

Kidney stone: A clinical review

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Abstract

Kidney stone disease is a crystal concretion normally produced within the kidneys. it is the third most common disorders of urinary system. kidney stone is a common condition causing significant morbidity and economic burden. At any point in their lives, between 1% and 15% of persons worldwide are affected by kidney stones. Kidney stones are of various types, of which calcium oxalate is the most common. Remarkable advances have been made in the treatment of kidney stones following the introduction of percutaneous nephrolithotomy and extra corporeal shock wave lithotripsy (ESWL). Today's, Computed Tomography (CT) scan without contrast medium is the preferred screening method for investigating urolithiasis. The recurrence rate reaches approximate 50%, risen to 70% within 10 years, which is a significant problem in its therapy and management. Herbal therapies have found to be more effective with minimal associated after effects and also minimize the recurrence rate. Data from research and clinical trials showed that phytomedicine and plants derived products are useful in the treatment of kidney stone diseases. So the aims of present review to provide an update data about composition and mechanism of stone formation, current methods for investigation and the present trends in research of medicinal herbs used in the management of urolithiasis disorder.

Keywords: *Kidney stone, Urolithiasis, Renal stone, Calcium oxalate, Calcium phosphate*

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I. Introduction

Kidney stone is the third most common urological disease, which has high morbidity and socio-economical impact and low mortality. It is a long-standing medical condition and also a prevalent public health problem.¹ It affects up to 20% of general population worldwide. Through the growth of civilization, its frequency has risen and varies through region, geographical area, etc. Its world prevalence is estimated between 1 to 5%, in developed countries 2-13% (with a great variation among them) and in developing countries 0.5-1%. In different areas of the globe, the average chance of forming stones varies; 1-5 % in Asia, 5-9 % in Europe, 13 % in North America, 20 % in Saudi Arabia.² Recurrent rate of urolithiasis is high, which is a significant problem in its therapy and management. The recurrence rate reaches approximate 50%, risen to 70% within 10 years. The etiology of kidney and urinary tract stone is multifactorial. An imbalance in the urine of stone modulators (antagonist and agonists) allow to stones formation. Elevation of stone promoters (e.g. calcium, oxalate, phosphate and uric acid) or reduction of inhibitors (e.g. citrate, potassium, magnesium and anion bimolecular) creates super saturated urine; consequently, nucleate crystals and agglomerate and eventually calculi are formed.³ A number of epidemiological and experimental studies have identified risk factors of stone occurrence which are classified in to extrinsic and intrinsic factors. Intrinsic risk factors includes namely genetic background, sex, age, body mass index and ethnic; whereas extrinsic risk factors are dietary habit, water consumption, lifestyle, climate, occupation, drug and stress. Kidney stone affects the male rather than female and obese person have higher risk than the lean ones. About 80% of the stone consists of calcium oxalate and calcium phosphate, 10% of struvite (magnesium ammonium phosphate generating bacterial contamination with the enzyme urease), 9% of uric acid, and the remaining 1% were made of cystine or ammonium acid urate or diagnosed as drug-related stones.⁴ The medical management of urolithiasis has under gone a great change. The treatment of urolithiasis is not just the removal of stones at present times, but also the avoidance of its recurrence. With recent advances in the understanding pathogenesis of urolithiasis, the medical treatment is not only confined to increased fluid intake, but investigate the cause of urolithiasis by a battery of investigates, the use of a specific medication if necessary to avoid urolithiasis, and then to test the efficacy of the drug by carrying out investigations.⁵ With hydration and pain control, calculi smaller than 5 mm will pass spontaneously in approximately 90% of patients. The rate of passage decreases as stone size increases; a 1 cm stone has a <10% chance of passing without surgical intervention. Currently the treatment options for urinary calculi include drug therapy, surgical removal and extracorporeal shock wave lithotripsy (ESWL). The high recurrences rate, even after surgery or ESWL, is a major problem.

Composition of kidney stone

A kidney stone is a cluster of crystals when they formed together to create a hard lump in one or both kidneys. They can vary in size from a few millimetres to several centimetres. The majority of stones will pass out of the body in the urine without any help, but some will require intervention to remove them. The Urinary stone have been created with the crystal of phosphate, uric corrosive, magnesium ammonium phosphate with apatite and struvite. Among the urinary stones, calcium-containing stones have been found to about 75% of every urinary analytics, which might be available as crystal of unadulterated calcium oxalate (half), calcium phosphate (5%) and a blend of the two mixes (45%). The diet can affect the concentration of certain substances in the urine and can affect the acidity of urine. The 24-hour urine collection of urine may find any of the given properties have increased risk of forming a stone.⁶

- I. High levels of calcium (hypercalciuria)
- II. High levels of oxalate (hyperoxaluria)
- III. High levels of uric acid (hyperuricaemia)
- IV. Low levels of citrate (hypocitraturia)

Stone formation may be a complicated method involving crystal nucleation, aggregation and/or secondary nucleation, fixation among the kidney, and a lot of aggregation and secondary nucleation. These steps are heavily modulated by the balance of amounts of stone constituents showing in tubular fluid, their concentration as pH water excretion, the hydrogen ion concentration of ph fluid and/or urine, and therefore the balance of promoters and inhibitors that are not major parts themselves of the clinical stones. whereas these influences appear to explain stone formation, none of them specifically distinguish the stone forming population from non-stone formers, with the potential exception of these persons with genetic cystinuria, and there's a small percentage during which no abnormality may be identified. even so, success ways for decreasing stone recurrence rate are based on manipulating these processes.⁷(figure 1)

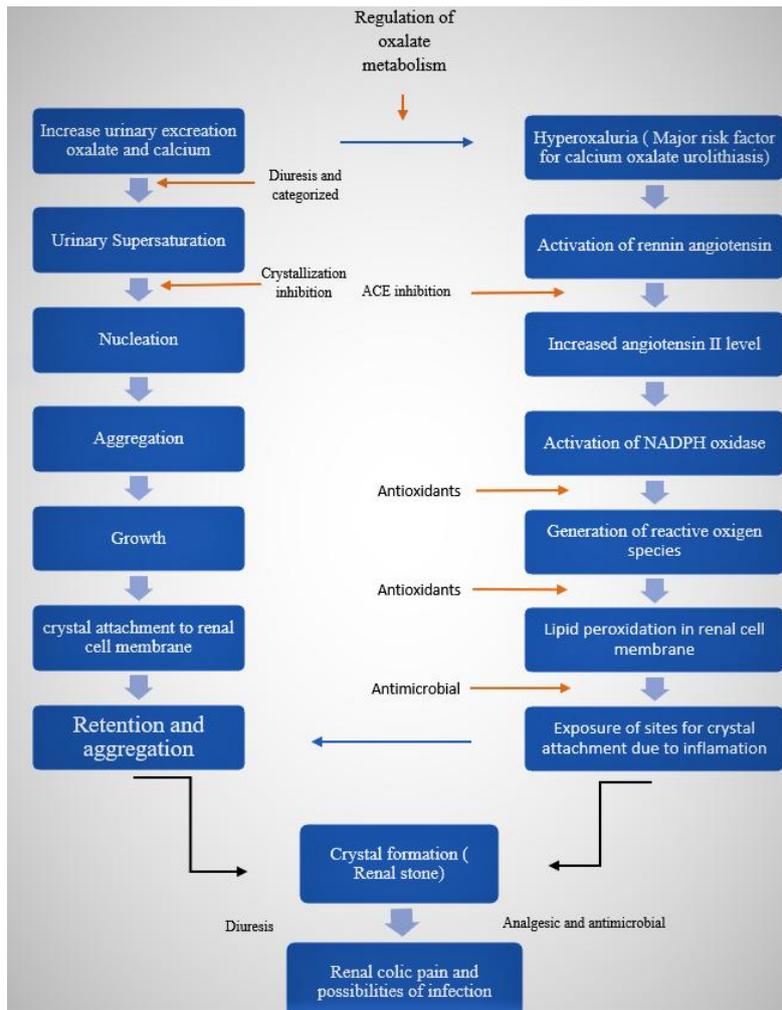


Figure 1: Mechanisms of Renal Stone Formation

II. Types of kidney stone

Calcium oxalate stones

Calcium oxalate stones reducing the urine oxalate decreases calcium oxalate super-saturation. In patients with a severe type of nephrolithiasis, the only known method to minimize endogenous oxalate production is to avoid high-dose vitamin C supplements. Firstly, foods containing large levels of oxalate, such as lettuce, rhubarb and potatoes, should be avoided. Higher calcium intake decreases the absorption of oxalate; thus, it is recommended that individuals with higher than ideal urinary oxalate consume sufficient calcium. Citrate is a natural calcium oxalate inhibitor and a calcium phosphate block. More food intake should be promoted which is rich in alkali.

Calcium phosphate stones

Calcium phosphate stones share the same risk factors as with calcium oxalate stones, for example higher levels of urinary calcium and lower concentrations of urinary citrate. There are no current clinical trials to support preventive recommendations for calcium phosphate stone formers, so the therapies focus on improving the established risk factors. Reducing the dietary phosphate can help to reduce urinary phosphate excretion.⁹

Uric acid stones

The key component of uric acid production involves increasing urine pH. Although urine acidification can be difficult, urine alkalinisation can be accomplished easily by increasing the intake of alkali-rich foods (e.g., fruits and vegetables) and reducing the intake of acid-producing foods.¹⁰ Supplementation with bicarbonate or citrate salts (preferably potassium citrate) can be used all day and night to achieve the desired pH target of 6–7.

Struvite or Magnesium Ammonium Phosphate

Struvite stones occur in the range of 10–15 percent and were also called infection stones and triple phosphate stones.¹¹ It occurs in patients with chronic urinary tract infections that cause urease, with *Klebsiella pneumoniae*,¹² *Pseudomonas aeruginosins* and *Enterobacter* being the most prevalent pathogens and *Proteus mirabilis*.

Kidney stones can be as small as a grain of sand or as large—sometimes larger than pearl. They can remain in your kidneys or travel through your ureters (the cylinders that go from your kidneys to your bladder), and out of your body with your pee. At the point when a kidney stone travels through your ureters and out your urethra with your pee, it is called passing a kidney stone. A kidney stone can likewise stall out in your urinary lot and square pee from overcoming. At the point when you pass a kidney stone or an enormous kidney stone obstructs the progression of your pee, it tends to be difficult. Generally patients with kidney stone manage with non-steroidal anti-inflammatory drugs, pain killers until the condition becomes unmanageable.¹³ Then only open surgery, laparoscopy, extracorporeal shock wave lithotripsy, etc. standard procedures in urology practices are applied. However, traumatic effect, chances of infection, acute renal injury, recurrence of urolithiasis and high cost of these make people to move toward indigenous treatments to get rid of the problem. Herbal formulations are officious and have lesser side effects compared to modern medicine and also reduce the recurrence rate of renal stone. Therefore, it is worthwhile to look for an alternative to these means by, using medicinal plants or phototherapy. Keeping above knowledge in the mind, the current study is development and evaluation of herbal formulation used in kidney stone.

Sign and symptoms

The subject did not describe the weather he is suffering from kidney stones; without identification, it does not cause any signs to be observed. Upon passing the stone in the kidney, it travelled through ureters to the bladder.¹⁴ When some of the stones remain in the ureters, they obstruct the flow of urine from the kidneys and cause it to swell; this disorder is called hydronephrosis.¹⁵ It had caused a lot of kidney pain. Rare kidney stone symptoms are checked with.

- ✓ An acute, sudden, sharp and wavy pain in the back and its whole side, which can be moved to the lower abdomen or genital space. Some of the women patients say the pain which is worse than childbirth labour pains. It makes a situation of come and goes pain with discomfort.¹⁶
- ✓ A feeling of sudden urinate.
- ✓ Burning feeling at urination.
- ✓ The colour of the urine will be dark or red due to blood particles of RBCs. In some cases, the colour of the blood is very less that is not seen by naked eyes.
- ✓ Feeling of nausea and vomiting.

- ✓ Male patients feel pain at the tip of their penis.

Risk of factors

Dietary factors are key points for promoting or inhibiting the development of kidney stones. Other variables that include climate, body weight, genes and how much of a fluid intake will shape the stone. The following of factors that may increase the risk of kidney stones being promoted.¹⁷

- Dehydration of the body.
- Kidney stones may be come by genetically. Cystinuria is a genetic disorder which increases the risk of cystine stones developing.
- Taking more amounts of proteins, fats, sodium and sugar in the diet may increase the risk of kidney stones.
- People having kidney infections (especially women) and urinary tract infections (UTIs) can develop more easily struvite stones compare to other diseases.¹⁸
- The metabolic syndrome developed kidney stones.
- Obesity may increase risk of kidney stone.

Endogenous risk factors include:

- Age - Stones are more common at the age group 20-50 years old.
- Gender Urolithiasis is three times more common in males than in females.
- Family history/heredity-About 25 percent of urolithiasis patients claim that the same condition occurs or has been encountered by another member of their family.

Exogenous risk factors include:

- **Climate conditions:** People living in warm climates are more likely to develop stones.
- **Nutrition: The high intake** of salt, albumen and fat from animals is closely associated with the formation of stones. High calcium intake (dairy products) also favors the production of stones, as opposed to what is commonly assumed.
- **Obesity:** High body weight predisposes stone formation.
- **Fluid intake:** Low consumption of fluid, particularly if it is less than 1.5lt/day, increases the risk of stone growth. Also, the hardness of water is a factor correlated with the high stone intensity.
- **Pharmacotherapy:** Specific antihypertensive, antacid agents and therapies for immunosuppressed patients (e.g. HIV patients) predispose the formation of stones.

III. Urolithiasis diagnosed

The diagnosis is based on the experience of the case, on clinical assessment and on the laboratory and imaging screening testing required. The history and clinical review established the urologist's hypothesis of urologist's diagnostic testing seek to support the diagnosis, examine the urinary tract's structure and anatomy and determine possible etiological causes that could be implicated in the development of stones. Imaging and laboratory testing are categorized into screening tests needed for the investigation of urolithiasis. Based in the situation, the psychiatrist will decide which assessments are appropriate.¹⁹

Imaging screening tests:

- **Plain X-ray of kidneys, ureters and bladder (KUB X-ray):** It traces about 80-90% of stones. However, for KUB X-rays, there are stones (such as uric acid stones) that are not visible.
- **Ultrasound (U/S) of the urinary tract:** It provides information on the presence of obstruction (hydronephrosis) and can trace stones located in the kidney or bladder, but not in the ureter.
- **Intravenous Urography or Pyelography:** It indicates the exact location of stones and any structural anomalies that may occur which predispose to the formation of stones. It is also beneficial for determining the functionality of the kidneys and the extent of hydronephrosis.
- **CT scan without contrast medium:** Today this is the screening method of choice used in most urological centers for investigating urolithiasis, as it is diagnostically superior to intravenous urography and provides high-resolution imaging of renal anatomy.
- **Laboratory tests:**
- **General urine test (Urinalysis):** In the urine, there are normally red blood cells (erythrocytes) and occasionally features of urinary tract infection also occur.
- **Biochemical blood analysis:** Assessment of blood plasma urea, creatinine, uric acid, and calcium.
- **Parathormone:** The hormone secreted by the parathyroid glands; in cases with elevated calcium levels, it is calculated and there may be glandular over function that leads to the development with stones.

- **24-hour urine collection:** The goal is to determine the physiological status of the patient in order to detect any possible metabolic anomalies that may be responsible for the formation of stones.
- **Stone analysis:** After the stone is extracted, it is analyzed to determine the type of stone in specialist laboratories and take the required precautions required to minimize the risk of recurrence and relapse of urolithiasis.²⁰

IV. Urolithiasis treated

Treating symptoms

Special prescription agents are provided during the process of extreme pain (renal colic) to relieve the patient from the pain. These compounds are labelled 'Non-steroid Anti-inflammatory Drugs' (NSADs) in injectable form, which act as pain relievers and alleviate local edema. If pain persists, stronger analgesics can be administered, such as opioid analgesics Oral NSADs are administered for 7 days in order to avoid more renal colic attacks; an α -adrenergic receptor inhibitor may also be administered (usually given to men for prostate hyperplasia).

Immediate intervention is required only in a small number of patients, when:

- Pain persists despite pharmaceutical treatment.
- Obstruction impairs renal function.
- There is also urinary tract infection with fever.

In these cases, there may be need for a pig-tail catheter to be placed. With the use of special instruments inserted through the urethra, the physician reaches the bladder and advances the catheter through the ureter to the kidney. In case this is not feasible, the tubule is inserted through the skin (percutaneous nephrostomy). If possible, the stone is removed at the same time.

Pharmacotherapy

The therapist doctor can prescribe medicine for certain types of stones to either minimize the size of the stone or avoid its reformation. Pharmacotherapy focuses on the structure of the stone and the presence or lack of metabolic disorder.

Stones removed

The treatment of stones depends on the size and position of the stone in the urinary tract. When the stone is less than 1cm in size and treated pharmaceutically, in 70% of cases the stone will automatically subside on its own within a period of 4-6 weeks. In the rest of the cases, there will be need for invasive therapy aiming at the fragmentation and removal of the stones.

Invasive methods include:

- **Extracorporeal Shock Wave Lithotripsy (ESWL):** The stone is broken with the use of shock waves. Typically, the patient is well handled and has a 90-percent success rate. However, there are still some stones which cannot break with ESWL.
- **Ureterscopy and Intracorporeal Lithotripsy:** It is used to detach ureter-located stones. The ureterscope is placed into the ureter through the urethra until the stone is localized and the parts are extracted. Laser Lithotripsy is the most innovative procedure.
- **Percutaneous Nephrolithotripsy (PNL):** It is applied for removing large or/and dense kidney stones that do not break with extracorporeal lithotripsy. The nephroscope is inserted through the skin into the kidney, localizes the stone and breaks it up with the use of special ultrasonic or ballistic devices.
- **Open Surgery:** Today it is used only for very few selected cases.²¹

Treatment through allopathic medicines

It is not enough to change diets and take more fluids to Stop the accumulation of stones in the kidneys. Doctors are required to prescribe the medication to get rid of stones in the body that have developed. The type and size of Stone and urine anomalies can decide the drug that is best. The drugs that are used for stone removal are provided. (Table no.1)

Table 1: Treatment through allopathic medicines

1	<i>Allopurinol or febuxostat</i>	Allopurinol lowers the raised amount of uric acid in the blood and urine. ²²
2	<i>Acetohydroxamic acid (AHA)</i>	AHA can dilute the urine and make it unfavourable for the formation of struvite stones. The inhibition of struvite stones is prevented by blocking the action of repeated UTIs which is caused by some specific types of bacteria. ²³
3	<i>Corticosteroid</i>	Corticosteroids like prednisone are potent anti-inflammatory drugs and reduce inflammation associated with urinary stone. ²⁴
4	<i>Cholestyramine (Questran)</i>	It increases the hepatic LDL receptors.

5	<i>Cholic acid</i>	It induces bile flow, feedbacks.
6	<i>Digoxine</i>	Inhibit the Na ⁺ , K ⁺ ATPase.
7	<i>Etidronate disodium</i>	It prevents hydroxyl apatite Dissolutions.
8	<i>Fluvastatin</i>	Reduction of LDL level. It competitive Gall stone diseases inhibit
9	<i>Gemfibrozil</i>	It reduces triglyceride throughPPAR Gall bladder diseases a moderated stimulation of fatty acids oxidations. ²⁵
10	<i>Magnesium</i>	Magnesium can greatly reduce the recurrence rate of calcium oxalate kidney stone. Magnesium act by binding to oxalate in the digestive tract and thus inhibits the formation of calcium oxalate crystal in urine. ²⁶
11	<i>Nifedipine</i>	IT is a calcium channel blocker that is used for cardiovascular condition like hypertension and angina. It relaxes the smooth muscles of the urinary tract and facilitates excretion of the stone. ²⁷
12	<i>Tiopronin or D-penicillamine</i>	D-penicillamine is a drug that bind to cystine in the urine, resulting in the formation of soluble compounds. ²⁴
13	<i>Terazosin or tamsulosin</i>	Relax and relieve the spasm of the muscle of the lower urinary tract. They reduce the pain and help in the expulsion of the stone. ²⁸
14	<i>Pitofenone</i>	Pitofenone is an antispasmodic drug (spasmolytic) drug that is used to relieve pain and spasms of smooth muscles. ²⁹
15	<i>Potassium citrate</i>	Potassium citrate makes the urine more alkaline basic. This property helps to prevent formation of cystine and uric acid stones. ²³
16	<i>Thiazide diuretics</i>	These drugs help the kidneys to remove excessive calcium to out of the body and prevent formation of calcium stones. ³¹
17	<i>Vitamin B6 or Pyridoxine</i>	Urinary oxalate is important in the formation of calcium oxalate stones. It inhibits the urinary oxalate formation. ³²

Treatment through Herbal Drugs

Herbs and herbal remedies are useful for kidney stone. These drugs have developed among people through their awareness in them. Clinically proven effects such as immunomodulation, adaptogenic and antimutagenic effect. Overuse of synthetic drugs also results in the higher occurrence of drug adverse reactions has inspired humans to back to the use of natural remedies. (table no. 2)

Table 2: Treatment through Herbal Drugs

1	<i>Aerva lanate (L.) Juss. ex Schult.</i>	Exhibited the reduced activity of oxalate synthesizing enzymes, and diminished the markers of crystal deposition in the kidney (Soundararajan et al. 2006). ³³
2	<i>Adiantum capillus-veneris L.</i>	Lower dose of 127.6 mg/kg b.w. had significant impact on reducing the elevated level of calcium oxalate crystals in urine than its higher dose (Ahmed et al., 2013). ³⁴
3	<i>Agropyron repens (L.) P. Beauv (Synonym of Elymus repens (L.) Gould)</i>	In folk medicine, its rhizome has been used to treat nephritis, urethritis and urinary calculi (Grases et al., 1995). ³⁵
4	<i>Ammannia baccifera L.</i>	The oral administration of ethanolic extract of <i>A. baccifera</i> (2 g/kg/day) was found to be effective in reducing the formation of stones (Prasad et al., 1994). ³⁶
5	<i>Bergenia ligulata</i>	Bashir and Gilani (2009) also reported calcium oxalate crystal aggregation inhibitory potential to aqueous methanolic extract of <i>B.ligulata</i> rhizome (BLR) ³⁷
6	<i>Boerhavia diffusa L</i>	aqueous root extract of <i>B. diffusa</i> mediated antiurolithic activity through inhibition of calcium oxalate crystallization, diuresis and hypo-oxaluria (Pareta et al., 2011a). ³⁸
7	<i>Bryophyllum pinnatum (Lam.)</i>	<i>B. pinnatum</i> was found to reduce crystal size and promote the formation of calcium oxalate dihydrate crystals instead of monohydrate crystals under <i>in vitro</i> studies (Yasir and Waqar, 2011). ³⁹
8	<i>Crateva nurvala Buch</i>	Varalakshmi and co-authors (1990) reported that the oral administration of <i>C. nurvala</i> bark decoction (2 ml/rat/day) decreased the urinary and renal tissue oxalate levels. ⁴⁰
9	<i>Costus spiralis</i>	It has been found that oral treatment of <i>C. spiralis</i> extract (0.25 and 0.5g/kg per day) to rats resulted into reduction of the calculi growth after four weeks, (Araújo Viel et al., 1999). ⁴¹
10	<i>Cystone</i>	<i>Cystone</i> is a marketed polyherbal Ayurvedic antiurolithic medicine, which comprise seven herbs: 1. <i>Didymocarpus pedicellatus</i> R. Br. (stem), 2. <i>Saxifraga callosa</i> Sm. (whole plant), 3. <i>Rubia cordifolia</i> L. (whole plant), 4. <i>Cyperus scariosus</i> R. Br. (rhizome), 5. <i>Achyranthes aspera</i> L. (root), 6. <i>Onosma bracteata</i> Wall. (root), 7. <i>Cyanthillium cinereum</i> (L.) H.Rob. (whole plant) (Kumaran and Patki, 2011). ⁴² <i>Cystone</i> found to reduce urinary and kidney oxalate levels, due to its probable inhibitory action on oxalate synthesizing liver enzyme glycolate oxidase (Mitra et al., 1998).
11	<i>Gokshuradi Yog</i>	Aqueous extract of <i>Gokshuradi Yog</i> exhibited diuresis property which is accompanied by a saluretic effect. ⁴³

12	<i>Herniaria hirsuta L.</i>	queous extract of <i>H. hirsuta</i> at different concentrations (0.0625-1 mg/ml) inhibited calcium oxalate crystal aggregation, controlled the calcium oxalate crystal size and promote the formation of calcium oxalate dehydrate crystals under <i>in vitro</i> calcium oxalate crystallization study (Atmani and Khan, 2000). ⁴⁴
13	<i>Kampo herbs</i>	<i>Kampo</i> Extracts strongly inhibited oxalate monohydrate crystal aggregation <i>in vitro</i> , and also prevented the crystal adhesion to Madin–Darby canine kidney cells at concentration, 10 µg/ml (Nishihata et al., 2013). ⁴⁵
14	<i>Origanum vulgare L.</i>	In <i>in vitro</i> experiments, aqueous-methanolic extract of <i>O. vulgare</i> (Lamiaceae) exhibited a concentration-dependent (0.25- 4 mg/ml) inhibitory effect on calcium oxalate crystallization. (Khan et al, 2011). ⁴⁶
15	<i>Phyllanthus niruri L.</i>	Aqueous extract of <i>P. niruri</i> was found to interfere with the early stages of calcium oxalate crystal growth and aggregation and was also found to have a potent inhibitory effect on calcium oxalate crystal adhesion and/or endocytosis (Campos and Schor, 1999). ⁴⁷
16	<i>Tribulus terrestris</i>	<i>T. terrestris</i> fruit inhibited the nucleation and growth of the calcium oxalate crystals. (Aggarwal et al., 2010b). ⁴⁸
17	<i>Wu-Ling-San</i>	Wu-Ling-San extract was found to inhibit the calcium oxalate nucleation and aggregation under <i>in vitro</i> conditions, and may have the ability to prevent stone recurrence. (Chen et al., 2007). ⁴⁹
18	<i>Zea mays L.</i>	It is a well-known herbal diuretic, mentioned in almost 93 phytotherapy books from 13 countries (Velazquez et al., 2005). ⁵⁰

Homeopathy treatment for kidney stones

Homeopathy is one of the most popular holistic systems of medicine. The selection of a remedy is based upon the theory of individualization and symptoms similarity by using the holistic approach. This is the only way through which a state of complete health can be regained by removing all the sign and symptoms from which the patient is suffering. The aim of homeopathy is not only to treat kidney stone but to address its underlying cause and individual susceptibility.⁵¹ list of homeopathy medicine for kidney stone are *Argentum nircum*, *Asparagus*, *Belladonna*, *Benzoic acid*, *Bryophyllum*, *Calcarea carb*, *Cantharis*, *Chimaphila umb*, *Hydrangea Hydrastis*, *Lachesis*, *Lithium carb*, *Lycopodium*, *Natrum Phos*, *Nux vomica*, *Ocimum Can*, *Tabacum Sarsaparilla*, *Tabacum*.

V. Conclusion

Adding to the growing incidence of renal stones is to the morbidity and immense economic losses of this pathology around the world. Early diagnosis and treatment have been helped by technical advancements. However, the frequent association of renal stones with metabolic disorders such as hypertension, diabetes, and obesity highlights the importance of the incidence and reoccurrence of dietary practices. Any of the cost-effective measures for the treatment of kidney stones are high fluid consumption and healthy lifestyle measures.

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