

## A literary review on Urolithiasis and its treatment procedures in the perspective of Unani system of medicine

Wajeehu S.<sup>1</sup>, Fahamiya N.<sup>2</sup> and Shiffa M.<sup>3</sup>

### Abstract

Urolithiasis is crystallization of particles within the kidneys which is also known as kidney stones. Development of renal calculi is a complex process which is a state of disturbed equilibrium in the kidney between the promoters and inhibitors. The etiology is multifactorial, but strongly related to dietary habits and lifestyle. This is mainly made up due to presence of high crystals in urine like calcium, oxalates, uric acid and low citrates. Unani healing system approaches the literature of renal calculi in classical texts as *Hasat e Kulliyah* (kidney stone), *Hasate Masana* (bladder stone) and *Hasate Kulliya wa Masana* (kidney and bladder stone). As it is an increasing urological disorder among population, this literary research is aimed to target about the remedial measures in Unani medicine. Therefore, systematic literature review has been carried out to gather information on renal calculi and its remedial measures from Unani classical text and pharmacopeias, ethno-botanical literatures, scientific journals and data bases. The gathered data was analyzed and the results showed that according to Unani philosophers' factors responsible for urolithiasis are weakness of kidney, thick and viscous humor, concentrated and sticky fluid, *Su-e-Mizaj Kulyah* (weakened temperament of kidney), *Warm-e-Kulliyah* (nephritis), *Qurooh-e-Kulliyah* (kidney ulcer), *Quwwat-e-Dafiyah* (weakness of expulsive power) and high virulent temperature. The calculi are treated mainly by dietary and lifestyle modification, as well as *Mufattite Hasat* (lithotriptic) and *Mudir*

(diuretic) drugs, regimental therapies and surgical procedures. It will be treated with single or either compound drugs such as *Habbul Qilt*, *Duqu*, *Khare Khasak*, *Jawakhar*, *Hajrul Yahoood*, *Aqrab Sokhta*, *Ananas*, *Aloobaloo*, *Majoon Hajrul Yahoood*, *Qurs Kushta Hajrul Yahoood*, *Majoon Aqrab*, *Sharbat Mudir*, *Habbe Mudir*, *Sharbat Ananas* etc.

**Keywords:** *Hasat e Kulliyah*, Urolithiasis, kidney, Unani medicine, calculi, *Kulliyah*

### Introduction

Urolithiasis is crystallization of particles within the kidneys which is also known as kidney stones. This is known to be as the most common diseases of the urinary tract.<sup>1</sup> Renal calculi (hard solidified particles) develop mainly the kidney surfaces interiorly, in the renal pelvis, or in the ureters.<sup>2</sup> Stones are formed in the presence of high crystals in urine including calcium, oxalates, phosphates, uric acid and low citrates. When the equilibrium state of these crystals are disturbed particles solidify to form calculi. They are found in various sizes and can be found anywhere in the urinary tract. It is a very common and highly prevailing condition among the population which affects the health state of every individual. Around 12% of population are affected and the risk state of recurring is by 50% in the period of 5-7 years.<sup>3</sup> Chances of renal calculi are more common in women because they excrete more citrate. Therefore, incidence of stone formation is very less. There are intrinsic and extrinsic factors which play a major role

<sup>1</sup>British College of Applied Studies, Colombo, Sri Lanka.

<sup>2</sup>Department of Unani Pharmacology, Faculty of Indigenous Medicine, University of Colombo, Sri Lanka.

<sup>3</sup>Department of Unani Clinical Medicine, Faculty of Indigenous Medicine, University of Colombo, Sri Lanka.

\*Correspondence: Wajeehu S., Visiting Lecturer, British College of Applied Studies, Colombo, Sri Lanka.. Email: wshifka@gmail.com

in the formation of kidney stones which is known to be complex and multifactorial process. Age, sex, and heredity are known to be as inborn factors while geography, climate, dietary, mineral composition, and water intake are known external factors.<sup>4</sup>

Sharp pain in the lower abdomen, back or groin which are not easily relieved by ordinary pain killers but may need analgesics to sedate the pain, nausea, vomiting, fever and chills, blood in urine, feeling of sand or small particles passing through urine and pain during urination are some most common signs and symptoms.<sup>5</sup> Urinary calculi may also cause obstruction in the pathway, hydronephrosis, infection and this may result in hemorrhage in the urinary tract system<sup>6,7</sup>. In urolithiasis, due to the obstruction of the outflow of urine formed by the stones in the urinary system there is a decrease in the glomerular filtration rate (GFR). Decreased GFR causes retention of waste particles such as nitrogenous substances, urea, creatinine and uric acid to get sedimented in blood.<sup>7,8,9</sup> Surgically operation in surgical, lithotripsy and local calculus disruption using high-power laser are widely used to remove the calculi. Modification of lifestyle is a very important factor in the prevention of kidney stone in the individuals who have a low risk of recurrence, whereas individuals with recurrent stones are advised to consume citrate supplementation and medications. A balanced diet is ideal for preventing stone recurrence with fruits and vegetables which are having a high fiber and alkaline content, normal calcium content, drinking alkaline mineral water and limited sodium and animal protein.<sup>10,11</sup>

Risk factors to develop renal calculi are loss of water from the body, genetical reasons, Cystinuria (a genetic disorder), intake of high proteins, fats, sodium and sugar in the diet, people with kidney infections and urinary tract infections (especially women), obesity and metabolic syndrome.<sup>12</sup>

Unani classical texts have well explained on *Hasaat-e-Kulya* (renal stone) and Unani physicians have described broadly the pathology, manifestation and treatment.<sup>13</sup> Therefore, knowing about renal calculi in Unani classical texts and finding out the remedies are very important.

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## Materials and Methods

Systematic literature review carried out to gather information on renal calculi and its remedies from Unani classical text, ethno-botanical literatures, and scientific journals and from data bases. Unani pharmacopoeia also contains many drug formularies for the above condition. Data are mainly included from Unani classical texts and ethno-botanical literatures. Research articles from unauthentic sites and unproven ones were excluded. The ethno-botanical literatures of herbal, animal and mineral origins used for lithotriptic were analyzed with Unani classical texts under different terminologies.

## Results

### *Unani description on Urolithiasis*

Unani healing system approaches the literature of renal calculi in classical texts as *Hasat e Kulliyah* (kidney stone), *Hasat e Masana* (bladder stone) and *Hasat e Kulliya wa Masana* (kidney and bladder stone). According to Unani medicine morbid thick particles stagnate to form renal calculi. *Ghaleez madaa* (the thick morbid particles) formed by consumption of *Ghaleez Aghzia* (thick heavy food) such as *Ghaleez* meat, fish, concentrated milk and dairy foods which are not easily digested are the main reasons for stagnation. Therefore, crystallization of these particles occurs between the kidneys to the bladder. Factors responsible for urolithiasis are weakness of kidney, thick and viscous humor, concentrated and sticky fluid, *Su-e-Mizaj Kulyah* (weakened temperament of kidney), *Warm-e-Kulliyah* (nephritis), *Qurooh-e-Kulliyah* (kidney ulcer), *Quwwat-e-Dafiyah* (weakness of expulsive power) and high virulent temperature<sup>14,15</sup>.

### *Various theories associated to Urolithiasis by ancient Unani Philosophers*

Ibn-e-Abbas Majoosi (930-994 AD) stated that due to high virulent temperature the viscous fluids dry up. This dried fluid adheres to calyces to form crystals resulting in stone formation. Jaleenous described ulcer in the kidney is the main cause for urolithiasis.<sup>16,17,18,19</sup> According to Ali Ibn-e-sina (980-1037 AD) active power (*Quwat-e-Taayelah*)

raises the temperature inside the kidney, and he also mentioned that stone producing substance is viscous (sticky matter) which may be either phlegm or viscous blood or pus and this retains in the calyces of kidney when *Quwwat-e-Dafiyah* become weak.<sup>20</sup> According to Ibn-e-Zohr (1091-1162 AD) when there is weakness in the kidney there is difficulty in excreting *Ghaleez mada* from the urinary tract. This causes sedimentation of the particles.<sup>21</sup> Zakariya Razi (850-932 AD) mentioned that the body produce abnormal humours which are evacuated in the form of thick fluid moves towards kidney and form stone.<sup>22</sup>

### **Pathophysiology of renal calculi**

Renal calculi formation is a multicomplex process which occurs when high concentration of humours (*Akhlat*) and increased viscosity of fluid adhere to the calyces of kidney. Due to high temperature supersaturation of solute in urine undergo nucleation, growth and the viscous fluid dries up. Hence, retention of humors increases and gradually forms calculi. This process can be influenced by promoters and inhibitors in the kidney. The imbalance between them can produce stones. There are many promoters and inhibitors in the body. Calcium, sodium, oxalate, urate, pH of urine being low, low urine volume and Tamm-Horsfall protein act as promoters while magnesium, citrate and Pyrophosphate act as inorganic inhibitors and Tamm-Horsfall protein (Glycoprotein), Urinary prothrombin fragment, Renal lithostathine, Glycosaminoglycans, Osteopontin (Uropontin) and Nephrocalcin act as organic inhibitors.<sup>23,24,25</sup> Calcium oxalate stones are mainly formed due to hyperoxaluria and due to decreased calcium oxalate solubility in the presence of uric acid.<sup>26,27</sup> Urine citrate can be decreased due to chronic diarrhoea, renal tubular acidosis and high animal protein diet which in turn produces calculi.<sup>28</sup> Increased purine diet is the reason for hyperuricosuria which produces uric acid and calcium stones. Hyperparathyroidism results in hypercalcuria which increase the risk of calcium stone formation.<sup>29</sup> The main risk factors of urinary calculi are inadequate urinary drainage, increased intake of *Wajeehu et. al., A literary review on Urolithiasis*

calcium and oxalate diet, urinary tract infections (especially in females), vitamin A deficiency, increased vitamin D, hyperparathyroidism, hypertension, obesity, gouty arthritis, cystinuria, intestinal dysfunction and hot and dry climate causing dehydration.<sup>30</sup> Anatomical abnormalities also play a major role in stone formation. They are horseshoe kidney, obstruction of the uretero-pelvic junction, complete or incomplete duplicated ureter, bifid pelvis, and medullary sponge kidney.<sup>31</sup>

### **Signs and symptoms<sup>8,9,10,11</sup>**

Nausea and vomiting, fever, blood in urine, abdominal pains which can be severe colic pains (sometimes these pains don't suppress for pain killers unless analgesics taken), obstruction of urine and difficulty in urine passage, urge to pass urine frequently (male patients complain of having pain at the tip of the penis), and these may lead to infections and oedema.

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

*Usul-e-Ilaj* of *Hasaat-e-Kulya* that is principle of remedial measure of urolithiasis in Unani system of medicine are categorized into two steps. One is mainly the remedial measure followed when there is the attack of pain or colicky pain and the second is the treatment procedure followed after the symptoms of pain subsides. This can be as curative treatment given with *Mufattite Hasat* (lithotriptic), *litholytic*, *Mohallil* (resolving) and *Mudir* (diuretic) drugs.<sup>32</sup>

The easiest and the most common method of expulsion of calculi is advising to increase fluid intake which increases urine out-flow resulting in expulsion of calculi naturally. But only the small stones can be passed with natural remedies. Therefore, beneficial effects by the phytoconstituent in herbal drugs are mainly considered in the *Usul-e-Ilaj* of *Hasaat-e-Kulya* due to their main actions such as, diuretic activity which helps in natural passage of calculi with much of external efforts (increases the volume of urine, pH of urine and anti-calcifying activity of urine), crystallization inhibition activity which helps to inhibit and promote solidification in

urine by affecting the crystal nucleation, aggregation and growth, antimicrobial activity, lithotriptic activity which relieves the binding mucin, antioxidant activity which improves the status of renal tissue and cell membrane integrity, analgesic and anti-inflammatory activity which helps to overcome pain, burning micturition and haematuria, control of oxalate metabolism, management of the imbalance in crystalloid colloid, enhancing the functional activity of renal and obstruct ACE and phospholipase.<sup>[33,34]</sup>

### *Ilaj-bil-Ghiza*<sup>35,36,37,38</sup>

Prevention is much important as it helps to maintain a healthy lifestyle. Therefore, it is always advised to prevent renal calculi and recurring state by increasing fluid intake and by modifying the dietary patterns. Patient should be advised to drink plenty of water which helps to flush away the kidney stones out of the body. Coffee, alcohol, tea, and soda consumption should be reduced while flushing out a stone as drinking these can produce dehydration due to their dryness property and this may worsen the pain.

Drinking lemon juice and olive (*Olea europeae*) oil helps to prevent stones. Lemon juice is rich in citrate which breaks the stones and olive oil helps to pass out the stone smoothly throughout the pathway. Lemon juice mixed with olive oil and sugar relieves the pain during the passage of stone. Hydroxycitrate (HCA) compound dissolves calcium oxalate crystals.

Orange juice, Pomegranate seeds and the juice which is rich in potassium is very effective in removing the kidney stones as it prevents crystal formation due to sedimentation. This also has astringent properties which reduces the stone formation and the waste materials are removed from the kidney hence, the acidity levels in the urine becomes low.

Kidney beans are rich source of fibers, minerals and B vitamins that helps in cleaning the kidneys. Easily digestible foods are preferred to be consumed in Unani texts. Ex: *Aab-e-Naryl* (coconut water), carrot, chicken, pear, almond, goats heart (*qalab-e-ghenam*) and Sparrow (*Asaafeer*). Also, tomato, amla, cashew nuts, pumpkin, spinach, amaranth leaves, mushrooms, cauliflower, brinjal should be avoided. Consumption of increased alcohol, tea, coffee,

caffeinated beverages, wine or beer, animal proteins, grapefruit juice, apple juice and salt are also at high risk in increasing stone formation. Dietary calcium intake helps in binding with oxalates. Therefore, low calcium diets do not prevent kidney stones.<sup>39</sup>

### *Ilaj-bil-Dawa*

Pharmacologically either single or compound drugs are beneficial in treating renal calculi.<sup>40,41,42,43,44,45,46</sup>

Single drugs are mentioned in Table 1.

**Table 1: Single drugs used in renal calculi**

Tibbi Name	Botanical Name	Actions
<b>Plant origin</b>		
<i>Habb-ul-Qilt</i>	<i>Dolichos biflorus</i>	Litholytic (Mufattite Hissat) Lithotriptic (Mukhrij-e-Hisat)
<i>Khar-e-Khasak</i>	<i>Tribulus terrestris</i>	Litholytic
<i>Dooqu</i>	<i>Peucedanum grande</i>	Diuretic (Mudir-e-Baul) Litholytic, Lithotriptic Nephroprotective (Muqawwi-e-Gurdah)
<i>Aalu Balu</i>	<i>Prunus cerasus Linn</i>	Lithotriptic Diuretic
<i>Beekh-e-Badyan</i>	<i>Foeniculum vulgare</i>	Diuretic
<i>Post beikh-e-Karafs</i>	<i>Apium graveolens</i>	Lithotriptic Diuretic
<i>Beekh-e-Neil</i>	<i>Ipomoea nil Linn</i>	Litholytic
<i>Beekh-e-Gh'ar</i>	<i>Prunus Laurocersus</i>	Diuretic Anti-inflammatory (Mohalli e warm) Nephroprotective
<i>Beekh-e-Halyoon</i>	<i>Asparagus officinalis Linn</i>	Diuretic Thrombolytic Litholytic Lithotriptic
<i>Khurfah</i>	<i>Portutaca oleracea Linn</i>	Lithotriptic Diuretic Anti-inflammatory
<i>Charchatah</i>	<i>Achyranthes aspera</i>	Diuretic
<i>Kaaknaj</i>	<i>Physalis alkekengi</i>	Diuretic Litholytic Lithotriptic Nephroprotective
<i>Qurtum</i>	<i>Carthamus tinctorius</i>	Litholytic Lithotriptic
<i>Tukhm-e-Khurfah</i>	<i>Portulaca oleracea</i>	Diuretic
<i>Tukhm-e-Khayaar</i>	<i>Cucumis sativus Linn</i>	Diuretic Lithotriptic

<i>Maghz-e-Tukhm-e-Kharboosa</i>	<i>Cucumis melo</i> Linn	Litholytic Lithotriptic	<i>(Adiantum capillus)</i> , <i>Hulbah (Trigonella foenum)</i> , <i>Khurfah (Portutaca oleracea)</i> , <i>Banafshah (Viola odorata)</i> , and <i>Beekh-e-Kibr (Capparis spinosa)</i> can be used. <sup>47,48</sup>
<i>Tukhm-e-Gazar</i>	<i>Daucus carota</i> Linn	Litholytic	
<b>Mineral origin</b>			
<i>Hajr-ul-Yahood</i>	<i>Lapis judaicus</i> (Jewes stone)	Diuretic Nephroprotective	<b><i>Ilaj-bil-Yad</i></b> <sup>49</sup> If the above-mentioned treatment procedure fail, surgical intervention is done to remove renal calculi. About 10-20% need radiological or surgical procedures. If the stone size is less than 1 cm shock wave lithotripsy is useful for proximal ureteric stones and if the stone size is greater than 1 cm ureteroscopy is effective.
<i>Jawakhar</i>	<i>Potassium carbonate</i>	Litholytic Lithotriptic	
<i>Shorah qalami</i>	<i>Potassium nitrate</i>	Diuretic	
<i>Sang -e-sarmahi</i>	<i>Fish stone</i>	Litholytic Lithotriptic	
<i>Shibb-e-Yamani</i>	<i>Alum</i>	Litholytic Lithotriptic	
<b>Animal origin</b>			
<i>Aqrab Sokhata</i>	<i>Burnt scorpion</i>	Litholytic	
<i>Kharateen-e-Mas'hooq</i>	<i>Earthworm</i>	Litholytic	
<i>Asaafeer</i>	<i>Sparrow</i>	Litholytic	

### Compound drugs used in renal calculi

*Qurs-e-kaaknaj*, *Majoon-e-Aqrab*, *kushta-e-Hajr-ul-yahood*, *Kushta Hajr-ul-Yahood*, *Qurs kushta Hajr-ul-yahood*, *Sharbat Aaloo Balu*, *Jawarish Zarooni saada*, *Jawarish Zarooni Ambari*, *Ikseer-e Gurdah*, *Majoon-e-Sang-e-Sarmahi*, *Hab-e-Mudir*, *Sharbat-e-Buzoori Motadil* etc.

### *Ilaj-bil-Tadbeer*<sup>1,8</sup>

Basic aim of regimental therapy is to change the consistency (soft) of morbid matter (*Ghaleez mada*) into soft easily digestible expulsive form and resolving the disease matter (*Taqtee-e-Maddah*). Various techniques are followed for the above purpose. Purgation (*Mushilat*), enema (*Huqna*), venesection (*Fasad*) and Sitz bath (*Aabzan*) are indicated. *Sapistan (Cordia latifolia)*, *Maghz-e-Amaltas (Cassia fistula)* and *Anjeer (Ficus carica)* can be used as mild Purgatives (*Mushilat*). *Luaab-e-tukhm-e-Khatmi (Althoea officinalis)*, *Luaab-e-Katan (Linum usitatissimum)* and *Luaab-e-Hulbah (Trigonella foenumgraeceum)* can be given as *huqna* and orally *Roghan-e-Badam* (Almond Oil) with *Maghz-e-Amaltas (Cassia fistula)* can be given in obstructions as enema. To relieve pain the patient is advised to follow sitz bath which sedates the pain. For this *Baboona (Maticaria chamomilla)*, *Shibt (Anethum sowa)*, *Karafs (Apium graveolens)*, *Qurtum (Carthamus tinctorius)* *Pershioshan Wajeehu et. al., A literary review on Urolithiasis*

### Discussion

*Hasaat-e-Kulya* is crystallization of particles within the kidneys which is also known as kidney stones. This is known to be as the most common diseases of the urinary tract globally and is a common painful condition. Stones are formed in the presence of high crystals in urine including calcium, oxalates, phosphates, uric acid and low citrates. When the equilibrium state of these crystals are disturbed particles solidify to form calculi. They are found in various sizes and can be found anywhere in the urinary tract. It is a very common and highly prevailing condition among the population which affects the health state of every individual. Around 12% of population are affected and the risk state of recurring is by 50% in the period of 5-7 years. Males are at higher risk of developing renal calculi than females.

Unani healing system approaches the literature of renal calculi in classical texts as *Hasat e Kulliyah* (kidney stone), *Hasat e Masana* (bladder stone) and *Hasat e Kulliya wa Masana* (kidney and bladder stone). According to Unani medicine morbid thick particles stagnate to form renal calculi. *Ghaleez madaa* (the thick morbid particles) formed by consumption of *Ghaleez Aghzia* (thick heavy food) which are not easily digested are the main reasons for stagnation. Therefore, crystallization of these particles occurs between the kidneys to the bladder. Apart from preventive measures, Unani formulations have been successfully tested over a period of time

and used effectively for treating renal calculi. The remedies in Unani medicine mainly discusses about the four main treatment methods which are *Ilaj-bil-Ghiza*, *Ilaj-bil-Dawa*, *Ilaj-bil-Tadbeer* and *Ilaj-bil-Yad*.

Searched literature indicated that dieto-therapy plays a major role in the prevention and management of renal calculi. Also, there are many single drugs and compound formularies that can be utilized in the prevention and management of renal calculi. Ethno-botanical literatures collected on plant, animal and mineral origins and they're actions are explained in detail. Regimental therapies are also successful techniques followed in treating. If the above methods fail, surgical procedures are conducted.

### Conclusion

This is known to be as the most common diseases of the urinary tract. Renal calculi (hard solidified particles) develop mainly the kidney surfaces interiorly, in the renal pelvis, or in the ureters. When the equilibrium state of these crystals are disturbed particles solidify to form calculi. This stone (hard pebbles) develops on the inner surfaces of the kidney, in the renal pelvis, or in the ureters. Around 12% of population are affected and the risk state of recurring is by 50% in the period of 5-7 years. Therefore, it is very important in knowing about urolithiasis and treatment procedures in the system of Unani medicine. Principle of remedial measure of urolithiasis in Unani system of medicine are categorized into two steps. One is mainly the remedial measure followed when there is the attack of pain or colicky pain and the second is the treatment procedure followed after the symptoms of pain subsides. This can be as curative treatment given with *Mufattite Hasat* (lithotriptic), litholytic, *Mohallil* (resolving) and *Mudir* (diuretic) drugs. There are many single drugs and compound formularies that can be utilized in the prevention and management of renal calculi. To get maximum benefits of these medicinal plants it is a need of hour to do more research in these medicinal plants to provide effective, better-quality and safer drugs for humanity.

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