

Review: Impact of Khat Use on Renal Function and Risk of Chronic Kidney Disease and End-Stage Renal Disease



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Submission: June 30, 2024; **Published:** July 07, 2024

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Abstract

Khat, a plant containing the psychoactive alkaloid cathinone, is widely consumed in Yemen, Somalia, and Ethiopia for its stimulating effects. This review explores the relationship between khat use and renal health, highlighting the risk of chronic kidney disease (CKD) and end-stage renal disease (ESRD). Chronic khat consumption is associated with hypertension, nephrotoxicity, and dehydration, contributing to CKD development and progression. Epidemiological studies link khat use with elevated serum creatinine levels and impaired renal function. Diagnosis involves clinical evaluation and laboratory tests, with histological findings indicating tubulointerstitial nephritis and glomerulosclerosis. The increasing incidence of ESRD among khat users strains dialysis services, especially in low-income regions. Addressing these health risks requires public health interventions, improved healthcare access, and further research to develop effective prevention and treatment strategies.

Keywords: Khat, Nephrotoxicity, Chronic kidney disease, End Stage Renal Disease; Dialysis

Abbreviations: CKD: Chronic Kidney Disease; ESRD: End-Stage Renal Disease; BUN: Blood Urea Nitrogen; eGFR: estimated Glomerular Filtration Rate

Introduction

Khat (*Catha edulis*) is a plant indigenous to East Africa and the Arabian Peninsula. Its leaves contain psychoactive alkaloids, primarily cathinone, which exert stimulating effects when chewed. Despite its deep cultural and social integration in countries such as Yemen, Somalia, and Ethiopia, the impact of khat on health, particularly renal function, is a growing concern. This review examines the relationship between khat consumption and the risk of chronic kidney disease (CKD), end-stage renal disease (ESRD), and the necessity for dialysis among Yemeni and other populations.

Mechanism of Khat on Renal Function

The primary psychoactive constituent of khat, cathinone, is structurally analogous to amphetamines, promoting catecholamine release, resulting in increased blood pressure and vasoconstriction. Chronic khat use is associated with several adverse effects on renal function, including hypertension, nephrotoxicity, and dehydration. Persistent hypertension is a well-documented consequence of chronic khat use. Hypertension is a

leading etiological factor for CKD and can expedite the progression of renal damage [1]. Studies suggest that khat's compounds may exert direct cytotoxic effects on renal cells, leading to glomerular and tubular damage. Cathinone and its metabolites induce oxidative stress, inflammation, and apoptosis in renal tissues. These effects are exacerbated by other khat constituents, such as tannins, which can further impair renal function [2,3]. Prolonged khat chewing sessions often result in reduced water intake, leading to dehydration, decreased renal perfusion, and subsequent renal injury [4].

Epidemiological Evidence

Several studies have explored the impact of khat use on renal health, particularly within Yemeni populations. Research in Yemen has demonstrated a significant association between chronic khat use and elevated serum creatinine levels, an indicator of impaired renal function. One study reported that habitual khat chewers exhibited a higher prevalence of CKD compared to non-chewers [5]. Similar findings have been reported in other khat-chewing regions such as Somalia and Ethiopia. These studies support the

link between khat use, hypertension, and renal impairment [6,7].

Risk of Chronic Kidney Disease and End-Stage Renal Disease

Chronic khat use increases the risk of developing CKD through mechanisms such as hypertension, nephrotoxicity, and recurrent dehydration. The progression of CKD in khat users may be accelerated due to continuous renal stress [8]. As CKD advances, the risk of ESRD becomes significant. Patients with ESRD require renal replacement therapy, such as dialysis or kidney transplantation, to survive [9].

Diagnosis of Khat-Related Kidney Disease

Diagnosing khat-related kidney disease involves a combination of clinical evaluation, laboratory tests, and occasionally histological examination. Key diagnostic steps include clinical evaluation, laboratory tests, and imaging studies. A detailed patient history is crucial for identifying chronic khat use and its potential contribution to renal disease. Physicians should assess symptoms such as fatigue, edema, hypertension, and changes in urine output. Laboratory tests such as serum creatinine and blood urea nitrogen (BUN) levels indicate impaired renal function. Reduced estimated glomerular filtration rate (eGFR) signifies decreased renal function. Urinalysis often reveals proteinuria and hematuria, common findings in CKD. Electrolyte imbalances in sodium, potassium, and other electrolytes may indicate renal dysfunction. Imaging studies like ultrasound can evaluate renal size, structure, and detect obstructions or anomalies.

Histological Changes in Khat-Related Kidney Disease

Specific histological changes associated with khat use include tubulointerstitial nephritis, glomerulosclerosis, and vascular changes. Tubulointerstitial nephritis, which involves inflammation of the renal tubules and interstitial tissues, is a common finding in khat users, potentially leading to chronic damage and scarring [10]. Glomerulosclerosis, or the scarring of the glomeruli, can occur due to chronic hypertension and direct nephrotoxic effects of khat [11]. Hypertensive damage to renal blood vessels, including arteriosclerosis, can reduce renal blood flow and exacerbate renal dysfunction [12].

Risk of Dialysis

Dialysis is a critical intervention for patients with ESRD. The prevalence of khat use among ESRD patients requiring dialysis is significant in countries like Yemen. The increased incidence of ESRD among chronic khat users has led to a higher demand for dialysis services. Healthcare systems in khat-using regions face substantial challenges in meeting this demand [13]. The burden of providing dialysis and other renal replacement therapies strains healthcare resources, particularly in low-income countries where khat use is prevalent [14].

Other Nationalities

While most research focuses on populations in Yemen and East Africa, khat use is also prevalent among expatriate communities in countries such as the United Kingdom and the United States. The health impact on these populations remains understudied, but similar risks are likely given the pharmacological effects of khat [15].

Conclusion

Khat use poses a significant risk to renal health, contributing to the development and progression of CKD and ESRD. The need for dialysis among chronic khat users is a growing public health concern, particularly in regions where khat chewing is culturally ingrained. Addressing this issue requires a multifaceted approach, including public health interventions to reduce khat use, improving access to healthcare, and enhancing the capacity of renal services in affected regions. Further research is needed to fully understand the long-term impacts of khat on renal function and to develop effective strategies for prevention and treatment.

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DOI: [10.19080/JOJUN.2024.09.555755](https://doi.org/10.19080/JOJUN.2024.09.555755)

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