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Integrative Review of Mutrashmari (Urolithiasis): Correlation of Ayurvedic and Modern Perspectives

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ABSTRACT: Mutrashmari, described in Ayurvedic literature as a disorder characterized by the formation of urinary calculi, has important clinical parallels with contemporary urolithiasis. This review brings the two medical frameworks into comparison across etiology, disease development, clinical manifestations, classification, diagnosis, treatment, and prevention. Classical Ayurvedic sources describe Ashmari in relation to Dosha involvement, urinary stasis and disturbances of diet and lifestyle, and recommend Nidana Parivarjana, Shamana therapies, selected herbal formulations, Basti-based approaches and Shastra Karma according to clinical circumstances. Modern medicine explains stone formation through urinary supersaturation, crystal nucleation and growth, retention within the urinary tract, and metabolic, dietary, infectious and genetic determinants. Contemporary diagnosis relies on clinical assessment, urine and biochemical evaluation and imaging, with non-contrast computed tomography providing highly accurate assessment of stone location, burden and density in appropriate clinical settings. Management ranges from hydration and dietary or metabolic correction to medical expulsive therapy and procedures such as shock wave lithotripsy, ureteroscopy and percutaneous nephrolithotomy. The comparison identifies several shared practical domains, especially dietary habits, adequate hydration, lifestyle measures, recognition of symptoms, and individualized care. An evidence-based integrative model can retain contemporary standards for diagnosis and procedural safety while evaluating Ayurvedic preventive and therapeutic approaches through experimental, pharmacological, and appropriately designed clinical studies.

1. INTRODUCTION

Within Ayurveda, Mutrashmari denotes urinary stone disease and receives significant attention in descriptions of urinary and surgical disorders. The condition is characterized by pain and difficulty during micturition, altered urinary flow and other manifestations that can be correlated clinically with urinary calculi. Sushruta gives Ashmari considerable importance because of its potential severity and the difficulty associated with its management ¹. The classical description therefore provides both a diagnostic framework and a therapeutic rationale that includes conservative measures as well as operative intervention when required.

In contemporary medicine, urolithiasis is frequently encountered, can produce considerable morbidity, and is characterized by a substantial risk of recurrence. Stone formation is influenced by fluid intake, dietary composition, urinary chemistry, metabolic abnormalities, infection, anatomical factors and genetic susceptibility. Calcium-containing stones constitute the majority of urinary calculi, while uric acid, infection-related and cystine stones represent other important categories. The

modern approach has progressively moved from treatment of an existing stone toward risk assessment and recurrence prevention.

An important feature of urolithiasis is the need to match treatment to stone size, location, composition, obstruction, infection, renal function and patient-related factors. Contemporary guidelines recognize non-contrast computed tomography (NCCT) as a highly accurate imaging method for suspected acute urolithiasis after initial assessment, and modern treatment includes observation in selected patients, medical expulsive therapy, shock wave lithotripsy (SWL), ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL) ².

Although Ayurveda and modern medicine employ different explanatory models, both recognize the importance of dietary and behavioural factors and the need for individualized treatment. Accordingly, this review does not attempt to make the two systems identical; rather, it explores where their concepts overlap or differ and considers how they may inform a scientifically evaluated integrative approach to Mutrashmari.

2. MATERIALS AND METHODS

This article is an integrative narrative review. For the Ayurvedic component, classical and secondary sources were consulted, including Sushruta Samhita, Charaka Samhita, Ashtanga Hridaya, Harita Samhita, Sharangadhara Samhita, and other texts listed in the references. The contemporary component drew on literature concerning urolithiasis, surgical and medical management, and current urological guidance. The material was considered under six principal domains: etiology, pathogenesis, clinical presentation, classification, diagnosis, and management.

The review emphasizes conceptual correlation rather than direct equivalence between Ayurvedic and biomedical categories. Particular care was taken to distinguish classical textual descriptions from modern interpretations. Current diagnostic and treatment recommendations were considered in the context of contemporary urological practice. As the work is a narrative integrative review and not a systematic review or meta-analysis, statistical pooling of study outcomes was not performed.

3. RESULTS AND DISCUSSION

3.1 Ayurvedic perspective

Ayurvedic literature describes Ashmari within the disorders of the urinary system and gives prominence to its painful and obstructive manifestations. In the classical framework, disease development is understood through Dosha disturbance, its interaction with Dushya, and localization in the urinary tract. The descriptions of pain, dysuria, hematuria and difficulty in urine passage provide a clinically recognizable syndrome even though the underlying explanatory model differs from contemporary stone pathogenesis.

3.1.1 Etiology (Nidana)

Classical Ayurvedic discussions associate Mutrashmari with inappropriate dietary and behavioural practices, disturbances of urinary physiology and Dosha aggravation. Dietary excesses, unsuitable food habits, reduced physical activity and suppression of natural urges are relevant within the broader Ayurvedic framework ^{3,4}. These descriptions should be interpreted within their original textual context rather than retrospectively converted into modern biochemical risk factors.

From a modern perspective, dehydration and low urine volume increase the concentration of lithogenic solutes. Dietary sodium, animal protein and oxalate intake may influence risk according to stone type, while metabolic abnormalities such as hypercalciuria, hypocitraturia and hyperuricosuria contribute to recurrence. Family history and genetic disorders are also recognized risk factors. Thus, the broad Ayurvedic emphasis on Ahara and Vihara has a meaningful preventive parallel with modern dietary and lifestyle assessment, although the explanatory mechanisms are different.

3.1.2 Pathogenesis (Samprapti)

The Ayurvedic account of Ashmari is based on Dosha involvement and the transformation of urinary constituents into a hard obstructive mass within the urinary system. The classical classification into Vataja, Pittaja, Kaphaja and Shukraja Ashmari reflects differences in Dosha predominance and associated clinical characteristics ^{4,5}.

Biomedical explanations emphasize urinary supersaturation followed by crystal nucleation, enlargement, aggregation, and eventual retention. For calcium stones, crystal formation and retention may be promoted by changes in urinary calcium,

oxalate, phosphate and citrate and by local renal factors. Randall's plaques have been proposed as an important site associated with calcium oxalate stone attachment and development ⁶. These mechanisms provide a biochemical and structural explanation for stone formation that is distinct from, but can be studied alongside, the Ayurvedic Samprapti model.

3.1.3 Clinical features (Lakshana)

Classical descriptions of Ashmari include severe pain, difficulty in micturition, interruption or alteration of urinary flow and hematuria. Depending on the site and movement of the calculus, symptoms may become acute and severe. Modern urolithiasis similarly presents with renal or ureteric colic, hematuria, dysuria and, in complicated cases, obstruction or infection ⁷. The overlap is principally clinical and symptomatic; it should not be taken to imply that the two systems use identical disease mechanisms.

3.1.4 Classification

Ayurvedic classification includes Vataja, Pittaja, Kaphaja and Shukraja Ashmari ^{8,4}. Modern classification is primarily based on chemical composition and may include calcium oxalate, calcium phosphate, uric acid, magnesium ammonium phosphate/struvite and cystine stones. These classifications represent different conceptual frameworks. Therefore, a direct one-to-one mapping—for example, equating a particular Dosha type with a particular chemical stone type—is not scientifically established and should be avoided.

A productive area for future research would be to investigate whether specific Ayurvedic phenotypes, dietary patterns or treatment responses are associated with reproducible biochemical or compositional characteristics. Such work would require prospective clinical studies with standardized stone analysis and objective imaging.

3.1.5 Ayurvedic management

Ayurvedic management may involve Nidana Parivarjana, Shamana measures, selected medicinal plants and formulations, appropriately indicated Panchakarma procedures, and Shastra Karma when conservative measures are inadequate or obstruction warrants intervention. Drugs traditionally discussed in relation to urinary disorders include Varuna, Pashanabheda, Gokshura and Punarnava, while formulations such as Gokshuradi Guggulu and other urinary formulations are used in clinical practice ^{9,10}.

The terminology used for these interventions should be interpreted cautiously in modern scientific writing. Claims that an Ayurvedic preparation 'dissolves' all types of stones are not justified without evidence specific to stone composition and clinical setting. Instead, research should evaluate measurable outcomes such as change in stone burden, spontaneous passage, urinary biochemical parameters, recurrence, pain episodes and adverse events.

3.2 Modern perspective

3.2.1 Etiology and risk factors

Urinary stone disease has a multifactorial origin. Low fluid intake and low urine volume are major modifiable contributors. Dietary sodium, animal protein and oxalate may affect stone risk, while appropriate dietary calcium is also relevant to prevention of calcium oxalate stones. Obesity, metabolic abnormalities, urinary tract infection, anatomical factors and inherited disorders can further increase risk. Modern prevention therefore requires attention to the stone type and, in recurrent stone formers, appropriate metabolic evaluation ^{11,2}.

The importance of hydration is one of the clearest points of convergence with Ayurvedic preventive principles. However, fluid recommendations should be individualized, particularly in patients with renal, cardiac or other conditions in which unrestricted fluid intake may not be appropriate.

3.2.2 Pathogenesis

Stone formation begins when urine becomes supersaturated with one or more lithogenic substances. Nucleation is followed by crystal growth and aggregation. Whether crystals remain suspended and are excreted or become retained in the kidney depends on urinary inhibitors and promoters, epithelial interactions, urinary flow and anatomical factors. In calcium oxalate stone disease, Randall's plaque has been described as a possible substrate for crystal attachment ⁶.

This model emphasizes measurable physicochemical processes and provides a basis for targeted prevention. For example, increasing urine volume reduces the concentration of lithogenic solutes, while potassium citrate may increase urinary citrate and alter urinary chemistry. Thiazide diuretics may be used in selected recurrent calcium stone formers with appropriate indications ¹².

3.2.3 Diagnosis

Assessment of urolithiasis integrates clinical findings with laboratory testing and appropriate imaging. Urinalysis can identify hematuria, pyuria and other abnormalities, while blood tests may assess renal function and metabolic parameters. Ultrasound is useful as an initial imaging modality, particularly when radiation avoidance is important. Plain KUB radiography may identify radiopaque calculi but has limitations related to stone size, location and composition.

NCCT has become a standard and highly accurate imaging technique for suspected acute urolithiasis and can provide information on stone location, burden and density ². Its ability to objectively quantify stone size and location makes it particularly valuable in clinical research. For integrative studies evaluating a putative antiurolithiatic intervention, standardized imaging—preferably using the same modality and predefined measurement protocol—is important for reproducibility.

3.2.4 Modern management

Choice of treatment is influenced by symptoms, calculus size and site, obstruction, infection, renal function, composition of the stone, and patient preference. Selected small ureteral stones can be observed when there is no infection, uncontrolled pain or deterioration in renal function. Medical expulsive therapy with an alpha-blocker may be offered for selected distal ureteral stones, particularly those larger than 5 mm, according to current guideline recommendations ².

SWL provides non-invasive fragmentation using externally generated shock waves. URS permits direct endoscopic visualization and stone fragmentation or extraction. PCNL is an established treatment for large renal calculi and is generally preferred for stones greater than 20 mm in appropriate patients. The choice among these procedures depends on stone characteristics, anatomy, patient factors and local expertise ².

Long-term management should not end with stone removal. Stone analysis and metabolic assessment can guide recurrence prevention. Dietary modification, adequate fluid intake and targeted pharmacological therapy may be used according to the patient's stone type and metabolic profile. Potassium citrate and thiazide therapy have established roles in selected recurrent calcium stone formers ¹².

3.3 Integrative correlation

The strength of an integrative framework lies not in making two distinct medical systems use identical terminology, but in identifying areas in which their contributions may complement one another. Ayurveda provides a holistic framework that emphasizes individualized assessment, diet, lifestyle, prevention and the use of traditional medicinal preparations. Modern urology provides validated imaging, laboratory assessment, stone analysis and minimally invasive procedures for patients requiring active intervention.

The concept of Nidana Parivarjana can be meaningfully discussed alongside modern recurrence prevention. Both approaches emphasize correction of modifiable factors rather than focusing exclusively on removal of the existing stone. Similarly, Ayurvedic attention to diet and daily routine may complement modern counseling on fluid intake, sodium, animal protein, oxalate and appropriate calcium intake. These parallels should be tested prospectively rather than assumed to represent equivalence.

Herbal antiurolithiatic research is another potential area of integration. Experimental studies may investigate effects on crystal nucleation, aggregation, adhesion, urinary volume, oxidative stress and relevant biochemical pathways. Clinical studies should then determine whether such effects translate into clinically meaningful outcomes. Standardization of botanical identity, extraction method, dose, formulation, quality control and safety assessment is essential before conclusions about efficacy can be generalized.

The most defensible integrative model is therefore evidence-informed and safety-oriented: modern imaging and laboratory evaluation can establish stone burden, obstruction, infection and renal status; Ayurvedic assessment may be used to guide individualized diet, lifestyle and selected traditional interventions; and urological procedures should be used without delay

when established indications for intervention are present. Traditional therapy should not be presented as a substitute for urgent management of infected obstruction, significant renal compromise or other potentially dangerous complications.

Domain	Ayurvedic perspective	Modern perspective	Integrative interpretation
Etiology	Ahara, Vihara and Dosha-related factors	Low urine volume, diet, metabolic, infectious and genetic factors	Diet, hydration and lifestyle are important shared preventive domains
Pathogenesis	Dosha involvement and formation of Ashmari in the urinary system	Supersaturation, nucleation, crystal growth, aggregation and retention	Different explanatory models; direct equivalence is not established
Clinical features	Pain, dysuria, hematuria and altered urine flow	Colic, hematuria, dysuria, obstruction and infection	Substantial clinical overlap
Classification	Vataja, Pittaja, Kaphaja and Shukraja	Calcium, uric acid, infection-related, cystine and other stone types	Classifications should be compared, not equated
Diagnosis	Clinical and classical examination	Urinalysis, biochemical tests and imaging including NCCT	Modern objective assessment is essential for safety and research
Conservative care	Nidana Parivarjana, Shamana and selected traditional therapies	Hydration, diet, metabolic correction and selected pharmacotherapy	Potential complementary preventive framework
Intervention	Shastra Karma in selected advanced cases	SWL, URS and PCNL according to indications	Modern procedures remain essential when active removal is indicated
Research	Classical formulations and individualized treatment	Standardized outcomes, imaging, stone analysis and adverse-event monitoring	Integrative trials require objective endpoints and rigorous safety assessment

Table 1. Comparison of Ayurvedic and modern perspectives on urinary calculi.

3.4 Research priorities

Future work should progress beyond descriptive comparisons toward testing specific, prespecified hypotheses. Clinical studies of Ayurvedic formulations should use standardized preparations, appropriate control groups, prespecified inclusion and exclusion criteria, validated pain and quality-of-life outcomes, objective imaging, stone composition when available, renal and urinary biochemical parameters, and systematic adverse-event monitoring. CT-based measurement may be particularly useful where accurate assessment of stone burden is required, although radiation exposure and clinical appropriateness must be considered.

Studies should also distinguish spontaneous passage from true reduction in stone burden and should report stone size, number and location separately. Recurrence prevention should be evaluated over adequate follow-up rather than inferred from short-term symptom relief. Applying this level of methodological rigor would permit cross-disciplinary evaluation of Ayurvedic interventions while retaining the individualized principles central to Ayurveda.

4. CONCLUSION

Mutrashmari and modern urolithiasis describe clinically overlapping disorders, but their explanatory frameworks arise from different medical traditions. Ayurveda contributes a holistic approach centered on Nidana Parivarjana, individualized diet and lifestyle, traditional medicinal interventions and appropriate surgical principles. Modern urology contributes objective imaging, biochemical evaluation, stone analysis, evidence-based pharmacotherapy and minimally invasive procedures. The most practical scope for integration is to combine reliable modern diagnosis and appropriately indicated procedures with

systematically studied Ayurvedic strategies for prevention and supportive care. Direct equivalence between Dosha-based and chemical stone classifications should be avoided. Future research should prioritize standardized formulations, objective imaging, stone composition, metabolic outcomes, recurrence and safety so that the potential contribution of Ayurvedic medicine to urolithiasis can be evaluated with scientific rigor.

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AUTHOR CONTRIBUTIONS

R. Jayalekshmi: Conceptualization, literature review, analysis and manuscript drafting. D. Dasar: Supervision, critical review and final approval of the manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ETHICS STATEMENT

Ethical approval was not required because this article is an integrative literature review and does not involve new research involving human participants or animals.

DATA AVAILABILITY STATEMENT

No original dataset was generated for this review.

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