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A CONCEPTUAL REVIEW ON MOOTRASHMARI W.S.R TO UROLITHIASIS

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ABSTRACT

Urolithiasis is a global health problem with a high recurrence rate. It is also called Nephrolithiasis or kidney stones. Urolithiasis is the formation of calculi, or a condition associated with urinary calculi. The term calculi are synonymous with uroliths, stones, or crystals. Kidney stone formation or Urolithiasis is a complex process resulting from several physiochemical events, including supersaturation, nucleation, growth, aggregation, and kidney retention. The most common stones are struvite, calcium oxalate, urate, cystine and silica. *Mootrashmari* is a disease manifesting essentially from suppressing the urge to void. According to pathology, the *Sthansamshraya* stage of the disease *Mootrashmari* takes place in *Basti,* considered the *Mootravaha strotas*. Thus, due to similar pathophysiology and clinical features, *Mootrashmari* can be linked to Urolithiasis. This article attempts to compile and interpret scattered references of *Mootrashmari* in Ayurvedic texts with the concept of urolithiasis.

Keywords: Urolithiasis, *Mootrashmari, Chikitsa,* Treatment*, pathya-apathya*

INTRODUCTION

Urolithiasis is commonly called stone formation and is present in any part of the urinary tract, such as the kidneys, ureters, urinary bladder, and urethra. It is a stone-like body composed of urinary salts bound together by a colloidal matrix of organic materials. It consists of a nucleus around which concentric layers of urinary salts are deposited[1]. It is one of the most frequent and highly recurrent, which can predispose an individual to urinary tract infections and renal failure. Studies have shown that the recurrence rate of Urolithiasis to be 30% to 50% within 5 to 10 years after an initial episode. The incidence of Urolithiasis increased by 48.57%, i.e., 77.78 million cases in 1990 to 115.55 million cases in 2019.[2] As per various surveys, about 57.8% of the patients were asymptomatic, 35.5% of patients had pain in flanks, whereas 42.8% patients had a family history of Urolithiasis. It occurs more frequently in men than in women, with the ratio of male to female as 3:1. It is rare in children and shows familial predisposition. Patients with a Body Mass Index (BMI) of >25kg/m^2 are associated with a greater risk of Urolithiasis.[3]Equilibrium of *Dosha*, well-nourished *Dhatu*, regular excretion of *Mala,* and good *Agnibala* help one to stay healthy.[4] *Mootrashmari* is a disease manifesting essentially from suppressing the urge of micturition.[5] Ashma means stone. *Ashmari* is a disease related to *Mootravaha srotas*, though *Tridoshaja Vyadhi Kapha Dosha* is essential in solidifying the A*shmari*. *Basti Marmashrayatva* and *Vata Vaigunya* are the most potent factors to consider *Mootrashmari* as *Mahagada*.[6]

MATERIALS AND METHODS:

This article draws upon a comprehensive review of Ayurvedic literature, collecting material pertinent to the concept of *Mootrashmari.* References encompassing Ayurveda and modern perspectives on Urolithiasis were gathered from textbooks, various reputable websites and articles.

UROLITHIASIS/NEPHROLITHIASIS DERIVATION:

The word "Nephrolithiasis" is derived from the Greek word nephros- which means kidney, and lithos- which means stone.

Ashma- means stone. The urinary calculi are the gradual outcome or formation in the urinary tract when *Vata* dries up the urine

NIDANA PANCHAKA:

NIDANA:

Hetu, also called Nidana, is the primary factor that causes disease.

According to Acharya S*ushruta, Asamshodhana Sheelasya*(not subjected to timely evacuation procedures), *Apathyakarina(*indulging in indiscriminate diets and regimen), *Ushna Gaman*(hot climate can cause an increase in the concentration of solutes), *Adhvagaman*(excess physical exercise)leads to *Mootrashmari.*[7]

Acharya Charaka has not given a separate chapter for *Mootrashmari*, but he explained it under "*Mootrakrichra"*. Hence, the *Nidanas* of *Mootrakrichhra* and *Ashmari* can be taken as exact. They are-

1. *Ativyayama (*exercise over one's capacity)
2. *Tikshna Aushadhi*(studies have shown that spices contain variable amounts of oxalates, which make people liable to kidney stone formation)
3. *Ruksha Madyapana* (it causes so much urine to pass so much urine that it can become dehydrated)
4. *Nityadruta Prustayan*
5. *Ati Anupa Mamsa Sevana* and *Matsya Sevana*(these foods contain calcium, oxalate, phosphates and purines, which help in the formation of calcium, oxalate and phosphate stones)
6. *Adhyashan* (consumption of food before the digestion of the previous meal)
7. *Ajeerna bhojana* (improperly cooked food)
8. *Mootravegavidharana* (suppression of the urge to micturate)[8]

In *Laghutrayee,* there is no description related to *Nidana. Hareeta Samhita* has given some slightly different causes for the formation of *Ashmari.* It can

occur due to *Vegavarodha*(when intercourse is done by suppressing the urge to urine) and *Apathyasevana.*

ETIOLOGY:[9]

The cause of renal stone formation is not yet fully understood, but in most cases, multiple causes are involved. The critical factors which influence the formation and growth of Uroliths are as follows-

A. DIETARY CAUSES: Dietary factors associated with an increased risk of Nephrolithiasis include animal protein, oxalate, sodium, sucrose, and fructose.

1. Calcium- The role of dietary calcium deserves special attention. Hypercalcaemia is seen in sarcoidosis, milk-alkali syndrome, and hypervitaminosis D. Due to loss of bone density, acute osteoporosis, acidosis, and Paget's disease,
2. Oxalate- Urinary oxalate is derived from both endogenous production and absorption of dietary oxalate. Due to Hyperoxaluric seen in primary hyperoxaluria due to enzymes deficiencies like type 1 ketaglutarate glyxylate carboligiasse deficiency and type 2 D Glyceric dehydrogenase deficiency.
3. Other nutrients- A higher animal protein intake may increase calcium and uric acid excretion. Vitamin C supplements are associated with increased calcium oxalate stone formation risk.
4. Fluid—The risk of stone formation increases as urine volume decreases. The risk is more than double when urine output is less than 1 litre/day.
5. Vitamin A deficiency—Vitamin A deficiency causes desquamation of epithelium. The cells form a nidus on which the stones are deposited.

B. non-dietary risk factors- Age, race, body size and environment are essential for Nephrolithiasis. Weight gain increases the risk of stone formation. 1. Infections- Organisms such as proteus, pseudomonas, and klebsiella produce recurrent UTIs. These organisms produce the enzyme Urease, which splits urea into ammonium and carbon dioxide. Ammonium renders the urine alkaline, which facilitates the precipitation of phosphates. 2. Hot climate- Causes dehydration, which produces highly concentrated urine laden with precipitable solutes, namely calcium and oxalate, which lead to the formation of calcium oxalate stones. 3. Immobilisation- As in bedridden patients, it leads to extensive bone demineralisation. This, in turn, causes hypercalciuria, which increases the risk of stone formation; such stones are called “recumbency stones”.

C. Urinary risk factors-

1. Urinary stasis- Urinary stasis due to resistance to urinary flow (horseshoe kidney, ectopic kidneys, etc) increases the risk of infections and stone formation. 2. Urine citrate- Urine citrate is a natural inhibitor of calcium-containing stones; thus, lower urine citrate excretion increases the risk of stone formation. 3. Urine uric acid- Higher Uric acid levels in urine - a risk factor for uric acid stone formation is found in individuals with excess purine consumption. 4. Urine pH- Urine pH influences the solubility of some crystal types. Uric acid stones form only when the urine pH is consistently less than or equal to 5.5 or lower, whereas calcium phosphate pH is less than or equal to 6.5 or higher.

D. Genetic risk factors- The risk of Nephrolithiasis is more than twofold greater in individuals with a family history of stone disease. This association is likely due to genetic predisposition and similar environmental exposures.

COMPOSITION OF RENAL STONES[10]

Calcium oxalate	60%
Calcium phosphate	15%
Uric acid	10%
Magnesium ammonium phosphate(struvite)	15%
Cystine and others	1%

SAMPRAPTI:[11]

Kapha Prakopak Ahara-Vihara Sevana

leads to *Prakopa of kapha Pradhana Tridosha*

The vitiated *Vata Dosha* reaches the urinary bladder and dries up urine in association with *Sukra/kapha/pitta.*

Which leads to the gradual formation of calculi. (Because *kapha* possess *Pruthvi* tattva in it, that helps in solidifying the *Ashmari)*

SAMPRPARTI VIGHATANA:[12]

Dosha- Kapha, Vata, Pitta Dushya- Mutra, Shukra(shukrashmari) Agni- Pachakagni/Dhatwagni Ama-Pachakagni/Dhatwagni Janya Udbhavasthana- Kaphashaya Sancharasthana- Mootravaha Srotas Adhistana – Basti Srotas- Mootavaha Srotas

PATHOGENESIS:[13]

Saturation

supersaturation (formation of crystals in supersaturated urine)

Nucleation (adhered to urolithium, thus creating nidus)

Crystal growth - Stone Formation

Crystal retention and aggregation

***PURVARUPA*-**

Ashmari is generally due to the combined impact of all three *Doshas*. *Purvarupa,* or premonitory signs and symptoms, which appear in the stage of *Dosha Dushya* Sammurchana and *Sthana Samshrayavasta*, suggest the probable forthcoming disease.

S.NO	Purvarupa	Su[14]	A.Hr[15]	A.S.	M.N.	B.P	Y.R.
1	*Basti peeda*	+	+	+	+	+	+
2	*Aruchi*	+	+	+	+	+	+
3	*Mutrakricchra*	+	+	+	+	+	+

4	*Bastisirovedana*	+	-	+	-	-	-
5	*Mushka Vedana*	+	-	+	-	-	-
6	*Shepha Vedana*	+	-	-	-	-	-
7	*Jwara*	+	+	+	+	+	+
8	*Avasada*	+	-	-	-	-	-
9	*Bastagandhatwa*	+	+	+	+	+	+
10	*Sandra Mootra*	+	-	-	-	-	-
11	*Avila Mootra*	+	-	-	-	-	-
12	*Basti adhmana*	-	+	+	+	+	-

SAMANYA LAKSHANA-

The signs and symptoms that are fully manifested are called *Roopa*. This is the stage when the disease comes out with full signs and symptoms indicating the specific characteristics of the disease. The symptoms can be explained according to the site of calculi in the urinary tract. *Nabhi Vedana* and *Basti Vedana* can be interpreted as localised pain or radiating or referred pain in the case of ureteric, renal, and urethral calculi. *Sivani Vedana* (pain in perianal raphae) seen in the case of renal and ureteric calculi can be taken as radiating, unbearable pain. *Mehana Vedana* (pain in the penis) and *Mrudant Medra* (squeezes the phallus), *much anti mehana-* These symptoms suggest the referred pain in the case of urethral stone, pain in these areas is usually felt at the end of the *micturition.*

S.NO	*RUPA*	*Su.*[16]	*Ch*[17]	*A.Hr.*[18]	*A.S.*	*Har.*	*M.N.*	*B.P*	*Y.R*
1	*Nabhi Vedana*	+	-	+	+	+	+	+	+
2	*Basti Vedana*	+	+	+	+	+	+	+	+
3	*Sevani Vedana*	+	+	+	+	+	+	+	+
4	*Mehana Vedana*	+	+	-	-	+	-	-	-
5	*Mootra dhara sanga*	+	-	-	+	_	-	-	-
6	*Mootra Vikirana*	+	-	-	-	-	-	-	-
7	*Gomeda Prakasha*	+	-	+	+	-	+	+	+

TYPES:

Asmari is invariably *Tridoshajanya. H*owever, the classification of *Ashmari* is based on the predominance of *Dosha.*

Sushruta Samhita[19] *(4)*	*Ashtanga Hridaya*[20] *(4)*	*Madhava Nidan (5)*	*Bhav Prakash(4)*
1. Vataja	*1.Vataja*	*1. Vataja*	*1.Vataja*
2. Pittaja	*2.Pittaja*	*2. Pittaja*	*2.Pittaja*
3. Kaphaja	*3.kaphaja*	*3. Kaphaja*	*3.kapaja*
4. Sukraja	*4.Shukraja*	*4. Sannipataja*	*4.Shukraja*
		5. Sukraja	

TYPES OF STONE AND THEIR FEATURES:[21]

VATAJA ASHMARI	CALCIUM OXALATE STONES
-- Colour of the stone- *Shyava varna* (black or reddish black) -- Features of stone- *kantakachita*(spiky), *pausham*(hard*i*), *Vsham*(irregular), *khar*(rough surface), *Kadamba*	--They are irregular hard and single, rough surface, usually small -- Dark brown coloured

pushpavat(appears like flowers of *Kadamba*)	-- Causes haematuria -- Visualised in plane x-ray
PITTAJA ASHMARI	URIC ACID STONE
-- Colour- *Sarakta, krishna, Peeta, Madhuvarna* -- Features of stone- *Bhallataka Asthi Prathima*(resembles seed of *Bhallataka*)	-- Multiple small and hexagonal -- Yellow, reddish brown colour -- Hard --Grow in acidic urine -- Pure uric acid stones are radiolucent
KAPHAJA ASHMARI	PHOSPHATE STONES
-- Colour- *Shwetha*(white), *Shlakshna, Madhuvarna, Sitavarna, Madhuka Pushpa Varna* --Features of stone- *Kukkutanda Pratikansha*(hens' egg), *Mahati*(bigger)	-- Smooth and round -- Dirty white or yellow white or grey -- Occur in renal pelvis enlarges in major and minor calyces -- Grow bigger in size -- Grow in alkaline urine

VISHESHA LAKSHANA:[22]

VATAJA ASHMARI	URETERC STONE
-- *Teerva Vedanam Bhavati, Brusha Peeda, Atyarthapeedyamano, Dantan khadati, Nabhi Peedayati Anisham* -- *Nabhi, Mehan, Guda Shula, Mrudati Medran* -- *Mehati Bindusha*	-- Ureteric colic- The agonizing pain occurs typically at loin and radiates to groin. It starts suddenly causing the patient to move around to find comfort. The pain occurs when the stone is entering the ureter, but it may also occur when a stone becomes lodged in pelviureteric junction. Pain is caused due to irritation of genitofemoral nerve.
PITTAJA ASHMARI	VESICLE STONE
-- *Pittena Dahyate Basti, Pachyate, Dushyate Eva Vedana*	-- Burning and sucking types of pain occur. When the stone approaches the bladder the symptoms of vesicle irritability are observed. A stone impacting very near the bladder can mimic acute cystitis therefore scalding pain occurs.
KAPHAJA ASHMARI	KIDNEY STONES
-- *Dhalyate, Vishiryate Iva Bhidyate, Vidiryate Iva, Nistudyate, Suchibhiriva, Basti Guru*(heaviness in kidney)	-- Renal pain occurs when stone is in kidney. There is dull and constant ache and heaviness felt in the region of the kidney. It is fixed pain not radiating.
SHUKRASHMARI	SEMINAL VESICLE
The stone developed in seminal vesicle.it occurs in adults. suppresion of *Shukra Vega* is the main cause for formation. There is pain in *Basti* region (suprapubic region), difficulty in micturition, swelling in scrotum.	-- pain in the pelvic, penile area, blood in the semen, painful ejaculation, difficulty urination

INVESTIGATIONS:[23]

1. Blood examination- for WBC count, creatinine, blood urea 2. Urinalysis- i) Physical examination- smoky urine due to haematuria. ii) chemical examination- protein and blood in the urine. iii) microscopic examination- R.B.C., pus cells and casts, different crystals. iv)Bacteriological examination- culture and sensitivity. 3) Radiography- A) straight x-ray B) Excretory Urogram 4)Ultrasonography 5)Computed tomography 6)Renal scan 7) Instrumental examination- Cystoscopy

***CHIKITSA*:**[24] Mainly, two types of *chikitsa* are described in our *shastras* for every disease.

1) *Samanya chikitsa*- i) *Nidan Parivarjan*- by avoiding causative factors ii) *Prakruti Vighatan*- By *Shaman* measures and intake of plenty of water 2)*Vishesha chikitsa- i) Aushadhi chikitsa*- mentioned in the below table ii) *Basti karma*- All acharyas indicate it. *Acharya sushruta* says that the decoction of latex trees*(ksheera vruksha)* administered through *Mootramarga* flushes out the calculus along with urine iii)*kshara Chikitsa- Kshara* prepared from the paste of *Tila, Apamarga, kadali, Palasha and Yava* should be taken with sheep's urine to destroy urinary gravel. *Acharya sushruta* has mentioned the drugs like *apamarga and yava* for preparing *ghrita.* iv) *Shastra Chikitsa*- In the early stages, where

Purvarupa is expressed, it should be subjected to medical treatment and cured with *snehana. Swedana, Samshodhana and Shamana* are to be eradicated. Later on, if it advances in size, surgical intervention becomes inevitable.

DRUG OF CHOICE:[25] P*ashanabeda, Gokshura, Ikshurasa, Trapusa Bheeja, Trunapanchamoola, kulattha, Varuna, Kusumba Bheeja, Badara, Shilajatu, Usheera*

SHAMANOUSHADI:[26]

VATAJA ASHMARI	*PITTAJA ASHMARI*	*KAPHAJA ASHMARI*	*SHUKRASHMARI*
Sahachara taila	*Shilaapraval vanga*	*Eranda karkatimula churna*	*Shilajatvadi yoga*
Viratarvadi kwatha	*Kushadha ghrita*	*Trivikrama rasa*	*Pashanabhinn arasa*
Pashanbinna rasa	*Sharadi panchamula ghrita*	*Varunadha ghrita*	*Trikantakadi kwatha*
Bhrihat varunadi kwatha	*Sharamuladi hima*		

MANAGEMNT:[27] 1) 1)Preventive measures: i) Fluid- increasing the fluid intake, check with 24hrs urine collection ii) Sodium restriction in food iii) Moderate protein iv) maintain good calcium intake v) Avoid calcium supplements separate from foods vi) Avoid food rich in oxalate(spinach, rhubarb) 2) Conservative measures: i) Hydration ii) Flush therapy iii) pain management(NSAIDs) iv) Diuretics(thiazide) v) metabolic assessment vi) Infection control(antibiotics) 3) Percutaneous methods: i) percutaneous Nephrolithotomy ii) ESWL(Extracorporeal Shock Wave Lithotripsy) iii)Ureteroscopy 4) Surgical methods: i) Pyelolithotomy ii) Nephrolithotomy iii) Pyelonephrolithotomy iv) Partial Nephrectomy v) Nephrectomy

Food rich in calcium, phosphate, oxalate and purine-[28]

Calcium	**Phosphate**	**Oxalate**	**Purine**
Leafy vegetable, milk and milk products, sesame seed and ragi	Whole cereals, legumes, nuts and oils, meat, fish, eggs and milk	Leafy vegetables, beetroot, rhubarb, tea, sesame seeds	Meat, fish, animal tissue and organs

PATHYA- Old rice, barley, *kulattha*(horsegram), *mudga*(green gram), *Shigru*(drumstick), *Snehana, Swedana, Virechana, Basti* ***APATHYA-*** *Viruddha Ahara*, tomato, brinjal, spinach, *Guru* and *Tikshna Guna Ahara, Avyayama, Vegadharana*

DISCUSSION

Mootrashmari is one among the *Ashtamahagada* because it is *Tridoshaja, Marmashrayee* and *Vyaktasthana* of *Ashmari* is *Basti* which is one among *Dasha Vidha Pranayatana.* Based on *Vishishta Purvaroopa,* we can analyse the involvement of predominant *Dosha,* which can be treated in the *Purvaroopa* stage. Ayurveda has a broad spectrum of treatment modalities that not only cure the disease but can also prevent it through various types of treatment- *Nidanparivarjan, Samshodhan, Samshaman* and *Shastrakarma*. *Aushadha chikitsa* involves the administration of drugs, which are having action of *Mutrala*, *Ashmaribedhen*a etc. Drugs like *Gokshura, Pashanabheda, Varuna, and Kulattha* are many others. These drugs possess lipolytic properties that can help dissolve stones, detoxify, balance doshas, reduce inflammation, and alleviate pain and discomfort. *Basti Chikitsa* is considered an effective treatment in *Mootrashmari*. It detoxifies by eliminating the toxins that can contribute to stone formation. It increases hydration in the urinary system, promoting urine flow and aiding in the expulsion of stones. It also relaxes urinary tract muscles, facilitating the passage of stones. Enhancing digestive fire can indirectly support kidney and urinary health, reducing stones. Another mode of treatment is *kshara Chikitsa*, which helps break down

urinary stones due to its alkaline properties, aiding in their dissolution. *Kshara* has anti-inflammatory properties that can alleviate pain and discomfort associated with urinary stones. It can support the healing of the urinary tract lining, preventing irritation and promoting recovery.

CONCLUSION

Mootrashmari, with its diverse manifestations and implications, underscores the importance of understanding urinary disorders within the broader context of health. Its management, rooted in classical and contemporary approaches, highlights the need for a comprehensive strategy.

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