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## Renal calculi and unani medicine: A review

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### Abstract

Kidney stone disease is a crystal concretion formed usually within the kidneys. It is an increasing urological disorder of human health, affecting about 12% of the world population. Ancient Unani Literature is enriched in *Hasaat-e-Kulya* (Renal Stone), where as Unani physician described broadly the pathology, manifestation and treatment. In Unani system of medicine the drug used for renal calculus breaks the stone and then remove it groom urinary system. Pharmacologically it will be treated with single or either compound drugs such as Habbul Qilt, Duqu, Khare Khasak, Jawakhar, Hajrul Yahood, Aqrab Sokhta, Annanas, Aloobaloo, Majoon Hajrul Yahood, Qurs Kushta Hajrul Yahood, Majoon Aqrab, Sharbat Mudir, Habbe Mudir, Sharbat Ananas etc.

**Keywords:** Renal calculi, hasaat-e-kulya, amraz-e-kulya, unani medicine

### Introduction

A stone that develops from crystals that form in urine and build up on the inner surfaces of the kidney, in the renal pelvis, or in the ureters is known as renal calculi<sup>[1]</sup>. Renal stones are hard pebbles that form inside your kidneys<sup>[2]</sup>. Renal stone or calculi or lithiasis is one of the most common diseases of the urinary tract<sup>[3]</sup>. It occurs more frequently in men than women<sup>[4]</sup> Kidney stone disease is a crystal concretion formed usually within the kidneys. It is an increasing urological disorder of human health, affecting about 12% of the world population<sup>[5]</sup>. Increased incidence of kidney stones in the industrialized world is associated with improved standards of living and is strongly associated with race or ethnicity and region of residence.<sup>6</sup> A seasonal variation is also seen, with high urinary calcium oxalate saturation in men during summer and in women during early winter<sup>[7]</sup>. The peak age in men is 30 years; women have a bimodal age distribution, with peaks at 35 and 55 years. Once a kidney stone forms, the probability that a second stone will form within five to seven years is approximately 50%<sup>[8]</sup>. The chemical composition of kidney stones depends on the abnormalities in urine composition of various chemicals. Stones differ in size, shape, and chemical compositions (Mineralogy)<sup>[9]</sup>.

Based on variations in mineral composition and pathogenesis, kidney stones are commonly classified into five types as calcium oxalate stones, cystine stones, struvite stones uric acid stones and drug induced stone<sup>[10]</sup>.

Calcium stones are the most frequent type, accounting for up to 80%<sup>[11]</sup>. Formation of kidney stones (Calculogenesis) is a complex and multifactorial process including intrinsic (Such as age, sex, and heredity) and extrinsic factors such as geography, climate, dietary, mineral composition, and water intake<sup>[12]</sup>.

There are various sign and symptoms of renal calculi such as; sharp pain in your lower belly, back, side, or groin, Nausea and vomiting, Fever and chills, Blood in in urine, feeling of sand or small particles passing through urinate, pain occurs during urinate<sup>[13]</sup>.

There are various complications of kidney stones, including urinary infection, perinephric abscess, or urosepsis. Drainage of an infected obstructed kidney is a medical emergency, and may result in death if left untreated. Infection may also occur after invasive procedures for stone removal. Some of these complications may cause kidney damage and compromised renal function<sup>[14]</sup>.

Investigation begins with an appropriate history and physical examination, followed by selected laboratory tests (X-ray KUB, USG, MRI etc.) aimed at discovering factors that may be contributing to stone formation and also at classifying the activity of the stone disease<sup>[15]</sup> Effective kidney stone prevention depends upon addressing the cause of stone formation. Generally, to prevent the first episodes of kidney stone formation or its secondary episodes,

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proper management of diet and the use of medications is required. Primary prevention of kidney stone disease via dietary intervention is low-cost public health initiative with massive societal implications. Thus, nutritional management is the best preventive strategy against urolithiasis [16].

Ancient Unani Literature are enriched in Hasaat-e-Kulya (Renal stone), Unani physician described broadly the pathology, manifestation & treatment [17].

According to Ali Ibn Abbas Al-Majoosi, renal calculi are formed due to increased Hararate Ghareezia and Madda of these calculi derived from viscous and mucous matter. These matters may be the phlegmatic or viscous or blood [18].

According to Galen, ulceration in kidney is the main cause of kidney stone [17]. Razi mentioned the symptom of calculi i.e. renal pain, incontinence of urine & the person passing sandy precipitate in their urine must have the calculi in his kidney [19].

Any surgical intervention carries the risk of complication. Small renal calculi may cause symptoms by obstructing a calyx as a focus for secondary infection [20].

In Unani system of medicine the drug used for renal calculus breaks the stone and then remove it groom urinary system [17].

Pharmacologically it will be treated with single either compound drugs such as Habbul Qilt, Duqu, Khare Khasak, Jawakhar, Hajrul Yahood, Aqrab Sokhta, Annanas, Aloobaloo, Majoon Hajrul Yahood, Qurs Kushta Hajrul Yahood, Majoon Aqrab, Sharbat Mudir, Habbe Mudir, Sharbat Ananas etc. [18-20].

### Management of renal calculi

Management of stone disease needs individualization [20]. Management of a kidney stone depends on its size, location, and composition and the presence of anatomical malformation and complications [21].

Clinical presentation, proper history, and laboratory tests help to identify whether one needs urgent surgical or medical treatment. Medical management is indicated for clinically stable patients with non-obstructive urinary stones, recurrent stone formers, and the patients with underlying systemic diseases. Detailed history of patient illness including family history, drug history, and history of previous similar illness and previous interventions needs to be recorded. Assessment of risk factors for stone disease should be carried out [20].

Medical management of stone disease includes laboratory evaluation and treatment [22]. Medical treatments of kidney stones includes dietary management, disease-specific therapies, and medical expulsion therapy (MET) of stones [23].

### Dietary management

Fluid intake and dietary changes are important measures in preventing recurrence of kidney stones. Many trials have shown that increasing urine volume to at least 2 L/day OR 2 lit/day can reduce the recurrence of stone disease by up to 40-50% [24]. Fluid intake mainly should include water. As tea and coffee contain oxalate, milk (Which binds free oxalate) should be added to them. However, increasing the urine volume has a disadvantage of reducing urinary citrate. A small reduction in urinary oxalate has been found to be associated with significant reduction in the formation of calcium oxalate stones; hence, oxalate-rich foods like cucumber, green peppers, beetroot, spinach, soya bean,

chocolate, rhubarb, popcorn, and sweet potato should be avoided. Many studies have found calcium restriction to increase the risk of stone disease; therefore, dietary calcium restriction is not recommended. Hypocitraturia is a proven risk factor for stone formation and is found in about 16–63% of calcium stone formers [25, 26]. Oral potassium citrate (Kcit) has been shown to be useful in increasing urinary citrate and reducing the stone recurrence. Dietary replacement with high citrate as a substitute to Kcit has been studied. Lemon juice when delivered as a lemonade therapy was found to increase urinary citrate [27]. Odvina found orange juice to increase urine pH and urinary citrate.<sup>28</sup> Kang *et al.* compared 11 patients taking Kcit with 11 matched patients on lemonade therapy and found both the therapies to increase urinary citrate. However, the effect with Kcit was significantly better than the effect with lemonade [29]. Yilmaz *et al.* studied tomato, orange, lemon, and mandarin juice for nutritional content [30]. Unexpectedly, fresh tomato juice was found to have the highest citrate and low oxalate content. Reduction of animal protein intake is suggested in both calcium oxalate and uric acid stone formers.

### Stone-specific therapies

#### Calcium oxalate stones

In patients with idiopathic hypercalciuria, thiazide diuretics have shown to reduce the recurrence rates by up to 70% [24]. It is the only medical therapy directed at reducing urinary calcium [31]. Citrate supplements as detailed earlier are useful. Pyridoxine sometimes can be useful in patients with primary hyperoxaluria, but not in idiopathic hyperoxaluria [32]. *Oxalobacter formigenes* is an oxalate degrading bacterium found in human gastrointestinal tract. It is thought that increased colonization of the gut might lead to decreased absorption of dietary oxalate and decrease in urinary oxalate excretion. Colonization with *O. formigenes* showed benefit in uncontrolled studies; [33] however, a prospective, randomized, placebo control, double-blind trial refuted such benefits [32, 33].

#### Uric acid stones

The aim of treatment in uric acid stones is to increase the solubility of uric acid in urine. It is achieved by increasing the urine volume and by alkali therapy. Allopurinol is a useful adjunct to the therapy [34].

#### Struvite stones

Struvite stones form in alkaline urine from infection with urea-splitting microorganisms. Antibiotics are the mainstay of the therapy with occasional use of acetohydroxamic acid. [31].

#### Cystine stones

This is a rare stone type. The aim of treatment is to reduce the concentration of free cystine and increase its solubility in urine. A high fluid intake up to 4-5 L/day OR 4-5 lit/day and alkalinization of urine with target urine pH >7 is desirable. Chelating agents like D-penicillamine or tiopronin are indicated when 24-hour urine cystine concentration exceeds 2000 μmol/l [35].

#### General stone-expulsive therapies

MET is treatment with combination of drugs which facilitates the spontaneous passage of ureteric calculi.

Ureteric colic is an emergency and management depends upon the severity of obstruction and degree of renal function deterioration. Approximately 90% of stones <5 mm and 15% of stones between 5 and 8 mm pass spontaneously within 4 weeks, while 95% of those larger than 8 mm require urological intervention [36]. The American Urology Association Nephrolithiasis Clinical Guidelines panel in its recent guidelines have found MET to facilitate and accelerate the spontaneous passage of ureteric stones and the stone fragments generated by shock wave lithotripsy [37]. Smooth muscles of lower ureter innervated by alpha adreno-receptors and abundance of calcium channels, which on stimulation causes peristalsis of ureter, maintain basal tone. Calculus in distal ureter causes ureteric spasm and increases contraction by activating these receptors. Mechanical effects include submucosal edema and associated inflammation. Combination therapy used includes alpha adrenoreceptor blockers, calcium channel blockers, corticosteroid, analgesics, and hydration [33-36]. In a recent prospective, randomized study which compared three drugs as MET for distal ureteral calculi, patients with symptomatic distal ureteral stones >4 mm were randomly assigned to three treatment groups : phloroglucinol and corticosteroid, tamsulosin and corticosteroid, and nifedipine and corticosteroid [37, 38]. Tamsulosin and corticosteroid was the most efficacious combination – stones passed more quickly and the need for analgesics was reduced. A randomized, controlled, prospective study has also shown tamsulosin to be a useful addition to shock wave lithotripsy [38, 39].

Alpha adrenergic receptors are densely located in the smooth muscles of ureter. Alpha-1a-receptors predominate in Kidney outlet, prostate, and proximal urethra, whereas alpha-1d-receptors are seen in lower ureter and detrussor muscle of Kidney [39]. Drugs which block these receptors cause smooth muscle relaxation and inhibits peristalsis and relieves spasm.

Tamsulosin is effective in expulsion therapy as it increases the passage rate and reduces the passage time for stones up to 10 mm. [40]. Calcium channel blockers (CCBs) cause inhibition of calcium channels in distal ureter and decrease the contraction and spasm caused by distal ureter calculus [41]. A study of combination therapy with nifedepine and deflazacort in distal ureter stone resulted in stone expulsion in 79% of the treatment group and in only 35% of control subjects. The average stone size was 5.8 mm (range 3.5-10 mm) for the treatment group and 5.5 mm (Range 3-10 mm) for the control group. CCBs can facilitate spontaneous passage for stones up to 10 mm, though no correlation was found between stone size and expulsion time in the treatment group [42]. Steroids are also found to be useful as medical expulsive agents in distal ureteric stones. Calculus in distal ureter causes inflammation and submucosal edema which further aggravates the obstruction due to the stone per se. Being anti-inflammatory agents, steroids reduce the inflammation and neutrophil-induced damage. This class of drug, in combination with other agents described earlier, improves stone passage and reduces stone expulsion time [43]. Patients receiving MET, who do not pass their stones within 4 weeks, should be referred to a urologist since delay in definitive management may increase the rate of complications, including renal dysfunction, urosepsis, and intractable pain [43, 44]. Side effect profile should be considered before initiation, and during therapy [44].

### Surgical treatment

Surgical management has recently been reviewed elsewhere and about 10-20% of all kidney stones need radiological or surgical intervention to remove the stone [45]. For proximal ureteric stones, shock wave lithotripsy is useful if the stone is less than 1 cm in size, and ureteroscopy is more successful for stones larger than 1 cm. The preferred approach for distal ureteric stones is controversial. Shock wave lithotripsy and ureteroscopy have shown similar stone-free rates in distal ureteric stones of less than 7 mm. Ureteroscopy is less expensive than shock wave lithotripsy but is more time consuming and technically demanding. Shock wave lithotripsy is less efficacious if the stone is dense (Attenuation value of more than 1000 Hounsfield units) on helical computed tomography and might adversely affect ovarian function when used for distal ureteric stones in women. Ureteroscopy using the holmium: yttrium-aluminum-garnet (YAG) laser (Photothermal lithotripsy) is effective for stones of all compositions and sizes, with a success rate of 97-100% [46].

### Medical treatment to prevent recurrent stones

Medical management to prevent recurrence after a first stone episode is not cost effective [47]. All patients should be advised to follow general treatment recommendations for prevention of stone recurrence, and specific treatment should be advised to patients with specific problems or with frequent recurrences (A stone at least every three years). Medical prophylaxis is effective in up to 80% of patients with recurrent calcium stones [48].

### Usul-e-Ilaj of Hasaat-e-Kulya

#### Unani pharmacotherapy for urolithiasis

The treatment of urolithiasis in Unani system of medicine is in two steps:- (i) Symptomatic treatment given during the attack of pain or renal colic. (ii) Curative treatment after the symptoms of pain subsides [17].

#### Symptomatic treatment

Nutul (Irrigation) and massage with roghan (Oil), and use of Zimad (Paste) and Qairuti (Pollice) on the affected part is useful in this condition but these measures must be done in controlled manner so that “Quwwat-e Dafeah” (Evacuating power) should not get exhausted, then “Mufattit” (Lithotryptic) and “Mushil” (Purgative) drugs can be used. [17-19].

#### Drugs beneficial in urolithiasis

In Kitab Al-Kulliyat, Ibn-e-Rushd writes that the statements of many physicians that, the drugs used mufattitat-e-hissat (Lithotryptic) must have mild temperature because severe degree of heat makes substances harder, such as the abnormal heat responsible for the formation of renal stones. Hence the amount of heat in the drugs used as lithotryptic must be less than that required for the formation of stones. The principle used is, any substance or morbid matter which is under the influence of har (Hot) and yabusat (Dry) can be correct by barudat (Cold) and ratubat (Moist). Hence the temperament of drugs to be used for the treatment of urolithiasis must be less hot comparatively. These mild degree drugs bring equilibrium in the morbid matter or substance and the normal heat expels them out of the body. The drugs beneficial are halyun, chana, badam etc. It is also possible that these drugs act due to their constituents and

their characteristic features. Drugs which are used to expel the urinary stones must be talkh (Bitter) in taste, not very hot, and have the property of taqti (Cutting into small bits). Drugs used for Kidney calculi must be slightly hotter than those used for renal calculi. However few drugs are used which act because of their mufattit (Lithotryptic) property and not because of hot or cold temperament. There are some drugs which are useful in renal calculi Hajrul Yahud. Fewer drugs are beneficial in both Kidney and renal calculi. Some drugs do not have the property of nuzj, but a few are mufattit as well as have the property of nuz like Habbul Qilt. abbul Mudirr-e-Baul property also have mild degree of hararat which helps the kidneys to absorb the liquid matter. All those drugs which are act as diuretics such as Karafs (*Apium graveolens*), Badiyan (*Foeniculum vulgare*), Duqu (*Peucedanum grande*) etc., acts as Mufattite Hissat<sup>[17-19]</sup>.

### Conclusion

*Hasaat-e-Kulya* is a most common globally and is painstaking common painful condition. Prevalence is increasing day by day. Though males are at higher risk of developing ranalcalculi than females. According to Unani Medicine it arises due to Sue Mizaj Gurdah, Qarha, Ghaleez Madda and their stationary. Fluid intake and dietary changes are important measures in preventing recurrence of kidney stones.

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