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REVIEWER'S REPORT

Manuscript No.: **IJAR-53139** Date: 06-08-2025

Title: Novel In Vitro Approaches for Screening and Identification of Anti- Urolithiatic Activity: A Comprehensive Review

Recommendation:
Accept as it is .....YES.....
Accept after minor revision.....
Accept after major revision .....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality			✓	
Techn. Quality			✓	
Clarity			✓	
Significance		✓		

Reviewer Name: Dr Aamina

Reviewer's Comment for Publication.

Abstract

The abstract provides a clear and comprehensive overview of urolithiasis, emphasizing its clinical significance as a global health concern, the limitations of existing treatment modalities, and the high recurrence rate of renal calculi. It identifies the major stone types—calcium oxalate, calcium phosphate, uric acid, struvite, and cystine—and their distinct etiologies, which adds scientific rigor and context.

The description of the pathophysiology of stone formation is precise, highlighting key steps such as supersaturation of urine, nucleation, growth, aggregation, and retention. Current treatment strategies like extracorporeal shock wave lithotripsy (ESWL), ureteroscopy, and percutaneous nephrolithotomy are discussed effectively in terms of their benefits and limitations.

The section appropriately transitions to the potential of medicinal plants in anti-urolithiatic therapy, linking phytochemicals such as flavonoids, saponins, phenols, tannins, and alkaloids to therapeutic effects like antioxidant, diuretic, and anti-inflammatory properties. The inclusion of

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examples—*Bryophyllum pinnatum* and *Aerva lanata*—and mention of in-vitro dissolution studies on egg membrane models reinforces the scientific validity and practical relevance of this review.

Overall, the abstract is well-structured, clinically relevant, and informative.

Introduction

The introduction begins by defining urolithiasis and positioning it as one of the most prevalent urinary tract disorders, successfully capturing its public health importance. It outlines the multifactorial nature of kidney stone formation, citing genetic, metabolic, dietary, infectious, and lifestyle factors as major contributors. This discussion reflects a sound understanding of the complex etiology of the disease.

The pathogenesis of stone formation is well-explained through the process of urine supersaturation and subsequent stages of crystallization, including nucleation, growth, and aggregation. These details demonstrate strong scientific grounding and align with the pathophysiological framework widely accepted in nephrology research.

The narrative then provides a logical progression to therapeutic interventions, contrasting the limitations of conventional treatments (e.g., invasiveness, recurrence risk) with the emerging role of medicinal plants. The introduction effectively justifies the relevance of phytochemical-based approaches and traditional medicine systems, particularly Ayurveda, in the prevention and management of nephrolithiasis.

The description of bioactive phytoconstituents—flavonoids, alkaloids, saponins, tannins, glycosides, and terpenoids—adds depth and demonstrates an understanding of their pharmacological roles in diuresis, anti-inflammatory effects, and inhibition of stone formation.

Scientific Strength and Relevance

This paper addresses a clinically significant and pharmacologically rich research area by integrating pathophysiology, current treatment limitations, and novel in vitro screening methods for plant-derived anti-urolithiatic agents. The review emphasizes experimental approaches such

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as dissolution models using egg membranes, which are practical and reproducible for initial screening.

The selection of medicinal plants with reported anti-urolithiatic activity and identification of specific phytochemicals establishes a strong scientific basis for developing safer, cost-effective therapeutic alternatives. The work is particularly relevant given the global trend toward phytotherapy and natural product-based drug discovery.

Language and Structure

The language used is formal, academic, and suitable for a scientific review. Technical terms—such as *supersaturation, nucleation, crystal aggregation, and phytochemicals*—are employed accurately. The abstract and introduction maintain coherence, logical flow, and a research-oriented tone throughout.

Overall Assessment

The paper is comprehensive and demonstrates clarity in presenting the epidemiology, pathophysiology, therapeutic limitations, and phytopharmacological prospects of anti-urolithiatic interventions. It successfully bridges conventional nephrology and herbal pharmacology by emphasizing the need for scientifically validated in vitro screening models. The emphasis on phytochemical mechanisms makes this review highly valuable for researchers in pharmacognosy, nephrology, and drug development.
