phenomenon in Yemen. People who are interested in Yemeni society will find out that khat is a part of their life and khat has become a social phenomenon penetrating deeply into all facets of Yemeni lives and, therefore, they may modify the general view that khat use is a kind of addiction. The general attitude to consider khat use as a drug addiction, like those widespread substances in the West, reflects something of an exaggeration stem from the ignorance about the nature of real social life in Yemen. Therefore, khat users deem that khat confirms their Yemeni identity, social status and source of pride, boast and sense of self-esteem. Chewing khat is both a social and a culture based activity. It is said to enhance social interaction, playing a role in ceremonies such as weddings births, marriages, funerals.

The aim of the present paper is to provide a literature review on pharmacology, prevalence, physical and mental and addictive potential. The significance of khat sittings can not be realized or understood in terms of physical, psychological or psychopharmacological effects unless knowing the social, cultural and ritual tradition that urge the individuals participate in khat sittings.

**Khat History:** Khat (qat, kat) is a major cultural phenomenon in Yemen. Khat (Qat), evergreen shrub of the family Celastraceae [1] was named by botanist Peter Forsskal who died in Yemen in 1763 [2]. He litanies the Arabic name khat to Catha [3]. Khat (from the *Catha edulis* tree) consumption is a common habit in certain countries of East Africa and Yemen [4] and Southern Saudi Arabia [5]. Khat is grown commercially in the mountains of Yemen, Ethiopia, Somalia and Kenya and naturally in Turkestan and Afghanistan, Tanzania Uganda, Zambia, South Africa and Madagascar [6-8]. Also, it is grown in Israel by Jews of Yemeni origin [9]. The origins of the khat plant are obscure and much of what has been surmised about the early history of its use is speculative [1] and the beginning of qat consumption is meager and inconclusive [3]. The historical evidence for the beginning of qat suggested that the practice originated in the southern Red Sea area (Yemen or Ethiopia) prior to the mid-fourteenth century [3]. Rodinson [10] believes that there is evidence to the introduction of the drug into Yemen around 1300 A.D. Schopen's [8] opinion is that the use of stimulant existed in Yemen in the early 13<sup>th</sup> century. Kennedy [1] assessment indicates that use of ...khat... may well have begun in Yemen at least as early as the 12<sup>th</sup> century and spread to Ethiopia at that period. There are a number of legends in both Yemen and Ethiopia about the discovery of khat plant. According to Ethiopian and Yemeni legends, the properties of khat were discovered by Yemeni goatherd who observed the effects of the shrub on his goats. The goat herd trying it himself, he found his

activity and energy increased and he was able to stay all night to pray. Arabic sources indicate that khat was known as early as the beginning of the 11<sup>th</sup> century in Turkestan and Afghanistan [1,8]. The first reference to the plant in Yemeni literature was in the mid-sixteenth century. In that period, scholars from Yemen visited Mecca to request the judgment of the renowned holy man Ibn Hajar Al-Haythami on the religious status of khat. Al-Haythami, after having consulted other scholars found the opinions adversary. Those against khat claimed that it brought confusion, intoxication and sleeplessness, reduced the desire for cohabitation and food and caused dehydration and spermatorrhea. Conversely, those preferable to having khat argued that it had stimulating and pleasurable effects and that by its use they achieved closer communion with God. He concluded that khat should be considered as a doubtful substance, which should if possible be avoided, but he did not rule that it should be made illegal (haram) [3,8,10]. Khat consumption was limited to Sufis and religious men to intensify their mystic experience and also to certain members of privileged classes [1,8,11] wealthy individuals and probably to some farmers who grew it [1]. During the last two decades, due to the development of road networks and the availability of air transport, the habit has spread considerably to Europe and US [12,13].

**Chemistry:** There are more than 40 alkaloids, glycosides, tannins and terpenoids in khat [14]. The major active ingredients in khat leaf were identified as the phenylalkylamine (-)-alpha aminopropiophenone named as cathinone [15,17] and cathin (nor-pseudo-ephedrine) [18]. Cathinone is a psychostimulant; it has the same basic configuration as amphetamine.

In the late 1800s, European investigators isolated first the alkaloid fraction designated as "katin" whereas the first crystallized salt of khat was prepared by Beitter [19]. Stockman [20] described two fractions of an alkaloid nature, cathinine and cathidine. Friebel and Brilla [21] succeeded in isolating another alkaloid from fresh khat which was more potent than (+)-norpseudoephedrine in stimulating the motor activity of mice [22]. This new alkaloid was not detected in the dried khat; it may be the precursor of (+)-norpseudoephedrine [23]. In addition to cathine, four major alkaloid fractions; cathinine, cathidine, eduline and ephedrine were also isolated [24,25]. Other minor components such as amino acids (asparaginic acid, serine, glutamine acid, lysine, leonine, isoleucine, tyrosine, tryptophan, arginine, [26], tannins ([26], cathedulins [27], vitamins (ascorbic acid, niacin, thiamine, riboflavin, B-carotene) and minerals (calcium, magnesium)

have also been separated and identified. The total amine content varied between 0.2% and 9.6% and the cathinone content between 0.9% and 3.3% and the highest concentrations were detected in samples from Kenya and Ethiopia, the lowest in those from (North) Yemen and Madagascar ([28].

**Pharmacokinetics:** In its natural form, fresh khat leaves are chewed because the drug is perishable. Young leaves from the tip of the branch are more potent. While the leaves are chewed, the juices are swallowed and the residue is rejected. Cathinone is rapidly absorbed after oral administration. When khat is chewed, absorption of cathinone is slow and peak plasma levels of cathinone are obtained 1.5-3.5 hrs after the onset of chewing khat [29-31].

Cathinone is unstable and decomposes into (+)-norpseudoephedrine and norephedrine within few days of peaking or if the khat leaf is dried. Both excreted in unchangeable form within 24 hours [31].

**Mechanisms of Action:** Similarly to amphetamine, the constituents of khat have been shown to exert their effects mainly through two main neurochemical pathways: dopamine and noradrenaline. Besides, like amphetamine, cathinone may release serotonin in the central nervous system. Both cathinone and amphetamine increase the activity of the dopaminergic and noradrenergic pathways [22]. The potency of cathinone to release dopamine in the striatum and nucleus accumbens, is similar to amphetamine (low micromolar range [32-34]. Cathinone has more rapid and intense action than cathine, because of its higher lipid solubility [35].

**Legal Aspects of Use:** The first efforts to review the regulation of khat go back to 1933, by the Advisory Committee on the Traffic in Opium and Other Dangerous Drugs of the League of Nations. Attempts to prohibit the cultivation and trade of khat by French, British and Italian colonial administrations, have been undertaken in East Africa (Kenya Djibouti Somaliland) and South Yemen in the first half of the last century. Other attempts to ban khat have been undertaken in Aden in 1957 [4] and in Somalia in 1956 and 1983 [36]. In Yemen (1972) the prime minister initiated a full-scale propaganda campaign against qat. This campaign failed completely and some even suggest this was the cause of his downfall shortly after. Prior to the unification, in South Yemen, another attempt to reduce qat use was the implementation of a law that only allowed qat use on Thursdays. However, since unification of the two Yemens, all restrictions of qat have been lifted and qat chewing is a near-daily activity [13].

After having been implemented, WHO and other UN organizations became also active UNODC [37]. In 1973 the WHO expert committee listed khat as a 'dependence producing drug' and initiated basic research on khat [16]. The WHO advisory group found that the pharmacological effects of khat chewing were analogous to those of amphetamine [17] and that khat abuse was similar to amphetamine addiction. An international conference was held in 1983, but it was inconclusive. In 1985 cathine and cathinone, the two main active ingredients of khat, were assessed as meeting the criteria for control under the Convention of Psychotropic Substances and recommended for scheduling [38].

In 2002 the WHO Expert Committee undertook a pre-review of khat and concluded that there was sufficient information to justify a critical review on whether the plant itself needed to be placed under international control [39]. The WHO concluded in 2006 that scheduling was not required: "The Committee reviewed the data on khat and determined that the potential for abuse and dependence is low [40]. The level of abuse and threat to public health is not significant enough to warrant international control. Therefore, the Committee did not recommend the scheduling of khat. The Committee recognized that social and some health problems result from the excessive use of khat and suggested that national educational campaigns should be adopted to discourage use that may lead to these adverse consequences" [40]. The conclusion of the WHO Expert Committee blocked the option of bringing khat under UN control, clearly to the frustration of the International Narcotics Control Board (INCB)[41], and a strong recommendation by the INCB that khat should be brought under international control.

The Advisory Council on the Misuse of Drugs (ACMD) [42] believes that it would be inappropriate to classify khat under the Misuse of Drugs Act 1971 and that the evidence of harm resulting from khat use is not sufficient to recommend its control.

In UK, khat trade, possession and use are not illegal. Although cathinone and cathine, the major active constituents, are scheduled as class C drugs, khat itself is not a prohibited substance; khat remains a nonscheduled substance in the United Kingdom [42].

In some Muslim countries, where alcohol is banned, khat is commonly used in social situations, though it is often condemned on religious and cultural grounds. Campaign of Islamic scholars, who considered khat to be "haram" and forbidden by the Holy Koran [43], lead to its ban in some Islamic countries, especially Saudi Arabia.

**The Prevalence of Khat Use:** Khat chewing is traditionally a habit in Yemen and some African countries such as Ethiopia, Somalia and Kenya, as well as among emigrants from these countries in different parts of the world. In Africa, on the other hand, a different pattern of diffusion has emerged. Khat is moving rapidly across Kenya and into areas such as Uganda and even into Rwanda and Burundi [13]. It has been estimated that currently ten million people world-wide use khat on a daily basis [44]. In a large-scale survey in three in different zones including three urban and three rural areas, covering 800 Yemeni adults, Numan [45] found a lifetime khat use of 82% of men and 43% of women. There was a high incidence of khat use in the entire Yemeni population (67.9%); current every day use of khat was found in 23.6% of the total sample (men 31.8%, women 8.9%) [45]. In a previous, related study by Manciola and Parrinello [46] (who served in Yemen between 1955 to 1967) have estimated that 90.26% of males and 58.55% of females over the age 12 chewed khat, but only 69.26% of the males and 34.91% of the females users could be classified as habitual chewers in Yemen. Kennedy [1] in an extensive study carried out in 1974-76 has estimated that approximately 50-60% of women and 80-85% of men chewed qat more than once a week.

In Ethiopia, Alem *et al.* [47] found that more men habitually chewed than women: 75% of men chewed khat regularly compared with only 7-10% of women. Belew [48] current khat chewing was reported for 40.4% of men, 18.2% of women while daily use was found in 5.7% of the total sample.

In Somalia, Elmi [14] reported that in the north Somalia, 64% of adult males from the general population regularly consume khat compared to 21% in the south. Odenwald [49] reported that 31% of Somali men were current khat users and as many as 60% of ex-combatants.

In Uganda, a cross-sectional survey carried out in three towns in southwestern Uganda, 32% of participants had a lifetime experience of khat chewing and 20% were current chewers [50].

In the UK, the chewing of khat is largely confined to ethnic communities accustomed to its use, such as the Somali community [51]. Bhui [52] found among Somali refugees (180) in the UK, This study showed a higher prevalence of khat use in men (63%) than in women (17%). A study carried out a survey of 207 Somalis living in London: 79% of men and 76% of women had used khat and 6% were chewing on a daily basis; the average frequency of use was 3 days per week [53,54].

In the last decades, the khat 'habit' has spread to other African countries and to Europe, to Australia and to the United States; where it is practiced by immigrant groups [55]. Immigrants in Israel brought the khat chewing practice with them in the 1950s [56]. Its use has been described in Rome at the end of the 1980s [57]. Khat use has been reported in New York City among Somali, Ethiopian and Yemeni immigrants [58]. However, due to migration and advances in transport technologies it is increasingly widespread [13] and khat use is seen amongst immigrants from Yemen, Somalia and Ethiopia [58,59]. About 7 tones of khat pass through Heathrow airport each week and smaller amounts are imported through other airports [60]. Heathrow airport serves as a hub for the re-export of khat to other European countries [61]. According to a recent, overall World Bank Report [62], 72.4% of the men reportedly chew qat, compared to 33.6% of the women.

#### General Aspects of Khat Use

**Khat's Physical Effects:** The effects of khat were reviewed by a WHO report in 1980. Several authors have addressed the human aspects of khat use with particular reference to the issue of physical effects [1,4,17,23,46,62].

CVS. Tachycardia, extrasystoles, elevated blood pressure, transient facial and conjunctival congestion, headaches, hyperthermia [17,23]. Luqman and Danowski [4] point out that hypertension is "not observed". Manciola and Parrinello [46] stated that: "cases of angina or disorders of the peripheral circulation have never been detected". On the other hand, short term effects in the cardiovascular system do occur [4,46]. However, Halbach [23] reports that myocardial insufficiency and infarct have been described after the intake of khat, particularly in older and predisposed individuals. Khat chewing may be as a risk factor for occurrence of myocardial infarction in persons who are susceptible to the disease [63].

A study carried out in Yemen, which included 157 patients admitted to an intensive care unit with acute myocardial infarction, found that in 59% of khat chewers the period of presentation was during the afternoon, i.e. during the khat-effective period, compared to 36% among the controls [64].

Respiratory system. Increased respiration (through central stimulation, bronchodilatation and counter-regulation of hyperthermia) and pulmonary edema after the intake of khat, particularly in older and predisposed individuals [23] However, the proportion of smoking is

increasing during khat chewing than at other times, this associated with passive smoking. Some of chewers' use Hubbel-bubble (water pipe) and this might increase the chance of spreading of tuberculosis.

Gastrointestinal system. Gastrointestinal tract problems include; anorexia, constipation [4]. Constipation is frequent and is attributed tannin, a constituent of khat [4,23], where the laxatives sales are decreased when khat prohibited (1957) in Aden by 90% [4]. Tannin has also been implicated in incidence of periodontal disease, stomatitis, oesophagitis, gastritis and cirrhosis encountered in khat users [17,21]. Khat chewing has also been reported to be a risk factor for duodenal ulcer [65]. The tannins found in khat leaves have been shown to thicken the mucosa of the oropharynx and esophagus and also may be carcinogenic [66]. Oral cancers in certain regions of Saudi Arabia have been found to occur mainly among patients who had been chronic khat chewers [5]. Esophageal and gastric carcinoma have been attributed to khat chewing and water-pipe smoking in men and women in Yemen [66]. Khat-chewing men living in the area of the horn of Africa were studied and were found to have an increased risk of oral carcinoma, especially when accompanied by alcohol and tobacco consumption [67]. Two case reports of *Fasciola hepatica* infection have been attributed to contaminated khat chewing, that usually occurs from ingesting contaminated watercress, water, or liver [68,69]. Daily khat chewing has been found to be associated with a high prevalence of *Helicobacter pylori* [65]. One report has noted an exceptionally high rate of periodontal disease in Yemeni males who chewed khat [70]. A more recent report states that khat use is associated with some temporomandibular joint dysfunction and keratosis of the buccal mucosa [71].

Genitourinary system. Inhibition of micturition, increased diuresis (from intake of large quantities of fluids together with khat). Khat consumption sometimes causes spermatorrhoea, increases libido and by chronic use may lead to impotence [1,21,72,73]. Although libido initially may be increased, a loss of sexual drive, spermatorrhea and subsequent impotence soon follow. However, 72% of female users in one survey reported increased sexual desire, followed by an improvement in sexual performance in 78% of the respondents [74].

Endocrine. The effect of khat chewing in diabetic patients is unclear. Le Bras and Fretllère also reported no changes of blood sugar. Said [75] stated hyperglycaemia in rats after subcutaneous khat extract had injected.

Poor lactation may result from increased dopamine production [4,76]. A clinical study was conducted on diabetic patients in Yemen over 20 years ago [77]. It showed that when khat-extract was mixed with the glucose given for the glucose tolerance test, there was a significant lowering of blood glucose level in comparison to the non-khat (control) arm of the experiment. This effect was attributed to delayed glucose absorption from the intestine by the action of khat tannins and inorganic ions, particularly magnesium, which produces a substantial inhibitory action upon gastrointestinal function. It seems that khat-induced delay of gastric emptying may also play a role in reducing postprandial hyperglycaemia in patients with type 2 diabetes mellitus [78]. By contrast, interviews of 7500 khat users in Somalia [14] did not reveal any beneficial effect of khat in diabetic patients.

**CNS.** The subjective effects of khat include euphoria, intellectual efficiency and alertness in most subjects, while others report only dysphoria after khat chewing. The expression of these effects appears to be affected by environmental factors [79]. Insomnia is the most frequently reported effect of khat chew among khat users. With regard to relation between CNS problems and khat use, Halbach [23] reports that migraine and cerebral edema after the intake of khat, particularly in older and predisposed individuals.

**Eye.** Le Bras and Fretllère [80] reported that the intraocular pressure is decreased which resembled caused by amphetamine. Khat chewing causes mydriasis [81] and conjunctival congestion [23]. A report of 2 cases has described bilateral optic atrophy in 2 khat users who consumed amounts larger than usual. This may have been an idiosyncratic reaction to khat [82].

**Newborns.** In a study of 65, khat addicts compared with 50 non khat addicted subjects, statistically studies of full-term human newborns have shown that khat use by the mother is associated with lower birth weight [83], but no differences in the rates of stillborns or congenital malformations were observed [84].

The above-mentioned data fail to differentiate between moderate and excessive users and the analysis of co-morbidities present in users is scanty (history of hypertension, bronchitis, peptic ulcer or dental caries or carcinoma). In some cases not khat, but co-occurrence of other, factors (cigarette, hubbel-bubble (water pipe), sugary drinks) might serve as likely risk factors. In a few words, it is difficult to draw clear conclusions as to the exact causal relationship and the particular impact of the substance itself.

**Psychiatric Aspects of Khat Use:** Among the most controversially discussed khat are khat-induced psychotic phenomena and khat potentiality for dependence.

Khat chewers report increased levels of energy, alertness, sensations of elation, self-esteem, enhanced imaginative ability and capacity to associate ideas when chewing.

In general terms, there were sporadic case reports on a possible association between khat use and the occurrence of mental disorders, such as hypomania, manic psychosis, paranoid psychosis, brief episodes of psychosis, psychotic reaction, schizophreniform psychosis, aggressive behaviour or psychoses and homicide and suicide among users [38,49,51, 72,76, 85-91].

Also a number of studies report different changes in mood and behaviour [3,4,8,17,23,39,45,73,79, 92-94].

A quantitative studies were done, and its outcome reported are variable [14,45,47, 49, 56, 87,94,95].

The ACDM states that available evidence suggests that khat use is not a causal factor for the development of psychosis [42].

**Potentiality of Dependence:** There were contradictory reports on a possible association between khat use and the occurrence of and potential tolerance capacity, psychic and physical dependence [1,4,21,76,85,96-101].

- Eddy [96] reported traditional consumption by chewing characterized by moderate but often persistent, psychic dependence, *lack of physical dependence* and *absence of tolerance*, in contrast to the marked tolerance observed with amphetamine abuse [1,98].
- WHO [17] reported no *tolerance* to khat chewing is reported, this could be due to the physical limits on the amount that can be chewed rather than to an inherent property.
- Nencini [99] reported that a certain degree of tolerance may develop due to sympathetic effect of khat.
- Kalix [34] reported that cathinone induces compulsive khat consumption. Cathinone is the dependence-producing constituent of khat leaves. It is a reinforcer and maintains very high rates of responding in animal experiments [22]. Kalix [101] stated that: "since khat use may be compulsive, the habit has been as a phenomenon of drug addiction"

and he pointed that the question arises as to what extent the khat habit must be seen as a phenomenon of drug addiction.

- In contrast, no signs of khat dependence were found in a survey held in Kenya among outpatients attending rural and urban health centres ([102].
- Due to its self-limiting way of administration, khat was not classified as an inevitably dependence producing drug [23,103].

Also, there are conflicting opinions regarding the existence of a withdrawal syndrome and tolerance [1, 3,4,17,23,99,100,104].

- Tolerance to khat practically does not occur; if it does, the doses are increased only very slowly. This may be due to the intrinsic properties of khat or to the physical limits on the amount that can be consumed [104].
- A certain degree of tolerance seems to develop to the increases in blood pressure, heart rate, respiratory rate and body temperature and to the insomnia [4,99].
- Withdrawal symptoms after prolonged use are mild and may consist of lethargy, mild depression, slight trembling and recurrent bad dreams but these symptoms are mild and resolve in short time [105].
- Luqman and Danwiski [4] and Giannini [100] reported no physical symptoms on withdrawal from khat.
- Kennedy [1] reported 'a mild form of physiological dependence dose result from extremely heavy use' and they add... "the percentage of people using (Qat) at the very high level is small, true physiological dependence appears to be relatively unimportant in overall Yemen picture".

### Khat Sitting in Yemen

**Ceremonial and Hospitality Aspects:** Khat use represents the heart of the social life in Yemen; therefore, it is characteristically not a solitary but a group activity (groups of 2-20, occasionally over 150). A khat "party" can be organized for several reasons.

- The gathering can be organized on a specific occasion (marriage, child-birth, funeral
- The "public" or daily khat sitting necessitates no special occasion. The selection of attendants is based preferentially on family relationship-and social

status-related factors in the case of former whereas the criteria for attendance are not so strict in the latter variety.

- The third kind is the "private" khat sitting where the personal factor is predominant.

The gathering, besides the strictly social function gives occasion also for demonstrating wealth and social status. Therefore, the chewers are well-dressed in traditional clothes, the males wearing Gambia (curved knife-dagger-with a rhino horn shaped head). The sittings are organized separately for men and women. The males' sittings (*makil*) usually starts after having lunch i.e. around 2-3 p.m. whereas the females' sitting (*tafrot*) between 4-5 p.m. and the entire sitting lasts 4-5 hours. The use of khat is scheduled differently for the rural working class, where the regular use takes place mostly in the morning. The timing is different also during the Holy Ramadan (fasting month) when all chewers start having khat sitting after breaking fast at evening.

The traditional way to sit when chewing khat is a chewer is lying on the left arm with the body reclining on and right knee raised and the other leg outstretched or bent. Before chewing it, chewers wash the khat, but some others only clean the dust from the leaves by using thumb and index fingers, while the old individuals who have lost their teeth, grinding the khat and having it by spoonful.

The chewer prefers to pick the tender leaves and put them in the left side of the mouth between the teeth and the cheek, starting to chew and store it until small bulk can be visible. Khat leaves not swallowed only its juice. Always drinking water or soft drink to reduce the dryness and thirst from one time to another one.

The proportion of smoking is increasing during khat chewing. Some of chewers' use Hubbel-bubble (water pipe), others smoke non-nicotine containing leaves, only during khat chewing.

At some sittings, there may be a singer who plays the lute, sings and may be associated with traditional dance, in private, in weddings. At the final hour, the chewer contemplates and thinks deeply about him/ her self and surrounding, the chewer immediately gets out the khat from the mouth by spitting.

Generally, in a single sitting the chewers consumed 50-150 grams of picked khat leaves. A minority chewed over 150 grams. In Yemen, the common route is chewing. The chewer begins to pick up the soft young leaves (most favored), mainly because they are more potent and

tendered to chew thoroughly one by one and put them in his mouth between the cheek and the molar and start to masticate. The juice is only swallowed and the cheek becomes increasingly full with leaves, which are stored as bolus. Nevertheless, the modality of khat chewing in East Africa (Somalia and Ethiopia) may chew or boil the khat (Abyssinian tea) with water or milk and drink it. In Yemen, the consumed khat is spat after prolonged chewing, whereas in Somalia and Ethiopia the bolus is swallowed.

**Architectural Aspects of the Sitting Room:** The sitting room counts as the prominent site representing the comfortable part of the Yemeni house and reflecting its social status in the society and its quality depending on the owner's wealth.

The khat sitting is held in a room, which is called Al-diwan (beautiful pavilion or reception room) or al-mafraj (in Arabic meaning 'to vent and remove grief and anxiety, hence mafraj means place or room for pleasant gatherings) where khat parties are held and chewers are meeting with one another. The participants' seat in the customary fashion is suitable for khat sitting. For Sana'a lies at over 2000 meters and often cold. Mafraj or Diwan is preferable to be located in the southern east or the southern west of the house for the purpose of that becomes warm in winter season or calm in summer season.

The room is always located in the first floor, in the opposite site of the garden to enable the sitters watching the streamlined water of the fountain that creating kind feeling. The room ( called Al-Mandhar) can be located in the upper floor (roof of the house) allowing the chewers to extend their sight to further view, watching the charming landscape such as the farms, the valleys and the high mountains. The room well-furnished. The floor of the room is covered with rugs. The walls of the room are lined with cotton or spongy mattresses (covered with colorful brocade) laid on the floor and along the back are put heavy bolster which serves as back-rest. Small pillows topped with cushions are placed in interval along the mattresses to divide them into individual seating place.

In the middle of the khat sitting room a large brass placed. On this stand several Hubble-bubbles (*Madaa*; tobacco water pipes) with a long pipe ended with private wood for smoking. The ashtrays, spittoon, cups, water thermos and pottery jugs and brass incense burners can be seen on small table before the chewers. Also, coffee, coca, tea and water (sometimes water is mixed with incense) are served during khat consumption.

The walls are decorated with plaster mouldings in curvilinear design. On the walls, there are landscape pictures and as it is known, the beautiful ornamental fanlights (called *kamariah*) are over the glass windows. Ornamental shelves hold the various utensils used for khat sitting.

The door and windows are closed, where heat enhances khat effect, a small window are opened sometimes for ventilation. On occasions, such as marriage, funeral, delivery or circumcisions; all rooms of the house are crowded with people, thus all rooms can be deemed as khat sitting rooms. These preparations for khat sitting create the good feelings, pleasant conversation with a consequent improvement in socialization.

Currently, as fashionable mode, the wedding parties and condolence ceremonies are held at big halls rented where the capacity of these halls can be for hundreds of participants.

Chewing khat is not only limited at homes, but you can find khat sittings at work offices, workshops; shops, public sitting place (locandas) and on walk sides.

**Subjective and Society Reasons for Khat Use:** Although khat chewing may obviously have attractive psychomotor-and rewarding effects such as euphoria, enhanced self-confidence and self-esteem, feeling of calm, peace and friendliness towards strangers, heightened sense of awareness, increased attention and concentration, increased energy, reduction of depression and physical fatigue the primary reasons for its regular use in Yemeni society are entirely different and this difference can be extended also to the majority of Arabian countries.

Khat sitting has a social function [3]. Khat creates fraternal feelings and strong friendship when all barriers fall or thaw and constraints disappear among participants. Thereby, the most important aspect of khat sittings is that the people express themselves in spontaneous manner and obtain help and support from the others. Khat sittings are considered as a field for the exchange of information and ideas, also. Participants can meet friends, exchange news, take part in discussions and debates and make plans and decisions.

Khat sittings often have cultural phenomena and functions, where it confirms their Yemeni identity; belonging and social status, Khat sittings create a strong

bond among the participants and strengthen the relations. Some affairs such as political, law, business transactions and hand working skill are carrying out during khat chewing.

In case of invitation, a host also provides khat for the guests, when government officials, tribal or religious experts, elites, notable men and sheikhs (political leaders of tribes) are called to mediate and settle intertribal disputes; it is a rule and essential to let them feel comfortable at khat sitting. For instance, when there are squabbles among tribes such as vengeance, retaliation (revenge) or fight upon land property. During khat sitting, tribe's leader and their men meet face to face to solve the dispute, by attendance and effective help of mediators, with several sittings satisfactory solution to all debatable issues. In this point, in particular, the chewers consume khat not for its psychological effect (euphoria) or to escape from reality to forget the harsh surroundings, but in fact, khat make chewers deep in thought in their problems. Here is the function of khat sitting, that give meaning for gathering of high social significance rather than to provide pleasurable effects to the individual. For instance, some of the complicated problems, about land property and /or there are traffic accidents take many years in Yemeni courts, that sometimes hard to manage. When these people are frustrated, they decide to meet within khat sitting to get solutions. By this way many people reserves a time and money. In simple words here, khat arouses the cognitive function and makes the one to be more connected reality. At this level, it is possible to understand the widespread and acceptance for khat in Yemeni society.

Therefore, khat use is a tradition, not as drug taking, has a deep-rooted social and cultural tradition touched to the daily life events. Whereas the concept in the West is that khat is an illicit substance and Yemenis are massively addicted to khat and portrayed an impression about Yemen as a country of khat addiction. Chelhod [106] emphasizes the greater importance of qat parties in daily life and in the connection with major events of the life cycle, calling them 'the pivot on which the essence of social life turns'. In his opinion unlike the alcohol parties, combine gaiety with decorum and he contrasts their 'warmth and spontaneity' with 'ordinary' (presumably urban or Western) parties, which he sees as 'cold and superficial' occasions where guests are 'aloof and ill-at-ease'.

**Khat and Economy:** A number of local organizations and agencies call for Khat-ban through their symposiums and discussions that khat has a potential adverse effect is diversion of income for purchasing khat, resulting in neglecting the essential needs of the family and family's discord and divorce. By good faith, these organizations and agencies may pay no attention to and overlook that khat plays a major role in the Yemeni economy.

No doubt, the larger areas of cultivating khat, the greater khat consumption among the Adolescents and adults and this may not only affect the individuals health but could also have serious socio-economic consequences in Yemen.

One in every seven working Yemeni are employed in producing and distributing qat, making it the second largest source of employment in the country, exceeding even employment in the public sector\*. Nearly one-third of the agricultural labor force is engaged in qat production\*. Simply, around 75 percent of the population of Yemen lives in the rural areas and participates in the agricultural industry [107]. of which a large part works in the qat industry. Hence, a ban would impoverish hundreds of thousands, perhaps millions, of people [13]. Actually, Khat-ban would create a deep dilemma since the government can not have the final solution to compensate the land-holders of khat and on the other hand, it will increase a huge rate of unemployment.

\*(2004 estimate of the Ministry of Planning and International Cooperation, Socio Economic Development Plan for Poverty Reduction (DPPR)).

In addition to these figures mentioned above, the khat users have no Substitutions can be available or can't find for recreation or entertainment locations such as, play theater, movie theater, sports activities, public libraries, or public gardens and parks to spend and have a good time.

In my view, prevention of Khat use represents a complex problem to educators, public health authorities and law enforcement agencies in yemen, the comprehensive and uprooting solutions of khat dilemma can't be found except once the users and non-users and ruling regime persuasively has real intention and will that khat constitutes a big dilemma in our society.

## **DISCUSSION**

Because dissimilarity of scientific views on khat, it is not easy to declare or judge that khat is the cause of mental problems or in particular psychosisor dependence.

The problem of khat chewing is limited to those predisposed individual [23], or with preexisting mental disorders and originally have psychosis [73] or vulnerable individuals [49]. Bell [108] reported that amphetamines and some of its derivatives have been shown to induce psychotic symptoms in experiments in humans. Angrist *et al.* [109] and Janowsky and Davis [110] also, stated that amphetamines and some of its derivatives have been known to exacerbate psychotic states in psychiatric patients. Because cathinone resembles amphetamine in a chemical structure and affects the central and peripheral nervous system [57,105]. According to this, there is an opinion that khat (cathinone) may contribute to or cause psychosis.

At this point, many authors have been described in several cases studies that khat-induced psychotic states, khat might exacerbate preexisting schizophrenia-spectrum disorders or trigger them, hypomania, manic psychosis, aggressive behaviour or psychoses and suicide among users [49,53,55,56,72,76,85,86,88-92] and homicide including homicide [91]. The descriptions of cases among users in many scientific journal and literatures, that khat-induced psychotic states, hypomania, manic psychosis, aggressive behaviour or psychoses and suicide among users. It is extremely difficult to establish or judge that khat use as a causal agent to psychosis, or aggressive behaviour by the general public [42] or organized crime [111].

- Most published reports on the link between khat use and mental illness are case reports.
- Most of these cases were refugees or immigrants and seeking political asylum.
- Some of them have anti-government movement and believed that, when he returned to his country, he would be jailed or killed.
- Some, drinking beer or alcohol in a large amount, or drug use but others have family psychiatric illness such paranoid or suicide.
- Others are unemployed and socioeconomically handicapped position and culturally isolated state (exile, immigrant etc.). It seems that it is not the chewing of khat per se but rather specific factors are related to psychiatric morbidity or psychosis.

On other hand, psychosis due to khat use are considered by many authors to be rare phenomena [2,17,23,76,85,101]. Again, with regard to relation between

psychosis and khat use, Halbach [23] explained the rarity of khat induced psychosis due to the way in which khat is consumed does not permit the plasma level to raise high enough for toxic psychosis to be produced and most reports of the association are of exacerbation of psychosis in predisposed individual.

- Because there are other factors play such social stress as traumatic events during war in Somalia. A recent review of the existing literature on khat-induced mental health disorders therefore concluded that while some studies suggested a link between khat use and psychiatric morbidity, others indicated that there was no relationship [112]. The review warned against overemphasizing the significance of case reports and that the existing evidence indicated khat use as a co-factor in a range of conditions among a population exposed to severe psychological stress [113]. Warfa [112] noted the lack of evidence supporting causal links between mental illness and khat consumption. Similarly, Numan [45] found no association and association that is found may reflect an interaction with other environmental factors.

There is inconsistent data regarding the outcome reported of qualitative studies [14,45,47,49,56,87,94,95,112]. For instance,

- Unusually high levels of psychiatric morbidity were found, an association between the experience of traumatic events and the starting age for khat use and excessive khat chewing were both related to the onset of psychotic symptoms [49].
- Khat use is not linked to psychological morbidity and any association that is found may reflect an interaction with other environmental factors [45].
- The level of psychological dysfunction was similar in both khat users and non-users [114].
- Mental distress has not been shown to be associated with khat use [47].
- Frequency of khat use was not associated with common psychotic symptoms or with symptoms of anxiety and depression, nor with traumatic events in Somali population who have sought asylum in a non-conflict zone country [112].
- Some adverse psychological problems were associated with khat use [53].

Furthermore, several surveys reporting khat-induced psychoses were aimed at subjects who were taking the substance in Somali, Yemen or an unfamiliar setting such as UK, United States. These specific conditions often in a socioeconomically handicapped position and culturally isolated state (exile, immigrant etc.) or they live in conflict zone. These specific conditions may have contributed to the development of symptoms in several ways [45].

In summary, some qualitative studies or literature do not clarify the confusion on khat khat's effects but attributed to khat chewing gives one the impression that no part of the human body escape dangerous effects of the evil leaves of the cursed tree in term of Gebissa [116] and not realized that khat use in both countries is a culturally accepted practice, even those settled in the West from khat using communities.

**Regarding to Dependence:** There is inconsistent data regarding the dependence potential of khat. At the 34th meeting of the WHO Expert Committee on Drug Dependence (ECDD) it was determined that the potential for khat abuse and dependence was low [115]. In the 2006 report of the committee it was also noted that "The level of abuse and threat to public health is not significant enough to warrant international control. Therefore, the Committee did not recommend the scheduling of khat" [40]. The evidence of harm resulting from khat use is not sufficient to recommend its control [42].

- Kennedy [95] noted over 30 years ago that few of the allegations of health effects made against khat were substantiated in controlled studies in humans. In a wide-coverage Pennings [111] came recently to a similar conclusion: "the abuse potential of khat is low and khat dependence is low. Mild craving and tolerance to khat effects exists but there is no definite withdrawal syndrome. There is no strong and even contradictory, evidence for a causal relation between khat use and psychiatric morbidity".
- Nencini [99] reported that a certain degree of tolerance may develop due to sympathetic effect of khat. But in his study there no mention of any monitoring of a control group of non-chewers in identical condition. These finding cannot therefore be taken as evidence of tolerance. The interesting in his study indicate that no evidence of withdrawal symptoms and khat consumption being non-addictive than addictive.

- Kennedy [1] reported 'a mild form of physiological dependence dose result from extremely heavy use' and they add... 'the percentage of people using (Qat) at the very high level is small, true physiological dependence appears to be relatively unimportant in overall Yemen picture'.

In summary, though there are many studies, high quality studies are still rare and no accord as to the effects of khat use and the development of mental disorders. Briefly, when it comes to the effect of khat chewing on mental health in particular psychosis and dependence, the literatures are not just inconclusive but also contradictory. This means that khat is not a sole cause that could be attributed, but a host of other reason moreover khat chewing.

## CONCLUSION

- Khat culture per se represents the social behavior, not the individual behavior, since hundreds of years. Khat consumption did not take place by chance, but there was historical extent and experiences were known by the society in Yemen. These experiences included heritage of shared values, beliefs, attitudes and practices as the other communities. khat use not for its CNS effects as reward, but the reward of khat sittings the great social interaction and gathering during khat sittings. All these experiences interact to reveal the khat phenomenon as social drug.
- Wire[3] is essentially correct in stressing the social function behind khat sitting. But this dose not means we disregarded the hardship that may cause at family such as income attrition that represents a great obstacle against the family budget for the purchase of khat.
- Regarding to mental effects, no association between khat and psychosis, the problem may limited to those individuals predisposed individual or with preexisting mental disorders. Also, it is extremely difficult to establish or to attribute that khat use causes mental illness in particular psychosis and the insufficient evidence, the relationship between khat use and psychosis will remain indistinct. Other variables should be considered.
- Regarding to dependence, there is no evidence of true tolerance or ture withdrawal symptoms.

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