

# Scientific Support for Traditional Knowledge in Relation to the Significance of Herbs in Lithiasis

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ABSTRACT

Herbal medicine has been described as the oldest form of therapy practiced by mankind, with archaeological evidence dating back 60,000 years. The ability of plants to survive hostile conditions may have contributed to their long survival. Because of this extended survival and constant fight for billions of years, these building blocks of life have progressively evolved to their current incarnation through the process of evolution. Plants have highly developed molecular recognition properties, which are now recognised in the practice known as Ayurveda. Herbal plants have grown and developed in such a way that they outperform their allopathic counterparts (pharmaceutical drugs). Ayurvedic characteristics. This has captivated the interest of scientists working on next-generation anti-treatments, which are derived from a wide range of natural resources, including plant leaves, bark, berries, flowers, and roots. The amazing references and treatises on herbal treatments that have been available in India cite the works of Dhanwantari, Nagarjun, Sushrut, and others, along with hundreds of independent treatises and treatises that have been written by practitioners for more than a thousand years. The ability of a few rare plants to thrive on the meagre quantity of soil that forms on or between stones is one of their most intriguing lithiasis medications. Various ayurvedic medications, both aromatic and non-aromatic, are said to offer potential for treating lithiasis, according to Ayurveda. The validity of this ayurvedic assertion has recently been demonstrated by numerous scientific studies. This review paper is an attempt to compile all the scientific understanding of plants used for anti-lithiasis studies. We believe that this article will be advantageous for those wishing to work in the area of anti-lithiasis research.

**Keywords:** Herbal medicine; Building blocks of life; Process of evolution; Molecular recognition; Treatises; Ayurveda; Lithiasis

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## INTRODUCTION

Plants have been used in traditional health care systems for centuries. W.H.O. has listed about 20,000 medicinal plants globally, of which India contributes 15%-20%. India is one of the 12 leading biodiversity centers, with the presence of over 45,000 different plant species. Our country has about 15000–18000 flowering plants, 23,000 fungi, 2500 algae, 1600 lichen, 1800 bryophytes, and 13 million microorganisms in its biodiversity region. From this flora, 1500 to 20,000 have good medicinal value. However, out of these strong resources, only about 7000 plants are used in Ayurveda, 600 in Siddha, 700 in Unani, and 30 in modern medicine.

The World Health Organisation (WHO) estimates that 80% of the world's population still relies on herbal medicines as their major source of medicinal products. India is perhaps the largest producer of medicinal herbs and is rightly called the "botanical garden of the world [1]." For thousands of years, herbs have filled medicine bags, cosmetic bowls, culinary spice jars, perfume vials, and dry pots. Since very early times, the healing arts and, with them, medicinal herbs, were considered a gift from the gods. Herbal remedies are a type of alternative medicine that originates from plants and plant extracts. Used to heal illnesses and diseases and address psychological concerns, herbal remedies have been around for centuries and were the precursor to modern medicine. Herbal remedies are obtained from a wide variety of natural resources, including plant leaves, bark, berries, flowers, and roots. The wonderful references and treatises on herbal cures that have been available in India mention the works of Dhanwantari, Nagarjun, and Charak. According to Bhatacharjee, most of the Bhikshus in Buddhist Monasteries actually maintained the nursery of medicinal herbs around them, and when they went abroad, they carried these herbs for the welfare of common men in those lands.

## LITERATURE REVIEW

According to the World Health Organisation (WHO), "any plant and its organs containing any substance can be used therapeutically or can be used as raw material for chemical or pharmaceutical synthesis." Herbal medicine has been described as the oldest form of therapy practiced

by humans today, with archaeological evidence of the medicinal use of herbs dating back 60,000 years [1]. As reported by Kalia, herbal medicines often complete conventional treatments, providing safe and well-tolerated remedies for chronic illness [2].

### Urolithiasis

The process of the formation of calculi (singular calculus) in the urinary system and gall bladder is known as urolithiasis. According to Mikawlawng et al., renal calculi, or kidney stones, are referred to as nephrolithiasis, ureter calculi as ureterolithiasis, and bladder calculi as cystolithiasis. Urolithiasis can also be associated with morbidity and renal damage. The disease affects all age groups, from less than 1 year old to more than 70 years old. After their initial stone episode, the recurrence rate of stone is approximately 10% within one year, 35% within five years, and 50% within 10 years. According to

Mikawlawng et al., urinary stones are a major problem and a major cause of morbidity and end stage renal failure in India [3].

### Kidney stone

It is known as nephrolithiasis, or renal calculi, and the common term referred to for this is urolithiasis. It is a solid piece of material that forms in the kidney when substances that are normally found in the urine become highly concentrated. A stone may stay in the kidney or travel down the urinary tract, as shown in Fig. 1. These stones vary in size and shape, as shown in Fig. 2. A small stone may pass on its own, causing little or no pain. A larger stone may get stuck along the urinary tract and block the flow of urine, causing severe pain (or bleeding) most commonly felt in the flank, lower abdomen, and groin, as reported by Provophys et al. [4].

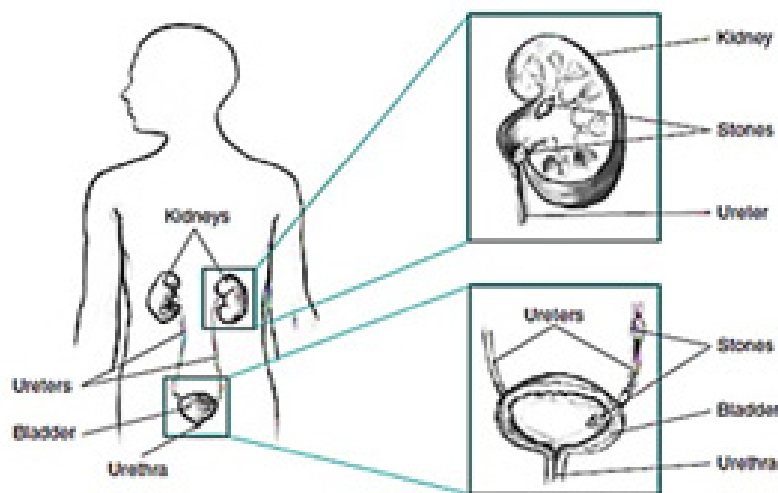


Fig. 1. Stone in kidney and urinary tract.

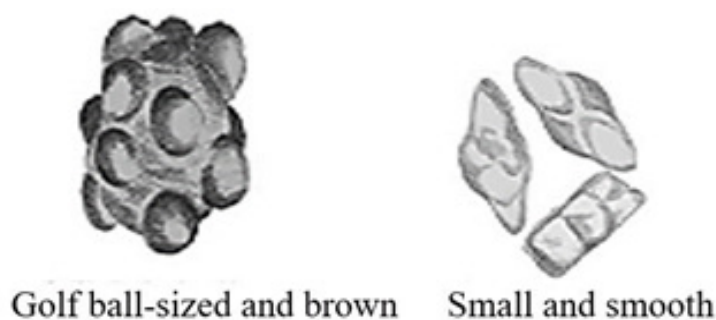


Fig. 2. Various shapes of kidney stones.

Kidney stones are one of the most common disorders of the urinary tract. A large number of people are suffering from urinary stone problems all over the world. The occurrence in some areas is so alarming that they are known as "stone belts. Each year in the United States, people make more than a million visits to health care providers, and more than 300,000 people go to emergency rooms for kidney stone problems, as reported by Litwin and Saigal [5].

**Types of kidneys stones**

Depending on the composition, kidney stones are characterised by four major types, which include those described by Litwin and Saigal [5].

- Calcium stones are the most common type of kidney stone and occur in two major forms: Calcium oxalate and calcium phosphate. Calcium oxalate stones are more common. Calcium oxalate stone formation may be caused by high calcium and high oxalate excretion, *i.e.*, a

a lower pH. Excretion Urine is acidic because of high oxalate levels. Calcium phosphate stones are caused by the combination of high urine calcium and alkaline urine, meaning the urine has a high pH.

- Uric acid stones form when the urine is persistently acidic. A diet rich in purines-substances found in animal proteins such as meat, fish, and shellfish-may increase uric acid in the urine. If uric acid becomes concentrated in the urine, it can settle and form a stone by itself or along with calcium.
- Struvite stones result from kidney infections. Eliminating infected stones from the urinary tract and staying infection-free can prevent more struvite stones.
- Cystine stones result from a genetic disorder that causes cystine to leak through the kidneys and into the urine, forming crystals that tend to accumulate into stones.

The occurrence of stones along with their general information is presented in Tab. 1.

Tab.1. Categorization of kidney stones according to their location and chemical composition.	S. no.	Kidney stones type	Population	Circumstance	Color	Sensitivity
	1.	Calcium oxalate	80%	When urine is acidic (decreased pH)	Black/dark brown	Radio opaque
	2.	Calcium phosphate	5%-10%	When urine is alkaline (increased pH)	Dirty white	Radio opaque
	3.	Uric acid	5%-10%	When urine is persistently acidic	Yellow/reddish brown	Radio lucent
	4.	Struvite	10%-15%	Infection in kidney	Dirty white	Radio opaque
	5.	Cystine	1%-2%	Rare genetic disorder	Pink/yellow	Radio opaque
	6.	Xanthine	-	Extremely rare	Brick red	Radio lucent

Stones may be as small as a grain of sand or as large as a pearl. Some stones are even as big as golf balls, may be smooth or jagged, and are usually yellow or brown, according to Litwin and Saigal [5].

**Causes of kidney stones**

In general, kidney stones can form in anyone, but some people are more susceptible to them. Men are more affected than women, and kidney stones are more common in non-Hispanic white people than in non-Hispanic black people and Mexican Americans. According to Litwin and Saigal, overweight and obese people are more likely to get kidney stones than people of normal weight, but the causes of kidney stones that are eventually stated are as given

below [5].

- Kidney stones can form when substances in the urine such as calcium, oxalate, and phosphorus become highly concentrated.
- Certain foods may promote stone formation in people who are susceptible, but scientists do not believe that eating any specific food causes stones to form in people who are not susceptible. People who do not drink enough fluids may also be at higher risk, as their urine is more concentrated.
- Certain disease conditions like cystic kidney diseases, hypercalciuria, hyperparathyroidism, renal tubular acidosis, cystinuria, hyperoxaluria, hyperuricosuria,

gout, blockage of the urinary tract, chronic inflammation of the bowel, etc., are responsible for causing kidney stones.

- A person who has a family history of kidney stones and a history of gastrointestinal tract surgery is also more likely to develop the stone.
- Certain medicines are also responsible for the formation of stones in many people, like diuretics, calcium based antacids, protease inhibitors like Indinavir (Crixivan), a medication used to treat HIV infection, anti-seizure medication (Topamax), etc.

### Mechanism of kidney stone formation

Kidney stones form in the body when calcium oxalate, calcium phosphate, uric acid, and other crystals aggregate in the kidney.

Symptoms of kidney stones:

- Pain while urinating.
- Blood in the urine.
- Feel a sharp pain in your back or lower abdomen (the pain may be brief or prolonged).
- Nausea and vomiting with the pain.

People who have small stones pass them easily through the urinary tract and do not show any characteristic symptoms, according to Litwin and Saigal [5].

### Diagnosis of kidney stones

The healthcare provider will perform a physical exam and take a medical history to diagnose kidney stones. The medical history may include questions about the family history of kidney stones, diet, GI problems, and other diseases and disorders. The healthcare provider may perform urine, blood, and imaging tests, such as an x-ray or CT (CT) scan, to complete the diagnosis. These techniques are listed by Litwin and Saigal [5].

- **Urinalysis:** Urinalysis is the testing of a urine sample. The urine sample is collected in a special container in a health care provider’s office or commercial facility and can be tested in the same location or sent to a lab for analysis. A urine analysis can show whether the person has an infection or whether the urine contains substances that can form stones later on.

- A blood test involves drawing blood at a health care provider’s office or commercial facility and sending the sample to a lab for analysis. The blood test can show biochemical variations that can lead to the development of kidney stones.

- **Abdominal X-ray:** An abdominal X-ray is a picture created using radiation and recorded on film or on a computer. The amount of radiation used is small. An X-ray is performed at a hospital or outpatient centre by an X-ray technician, and the images are interpreted by a radiologist-a doctor who specialises in medical imaging. The person will lie on a table or stand during the X-ray. The X-ray machine is positioned over the abdominal area. The person will hold his or her breath as the picture is taken so that the picture will not be blurry. The person may be asked to change positions for additional pictures. X-rays can show the location of stones in the kidney or urinary tract.

- **CT Scans:** CT scans use a combination of x-rays and computer technology to create (3-D) images. A CT scan may include the injection of a special dye called contrast medium. CT scans require the person to lie on a table that slides into a tunnel-shaped device where the X-rays are taken. The procedure is performed in an outpatient centre or hospital by an X-ray technician, and the images are interpreted by a radiologist. CT scans can show stone locations and conditions that facilitate stone formation.

### Treatment of kidney stones

Treatment for kidney stones usually depends on their size and what they are made of, as well as whether they are causing pain or obstructing the urinary tract. Kidney stones may be treated by a general practitioner or by a urologist-a doctor who specialises in the urinary tract. Small stones usually pass through the urinary tract without treatment. Still, the person may need pain medication and should drink lots of fluids to help move the stone along. Pain control may consist of oral or Intravenous (IV) medication, depending on the duration and severity of the pain. Amounts of IV fluids may be needed if the person becomes dehydrated from vomiting or an inability to drink. A person with a larger stone, or one that blocks urine flow and causes great pain, may need more urgent or emergency treatment. Emergency treatments given to a person who has kidney stones are shown in Fig. 3., reported by Litwin and Saigal [5].

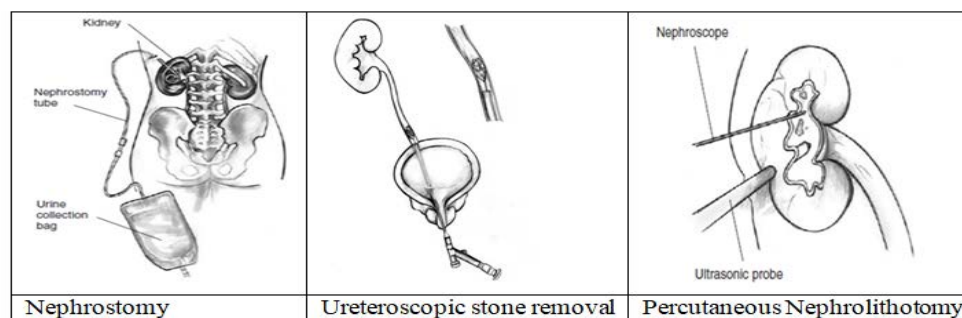


Fig. 3. Kidney stone treatment strategies.

- **Shock wave lithotripsy:** A machine called a lithotripter is used to crush the kidney stone. The procedure is performed by a urologist on an outpatient basis, and anaesthesia is used. In shock wave lithotripsy, the person lies on a table or, less commonly, in a tub of water above the lithotripter. The lithotripter generates shock waves that pass through the person's body to break the kidney stone into smaller pieces that pass more readily through the urinary tract during urination.
- **A ureteroscope:** A long, tube-like instrument with an eyepiece is used to find and retrieve the stone with a small basket or to break the stone up with laser energy. The procedure is performed by a urologist in a hospital under anaesthesia. The urologist inserts the ureteroscope into the person's urethra and slides the scope through the bladder and into the ureter. The urologist removes the stone or, if the stone is large, uses a flexible fibre attached to a laser generator to break the stone into smaller pieces that can pass out of the body in the urine. The person is usually discharged on the same day.
- **Percutaneous nephrolithotomy:** In this procedure, a wire-thin viewing instrument called a nephroscope is used to locate and remove the stone. The procedure is performed by a urologist in a hospital under anaesthesia. During the procedure, a tube is inserted directly into the kidney through a small incision in the person's back. For large stones, an ultrasonic probe that acts as a lithotripter may be needed to deliver shock waves that break the stone into small pieces that can be removed more easily. The person may have to stay in the hospital for several days after the procedure and may have a small tube called a nephrostomy tube inserted through the skin into the kidney. The nephrostomy tube drains urine and any residual stone fragments from the kidney into a urine collection bag. The tube is usually left in the kidney for 2 or 3 days, and the person has to stay in the hospital for this.

### Prevention of kidney stones

The first step in preventing kidney stones is to understand what is causing the stones to form. The healthcare provider may ask the person to try to catch the kidney stone as it passes so it can be sent to a lab for analysis. Stones that are retrieved surgically can also be sent to a lab for analysis. The health care provider may ask the person to collect urine for 24 hours after a stone has passed or been removed to measure daily urine volume and mineral levels. Producing too little urine or having a mineral abnormality can make a person more likely to form stones. Stones may be prevented through changes in eating, diet, nutrition, and medications mentioned by Litwin and Saigal [5].

People can help prevent kidney stones by making changes to their fluid intake [6-12]. Depending on the type of kidney stone a person has, changes in the amounts

of sodium, animal protein, calcium, and oxalate consumed can also help. Drinking enough fluids each day is the best way to help prevent most types of kidney stones. Healthcare providers recommend that a person drink 2 to 3 litres of fluid a day. People with cystine stones may need to drink even more. Though water is best, other fluids may also help prevent kidney stones, such as citrus drinks [13-25].

### Medications

The health care provider may prescribe certain medications to help prevent kidney stones based on the type of stone formed or conditions that make a person more prone to forming stones [26-45].

- **Hyperuricosuria:** Allopurinol (Zyloprim), which decreases uric acid in the blood and urine.
- **Hypercalciuria:** Diuretics, like hydrochlorothiazide.
- **Hyperoxaluria:** Potassium citrate to raise the citrate and pH of urine.
- **Uric acid stones:** Allopurinol and potassium citrate.
- **Cystine stones:** Mercaptopropionyl glycine, which decreases cystine in the urine, and potassium citrate.
- **Struvite stones:** Antibiotics, which are bacteria-fighting medications, when needed to treat infections, or acetohydroxamic acid with long term antibiotic medications to prevent infection [46-67].

### DISCUSSION

People with hyperparathyroidism sometimes develop calcium stones. Treatment in these cases is usually surgery to remove the parathyroid glands. In most cases, only one of the glands is enlarged. Removing the glands cures hyperparathyroidism and also prevents kidney stones [68-78].

### Medicinal plants as anti-urolithiatic agents

In the traditional systems of medicine, most of the remedies for kidney stone management were taken from plants, and they proved to be useful, though the rationale behind their use is not well established through systematic pharmacological and clinical studies, except for some herbal drugs and plants [79-87]. Various plants exert their antilithiatic properties by altering the ionic composition of urine, e.g., by decreasing the calcium ion. The plants that have antiurolithiatic potential are given in Tab. 2.

Today, many herbal formulations are commercially available that are used for kidney stone management. The marketed composite herbal formulations are cystone, calcuri, uriflush, uriflow, and chandraprabha. They have been widely used clinically to dissolve urinary stones in the kidney and urinary bladder [88-111].



## CONCLUSION

In conclusion, the rich tapestry of herbal medicine, spanning over 60,000 years of human history, attests to the enduring power of nature's pharmacy. The tenacity of plants, honed through eons of evolution, has bestowed upon them intricate molecular properties, showcased notably in Ayurveda. Their ability to surpass allopathic counterparts in various aspects has ignited scientific curiosity, paving the way for next generation treatments sourced from the vast array of botanical resources.

The historical depth of herbal wisdom, documented by luminaries such as Dhanwantari and Nagarjun, has been a beacon for over a millennium.

Rooted in ancient traditions, this knowledge finds validation in contemporary scientific studies, particularly in the context of lithiasis treatment. The remarkable adaptability of certain plants, thriving in seemingly inhospitable conditions, underscores their efficacy in combating lithiasis, as corroborated by Ayurvedic principles.

This comprehensive review serves as a synthesis of scientific insights into anti-lithiasis properties inherent in various plant species. As we navigate the evolving landscape of medical research, this compilation stands as a valuable resource for those venturing into the realm of anti-lithiasis studies, bridging the timeless wisdom of herbal traditions with the rigors of modern scientific inquiry.

**Tab. 2.** Scientific details of traditionally used and historically recognised medicinal herbs for the treatment of kidney stones

S. no.	Botanical name	Mode of use in traditional medicine	Anti-urolithiasis activity of plant part/ extract/ constituent (method/ model)	Reference
<b>Acanthaceae</b>				
1	<i>Hygrophila auriculata</i> (Schumacher) Heine	It is used as diuretic and urinary tonic.	<ul style="list-style-type: none"> <li>Aqueous extract of whole plant (<i>in-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Sathish R, et al.
2	<i>Lepidagathis prostrata</i> Dalzell	It is belonged to the pashanbhed group, used in the treatment of kidney stones.	<ul style="list-style-type: none"> <li>Methanol extract and fractions-petroleum ether, ethyl acetate, n-butanol and aqueous (<i>in-vitro</i>: Nucleation assay and aggregation assay).</li> </ul>	Devkar RA, et al.
<b>Adoxaceae</b>				
3	<i>Viburnum opulus</i> L.	In Turkish folk medicine, the juice obtained by squeezing of the is taken orally to pass kidney stones	<ul style="list-style-type: none"> <li>n-Hexane, ethyl acetate and methanol extracts of fruit (<i>in-vivo</i>: Sodium oxalate induced urolithiasis rat model).</li> </ul>	Ilhan M, et al.
<b>Amaranthaceae</b>				
4	<i>Achyranthes aspera</i> L.	The root paste is employed in urinary trouble in various parts of India. It is used as an active component of various drug formulations for treating kidney stone.	<ul style="list-style-type: none"> <li>Aqueous extracts of leaves and roots (<i>in-vitro</i>: Nucleation assay)</li> <li>Aqueous and ethanol extract of leaves (<i>in-vivo</i>: Ethylene glycol induced lithiasis).</li> </ul>	Agarwal K, et al.
5	<i>Aerva lanata</i> (L.) Juss.	It is used in Indian traditional medicinal system by ayurvedic practitioners as anti-urolithiatic drug. Whole plant decoction along with Castor root and Gokhuru fruits is taken in kidney stone (twice a day for three weeks). Root decoction is also used.	<ul style="list-style-type: none"> <li>Hydro-alcoholic extract of whole plant and their fractions-dichloromethane, ethyl acetate and n-butanol (<i>in-vivo</i>: Ethylene glycol-induced urolithiasis model and <i>in silico</i>).</li> </ul>	Dinnimath BM, et al; Prachi et al.

6	<i>Amaranthus viridis</i> L.	Whole plant is given to cure kidney stone.	<ul style="list-style-type: none"> <li>• Aqueous extract of roots (<i>In-vivo</i>: Ethylene glycol induced urolithiasis)</li> </ul>	Sharma N, et al.; Asha S, et al.
7	<i>Amaranthus caudatus</i> L.	Leaves extract is taken in kidney stone.	<ul style="list-style-type: none"> <li>• Pharmacological activity not reported</li> </ul>	Sharma N, et al.
8	<i>Amaranthus spinosus</i> L.	Root paste is used to reduce irritation in urinary duct.	<ul style="list-style-type: none"> <li>• Pharmacological activity not reported</li> </ul>	Sharma N, et al.
9	<i>Beta vulgaris</i> L.	Juice of rhizome is given to cure kidney stone (daily two glasses for seven days).	<ul style="list-style-type: none"> <li>• Extract of root (<i>In-vitro</i>: Calcium oxalate crystallization assay).</li> </ul>	Sharma N, et al.; Saranya R, et al.
10	<i>Celosia argentea</i> L.	It is used in the treatment of Kidney stone	<ul style="list-style-type: none"> <li>• Ethanol extract of seeds (<i>In-vivo</i>: Ethylene glycol induced urolithiasis)</li> </ul>	Joshi PC, et al.
11	<i>Digera muricata</i> (L.) Mart.	Whole plant is used in kidney stone and urinary tract troubles.	<ul style="list-style-type: none"> <li>• Extract of whole plant (<i>In-vivo</i>)</li> </ul>	Sharma N, et al.
12	<i>Gomphrena celosioides</i> Mart.	Juice of whole plant along with <i>Piper nigrum</i> and lemon juice (twice a day for 10 days) is taken in kidney stone and urinary tract troubles.	<ul style="list-style-type: none"> <li>• Pharmacological activity not reported</li> </ul>	Sharma N, et al.; Prachi, et al.
<b>Apiaceae</b>				
13	<i>Ammi visnaga</i> (L.) Lam.	Tea prepared from the fruits is used as a remedy to treat kidney stones.	<ul style="list-style-type: none"> <li>• Extract of fruits and its constituents khellin and visnagin (<i>In-vitro</i>: On renal epithelial injury using cell line model-Pig Kidney Epithelial (LLC-PK1) and Madin-Darby-canine kidney (MDCK) cells).</li> <li>• Aqueous extract of seeds (<i>In-vivo</i>: Glycolic acid induced nephrolithiasis).</li> </ul>	Vanachayangkul P, et al; Khan ZA, et al.
14	<i>Daucus carota</i> L.	One glass juice is taken regularly for a fortnight to remove stone from urinary bladder and kidney.	<ul style="list-style-type: none"> <li>• Hydroethanolic extract of root (<i>In-vivo</i>): Ethylene glycol and ammonium chloride induced hyperoxaluria</li> </ul>	Prachi, et al.
<b>Apocynaceae</b>				
15	<i>Ceropegia bulbosa</i> Roxb.	Decoction of tubers is orally given to get rid of urinary bladder stone.	<ul style="list-style-type: none"> <li>• Extract of whole plant: (Clinical Study)</li> </ul>	Sharma N, et al; Mehetre VG, et al.
16	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	The roots of the plants are used in the medicine as a substitute for Indian Sarsaparilla ( <i>Hemidesmus indicus</i> ).	<ul style="list-style-type: none"> <li>• Ethyl acetate extract of root (<i>In-vivo</i>: Ethylene glycol induced method).</li> </ul>	Anbu J, et al.
17	<i>Pergularia daemia</i> (Forssk.) Chiov.	It is used in Indian traditional medicine system for various diseases.	<ul style="list-style-type: none"> <li>• Hydro-alcoholic extract of whole plant (<i>In-vivo</i>: Ethylene glycol-urolithiasis in rats).</li> </ul>	Vyas BA, et al.

Araceae				
18	<i>Acorus calamus</i> L.	It is used in the treatment of kidney stone. Commercially, available in tablet form for kidney stone.	<ul style="list-style-type: none"> <li>Ethanol extract of rhizome (<i>In-vivo</i>: Ethylene glycol induced renal calculi).</li> </ul>	Bhat GM, et al.
Asparagaceae				
19	<i>Asparagus racemosus</i> Willd.	It exerts antilithiatic and diuretic properties by reducing the serum concentrations of calcium, phosphorus, urea, and creatine.	<ul style="list-style-type: none"> <li>Ethanol extract of whole plant (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Sharun K, et al.; Jagannah N, et al.
Berberidaceae				
20	<i>Berberis vulgaris</i> L.	It is used in used in the treatment of urolithiasis.	<ul style="list-style-type: none"> <li>Aqueous□methanol extract of root bark (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Bashir S, et al.
Bignoniaceae				
21	<i>Kigelia africana</i> (Lam.) Benth (Synonym <i>Kigelia pinnata</i> (Jacq) DC.)	It is used in Indian traditional medicine in the treatment of renal ailments	<ul style="list-style-type: none"> <li>Ethanol extract of fruits (<i>In-vivo</i>: Ethylene glycol induced hyperoxaluria).</li> </ul>	Kumar R, et al.
22	<i>Tecoma stans</i> (L.) Juss. ex Kunth	Flowers are reported to be constructive in the management of urinary stones.	<ul style="list-style-type: none"> <li>Aqueous and methanol extracts of Flowers (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Kameshwaran S, et al.
Boraginaceae				
23	<i>Rotula aquatica</i> Lour	It is used as anti-urolithiatic herbal medicine.	<ul style="list-style-type: none"> <li>Aqueous extract of root (<i>In-vivo</i>)</li> </ul>	Vijayakumari B, et al.
Brassicaceae				
24	<i>Brassica oleracea</i> L.	It is reported to use in kidney stone.	<ul style="list-style-type: none"> <li>Aqueous extract of aerial parts (<i>In-vivo</i>: Ethylene glycol and ammonium chloride induced urolithiasis).</li> </ul>	Ahmed S, et al; Kishore RN, et al.
25	<i>Raphanus raphanistrum</i> subsp. <i>Sativus</i> (L.) Domin (Synonym <i>Raphanus sativus</i> L.)	The decoction made from the fresh tubercle is used in kidney stone.	<ul style="list-style-type: none"> <li>Aqueous extract of the bark (<i>In-vivo</i>: Zinc discs implantation induced urolithiasis).</li> </ul>	Vargas SR, et al.
Capparaceae				
26	<i>Crateva nurvala</i> Buch. -Ham.	Bark decoction is used twice for seven days to remove stone from urinary tract.	<ul style="list-style-type: none"> <li>Decoction of bark (<i>In-vivo</i>: Glycolic acid induced urolithiasis).</li> </ul>	Prachi; Varalakshmi P, et al.
27	<i>Crateva religiosa</i> G.Forst. (Synonym <i>Crateva magna</i> Lour) DC.)	Bark is used to treat kidney stone.	<ul style="list-style-type: none"> <li>Aqueous and ethanol extract of bark (<i>In-vivo</i>: lactose and ethylene glycol and ammonium chloride and ethylene glycol induced urolithiasis).</li> </ul>	Mekap SK, et al.



Caryophyllaceae				
28	<i>Herniaria hirsute</i> L.	It is used in the treatment of kidney stone.	<ul style="list-style-type: none"> <li>• Aqueous extract of whole plant (<i>In-vitro</i>: Nucleation assay and Aggregation assay; cell line-Madin Darby canine kidney cells)</li> <li>• Aqueous of extracts (<i>In-vivo</i>: Experimentally induced nephrolithiasis)</li> </ul>	Ammor K, et al; Atmani F, et al; Atmani F, et al.
29	<i>Paronychia argentea</i> Lam.	Aerial parts are popular medicine as diuretic and for the treatment of the renal diseases, especially as anti-uroolithiasis.	<ul style="list-style-type: none"> <li>• Aqueous extract and butanol extract of aerial parts (<i>In-vivo</i>: Sodium oxalate induced urolithiasis).</li> </ul>	Bouanani S, et al.
Combretaceae				
30	<i>Terminalia chebula</i> Retz.	It is used in to dissolve mineral calculi.	<ul style="list-style-type: none"> <li>• Chloroform, ethanol and water extract of fruits (<i>In-vitro</i>: Kramer and Tisdall method)</li> </ul>	Varicola K, et al.
31	<i>Terminalia chebula</i> Retz.	It is used in urinary problems and treatment of kidney stone.	<ul style="list-style-type: none"> <li>• Aqueous extract of fruit (<i>In-vivo</i>: Ethylene glycol induced urolithiasis)</li> </ul>	Pawar AT, et al.
Compositae				
32	<i>Ageratum conyzoides</i> (L.) L.	Leaf extract given (twice a day) in kidney stone and urinary tract troubles.	<ul style="list-style-type: none"> <li>• Ethyl acetate, ethanol and aqueous extract of whole plant (<i>In-vivo</i>: Ethylene glycol induced urolithiasis)</li> </ul>	Sharma N, et al; Muthukrishnan S, et al;
33	<i>Centratherumant helminticum</i> (L.) Kuntze	The seeds are used in kidney troubles and as diuretic.	<ul style="list-style-type: none"> <li>• Hydro-alcoholic extract of seeds (<i>In-vitro</i>: Nucleation and aggregation assay)</li> </ul>	Galani VJ, et al.
34	<i>Helianthus annuus</i> L.	Leaves are used to cure diseases of the kidney.	<ul style="list-style-type: none"> <li>• Aqueous and ethanol extract of leaves (<i>In-vivo</i>: Ethylene glycol and ammonium chloride induced nephrolithiasis).</li> </ul>	Khan NI, et al.
35	<i>Tridax procumbens</i> (L.) L.	Leaf paste is used for kidney stone and urinary tract troubles. The plant juice when taken orally is claimed to remove stones in urinary bladder and kidney.	<ul style="list-style-type: none"> <li>• Ethanol extract (<i>In-vivo</i>: Ethylene glycol ammonium chloride induced calcium oxalate urolithiasis)</li> </ul>	Sharma N, et al; Sailaja B, et al.
36	<i>Cyanthillium cinereum</i> (L.) H. Rob. (Synonym <i>Vernonia cinerea</i> (L.) Less.)	The roots and leaves are used for medicinal purpose.	<ul style="list-style-type: none"> <li>• Ethanol extract of whole plant (<i>In-vivo</i>: Ethylene glycol-induced urolithiasis).</li> </ul>	Thamizhmozhi M, et al.
Convolvulaceae				
37	<i>Ipomoea eriocarpa</i> R. Br.	The seeds are nutritious and a good source of carbohydrates and proteins. It is used in the treatment of kidney stone.	<ul style="list-style-type: none"> <li>• Ethanol extract of leaves (<i>in-vitro</i>).</li> <li>• Ethanol extract of leaves (<i>in-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Das M, et al.

Crassulaceae				
38	<i>Bryophyllum pinnatum</i> (Lam.) Oken	It is used for the treatment of kidney stones. The extract of leaves is taken in empty stomach for treating bladder stones. Fresh juice of leaf along with powder of <i>Piper nigrum</i> (2-3) is taken twice a day for 15 days to expel the stones.	<ul style="list-style-type: none"> <li>Acetone, ethyl acetate, petroleum ether, chloroform, ethyl alcohol and water extract of leaves (<i>in-vitro</i>: Nucleation assay; Titrimetric assay).</li> <li>Aqueous extract of leaves (<i>In-vivo</i>: Ethylene glycol induced renal calculi).</li> </ul>	Agarwal K, et al; Prachi; Bansode P, et al; Shukla AB, et al.
Cucurbitaceae				
39	<i>Benincasa hispida</i> (Thunb.) Cogn.	Tamarind and sugar are added inside the fruit in equal amount and keep for 3 days and taken in kidney stone.	<ul style="list-style-type: none"> <li>Ethanol extract of seeds (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Nanda Y, et al.; Patel RK, et al.
40	<i>Momordica charantia</i> L.	Bitter melon is used kidney stones	<ul style="list-style-type: none"> <li>Ethanol and aqueous extract of leaves and aqueous extract of fruits- (<i>In-vitro</i>: Nucleation assay and aggregation assay).</li> </ul>	Vyawahare JN, et al.
Euphorbiaceae				
41	<i>Codiaeum variegatum</i> (L.) Rumph. ex A. Juss.	It is used in the treatment of kidney stones.	<ul style="list-style-type: none"> <li>Ethanol extract of leaves (<i>In-vitro</i>: Nucleation growth and aggregation microscopic assay).</li> </ul>	Fahmy MA.; Jha U, et al.
42	<i>Ricinus communis</i> L.	Root decoction along with half a gram of dried and powdered rhizomes of <i>Zingiber officinale</i> Roscoe (Sunthi), one pinch of <i>Ferula assaotida</i> L. (Heeng) and common Salt is taken (twice for seven days) to treat kidney stone.	<ul style="list-style-type: none"> <li>Chloroform and aqueous fractions of aerial part (<i>in-vitro</i>: Microscopic assay).</li> </ul>	Singh P, et al.
43	<i>Didymocarpuspedicellatus</i> R.Br.	It is widely used in variety of renal afflictions. It is considered to be of great value in the management of kidney and bladder stone.	<ul style="list-style-type: none"> <li>Hydro alcoholic extract of whole Plant (<i>in-vivo</i>: Ethylene glycol and ammonium chloride induced hyper-oxaluria)</li> </ul>	Baheti DG, et al.
Iridaceae				
44	<i>Crocus sativus</i> L.	Saffron, the dried stigma from the flower is used as a famous dietary ingredient and coloring agent since ancient times. In folklore medicine, it is recommended for painful urination and kidney stone.	<ul style="list-style-type: none"> <li>Aqueous extract of dried stigma from flower (<i>In-vivo</i>: Ethylene glycol induced nephrolithiasis).</li> </ul>	Amin B, et al.
Lamiaceae				
45	<i>Plectranthus amboinicus</i> (Lour.) Spreng. (Synonym <i>Coleus aromaticus</i> Benth.)	Leaves paste is used as a remedy for urolithiasis.	<ul style="list-style-type: none"> <li>Hydro alcoholic extract of leaves (<i>In-vivo</i>: Ethylene glycol induced urolithiasis)</li> </ul>	Venkatesh G, et al.

46	<i>Ocimum gratissimum</i> L.	Fresh decoction of leaves is used in the treatment of urinary stone.	<ul style="list-style-type: none"> <li>Alcoholic extract of leaves (<i>In-vitro</i>: Nucleation assay and Synthetic urine assay).</li> </ul>	Agarwal K, et al.
47	<i>Orthosiphon aristatus</i> (Blume) Miq. (Synonym <i>Orthosiphon stamineus</i> Benth.)	It is an important medicinal plant which used for kidney-based problems.	<ul style="list-style-type: none"> <li>Ethanol extracts of leaves (<i>In-vivo</i>: Ethylene glycol induced the urolithiasis).</li> </ul>	Ramesh K, et al.
<b>Leguminosae</b>				
48	<i>Butea monosperma</i> (Lam.) Taub.	It is reported to possess anti-lithiatic property.	<ul style="list-style-type: none"> <li>Hexane, petroleum ether, methanol and water extract of seeds (<i>In-vitro</i>: Estimation of titrimetric assay).</li> </ul>	Sikandari S, et al.
49	<i>Dichrostachys cinerea</i> (L.) Wight and Arn	Roots are used in urinary calculi and renal troubles, disease of vagina and uterus.	<ul style="list-style-type: none"> <li>Ethanol extract of root (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Jayakumari S, et al.
50	<i>Indigofera tinctoria</i> L.	The roots are used in the treatment of urinary stone.	<ul style="list-style-type: none"> <li>Ethanol extract of root (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Velmurugan C, et al.
51	<i>Sesbania grandiflora</i> (L.) Pers.	The root decoction with the rhizome of <i>Cyperus rotundus</i> is orally administered to remove stone.	<ul style="list-style-type: none"> <li>Aqueous extract (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Kishore RN, et al.
52	<i>Sesbania grandiflora</i> (L.) Pers.	In indigenous system of medicine in India, it is use for the treatment of renal calculi.	<ul style="list-style-type: none"> <li>Leaves juice (<i>In-vivo</i>: Calculi-producing diet model).</li> </ul>	Doddola S, et al.
53	<i>Allium sativum</i> L.	Garlic stimulates the production of nitric oxide and hydrogen sulphide which relax the blood vessels; this improves the circulation of the kidneys and prevents the formation of infection stones. Garlic is also believed to contain vitamin B <sub>6</sub> which helps to reduce the levels of urinary oxalate.	<ul style="list-style-type: none"> <li>Water, ethanol, ethyl acetate and petroleum ether extracts of bulbs with <i>Punica granatum</i> seeds (<i>In-vitro</i>: Estimation of calcium oxalate/phosphate by titrimetric and colorimetric method)</li> </ul>	Sindu PS, et al.
<b>Loganiaceae</b>				
<b>Lophiocarpaceae</b>				
54	<i>Corbichonia decumbens</i> (Forssk.) Exell	Crushed leaves are given orally in kidney stone and urinary tract troubles.	<ul style="list-style-type: none"> <li>Pharmacological activity is not reported</li> </ul>	Sharma N, et al.
<b>Loranthaceae</b>				
55	<i>Ammannia baccifera</i> L.	Whole plant is used in the treatment of renal and vesical calculi.	<ul style="list-style-type: none"> <li>Ethyl acetate extract of whole plant (<i>In-vitro</i>: Ethylene glycol and ammonium chloride induced hyper-oxaluria model).</li> </ul>	Baheti DG, et al.
<b>Lythraceae</b>				
56	<i>Ammannia baccifera</i> L.	It is used in urinary problems	<ul style="list-style-type: none"> <li>Ethanol extract (<i>In-vivo</i>: Zinc discs implantation induced urolithiasis).</li> </ul>	Prasad KV, et al.

57	<i>Punica granatum</i> L.	The seeds are considered as natural remedy for kidney stones, due to its astringent property. It is reported to regulate urine discharge and controls the burning sensation of urine.	<ul style="list-style-type: none"> <li>Water, ethanol, ethyl acetate and petroleum ether extracts of seeds with <i>Allium sativum</i> (<i>In-vitro</i>: Titrimetric and colorimetric assay).</li> <li>Chloroform and methanol extract (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Sindu PS, et al.
<b>Malvaceae</b>				
58	<i>Abutilon indicum</i> (Linn.) Sweet	Leaves juice is taken to treat kidney stone.	<ul style="list-style-type: none"> <li>Extract (<i>In-vivo</i>: Ethylene glycol and vitamin D<sub>3</sub> induced urolithiasis).</li> </ul>	Prachi, et al.
59	<i>Hibiscus sabdariffa</i> L.	It is used in the management of lithiasis.	<ul style="list-style-type: none"> <li>Ethanol extracts of leaves (<i>In-vivo</i>: Ethylene glycol induced lithiasis).</li> </ul>	Betanabhatla KS, et al.
<b>Meliaceae</b>				
60	<i>Melia azedarach</i> L.	It is used as anti-lithiatic medicine.	<ul style="list-style-type: none"> <li>Aqueous and alcoholic extracts of leaves (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> <li>Aqueous extract of leaves (<i>In-vivo</i>: Ethylene glycol-induced nephrolithiasis).</li> </ul>	Christina AJ, et al.; Bahuguna YM, et al.; Dharmalingam SR, et al.
<b>Menispermaceae</b>				
61	<i>Tinospora cordifolia</i> (Willd.) Miers (Synonym of <i>Tinospora sinensis</i> (Lour.) Merr.)	It is used to dissolve mineral calculi.	<ul style="list-style-type: none"> <li>Chloroform, ethanol and water extract of stems (<i>In-vitro</i>: Kramer and Tisdall method).</li> </ul>	Varicola K, et al.
62	<i>Moringa oleifera</i> Lam.	It is considered as miracle tree as all the parts of the plant are useful for human health. Bark is used as diuretic.	<ul style="list-style-type: none"> <li>Aqueous and alcoholic extract of root-wood (<i>In-vivo</i>: Ethylene glycol induced urolithiasis)</li> <li>Aqueous extract of bark (<i>In-vivo</i>: Zinc disc insertion with ethylene glycol induced urolithiasis).</li> </ul>	Karadi RV, et al.; Fahad JF, et al.
<b>Musaceae</b>				
63	<i>Musa × paradisiaca</i> L.	The ripe kernel juice is used to dissolve urinary stones	<ul style="list-style-type: none"> <li>Aqueous extract of stem core (<i>In-vivo</i>: Ethylene glycol and ammonium chloride induced urolithiasis).</li> <li>Stem and kernel extract and kernel juice (<i>In-vivo</i>: Calculi producing diet model).</li> </ul>	Thirumala K, et al; Devi VK, et al.
64	<i>Musa balbisiana</i> Colla	The decoction of root and gulli (axis of Maize cob, <i>Zea mays</i> Linn.) is given, twice for seven days in kidney and urinary tract stone	<ul style="list-style-type: none"> <li>Fractionated extracts of fruits (<i>In-vitro</i>: Nucleation and aggregation assay)</li> </ul>	Prachi, et al.
<b>Nyctagenaceae</b>				
65	<i>Borhaavia diffusa</i> L.	It is widely used in the treatment of renal disorders including urolithiasis. Root decoction is given daily for one month in kidney stone. It is also an important ingredient of polyherbal formulation, cystone	<ul style="list-style-type: none"> <li>Aqueous extract ethylene glycol induced urolithiasis).</li> </ul>	Prachi, et al.

Oleaceae				
66	<i>Jasminum auriculatum</i> Vahl	Indian Materia Medica describes the use of flowers in the treatment of urolithiasis and nephrolithiasis.	<ul style="list-style-type: none"> <li>Aqueous and alcohol extracts of flowers (<i>In-vivo</i>: Ethylene glycol induced hyperoxaluria).</li> </ul>	Bahuguna Y, et al.
Papilionaceae				
67	<i>Vigna unguiculata</i> Walp. (Synonym <i>Dolichos biflorus</i> L.)	The seeds are used in the treatment of urinary calculi.	<ul style="list-style-type: none"> <li>Aqueous, chloroform and benzene extract of seeds (<i>In-vitro</i>: Titration assay).</li> </ul>	Atodariya U, et al.
Pedaliaceae				
68	<i>Pedaliium murex</i> L.	It is used for the treatment of kidney stone related problems	<ul style="list-style-type: none"> <li>Ethanol extract of fruits (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Aziz SA, et al.
Plantaginaceae				
69	<i>Cynodon dactylon</i> (L.) Pers.	Whole plant is used to treat urinary tract calculus.	<ul style="list-style-type: none"> <li>Ethanol extract of whole plant (<i>In-vitro</i>: Modified Schneider slide gel method).</li> </ul>	Aziz SA, et al.
Poaceae				
70	<i>Cynodon dactylon</i> (L.) Pers.	The root decoction is given with honey or mishri (clarified and crystallised sugar) to cure urolithiasis, twice daily for three weeks. It is having diuretic action and used as a remedy for urinary infections and kidney stones.	<ul style="list-style-type: none"> <li>Ethanol extract of roots (<i>In-vivo</i>: Ethylene glycol induced urolithiasis model)</li> <li>Decoction of rhizomes (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Prachi et al.; Khajavi RA, et al.; Atmani F, et al.
71	<i>Desmostachya bipinnata</i> (L.) Stapf	Aerial parts are used as diuretic.	<ul style="list-style-type: none"> <li>Aqueous extract of aerial parts (<i>In-vivo</i>: Ethylene glycol and ammonium chloride induced urolithiasis).</li> </ul>	Kishore RN, et al.
72	<i>Hordeum vulgare</i> L.	The seeds are useful in the treatment of urinary stones.	<ul style="list-style-type: none"> <li>Ethanol extract of seeds (<i>In-vivo</i>: Glycolic acid induced in urolithiasis).</li> </ul>	Vargas SR, et al.
73	<i>Saccharum spontaneum</i> L.	The stems are useful in renal and vesical calculi.	<ul style="list-style-type: none"> <li>Alcoholic extract of root (<i>In-vivo</i>: Glycolic acid induced urolithiasis).</li> </ul>	Chinnaraj K, et al.
74	<i>Zea mays</i> L.	The decoction of styles obtained from female inflorescence or immature cobs are given twice daily for 7 days to expel stones from kidney.	<ul style="list-style-type: none"> <li>Infusion: (<i>In-vivo</i>: Rat model).</li> </ul>	Grases F, et al.; Prachi et al.
Portulacaceae				
75	<i>Portulaca oleracea</i> L.	It is utilized for treatment of urinary (kidney and bladder) disorders. It is listed in the WHO as one of the most used medicinal plant, term as Global Panacea.	<ul style="list-style-type: none"> <li>Ethanol extract of aerial parts (<i>In-vivo</i>: Ethylene glycol and ammonium chloride induced urolithiasis).</li> </ul>	Kishore DV, et al.

Pteridaceae				
76	<i>Adiantum capillus-veneris</i> L.	It is reported as an important ingredient of many formulations used in the treatment of urolithiasis, in ancient literature of Unani system of medicine. The decoction has long been used for the same purpose by several Unani physicians.	<ul style="list-style-type: none"> <li>Hydro alcoholic extract (<i>In-vivo</i>: Ethylene glycol and ammonium chloride induced urolithiasis).</li> </ul>	Ahmed A, et al.
Ranunculaceae				
77	<i>Adonis aestivalis</i> L.	It is used for its diuretic (edema) activity in pregnancy	<ul style="list-style-type: none"> <li>Ethanol extracts of leaves and roots- (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Pabba P, et al.
78	<i>Nigella sativa</i> L.	Seed are used in the treatment of kidney stone.	<ul style="list-style-type: none"> <li>Hexane, petroleum ether, methanol and water extract of seeds (<i>In-vitro</i>: Titrimetric assay).</li> <li>Seed Oil (<i>In-vivo</i>- ethylene glycol and ammonium chloride urolithiasis).</li> </ul>	Benhelima A, et al.
Rubiaceae				
79	<i>Rubia cordifolia</i> L.	The root is used internally in the treatment of stones in the kidney and gall bladder and as diuretic.	<ul style="list-style-type: none"> <li>Hydro-alcoholic extract of roots- <i>In-vivo</i>: Ethylene glycol induced urolithiasis in rats.</li> </ul>	Verma A, et al.; Divakar K, et al.
Rutaceae				
80	<i>Citrus medica</i> L.	It has been used in kidney stone. The peel of citrus fruits has been used in to heal urinary calculi.	<ul style="list-style-type: none"> <li>Hydro alcoholic extract of whole plant (<i>In-vitro</i>: Ethylene glycol and ammonium chloride induced hyper-oxaluria).</li> <li>Flavonoid rich fraction of fruits (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Baheti DG, et al.; Chavada KS, et al.
Sapotaceae				
81	<i>Mimusops elengi</i> L.	It is used in the treatment of kidney problems.	<ul style="list-style-type: none"> <li>Petroleum ether, chloroform and alcohol extracts of bark (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Ashok P, et al.
Saxifragaceae				
82	<i>Bergenia ciliate</i> (Haw.) Sternb.	It is commonly known as paashaanbhed, used in the treatment of kidney stone.	<ul style="list-style-type: none"> <li>Hydro alcoholic extract (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Saha S, et al.
Solanaceae				
83	<i>Solanum americanum</i> Mill. (Synonym <i>Solanum nigrum</i> L.)	Decoction of the plant is administered in stone.	<ul style="list-style-type: none"> <li>Hydroalcoholic extract of fruits (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Salama AA, et al; Nanda Y, et al.



84	<i>Solanum surattense</i> Burm. f.	Root powder with curd given daily for 2 weeks in kidney stone and urinary tract troubles. Root decoction along with Bari kateli ( <i>Solanum indicum</i> L.) root powder is given with curd daily for seven days to treat kidney stone.	<ul style="list-style-type: none"> <li>• Extract and Saponin rich fractions of fruits (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Tekuri SK, et al.; Prachi, et al.
85	<i>Solanum virginianum</i> L. (Synonym <i>Solanum xanthocarpum</i> Schrad. and H. Wendl.)	It is used as diuretic.	<ul style="list-style-type: none"> <li>• Saponin rich fraction from the fruits (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> <li>• Ethanol extract of whole plant-<i>In-vitro</i>: Ethylene glycol induced urolithiasis in rats.</li> </ul>	Patel PK, et al.; Chinnala KM, et al.
86	<i>Withenia somnifera</i> (L.) Dunal	Roots powder mixed with sugar and used in the treatment of kidney stone. Fruits are also used for kidney stone	<ul style="list-style-type: none"> <li>• Methanol extract (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Paul S, et al.; Patel RR, et al.
<b>Tamaricaceae</b>				
87	<i>Tamarix gallica</i> L.	It is used in kidney problems and as diuretic.	<ul style="list-style-type: none"> <li>• Acid fraction of leaves extract (<i>In-vitro</i>: Turbidimetry assay)</li> </ul>	Lakhdari W, et al.; Bensatal A, et al.
<b>Vitaceae</b>				
88	<i>Leeama crophylla</i> Roxb. ex Hornem.	Leaves of are usually used as first line therapy to get rid urinary disturbances and urinary problems.	<ul style="list-style-type: none"> <li>• Ethanol extract of whole plant (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Nizami AN, et al.
<b>Xanthorrhoeaceae</b>				
89	<i>Asphodelus tenuifolius</i> Cav.	The decoction of leaves is given in kidney stone and urinary tract troubles.	<ul style="list-style-type: none"> <li>• Pharmacological activity is not reported</li> </ul>	Sharma N, et al.
<b>Zingiberaceae</b>				
90	<i>Costus spiralis</i> (Jacq) Roscoe	A medicinal tea of the whole plant is used in diseases of the urinary tract, particularly for expelling urinary stones.	<ul style="list-style-type: none"> <li>• Aqueous extracts of whole plant part (<i>In-vivo</i>: Effect on formation of calculi induced by either calcium oxalate crystal or zinc disc implants).</li> </ul>	Viel TA, et al.
91	<i>Hedychium coronarium</i> J. Koenig	Roots are used in the treatment of urinary stones. It is one of the ingredients of reputed herbal formulation cystone for the treatment of kidney stones.	<ul style="list-style-type: none"> <li>• Ethanol AND aqueous extracts of roots and rhizomes (<i>In-vitro</i>: Estimation of calcium oxalate by Titrimetric method).</li> <li>• Alcoholic and water extract of root (<i>In-vitro</i>: Estimation of calcium oxalate by titrimetric assay).</li> </ul>	Tailor CS, et al.; Bahuguna YM, et al.
<b>Zygophyllaceae</b>				
92	<i>Tribulus terrestris</i> L.	It is actively used in various drug formulations of kidney stone treatments. Fruits and root decoction thrice a day is taken regularly for a fortnight to treat kidney stone.	<ul style="list-style-type: none"> <li>• Aqueous extract of fruits (<i>In-vitro</i>: Nucleation assay and growth assay)</li> <li>• Methanol extract of whole plant, sfruit and seeds (<i>In-vivo</i>: Ethylene glycol induced urolithiasis).</li> </ul>	Aggarwal A, et al; Inmozhi R, et al.; Shamina S, et al.; Anand R, et al.

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