



THERAPEUTIC POTENTIAL OF KUSHMANDA IN RENAL CALCULUS (MUTRASHMARI): AN AYURVEDIC REVIEW

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ABSTRACT

Renal calculus (urolithiasis) is one of the most prevalent disorders of the urinary tract, characterized by the formation of crystalline concretions in the kidneys or urinary passages. The disease has a high recurrence rate and significantly affects patients' quality of life. In Ayurveda, renal calculi are described under Mutrashmari, one of the Ashta Mahagada (eight grave diseases), resulting from vitiation of Kapha, Vata, and to a lesser extent Pitta Dosha, along with derangement of the Mutravaha Srotas. Ayurvedic management aims to alleviate pain, promote diuresis, facilitate the expulsion of urinary stones, and prevent recurrence through herbal medicines and lifestyle modifications. Kushmanda (*Benincasa hispida* (Thunb.) Cogn.), commonly known as ash gourd, is an important medicinal plant in Ayurveda with Mutrala (diuretic), Balya (strength-promoting), Brimhana (nourishing), Rasayana (rejuvenating), and Pittashamaka (Pitta-pacifying) properties. These attributes suggest a potential supportive role in the management of Mutrashmari.

KEY WORDS: Kushmanda, Renal Calculus, Mutrashmari

INTRODUCTION

Renal calculus, commonly known as kidney stone disease or urolithiasis, is a common disorder of the urinary tract caused by the formation of crystalline deposits within the kidneys, ureters, or urinary bladder. Calcium oxalate stones account for the majority of cases, followed by calcium phosphate, uric acid, struvite, and cystine stones. Globally, the prevalence of urolithiasis ranges from 5% to 15%, with recurrence rates approaching 50% within five to ten years. The disease is associated with severe colicky pain, hematuria, dysuria, urinary obstruction, recurrent urinary tract infections, and, in some cases, progressive impairment of renal function.

The increasing incidence of renal calculi has been attributed to changes in dietary habits, reduced fluid intake, obesity, metabolic disorders, climatic conditions, and sedentary lifestyles. Although modern treatment modalities—including medical expulsive therapy, extracorporeal shock wave lithotripsy (ESWL), ureteroscopy, and percutaneous nephrolithotomy—are effective for stone removal, recurrence remains common, and invasive procedures may be associated with complications and significant healthcare costs.

Ayurveda provides a comprehensive understanding of renal calculus under the disease entity Mutrashmari, which is elaborately described in Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. Sushruta classified Mutrashmari among the Ashta Mahagada, emphasizing its severity and the complexity of treatment. According to Ayurvedic principles, Mutrashmari develops due to the vitiation of Kapha, Vata, and Pitta Doshas, with Kapha contributing to the formation of a nidus for stone development and Vata facilitating its consolidation and obstruction within the Mutravaha Srotas. Improper dietary habits (Viruddha Ahara), suppression of natural urges (Vega Dharana), inadequate water intake, and sedentary lifestyle are recognized as important etiological factors.

The Ayurvedic management of Mutrashmari focuses on correcting Dosha imbalance, promoting urine flow (Mutrala), relieving pain (Vedanasthapana), reducing inflammation (Shothahara), facilitating the disintegration and expulsion of stones (Ashmaribhedana), and preventing recurrence through dietary regulation and rejuvenative therapies.

Among the medicinal plants used in Ayurveda, Kushmanda (*Benincasa hispida* (Thunb.) Cogn.), commonly known as ash gourd or winter melon, has been widely used for its cooling, nourishing, and restorative properties. Classical Ayurvedic texts describe Kushmanda as having Madhura Rasa, Guru and Snigdha Guna, Sheeta Virya, and Madhura Vipaka. It is indicated in conditions such as Mutrakrichra (dysuria), Daha (burning sensation), Raktapitta, Kshaya, Pittaja disorders, and general debility. Its Mutrala action suggests a possible supportive role in maintaining urinary tract function.

Phytochemical investigations have identified numerous bioactive constituents in *Benincasa hispida*, including flavonoids, phenolic compounds, triterpenoids, sterols, polysaccharides, vitamins, minerals, and amino acids. Experimental studies have demonstrated antioxidant, anti-inflammatory, nephroprotective, hepatoprotective, antimicrobial, gastroprotective, and immunomodulatory activities, which may contribute to renal protection and reduction of oxidative stress associated with urinary tract disorders.



MATERIALS AND METHODS

Study Design

The present study was conducted as a narrative review to critically evaluate the therapeutic potential of Kushmanda (*Benincasa hispida* (Thunb.) Cogn.) in the management of Mutrashmari (renal calculus) by integrating classical Ayurvedic literature with available modern scientific evidence.

Data Sources

Classical Ayurvedic literature was reviewed from the following texts:

- Charaka Samhita
- Sushruta Samhita
- Ashtanga Hridaya
- Bhavaprakasha Nighantu
- Kaiyadeva Nighantu
- Dhanvantari Nighantu
- Sharangadhara Samhita
- The Ayurvedic Pharmacopoeia of India

Modern scientific evidence was collected from the following electronic databases:

- PubMed
- Google Scholar
- Scopus
- Web of Science
- AYUSH Research Portal

Search Strategy

The literature search was performed using combinations of the following keywords:

- Kushmanda
- Benincasa hispida
- Renal Calculus
- Kidney Stone
- Urolithiasis
- Mutrashmari
- Ayurveda
- Diuretic
- Nephroprotective
- Antioxidant
- Anti-inflammatory

RESULTS

3.1 Ayurvedic Concept of Mutrashmari

Mutrashmari is described as one of the Ashta Mahagada by Acharya Sushruta because of its painful nature, tendency to recur, and potential to produce serious urinary complications.

The word Ashmari literally means "stone-like hard mass."

According to Ayurveda, the disease develops due to derangement of the Tridosha, predominantly Kapha and Vata, affecting the Mutravaha Srotas.

Kapha acts as the nidus by producing thick, sticky material, while aggravated Vata dries and consolidates this material into hard concretions.

Pitta contributes by causing inflammation, burning micturition, and discoloration of urine.

3.2 Nidana (Etiological Factors)

The major causative factors include:

- Excessive intake of heavy and unctuous foods
- Excessive dairy products
- Sedentary lifestyle
- Inadequate water intake
- Suppression of natural urges (Vega Dharana)



- Improper dietary habits (Viruddha Ahara)
- Metabolic disturbances
- Recurrent urinary tract infections

These factors result in Dosha vitiation and obstruction of the urinary channels.

3.3 Samprapti (Pathogenesis)

The pathogenesis of Mutrashmari may be summarized as follows:

Nidana Sevana



Kapha Prakopa



Accumulation of sticky material in Mutravaha Srotas



Vata aggravation



Drying and solidification



Formation of Ashmari



Obstruction to urine flow



Pain, dysuria, hematuria, and burning micturition

3.4 Lakshana (Clinical Features)

The important clinical manifestations described in Ayurvedic classics include:

- Severe colicky pain (Shoola)
- Dysuria (Mutrakrichra)
- Burning micturition (Daha)
- Hematuria (Raktamutra)
- Intermittent urinary stream
- Nausea and vomiting
- Difficulty in passing urine
- Pain radiating to groin or genital region

These features closely resemble the clinical presentation of renal calculi in modern medicine.

3.5 Chikitsa Siddhanta

The principles of management include:

- Ashmaribhedana – breaking the stone
- Mutrala – promoting urine flow
- Shoolahara – relieving pain
- Shothahara – reducing inflammation
- Vatanulomana – correcting aggravated Vata
- Kapha Shamaka – reducing Kapha accumulation
- Rasayana – preventing recurrence and improving renal health

3.6 Classical Review of Kushmanda

Kushmanda (Benincasa hispida) is an important medicinal plant described in numerous Ayurvedic texts.

Botanical Name-Benincasa hispida (Thunb.) Cogn.

Family-Cucurbitaceae

Common Names

- Sanskrit – Kushmanda
- English – Ash Gourd/Winter Melon
- Hindi – Petha
- Marathi – Kohala



3.7 Rasa Panchaka of Kushmanda

Rasa- Madhura

Guna|-Guru, Snigdha

Virya- Sheeta

Vipaka- Madhura

Dosha Karma| Vata-Pitta Shamaka

Karma

- Balya
- Brimhana
- Rasayana
- Mutrala
- Pittahara
- Daha Prashamana
- Trishnahara

3.8 Classical Indications

According to Ayurvedic literature, Kushmanda is indicated in:

- Mutrakrichra
- Daha
- Raktapitta
- Kshaya
- Jwara
- Pittaja Vikara
- Hridroga
- General debility
- Emaciation
- Fatigue

3.9 Phytochemical Constituents

Major phytochemicals reported in Benincasa hispida include:

- Flavonoids
- Phenolic compounds
- Triterpenoids
- Cucurbitacins
- Sterols
- Glycosides
- Polysaccharides
- Amino acids
- Vitamin C
- β -Carotene
- Calcium
- Potassium
- Magnesium
- Dietary fiber

These constituents are associated with antioxidant, anti-inflammatory, nephroprotective, and cytoprotective effects.

3.10 Pharmacological Activities of Benincasa hispida Relevant to Mutrashmari

Experimental studies have demonstrated that Benincasa hispida possesses several pharmacological activities that may contribute to renal health and support the management of urinary tract disorders. Although these findings are encouraging, most evidence is derived from in vitro or animal studies, and direct clinical evidence in patients with renal calculi remains limited.

Antioxidant Activity

-Oxidative stress is an important factor in renal epithelial injury and may facilitate crystal adhesion during stone formation. Phytochemical constituents such as flavonoids, phenolic compounds, and vitamin C present in Benincasa hispida exhibit significant



antioxidant activity by scavenging reactive oxygen species and reducing lipid peroxidation. These effects may help protect renal tissues from oxidative damage.

Anti-inflammatory Activity

-Inflammation contributes to pain, edema, and tissue injury associated with renal calculi. Experimental studies have shown that *Benincasa hispida* extracts reduce inflammatory responses by modulating inflammatory mediators, thereby supporting its traditional Ayurvedic use in conditions characterized by Shotha (inflammation) and Daha (burning sensation).

Diuretic (Mutrala) Activity

-Ayurvedic texts describe *Kushmanda* as a Mutrala Dravya, promoting urine flow. Increased urine output may help reduce urinary stasis and facilitate the passage of small urinary crystals. Although preclinical studies suggest diuretic activity, additional clinical research is required to determine its effectiveness in patients with renal calculi.

Nephroprotective Activity

-Experimental animal studies have demonstrated nephroprotective effects of *Benincasa hispida* against chemically induced renal injury. These protective effects are attributed to antioxidant activity, reduction of oxidative stress, and preservation of renal architecture. Such findings suggest a possible supportive role in maintaining renal function, although they should not be interpreted as evidence of stone dissolution.

Antimicrobial Activity

-Urinary tract infections may contribute to the formation of certain types of renal stones, particularly struvite calculi. Laboratory studies have reported antimicrobial activity of *Benincasa hispida* extracts against selected bacterial and fungal organisms. The clinical significance of these findings in preventing infection-related stones remains to be established.

Immunomodulatory Activity

-Bioactive polysaccharides isolated from *Benincasa hispida* have demonstrated immunomodulatory properties in experimental models. By regulating immune responses and reducing chronic inflammation, these compounds may indirectly support urinary tract health.

3.11 Possible Mechanisms Supporting the Management of Mutrashmari

Based on classical Ayurvedic principles and available pharmacological evidence, *Kushmanda* may support the management of Mutrashmari through several mechanisms:

Ayurvedic Action-Possible Modern Correlation

Mutrala- Increased urine output and reduced urinary stasis

Pittashamaka-Reduction of burning sensation and urinary irritation

Shothahara-Anti-inflammatory effects

Rasayana- Protection against oxidative stress and tissue injury

Balya- Support for recovery and general health

Brimhana-Nutritional support during convalescence

Ashmaribhedan-its chemical constituents like chloroform, flavonoids, saponin helps in dissolution of stone.

DISCUSSION

Renal calculi continue to represent a significant health burden because of their high prevalence, recurrence, and impact on quality of life. While modern surgical and minimally invasive techniques effectively remove stones, recurrence prevention remains a challenge. Ayurveda emphasizes correction of underlying Dosha imbalance, maintenance of urinary flow, and prevention of recurrence through herbal medicines, dietary regulation, and lifestyle modification.

Kushmanda has been used in Ayurveda for centuries as a nourishing and cooling medicinal plant. Classical texts describe its usefulness in Mutrakrichra, Daha, Raktapitta, and other disorders involving aggravated Pitta and disturbed urinary function. Its Madhura Rasa, Sheeta Virya, and Mutrala properties support its traditional use in relieving burning micturition and promoting urinary health.

Modern pharmacological research provides partial support for these traditional indications. Antioxidant and anti-inflammatory activities may reduce renal epithelial injury, while nephroprotective effects observed in experimental studies suggest protection against oxidative damage. The reported diuretic activity may aid urine flow, potentially assisting in the passage of small crystals and reducing urinary stasis.



However, it is important to distinguish supportive pharmacological effects from direct lithotriptic activity. Current scientific evidence does not demonstrate that Kushmanda dissolves or fragments established renal stones. Furthermore, most available studies have evaluated crude extracts of *Benincasa hispida* rather than standardized Kushmanda making direct extrapolation difficult.

Consequently, Kushmanda should be viewed as a potential adjunctive therapy rather than a substitute for established treatments. Its role may be most relevant in supportive care, symptom relief, promotion of hydration and urinary flow, and protection against oxidative stress. High-quality randomized controlled trials are needed to determine whether these theoretical and experimental benefits translate into improved clinical outcomes for patients with Mutrashmari.

Future research should focus on:

- Standardization of Kushmanda formulations.
- Phytochemical characterization and quality control.
- Experimental evaluation of effects on crystal formation and crystal adhesion.
- Randomized controlled clinical trials comparing Kushmanda with standard Ayurvedic and conventional therapies.
- Long-term safety, dosage optimization, and recurrence prevention.

CONCLUSION

Renal calculus (Mutrashmari) remains a significant clinical challenge because of its high prevalence, recurrence, and associated morbidity. Ayurveda describes Mutrashmari as one of the Ashta Mahagada and advocates a comprehensive management approach aimed at correcting Dosha imbalance, promoting urinary flow, relieving pain, reducing inflammation, and preventing recurrence through herbal medicines, dietary regulation, and lifestyle modification.

Kushmanda (*Benincasa hispida* (Thunb.) Cogn.) is a well-recognized medicinal plant in Ayurveda, possessing Madhura Rasa, Guru-Snigdha Guna, Sheeta Virya, and Madhura Vipaka, along with Balya, Brimhana, Rasayana, Pittashamaka, and Mutrala properties. These classical attributes, together with experimental evidence demonstrating antioxidant, anti-inflammatory, nephroprotective, and diuretic activities, suggest that Kushmanda may have a supportive role in maintaining urinary tract health and reducing factors associated with renal injury.

However, the current scientific literature does not provide sufficient direct clinical evidence to establish Kushmanda as a proven lithotriptic (Ashmaribhedana) agent or a definitive treatment for renal calculi. Most available studies have been conducted in experimental models or have evaluated crude extracts rather than standardized Kushmanda formulations. Therefore, while Kushmanda may be considered a promising adjunct in the holistic management of Mutrashmari, its efficacy in stone dissolution, stone expulsion, recurrence prevention, and long-term renal outcomes requires confirmation through well-designed randomized controlled clinical trials.

Future research should focus on standardization of Kushmanda, detailed phytochemical characterization, pharmacological evaluation, and multicenter clinical studies to establish its therapeutic role in evidence-based Ayurvedic management of renal calculi.

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