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ABSTRACT

Urolithiasis, or kidney stone development, is a complicated process that involves a series of physicochemical phenomena such as supersaturation, nucleation, growth, aggregation, and retention inside the kidneys. Calcium oxalate is the most common mineral in kidney stones, according to epidemiological research. Extracorporeal shock wave lithotripsy (ESWL) and medication therapy are two of the therapies employed. Even better, and despite the expensive expense, substantial evidence now suggests that therapeutic dosages of shock waves may produce acute renal damage, a loss in renal function, and an increase in stone recurrence. Furthermore, remaining stone fragments and the risk of infection following ESWL pose a severe concern in the treatment of stones. Furthermore, despite significant advances in the research of the biology and physical symptoms of kidney stones, no appropriate medicine for treatment has been discovered. Phyto therapeutic drugs may be effective as an alternative or supplementary therapy in the treatment of urolithiasis

INTRODUCTION

Kidney stone production is one of the oldest and most common disorders known to man [1]. Urolithiasis is the production of stones in the urinary system, such as the kidney, ureter, urinary bladder, or urethra. "Urolithiasis" is a term that combines the words "ouron" (urine) and "lithos" (stone). Urolithiasis is a major cause of morbidity and one of the most common disorders of the urinary system. Although the majority of patients only have one stone episode, 25% of people get recurring stones. Urinary stone illness is still uncommon in children, with the overall incidence remaining steady in most studies [2]. Urinary calculi have been discovered in Egyptian mummies' tombs going back to 4000 BC, as well as in the graves of North American Indians ranging from 1500 to 1000 BC. Between 3000 and 2000 BC, early Sanskrit records in India make mention of stone production [1]. After urinary tract infections and prostate disorders, kidney stones are the third most prevalent urinary tract ailment. The majority of persons with kidney stones experience severe colic pain that is not alleviated by traditional pain relievers and may necessitate the use of a narcotic painkiller [3]. In developed nations, 10–12% of the population suffers from urinary stones. Stone sickness is uncommon in just a few geographical places, such as Greenland and Japan's coastal regions. According to epidemiological research, nephrolithiasis is more common in males (12%) than in women (6%) and is more common in both sexes between the ages of 20 and 40. This condition has a complex etiology that is closely linked to dietary lifestyle behaviors or practices. Stone production is further aided by increased rates of hypertension and obesity, both of

which are connected to nephrolithiasis [4]. More than 90% of patients with upper urinary tract stones are now treated according to the size, kind, and location of the stone, with a treatment success rate of 68 percent to 86 percent. Geographic location, lifestyle, race/ethnicity, and other variables all impact the occurrence of kidney stones [3]. Calcium-containing stones, particularly calcium oxalate monohydrate, calcium oxalate dihydrate, and basic calcium phosphate, are the most prevalent, accounting for 75-90 percent of all cases, followed by magnesium ammonium phosphate (Struvite), uric acid, and cystine, each accounting for 3-10 percent. Calcium oxalate or magnesium ammonium phosphate stones are the most prevalent types of stones.' Pashanabheda group plants are reported to be effective in the treatment of urinary stones in India's Ayurvedic school of medicine. The Sanskrit name 'Pashanabheda' refers to a collection of plants that have diuretic and antiurolithiatic properties (Pashana = stone; Bheda = break) [5]. Renal stones are a prevalent clinical issue that doctors deal with. Younger people make up the majority of the prevalence, and recurrence rates are relatively high. India is a developing nation with a sizable population living below the poverty line, making treatment for kidney stones unaffordable for them. In contemporary medicine, surgical intervention is the only viable choice. However, the recurrence rate is significant even after surgery. Because it is linked to limited activity and/or hospitalization, this ailment has a considerable financial impact on the economically active population. We may contrast this illness with Ashmari, which is extensively documented in classical Ayurveda texts. Therefore, for certain Ayurveda ailments that are intricately detailed in Ayurvedic classics, dietary modification, lifestyle adjustments, and effective medication treatment are crucial. Our acharyas have described nidana parivarjana (etiological factor), shodhan chikitsa (purification treatment), and aushadhies (medication) [6]. Many claim that the World Health Organization's Canberra conference in 1976, which championed the idea of "Traditional" medicines for underdeveloped nations, is where it all began [7].

PHYSIOLOGY OF KIDNEY STONE FORMATION:

Renal stone formation progresses in successive steps [8].

1. Nucleation refers to the transformation of dissolved salts into solids. It is determined by the degree of urine saturation in a single solvent. Even if the concentration of a salt exceeds its solubility, it is feasible for it to remain dissolved in urine. The urine is classified as metastable in such instances. The upper limit of metastability is the point at which supersaturation causes precipitation of dissolved salts [9]. When crystal precipitation occurs spontaneously in supersaturated urine, it is homogeneous; when it occurs at lower saturation levels in the presence of nucleating chemicals, it is heterogeneous (i.e., cells, crystals, urinary proteins, or components of the epithelial cells).
 2. Crystal growth;
 3. Crystal aggregation;
- Retention of the original nucleus in urothelium sites.

The theories to explain the pathogenic mechanism of kidney stone formation [10, 11] are:

1. The free particle theory for lithogenesis.
2. The theory of fixed particles
3. Apatite plaque in the intestine. World Health Organization's Canberra conference in 1976, which championed the idea of "Traditional" medicines for underdeveloped nations, is where it all began [7].

There are different types of renal stones (Table 8.1) based on their composition

Table 8.1 Main types of renal stones:

| Types of Stones | percenta ge |
|------------------------------|----------------|
| Calcium oxalate stones | 59 |
| Calcium phosphate stones | 10 |
| Uric acid stones | 17 |
| Struvite or infection stones | 12 |
| Cystine and other stones | 2 |

Calcium-containing stones with a prevalence of 70-80%, this is the most frequent form of kidney stone [12, 13]. Calcium oxalate and calcium phosphate are the two main forms of calcium-containing stones. Calcium oxalate stones Supersaturation of acidic urine in calcium and oxalate is the main mechanism in their formation. Calcium phosphate stones Apatite (carapatite or hydroxyapatite) and brushite (calcium monohydrogen phosphate) stones are the most common calcium phosphate stones, with occurrence rates of 4-10 percent and 2-6 percent, respectively [14]. Hypercalciuria and an alkaline urine pH promote calcium phosphate stone formation by causing monohydrogen phosphate supersaturation and crystal precipitation [15]. Their chemical components are similar, but their crystalline structure and clinical characteristics differ. Brushite stones seem to be more resistant to conservative treatment, necessitating more extracorporeal shock wave lithotripsy (ESWL) treatments or perhaps surgery [16]. Interstitial apatite plaques, collecting ducts blocked with apatite, epithelial cell damage, interstitial fibrosis, tubular atrophy, and glomerulosclerosis were found in biopsies from patients with brushite stones [17]. These lesions may be caused by repeated ESWL procedures. Calcium phosphate, which is found in stones, is becoming more prevalent over time [18]. This is linked to the number of ESWL treatments received [19]. The alkalinization of urine pH and the formation of calcium phosphate stones may be aided by ESWL-induced renal damage and altered urinary acidity [20]. Uric acid stones Low urine volume, hyperuricosuria, and an acidic urine pH can all cause this. Uric acid precipitation occurs as a result [21]. Gout, which is characterized by hyperuricemia, recurrent monoarthritis, and hyperuricosuria, has been shown to increase the incidence of incident kidney stones in men in recent follow-up research [22]. Enomoto et al. identified the anion exchanger URAT1 as a urate transporter

in the renal proximal tubule and demonstrated that inactivating mutations in the gene coding for URAT1, SLC22A12 produced idiopathic hyperuricosuria, hypouricemia, or renal acid leak in a major study in uric acid research [23, 24]. Low urine pH, on the other hand, is by far the most common and important risk factor in uric acid nephrolithiasis. Low urine pH alone can convert urinary urate into sparingly soluble uric acid in the absence of hyperuricosuria. Uric acid is a weak acid with a pKa of 5.5 as its ionization constant [25]. 90% of urate in urine is in the soluble urate anion (salt) at a pH of 6.75, while 95% is in the soluble form with a pH of 7.0 [26]. At a urine pH of less than 5.5, however, supersaturation with the less soluble uric acid develops [27]. Defective Ammonium excretion and increased net acid excretion are thought to be the reasons for low urine pH in idiopathic uric acid nephrolithiasis [28]. Patients with normouricosuric uric acid nephrolithiasis may have a renal acidification condition, according to new research. Because of a highly defective ammonia excretory response, uric acid stone formers further acidify their urine after an acid load, despite their low baseline urinary pH [27]. Cystine stones inherited renal transport abnormalities are the source of cystine stones [29]. A heteromeric transporter composed of a light chain catalytic subunit, b0, plus amino acid transporter (b0,+AT), and rBAT (related to b0,+AT), a heavy chain component, is the major apical resorption mechanism for cystine in the kidney [30]. Mutations in one of the two subunits (rBAT or b0+AT1) cause urine loss of a variety of amino acids, including cysteine, arginine, lysine, and ornithine [31]. Because only cystine is soluble in urine, the phenotype is cystine stones. With an alkaline pH and homodimerization of cystine to cysteine, cystine solubility improves. The exact allelic frequency is difficult to ascertain because the incidence and prevalence rates fluctuate substantially depending on geographical area and screening method. However, a rate of one in 20,000 is frequently cited [32]. A molecular classification is now linked to the traditional clinical categorization. In type I cystinuria (rBAT mutations), heterozygotic carriers have urinary cystine concentrations within the normal range; in non-type, I cystinuria (i.e., type II and III; b0+AT mutations), heterozygotes exhibit intermediate aminoaciduria [21]. Patients of type I and type II, on the other hand, are clinically indistinguishable [33]. Young age upon presentation, moderately radio-opaque stones, family history, and typical hexagonal cystine crystals should all raise suspicion of cystine stones [21]. A 24-hour urine test is used to make the diagnosis. Urine cystine excretion ranges from 350 to 500 mg/day in all cases of cystinuria. With an alkaline pH and homodimerization of cystine to cysteine, cystine solubility improves. As a result, cystine excretion can be lowered by raising urine pH, lowering sodium and protein intake, and using drugs like d-penicillamine, α -mercapto propionyl glycine, or captopril, which form soluble heterodimers with cysteine [34]. Struvite or infection stones Struvite stones, which are magnesium ammonium phosphate ($MgNH_4PO_4 \cdot 6H_2O$) stones, form as a result of changes in urine chemistry caused by microbial proliferation. The main acknowledged reasons are recurrent urinary infections and anatomic predisposition. Urease-positive bacteria (some *Proteus* spp., *Klebsiella* spp., *Pseudomonas* spp., *Staphylococcus saprophyticus*, *Ureapla* - *SMA Urealyticum*) produce two ammonium and one bicarbonate for each urea, converting urinary divalent phosphate to trivalent phosphate and providing

enough ammonium for struvite crystallization. Struvite can grow quickly and widely, and staghorn, a calcareous cast of the collecting system, is a common feature of this stone type [21].

TREATMENT

Allopathic Treatment for Kidney Stone

Urolithiasis is treated with a combination of conservative medicinal medicines and surgical techniques, depending on the patient's acute presentation. When patients are present, pain management is frequently a priority. Anti-inflammatory medicines (NSAIDs) used orally or intravenously are recommended as first-line therapy for pain. Opioids can be utilized, but only in the case of severe pain. IV lidocaine has also been investigated as a pain-relieving alternative. IV antiemetic drugs such as ondansetron, metoclopramide, and promethazine, to mention a few, should be used to manage nausea and vomiting. Medical expulsive treatment, or MET, comprises alpha-blockers like doxazosin and tamsulosin, which have been demonstrated to help with the passing of bigger (5-10 mm) stones but not with the passage of smaller ones. Patients who seem dehydrated owing to frequent vomiting can be given IV crystalloid fluids, but they have not been proved to help with the stone passage [35]. Potassium citrate is used to reduce the acidity of urine and is beneficial for those with calcium, cystine, and uric acid stones as well as those who have low urinary citrate levels. Potassium citrate increases the alkaline basicity of the urine. This characteristic aids in preventing the development of uric and cystine stones. Additionally, the urine's citrate concentration rose, which aids in preventing the formation of calcium stones. The increased levels of uric acid in the blood and urine are decreased with allopurinol. It is also used to avoid kidney stones caused by uric acid and calcium. Acetohydroxamic acid is prescribed to individuals who have developed struvite stones or UTI infections. The recurrence of urinary tract infections might lead to the development of these stones. AHA may thin the urine, which makes struvite stone production more difficult [36].

Within 30-40 days, around 86 percent of stones will pass naturally. Overall, the size of the stone has a big impact on how long it takes to pass and how likely it is to pass spontaneously.

- Less than or equal to 2 mm stones, 8 days for mean passage, and passage rate of 87%
- 3 mm stones, 12 days for mean passage, and a passage rate of 76%
- Between 4-6 mm, 22 days for mean passage and passage rate of 60%
- 7 mm stone with a passage rate of 48%
- 8-9 mm stone with a passage rate of 25%

Patients with urolithiasis can present with varying degrees of illness/complications associated with the condition. Patients with small stones, physiologic blood work, no signs of infection, or acute obstruction can be managed using MET [35]. Common approaches in the active treatment of renal stone disease include extracorporeal shock wave lithotripsy (ESWL), retrograde intrarenal surgery (RIRS), and percutaneous nephrolithotomy (PCNL). Open and laparoscopic surgery is other treatment options but reserved only for selected patients [37]. PCNL was first described by Fernstrom and Johansson 1976 and has since become an established treatment modality in the

management of renal stones that are larger than 2 cm. CNL has the advantage of achieving a high stone-free rate (SFR) when compared to other treatment modalities, but it is relatively invasive [38]. ESWL revolutionized the treatment of urolithiasis and became the preferred option for its treatment. ESWL is considered as first line treatment for urinary stones below 2.5 cm.

Marketed Available Ayurvedic Medicines for Kidney Stones

Renal calculi are treated with Cystone Tablet from Himalaya, an ayurvedic medicine. The kidney stone-related problems can be effectively treated with Cystone. Additionally, these pills are employed in the management of kidney stones. Kidney stones can be removed and prevented from coming back with its help. An incredible Ayurvedic treatment that aids in kidney stone crushing is Krush by Revinto. Kidney stones should be crushed to let the stone flow through the urine more easily. The stones are reduced in size to make them readily drained out. Additionally; Phyto's Stonvil Capsule is a patented ayurvedic drug. Kidney stones and urinary issues are treated with it. This remarkable Ayurvedic pill aids in managing urinary issues and burning sensations. Additionally, Stonvil Capsule dissolves calculi and unclogs obstructions. This Ayurvedic remedy stops calculi from forming Restores the operation of the urinary system's essential organs while safeguarding them. Brihatri's Chandra Prabha Vati is a traditional herbal-mineral remedy. Its anti-inflammatory qualities help to lessen the burning feeling during urination. This Ayurvedic remedy works well as a diuretic as well. It eliminates undesirable toxins from the body and removes extra fluid from it. Doctors advise ChandraPrabha Vati for the treatment of renal calculi, intermittent urination, sparse urine, burning micturition, and urinary tract infections. Additionally, it reduces abdominal and muscular discomfort. K 4 Tablet by Zandu is an ayurvedic proprietary medicine. It is an excellent remedy for urinary tract infections. Recognized as a potent diuretic it helps in relieving water retention. It is also known to disintegrate renal calculi or kidney stones and flush them out through urine. It relieves inflammation in the urinary tract and soothes burning micturition. Ayurvedic medication brand Ural Cap is manufactured by Vasu Healthcare. Both renal calculi and kidney stones can be effectively treated with it. The Ural Cap breaks up stones and aids in their removal from the system. This Ayurvedic medication also eliminates the possibility of a recurrence [39]. For the treatment of renal stones, the ayurvedic writings primarily mention three types of medications: Mutravirechaniya (diuretic), Ashmarighna Dravya (lithotriptic), and Kshara Karma (alkali therapy). Also, after surgery, or if you have repeated kidney stones, ayurvedic herbs and remedies can avoid the chances of recurrence.

Ayurvedic herbs for Renal stones

- Punarnava (*Boerhaavia Diffusa*)
- Varuna (*Crataeva nurvala*)
- Shigru (*Moringa Oleifera*)
- Pashanabheda (*Bergenia ligulata*)
- Kushmanda seeds (*Benincasa hispida* Cong.)
- Kantkari (*Solanum xanthocarpum*)
- Bakul (*Mimusops Elengi*)

- Jasmine (*Jasminum auriculatum*)
- Coriander (*Coriandrum Sativum L.*) [40]

PREVENTION OF KIDNEY STONE:

Risk factors for stone formation include positive family history, nutritional factors (excessive intake of animal protein, fat, sugar, oxalates, colas, alcohol, caffeine, salt, and vitamin D), nutritional deficiencies (water, magnesium, calcium, potassium, and vitamin B6), lifestyle factors (physical inactivity and problematic pharmaceuticals), and associated disease states (osteoporosis, parathyroid problems, osteoporosis, gout and recurrent urinary tract infections). The chemical makeup of the stone is important since the prevention of recurrences varies somewhat depending on the type of stone involved.

- Abatement of smoking. Because of the cadmium content in tobacco, the higher body cadmium levels in smokers, and the identified risk in cadmium workers, smoking is a theoretical risk factor.
- Avoid aluminum-containing antacids.
- Careful consideration of prescription medications. Accompanied with adequate hydration, efficacy has been demonstrated with the use of thiazides in calcium stone formers [59]. Allopurinol reduces uric acid blood levels and may be useful in cases of uric acid stone formation.
- Increase water and liquid intake to reach a urine volume of at least two quarts daily, with a desirable goal of a urine-specific gravity below 1.015; efficacy of increased urine output has been repeatedly demonstrated [41].
- Vegetarian diet. A United Kingdom survey study of vegetarians found the prevalence of urinary stone formation 40–60% lower than that of the general population after matching for age, sex, and social class [42].
- Reduce animal protein and avoid purine protein (organ meats, shellfish, brewer's yeast, baker's yeast, herring, sardines, mackerel, and anchovies).
- Increase fiber intake. Ten grams of rice bran ingested b.i.d. by recurrent stone-formers reduced recurrences by 84%, with 61% remaining stone-free [43].
- Increase cranberry intake
- Increase intake of high magnesium-to-calcium ratio foods. These include avocado, potato, tomato, banana, orange, barley, buckwheat, rye, oats, brown rice, cashews, sesame seeds, and lima beans.
- Restrict high oxalate foods. Oxalate restriction should be considered for calcium oxalate stone formers, especially those with hyperoxaluria [44].
- Avoid excess alcohol, sugar, fat, and refined carbohydrates.
- Limit sodium intake to 2 g daily or less [45].
- Avoid excess phosphorus in soft drinks by quitting or cutting down. Vitamin B6. Eighty-six percent of stone formers given vitamin B6 10 mg daily with magnesium oxide for 5 years were either stone-free or had a greatly significantly reduced number of stone episodes [46].

DIFFERENT APPROACHES FOR STUDY OF KIDNEY STONE

In vitro, nephrolithiasis systems may be divided into two types: those that investigate the physical chemistry of stone production and those that investigate the pathophysiology of renal stone disease. In vitro crystallization systems are commonly used to research mechanisms of crystal nucleation, growth, and agglomeration for the first purpose [47]. In vitro models of urolithiasis are generally regarded as a method to investigate the mechanism of urolithiasis [48]. However, in vitro models only relate to one event and one element of the process (e.g., crystallization studies determining nucleation and growth). Animal models are extensively utilized to investigate all aspects of pathogenesis, including the anatomic and physiological involvement of kidneys [49]. The majority of the data on renal physiology is based on tests in rats, rabbits, and dogs; nevertheless, rats are the most widely utilized species in nephrolithiasis research [49].

Clinical And Pharmacological Studies:

Fruits of *Piper longum* Linn commonly called Bl pepper have a long history in Indian traditional medicine and Ayurveda for the treatment of Gastrointestinal and Respiratory complications. 1-(5(1,2-benzodioxol-5-yl)-1-oxo-2,4-pentadienyl) piperidine commonly known as piperine was reported to possess many pharmacological activities. reported that Piperine has significant anti-rourolithiasistivity in rats [50]. Aqueous extract from leaves of *Boldoa purpurascens* was evaluated for antiurolithiatic activity [51]. The effects of aqueous and ethanolic extracts of *Costus igneus* (stem) and isolated compounds lupeol and stigmasterol on calcium oxalate urolithiasis have been studied in animals [52]. *Macrotyloma uniflorum* Linn. (Fabaceae) seeds are widely used for their diuretic and urolithiasis effects in India [53]. The present study investigated the effect of aqueous extract of *Macrotyloma uniflorum* seeds (AEMU) on ethylene glycol-induced urolithiasis in animals. The chloroform extract of *Selaginella lepidophylla* Spring prevented calcium oxalate renal calculi [54]. The effects of *Solanum xanthocarpum* fruit extract in ethylene-glycol-induced urolithiasis in the animal. Treatment with *S. xanthocarpum* decreases hyperoxaluria, calcium, and uric acid, improves renal function, and also produces antioxidant effects [55]. The plant flavonoids could effectively inhibit the formation of CaOx stones, correlating with their diuretic, antioxidant, anti-inflammatory, ibacterial properties and other protective effects. Thus, the flavonoids or flavonoid-rich plant extracare tie endowed with anti-urolithiasis activities [56]. Aqueous extracts of leaves, stems, and rhizome of *Costus igneus* on the growth of COM crystals were studied. Results. With an increase in the concentration of aqueous extra igneous, the weight of the formed crystals was gradually reduced from 2.15 to 0.07 g(leaves), 0.06 g (rhizome,e.) and 0.03 g (stem) [57]. The methanol extract of Mexicanacana leavecontains aurolithiasisatic activity [58]. The chloroform extract of *Selaginella lepidophylla* (Hook. et Grev.) Spring prevented calcium oxalate renal calculi in rats [59]. Alkali supplements are used to treat calcium kidney stones owing to their ability to increase urine citrate excretion which lowers stone risk by inhibiting crystallization and complexing calcium. Hydroxycitrate can be complex calcium equivalent to that of citrate and that it is an effective inhibitor of calcium oxalate monohydrate crystallization. HCA was identified as the acidic component of the rind of the fruit from *Garcinia Cambogia* (GC) [60].

In addition to the above, some other plants which can show the antiurolithiatic effect were given below (Table-8.2)

Table 8.2 List of Plants Useful for Treatment of Urolithiasis

| Sr · N o | Scientific Name | Family | Part Used | Uses |
|-------------------|--|---------------|---------------------------|--|
| 1 | Abrus precatorius Linn. | Malvaceae | Leaves | Aqueous extract is used for the treatment of kidney Stones. |
| 2 | Abutilon indicum Linn | Malvaceae | Whole plant | Herb is employed in urinary troubles. |
| 3 | Actinodaphne angustifolia (Blume) Nees | Lauraceae | Leaves | The decoction of the plant is used in kidney diseases due to stones |
| 4 | Aeschynomene indica Linn. | Papilionaceae | Young tender leaves | Taken as salad, cures stones in urinary tract infection. Boiled extract of the leaves with black pepper is prescribed in painful urination. |

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|---|------------------------------------|--------------|-----------------|---|
| 5 | Allium Odorosum Linn. | Alliaceae | Leaves | Boil extract Leaves are given in painful urination, especially urinary tract infections due to stones. |
| 6 | Ananas comosus Linn | Bromeliaceae | Ripe fruit | Extract of the ripe fruit is prescribed against bronchitis, asthma, and urinary trouble due To stone. |
| 7 | Andrographis paniculata Nees | Acanthaceae | Leaves | Boiled leaf extract is used against fever, cold, cough, and urinary disorder |
| 8 | Anneslea fragrans Wall | Theaceae | Dried leaves | Boil 10 g in 1 liter water. Drink three times a day for kidney stones |

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|----|---------------------------------|--------------|--------|---|
| 9 | Asparagus racemosus Willd | Liliaceae | Root | Boiled decoction of the root with sugar is prescribed for urinary troubles due to stone |
| 10 | Averrhoa carambola Linn | Averrhoaceae | Fruit | The extract of the fruit mixed with asthma, bronchitis, and urinary trouble due to stone |
| 11 | Averrhoa carambola Linn | Averrhoaceae | Fruit | Put 2.8 g silver element into 300 ml fruit juice. Drink half a tea glass daily for five days for kidney stone |
| 12 | Bambusa nutans Wall | Poaceae | Shoots | Sliced 250 gm of shoots and boiled in 1 liter water. Drink half tea glass daily for seven days, for kidney stones |

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|----|---------------------------------------|-----------------|-------------------------|--|
| 13 | Bauhinia acuminata Linn | Caesalpiniaceae | Bark or or leaves | Decoction of bark or leaves is given to cure stone |
| 14 | Benincasa hispida (Thund.) Cogn | Cucurbitaceae | Fruit | Boiled decoction of the plant with sugar is prescribed in urinary troubles due to stone and urinary tract infections, kidney stones |
| 15 | Berberis aristata DC | Berberidaceae | Leaves | The boiled decoction of the leaves is prescribed in urinary tract infections and kidney troubles |
| 16 | Blumea balsamifera Linn | Asteraceae | Leaves | Two teaspoon of such crushed leaves juice is added to a glass of water with a little “Meitei thum” (local salt), for treatment of stone formation |

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|----|--|---------------------|----------------------------------|---|
| 17 | Bonnaya brachiata Link & Otto | Scrophularace ae | Whole plant | Urinary stone case |
| 18 | Bonnaya reptans (Roxb.) Spreng. | Scrophularace ae | Whole plant | The boiled decoction is prescribed for the kidney and urinary complaints due to stone |
| 19 | Capsella bursa- pastoris (Linn.) Medik | Brassicaceae | Whole plant | Freshly taken in Urinary problems |
| 20 | Cardamine hirsuta Linn | Brassicaceae | Whole plant except root | Diuretic |
| 21 | Celosia argentea Linn | Amaranthacea e | Roots | Boiled extract of the root with sugar is given in urinary tract and kidney stone |
| 22 | Carica papaya Linn. | Caricaceae | Young Fruit | Diuretic and Digestive |
| 23 | Celtis australis Linn | Urticaceae | Leaves | Boiled decoction of the leaves is given against stone in the urinary tract, and in stone cases |

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|----|---|-----------|--------------|--|
| 24 | Celtis timorensis Span. | Ulmaceae | Aerial parts | Boiled 10 g With 2 liters of water by putting 2 spoonfuls of sugar. Drink 1 tea glass twice daily for 10 days for kidney stone |
| 25 | Centella asiatica (Linn.) Urban | Apiaceae | Whole plant | Plant Juice with sugarcane molasses are taken in urinary calculus |
| 26 | Cinnamomum bejolghota (Buch-Ham.) Sweet | Lauraceae | Bark | Bark is useful for treatment in urinary stone troubles. |
| 27 | Cinnamomum glaucescens | Lauraceae | Bark | The powder of the bark is used in kidney Trouble. |
| 28 | Cinnamomum tamala Linn. | Lauraceae | Leaves | Boiled with Celtis timorensis and drink in kidney Stone. |

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|----|-----------------------------|----------|--------|--|
| 29 | Cissus adnata Roxb. | Vitaceae | Leaves | Boil decoction of the leaves and roots is given in kidney problem due To stone. |
| 30 | Cissus discolor Blume. | Vitaceae | Leaves | Skin diseases, poxes, & urinary Disorder. |
| 31 | Cissus javana DC | Vitaceae | Leaves | Boiled Extract of leaves is considered tonic for curing urinary trouble due to stone and to cure the burning sensation during urination. |
| 32 | Cissus javanica D.C. | Vitaceae | Leaf | Boiled extract of leaves is taken for Urinary disorder |
| 33 | Coix lacryma- Jobi Linn. | Poaceae | Leaves | Stone Case. |

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|----|---------------------------------------|----------------|------------------------|--|
| 34 | Citrus latipes (Swingle) Tanaka | Rutaceae | Fruit | The fruit extract mixed with that of Averrhoa carambola and a pinch of salt and honey is prescribed in urinary tract and kidney Stone. |
| 35 | Coriandrum sativum Linn | Apiaceae | Leave and Young Stalks | Diuretic, stomachic, aphrodisiac, to correct foul smell |
| 36 | Cordia grandis Roxb. | Boraginaceae | Fruits | Fruits are considered medicine for urinary trouble Due to stone. |
| 37 | Costus Speciosus (Koenig) Smith. | Zingiberaceae | Roots | Decoction of roots is prescribed in urinary Complaints. |
| 38 | Crinum asiaticum Linn. | Amaryllidaceae | Bulb | Bulb is used in urinary Complaints. |
| 39 | Curcuma angustifolia Roxb. | Cucurbitaceae | Whole plant | Jaundice, Kidney infection, Stone Case |

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|----|---|---------------|----------------|--|
| 40 | Cuminum Cyminum Linn. | Umbelliferae | Fruits | The boiled decoction of the fruits is used in urinary trouble |
| 41 | Cymbopogon citratuS Stapf. | Poaceae | Whole plant | The dried plant is boiled in water and decoction is taken orally for Stone Case. |
| 42 | Cyperus rotundus Linn. | Cyperaceae | Whole plant | The decoction of the plant is prescribed in urinary Trouble. |
| 43 | Desmodium microphyllum (Thunb.) DC | Papilionaceae | Whole plant | The decoction of the plant is prescribed for urinary Complaints due to stone. |
| 44 | Desmodium microphyllum (Thunb.) DC | Papilionaceae | Whole plant | The decoction of the plant is prescribed for urinary complaints Due to stone. |
| 45 | Docynia indica (Colebr.) Decne. | Rosaceae | Fruit | Infusion with sugar kept for two week and orally taken for Urinary troubles |

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|----|------------------------------------|---------------|--------------|---|
| 46 | Duchesnea indica (Andr.) Focke. | Rosaceae | Whole plant | Decoction of plants with sugar is used for treatment of stone case and other urinary Infection. |
| 47 | Emblica officinalis Gaertn. | Euphorbiaceae | Fruit | Juice extraction is prescribed in kidney Stone. |
| 48 | Enhydra fluctuans Lour. | Asteraceae | Aerial parts | Boiled with sugar and prescribed in kidney Stone. |
| 49 | Eupatorium birmanicum DC. | Asteraceae | Leaves. | Boiled decoction of the leaves with a pinch of indigenous Manipuri salt helps in exiting and eliminating calculi/stones |
| 50 | Euphorbia hirta Linn. | Euphorbiaceae | Whole | Boiled with Cuminum cyminum Linn. Seeds in water and is taken orally for Stone case. |

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|----|--|---------------|------------------|--|
| 51 | Fragaria indica F. | Rosaceae | Vegetative part. | The vegetative part of this plant is boiled with sugar and used in problems of urinary tract & stone Case. |
| 52 | Fragaria nilgerensis Schltdl. Ex. J. Gay. | Rosaceae | Vegetative part. | Boiled with water by putting a little sugar candy and drink to cure kidney Stone. |
| 53 | Hedychium aurantiacum Rosc. | Zingiberaceae | Rhizome | Boiled with water and drink in Kidney stone problem. |
| 54 | Hedychium Coronarium Koenig. | Zingiberaceae | Rhizome | Boiled extract of rhizome is given in Urinary tract. |
| 55 | Helianthus annuus Linn. | Asteraceae | Fresh Leaves | The juice of the fresh leaves is used in urinary trouble and diseases of Kidney. |

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|----|------------------------------------|----------------|-------------|--|
| 56 | Hemidesmus indicus (Linn.) Schult. | Asclepiadaceae | Root | Used as medicine Rheumatism, urinary diseases and skin troubles. |
| 57 | Hibiscus Sabdariffa Linn. | Malvaceae | Leaves | Decoction of Leaves in used in urinary troubles, especially due to stone in kidney. |
| 58 | Homonoia Riparia Lour. | Euphorbiaceae | Root | The decoction of the root is given in piles, stone in the urinary Bladder. |
| 59 | Hydrocotyle javanica Thunb. | Apiaceae | Whole plant | Used as medicine Stomach ulcer, urinary troubles, digestive complaints, Dysentery and skin diseases. |
| 60 | Indigofera tinctoria Linn. | Papilionaceae | Roots | Roots are used in urinary Complaints. |

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|----|--|---------------|------------------|---|
| 61 | <i>Ixora sub-sessilis</i> Wall.ex G.Don | Rubiaceae | Fruits and seeds | Fruits and seeds are useful in urinary Complaints. |
| 62 | <i>Knoxia roxburghii</i> (Spreng) M.A.Rau. | Rubiaceae | Leaves | Leaf- juice is given for urinary Troubles. |
| 63 | <i>Lindernia ruellioides</i> (Colsm) Pennell. | Linderniaceae | Whole plant | Boiled with water by putting a little sugar candy and drink In kidney stone. |
| 64 | <i>Lemanea Fluviatilis</i> Linn. | Lemnaceae | Whole Thallus | Used in Urinary trouble due to kidney stones. |
| 65 | <i>Magnolia grandiflora</i> Linn. | Magnoliaceae | Leaves | Stone case |
| 66 | <i>Mallotus philippensis</i> (Lan) Muell. Arg. | Euphorbiaceae | Bark | Boil decoction of the bark with sugar is given in urinary tract stone Problem. |

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|----|--|---------------|----------------------------|--|
| 67 | Melothria perpusilla (Blume) Cong. | Cucurbitaceae | Whole parts of plant | Vegetative parts of this plant is boiled with sugar candy in Water and given to patients of Jaundice, Kidney infection. |
| 68 | Mentha arvensis Linn. | Lamiaceae | Leaves | Crush 250 g leaves with 50 ml water by using mortar And pestle Drink half tea glass daily for 3-7 days. |
| 69 | Meriandra Benghalensis Benth. | Lamiaceae | Leaves | Expectorant s Against dyspepsia, dizziness and urinary problems. |
| 70 | Mesua ferrea Linn. | Clusiaceae | Flower | Asthma, Urine with Blood. |

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|----|---|---------------|-----------------------------------|--|
| 71 | Mimosa pudica Linn. | Mimosaceae | Roots | Root decoction with the rhizome of Cyperus rotundus and Flintstone is administered to remove Stone. |
| 72 | Momordica Cochinchinensis (Lour.) Spreng. | Cucurbitaceae | Fruits | Kidney Stone treatment. |
| 73 | Momordica dioica Roxb.ex Willd. | Cucurbitaceae | Fruits | Roots are used in urinary Complaints. |
| 74 | Myriogyne minuta Less. | Asteraceae | Aerial parts | Extract of the plants mixed in equal proportion with the juice of sugarcane is given against stone in the Urinary tract. |
| 75 | Nelumbo nucifera Gaertn. | Nelumbonaceae | Young leaves, flower and rhizomes | Diuretic, against dizziness and Stomachic. |

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|----|-----------------------------------|-------------|--------|---|
| 76 | Orthosiphon spiralis (Lour) Merr. | Lamiaceae | Leaves | Boiled extract of leaves is prescribed in urinary complaints. |
| 77 | Oxalis Corniculata Linn. | Oxalidaceae | Leaves | Boiled decoction of the leaves with a pinch of indigenous Manipuri salt helps in exiting and eliminating calculi/stones |
| 78 | Pavetta indica Linn. | Rubiaceae | Roots | Roots are used for urinary diseases. |
| 79 | Piper nigrum Linn. | Piperaceae | Seeds | Boiled with water and prescribed in kidney stone. |

CONCLUSION

One of the most frequent issues that affect the urinary system in developing nations and the rest of the world is kidney stones. The current paper objectively examines the impacts of numerous plants with potential use in preventing and treating stone kidney development. Above data suggest that Phototherapeutic agents could be used as an alternative or complementary therapy for urolithiasis management. Some proposed modes of action of plant extracts are increased urine citrate excretion, reduced urinary calcium and oxalate excretion, or diuretic, antioxidant, or antibacterial properties, according to the reviewed research. Some proposed modes of action of plant extracts are increased urine citrate excretion, reduced urinary calcium and oxalate excretion, or diuretic, antioxidant, or antibacterial properties, according to the reviewed research. Unfortunately, the examined studies recorded phytochemical characterization of all herbal formulations is insufficient. An adequate phytochemical description of the extract will greatly aid future scientific and clinical investigations on the efficiency of herbal extracts. Investigators are

increasingly aware that major changes in the result are likely to be product-specific, despite the fact that most papers fail to properly describe the exact herbal product. It is also advised that the extraction solvent, drug-extract ratio, and quantity of certain marker chemicals be utilized to define products used in research/clinical trials. This data should allow for a better-informed decision. A thorough data discussion would aid in better explaining inconsistencies between research. Furthermore, greater research into the mechanism of action of the extract and active components is required. The current situation necessitates the creation of for the treatment of urolithiasis, an effective, safe, and standardized herbal formulation is available. To develop novel plant-derived high-quality natural medicines to treat and prevent the formation of kidney stones, more multidisciplinary research involving pharmacognosists, pharmacologists, and clinical investigators are required.

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