

# The Scientific Debate on Khat Addiction: Evidence Across Humans, Animals, and Policy Domains

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**Abstract:** Khat's addictive status is highly contested, shaped by conflicting evidence, varied epidemiology, and politically charged regulation. Although its psychoactive alkaloids, cathinone and cathine, are controlled in several jurisdictions, khat itself remains ambiguously regulated, as shown by the UK's 2014 move to classify it as a Class C drug, a decision driven as much by sociopolitical narratives as pharmacology. WHO assessments describe khat as capable of producing mild to moderate psychological dependence, with harms linked more to patterns of use and structural vulnerabilities than alkaloid exposure alone. Human studies show widely differing dependence rates due to cultural factors and inconsistent diagnostic tools, and recent adolescent research warns against equating prevalence with addiction without validated measures. Limited preclinical work finds khat extract can induce conditioned place preference and relapse-like behavior, though weaker than classic stimulants. Evidence-based treatments remain underdeveloped. Progress requires standardized assessments, expanded neurobehavioral studies, and community-grounded interventions.

**Key Words:** khat, addiction, dependence, psychoactive stimulant.

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**K**hat (*Catha edulis*), a plant native to East Africa and the Arabian Peninsula, is traditionally chewed for its stimulant effects, mainly due to cathinone and cathine, which produce mild euphoria, increased alertness, and

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sociability.<sup>1,2</sup> Khat is legal and widely used in Yemen, Somalia, and Ethiopia, but rare elsewhere, with variable regulation, while the components, cathinone and cathine, are scheduled substances in the United States, but the plant itself is not. Whether khat should be considered addictive remains debated, reflecting conflicting policies, limited preclinical evidence, and heterogeneous epidemiological findings. These tensions arise from the interplay of pharmacology, cultural practices, public health concerns, and political pressures.

This commentary does not seek to defend or condemn khat, but to critically appraise the quality and consistency of evidence regarding its dependence potential and associated harms. Divergent interpretations of khat's risk profile reflect a complex interplay between pharmacological evidence, sociocultural practices, public health priorities, and regulatory influences. We argue that the ongoing controversy surrounding khat's addictive status stems not merely from limited evidence, but from inconsistencies across pharmacological findings, contextual factors, and interpretative frameworks. Rather than framing khat as inherently addictive, this commentary proposes that its dependence potential is context-dependent, shaped by how addiction is defined, measured, and interpreted across different settings.

In regulatory terms, khat has occupied an ambiguous position for decades. In the United States, khat is not controlled, but its psychoactive amphetamine-like compounds, cathine and cathinone, are controlled in Schedule IV and Schedule I of the US Controlled Substances Act, respectively.<sup>3</sup> Globally, khat is used by an estimated 10–20 million people, primarily in East Africa and the Arabian Peninsula, where it is deeply embedded in social and cultural practices. Countries such as Ethiopia, Yemen, and Somalia report particularly high prevalence, with use commonly occurring in daily or near-daily social settings. Beyond these regions, khat consumption has extended to diaspora communities in Europe, Australia, and North America, attracting increasing international regulatory attention. While many individuals engage in socially patterned use, heavy and prolonged consumption has been linked to adverse health, psychological, and socioeconomic outcomes, underscoring its relevance as a regionally concentrated public health concern.<sup>1</sup> Similar patterns are seen with other plant-based psychoactives. Coca leaves have traditional uses separate from cocaine but are still legally restricted; tobacco was once culturally accepted before its addictive effects were

known; and caffeine is widely used despite causing mild dependence. These cases show that dependence and regulation are influenced not just by pharmacology, but also by history, culture, and politics.

The World Health Organization (WHO) classifies khat as a drug of abuse causing mild to moderate psychological dependence, but not “seriously addictive.”<sup>4</sup> This does not mean it lacks physiological or neurobehavioral effects. Recent WHO efforts, including the 2024 Eastern Mediterranean program, reflect evolving understanding of khat-related harms, highlighting policy dialog on production and distribution, awareness and stigma reduction, community prevention, and improved recognition of withdrawal and co-occurring mental health conditions in countries like Djibouti, Somalia, and Yemen.<sup>4</sup> Harms often arise from use patterns, social stressors, and structural vulnerabilities rather than alkaloid exposure alone. Chronic khat chewing can cause insomnia, gastrointestinal issues, social and occupational impairment, and mental health stressors.<sup>5</sup>

Human studies of khat dependence vary by measurement, culture, and population. Using the Addiction Research Center Inventory, Widler et al<sup>6</sup> identified significant abuse potential in drug-naïve volunteers. The 5-item Severity of Dependence Scale (SDS)-Khat assesses control, preoccupation, anxiety, and difficulty abstaining (0–15); ~31% of Yemenis in the United Kingdom and 44.2% of Australian immigrants met criteria for probable dependence.<sup>7,8</sup> Using DSM-5 criteria validated for khat, Duresso et al<sup>9</sup> observed that 73% of their sample exhibited khat use disorder. Conversely, studies in East African contexts paint a different picture: in Somali refugees in Nairobi, Widmann et al<sup>5</sup> found that 85% of individuals did not meet criteria for probable dependence, highlighting that many regular users may maintain normal daily functioning despite khat use. Saudi khat users who engaged in chewing sessions lasting more than 6 hours showed higher dependency rates.<sup>10</sup> Taken collectively, these findings highlight the absence of a universally accepted diagnostic framework for khat addiction and suggest that prevalence estimates are shaped as much by cultural and methodological variability as by pharmacological properties.

Recent studies on khat use among Ethiopian adolescents report high prevalence but differ in defining and measuring “addiction.” The Haramaya study reports current khat chewing without a validated dependence tool, limiting conclusions about addiction.<sup>11</sup> In contrast, the Legambo High School study used the 17-item Problematic Khat Use Screening Test (PKUST-17), which assesses impaired control, preoccupation, psychological distress, and social/functional problems. Scores on a Likert scale indicate severity, with a validated cutoff identifying problematic use.<sup>12</sup> Differences in prevalence estimates come not only from research methods, like using validated or nonvalidated tools, but also from social and cultural factors. These include common local chewing habits, stress, and isolation from migration, economic conditions, and varying laws, all of which affect how

people use the substance and whether they meet dependence criteria. Traditional khat sessions are highly structured social events that reinforce communal bonds, facilitate discussion, and provide coping mechanisms for stress. Readers interested in detailed anthropological descriptions of these practices are referred to Kalix and Braenden,<sup>13</sup> which provide a comprehensive overview of the social and cultural dimensions of khat use.

Preclinical behavioral research on khat is limited compared with other psychostimulants. Standard assays for drug reward and reinforcement, such as self-administration, intracranial self-stimulation, and conditioned place preference (CPP), have been rarely applied to cathinone-rich khat preparations. CPP studies, however, have shown conditioned preferences for khat extract, highlighting its rewarding potential. Recent 2025 studies offer particularly valuable new insights into these effects. Female mice treated with 100–250 mg/kg of khat extract showed clear conditioned place preference, indicating a rewarding effect.<sup>14</sup> This preference was extinguished after 16 days of abstinence, but a priming dose of khat extract reinstated CPP, suggesting relapse-like behavior. A second priming dose, 35 days after the last conditioning session, failed to reinstate preference, indicating that reinforcement may be time-sensitive or transient. These results support that khat has rewarding and reinforcing properties and can induce relapse-like behavior, though effects appear milder and less persistent than other psychostimulants.<sup>14</sup> The lack of khat self-administration studies, which assess reinforcing properties rather than serve as a definitive measure of addiction, remains a major research gap. Such studies provide insight into khat’s reward potential and relapse-like behavior, which are relevant to, but not synonymous with, addiction liability.

Clinically, treatments for khat dependence are limited. Early reports from the 1990s described bromocriptine, a dopamine agonist, for khat addiction,<sup>15</sup> but this is now considered historical rather than evidence-based. The lack of approved medications likely reflects the broader absence of drugs for stimulant use disorders, such as amphetamine or cocaine dependence.

Debate on khat addiction centers on 3 areas: pharmacology, sociocultural context, and regulation. However, its use is often embedded in social rituals, traditions, and coping practices, making it more than just a drug-taking behavior. For instance, in many Yemeni and Somali communities, khat chewing takes place in structured social gatherings that reinforce social bonds, facilitate discussion, and serve as a coping mechanism for stress, distinguishing it from patterns of solitary or compulsive substance use. Pharmacologically, khat has rewarding effects and may cause mild-to-moderate psychological dependence. However, its use is often embedded in social rituals, traditions, and coping practices, making it more than just a drug-taking behavior. Regulatory decisions, such as the UK’s 2014 ban, have also shaped how its risks are perceived and discussed. Understanding khat addiction, therefore, requires considering biological, social, and political factors together.

Addiction is not the same as physical dependence. Physical dependence refers to tolerance and withdrawal, while addiction involves compulsive use and relapse risk. Animal studies show relapse-like effects with khat extracts, but standard self-administration studies are limited. Applying these findings to humans is challenging because khat is a plant-based and socially consumed. Another challenge is defining addiction itself. There is no single universal definition. Modern systems like DSM-5 and ICD-11 provide practical criteria, but these depend on context. As a result, whether khat is considered “addictive” depends largely on how addiction is defined and studied. Observed behaviors related to khat use include addiction-related behaviors, such as compulsive use and drug-seeking despite adverse consequences, which may be influenced by cultural and regulatory context.

Given that khat is so socially ingrained, caution must be exercised in regulating it without accurate scientific evidence. The key question is not whether khat is addictive in general, but how, for whom, and under what circumstances dependence-like behaviors occur. A balanced approach to policy and clinical practice should recognize that khat-related harms arise from the interaction of pharmacology and social vulnerability. Moving forward, there is a need for standardized assessment tools, further neurobehavioral research, and community-based interventions, without assuming that khat is either entirely safe or inherently harmful.

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