

HERBAL MEDICINE FOR KIDNEY STONE, GALLBLADDER AND URINARY STONES: A REVIEW

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ABSTRACT: Medicinal plants have been known for thousands of years for their therapeutic uses for the treatment of the different diseases. Today a very large number of populations suffer from the kidney stone, gallstone and urinary calculi. Stone disease increase due to change in life style and food habits. Medicinal plants used for removal of stone from the different body parts like kidney, gallbladder, and ureter from thousands of years due to their safety and efficacy and lesser side effects. The problem of stone in the urinary system is a worldwide disease from very long time. Different medicinal plants are used for the removal of stones from the different body parts like kidney, gallbladder and ureter. The present article describes the potential of medicinal plants for stone dissolving prosperities. In the present article, an attempt has been made to importance on herbal option for urinary stone.

Keywords: Medicinal plant, Kidney stone, Gall stone, Urinary calculi.

INTRODUCTION:

Nephrolithiasis is process of calcification that lies in the collecting system, bladder, ureter and calyceal system. Most of the cases of calculi are found in the palvicalyceal system and can be passed into the ureter. Herbal drugs very often contain a mixture of related substances, in which case the total content of quantified constituents is determined and expressed as one of the constituents is determined and expressed as one of the constituents usually the major constituents separate limits may be given in different forms of the herbal drugs.

The purpose of the research is

- Reduced risk of side effects, which is generally induced by allopathic drugs.
- Search the herbal drugs for the treatment of lithiasis.
- Use herbal medicine, which is a low in cost and available widespread in nature.
- Prove the effectiveness of the herbal drugs.
- Herbal medicines which are chosen in the study cooling in nature will helpful in reduce burning sensation during the discharge of the urine¹.

Epidemiology studies describe the interaction between factor such as a dietary factor or gene environment interaction because nephrolithiasis is a complex disease, an understanding of the epidemiology, particularly the interaction among different factors, may help lead to approaches that reduce the risk of stone formation. Kidney stones affect up to 5% of the improved standards of living and are strongly associated with race or ethnicity and region of residence.² A seasonal variation is also seen, with high urinary calcium oxalate saturation in men during summer and in women during early winter. Stones form twice as often in men as women. The peak age in men is 30 years; women have a bimodal age distribution, with peaks at 35

and 55 years. Once a kidney stone forms, the probability that a second stone will form within five to seven years is approximately 50%. Development of nephrolithiasis is increase in adult population varies in different part of world. The maximum incidence of nephrolithiasis is in Saudi Arabia at 20.1%, with incidence of 1-5% in Asia, 5-9% in Europe and 12-13% in Canada and North America . Nephrolithiasis present a peak incidence between 20 and 50 years of age, and overall male to female ratio of 4:1. Epidemiological factor for stone forming disease include race, sex, age, ingerited and individual predisposing factors such as obesity.³

Pathophysiology:

Despite continuous progress in the treatment of renal calculi, the degree of understanding of the pathogenesis of renal calculus disease has not paralleled this Precipitates of crystals to form in the urine. The crystals are believed to be retained in the tubules of the kidney. Different substances found in urine have been demonstrated to precipitate crystal formation, e.g., pyrophosphate. Magnesium, Tamm-Horsfall proteins. Noncrystalline organic material, matrix, is then combined with crystal to form calculi. The made that this occurs remains a source outgoing research. Several theories have been proposed for pathogenesis. One such theory is crystal-induced renal injury secondary to hyperoxaluria free particle hypothesis. This proposes that there is rapid crystal growth in the tubular lumen resulting in crystals being trapped in the papillary collecting duct, resulting in stone formation. An intravascular phenomenon has been proposed with calculi form in as a result of this phenomenon in the vasa recta.

Insufficient or abnormal urinary inhibitors are the factor which depends on the balance of super-saturation. Nano bacteria have been proposed as Cytotoxic gram-negative bacteria are also implicated in other diseases such as atherosclerosis and periodontal disease. Urinary stasis secondary to anatomic abnormalities is also an identified cause. Eg. Hydronephrosis, pelvoureteric junction obstruction and horseshoe kidney. Randall's plaques were described over 60 years ago; this suggested that calculi formed around calcium salt deposits in the tip of the renal papilla.

Kidney stones can be classified into calcareous (calcium containing) stones, which are radio-opaque, and non-calcareous stones. Stones can be classified on the basis of their composition. Recent research show that formation of kidney stones is a result of Nanobacteria disease akin to Helibacter pylori infection and peptic ulcer disease.⁴ Nanobacteria are small intracellular bacteria that form a calcium phosphate shell (an appetite nucleous) and are present in the central nidus of most (97%) kidney stones and mineral plaques in the renal papilla. Stone crystallization and their growth affected by endogenous dietary factors. Concentration of urine volume and solute concentration, and the ratio of stone inhibitors to promoters are the important factors that influence crystal formation. Crystallization occurs when the concentration of two ions exceeds their saturation point in the solution.

Calcium Calculi

This types of stones found in 60% of all renal stones. This is followed by calcium phosphate types . Hypercalcaemia is the most important pathophysiological risk factor. This types of stone can be divided into three categories.

1. Absorptive hypercalciuria due to increased stone absorption of calcium.
2. Renal hyper calcaemia due to renal tubular resorption of calcium, which precipitates
Increasing PTH secretion due to low serum calcium.
3. Resorptive Hypercalcaemia associated with primary hyperparathyroidism.

Other types of hypercalciuria include malignancy, sarcoidosis, hyperparathyroidism and Vitamin D toxicity. Hyperoxaluria, Hyperuricosuria and gout can also give rise to calcium oxalate calculi. Calcium oxalate calculi are dense and therefore relatively well identified on abdominal radiographs.

Cystine Stones

Cystinuria is an autosomal recessive disease that results in a defect in the renal tubular absorption of amino acids, which in turn results in cystinuria. These calculi are only identified on abdominal radiographs if they contain calcium.

Struvite or Infective Calculi

Struvite calculi it is the result of composition of magnesium and ammonium phosphate, approximately 13% of all renal calculi in the western world. They are formed secondary to infection by unnease-producing bacteria, most commonly *Proteus mirabilis*. Struvite not form crystal in the urine if the pH is less than 7.19. As urinary tract infections are more frequent in women, struvite calculi are seen in females more frequently than males (2:1).

Stone which is made by only struvite are rare, most commonly struvite stones is triple stones, calcium-magnesium- ammonium phosphate stones. This is the most common composition of staghorn calculi and is clearly see on abdominal radiograph. Pure struvite stones are radiolucent.

Uric Acid Calculi

The incidence of a uric acid stones varies from 40% in Israel to 10% in the USA. They are associated with obesity and type II diabetes. Three factor contributing to uric acid stones are Hyperuricosuria, acidic urine and low urinary volume. Low urine pH is often related to medication and also associated with chronic diarrhea and an ileostomy. A low urinary volume, less than 21 days, is considered to predispose to calculus formation. Hyperuricosuria is related to several inherited metabolic disorders such as Lesch Nyanan syndrome and glycogen storage disease type I, III, V and VII. Uric acid stones are radiolucent on abdominal radiographs. They how ever have sufficient density to be demonstrated in CT and cast an acoustic shadow on ultra sound (US).

Xanthine Calculi

Xanthine calculi are seen in patient with hereditary xanthuria and those undergoing treatment with Allopurinol. They are rare calculi with a density similar to that of uric acid calculi and have similar imaging characteristics.

Matrix Calculi

Like struvite calculi, matrix calculi are typically seen in patients with underlying protease infections, as well as other infections such as *Escherichia coli* and *Candida albicans*. Their composition is mainly of coagulated mucous with very little calcium component. They are radiolucent on abdominal X-ray.

Indinavir Calculi

Indinavir sulphate is a drug used widely to treat HIV infections. Drug inhibits protease during clinical trials. 4% of patients receiving the therapy developed calculi. Indinavir crystals are precipitated in the urine forming calculi. Indinavir crystals are precipitated in the urine forming calculi. These are radiolucent on both plain radiographs and CT. Calcium oxalate and phosphate precipitate within the indinavir crystals, and with time, the density all of the calculi will increase enough to become visible on CT and abdominal radiographs. Contrast-enhanced CT in the delayed phase is valuable in the diagnosis of non calcified indinavir calculi.

Oxalate Calculi

Oxaluria may be primary or secondary relating to underlying disorder such as inflammatory bowel disease and short, small bowel syndrome. This occurs due to fat malabsorption leading to saponification of calcium, leaving oxalate unbound, which is then absorbed in the mucous of the colon.

Patients with colic disease as well as Crohn's disease have increased absorption of oxalate from the colon. Patients which have inflammatory bowel disease are at increased risk of urolithiasis all types, with a reported prevalence for 2-12% Increased consumption of leafy green vegetables that are high in oxalate can also give rise to hyperoxaluria. This results in nephrocalcinosis and progressive formation of calcium oxalate stones. The majority of patients with calcium oxalate stones may not have any detectable abnormality of oxalate metabolite or hyperoxaluria. Oxalate calculi are usually radio-opaque on abdominal radiographs.

Causes of Urolithiasis

Race and Sex

A higher incidence is quoted in males in the Caucasian population, which has been attributed to genetic makeup. However, it is noted that the incidence difference in Black Americans disappears when they adopt a Caucasian diet. Conversely, the ratio is quoted as 0.5-0.7, respectively, male-to-female ratio in Black American and Hispanics. The higher prevalence of nephrolithiasis in males have been attributed to the effect of androgens (Fan et al 1999). Recent studies from the USA suggest that is changing gender prevalence of

stone disease with a change from a 1:7:1 to 1:3:1 male to female ratio. This is speculated to be due to lifestyle factors and obesity⁴.

Age

In idiopathic disease in males, a normal distribution of age is described with a peak incidence at 35 years. Females have a biphasic distribution peak, one at 30 years and second at 55 years. This is thought to be secondary to calcium reabsorption secondary to the menopause.

Inherited disease

The incidence quoted for disease such as cystinuria (autosomal recessive) and hyperoxaluria is scant. Multiple predisposing factors have been identified including general factors (male gender), inherited conditions (polycystic kidney disease), inherited conditions (polycystic kidney disease, renal tubular acidosis, hyperthyroidisms, cystinuria, and hypercalciuria), medications (triamterene, sulphonamides, carbonic anhydrase inhibitors, indinavir, acetazolamides), carbonic anhydrase inhibitors, indinavir, acetazolamide, corticosteroids, low volume urine, hypercalciuria. The prevalence of cystinuria is estimated at 2% in the general population.

Individual Predisposing factor

Obesity is the important factor which increased the risk of nephrolithiasis especially in females with a BMI over 40. Hypertensive patient is more susceptible to suffer from renal calculus disease. Factor influencing this are complex and may be due to the antihypertensive therapy and other obesity factors.

Environmental factors

Calculus disease is more prevalent in a temperature climate. This has been described secondary to decreased fluid intake combined with high plasma vitamin D serum levels secondary to sun exposure.

Socio Economic factor

Calculus disease is seen as a disease of more affluent nation.

Diet

A high- protein diet has influence on calculus formation risk and calculus composition. Uric acid and calcium oxalate calculi are more prevalent in those with a diet high in animal proteins. The role of dairy products in the pathogenesis of renal calculus disease remains in debate.

Currently Used Herbal Medicines:**TABLE 1: LISTS OF PLANT DRUGS USED IN KIDNEY STONE, GALL STONE, URINARY CALCULI** ⁵⁻²³

Botanicals name	Common name	Part use	Used
<i>Armoracia lopathifolia</i> (Brassicaceae)	Horse radish	Seeds	Diuretic, Kidney Stones
<i>Aervalanata</i> , (Amaranthaceae)	Gorkhabundi	Leaves	Cough, Sore throat, Diabetes, Lithiasis
<i>Amaranthus viridis</i> (L.) (Amaranthaceae)	Slender Amaranth, Green Amaranth.	All parts	Given in kidney stone
<i>Aegle marmelose</i> (L.) (Rutaceae)	Wood apple, Bael	Leaves and fruit	15 gram of Fruit pulp powder is taken orally with coconut milk for 14 days to Lithiasis.
<i>Amaranthus caudatus</i> (L.) (Amaranthaceae)	Love-lies- bleeding	Leaves	Extract is given in kidney stone
<i>Achyranthes aspera</i> (L.) (Amaranthaceae)	Khaff-flower	Roots	Urolithiasis, urinary tract
<i>Amni visnaga</i> (L.) (Apiaceae)	Khella	Whole plant	Urolithiasis, urinary tract
<i>Barbarea vulgaris</i> (Brassicaceae)	Rocket	Roots & Leaves	For kidney stone
<i>Berginia ligulata</i> (Saxifragaceae)	Pashanbheda	Rhizomes	Astringent. Diuretic, Lithotriptic
<i>Beta vulgaris</i> (L.) (Amaranthaceae)	Garden beet	Roots	Urolithiasis, urinary tract
<i>Bridolia montana</i> (Eupobiaceae)	Sugar beet	Rhizomes	Daily two glass of rhizomes juice is given in kidney stone
<i>Borhaavia diffusa</i> (Nyctagenaceae)	Hogweed, Punarnava	Root	Root decoction is given daily for one month in kidney stone
<i>Blumea balsamifera</i>	Sambong	Flowering plant	Diuretics, Common Cold, Urolitiasis expectorant

<i>Berberis vulgaris</i> (L)	barberry	Roots bark	Urolithasis, urinary tract
<i>Capsella Bursapastori</i>	Shapherd's purse	Entire plant	Diuretic for bladder & Kidney Spasm
<i>Cucumis sativus</i>	Cucu	Leaves	Kidney stones, Emollient
<i>Caesalpina huga</i>	Nicker nut	Root	Root Diuretic, Lithiotriptic
<i>Citrus japonica</i>	Celery	Whole plant	Antispasmodic , Eczema
<i>Celosia argentla</i>	Plumed	Leaves or Stem	Diarrhoea, Eye troubles, Sore mouth
<i>Chelidonium majus</i>	Chel	leaves	Diuretics, Antispasmodic
<i>Cassia fistula</i> (L.) (Caesalpinioideae)	Golden Shower tree	Fruit	Fruit powder is given with water for 3-4 month to expel the kidney stone.
<i>Ceropegia bulbos</i> (L) (Asclepidaceae)	Caudiciform	Tubers	Decotion of tubers is used to remove urinary bladder stone.
<i>Chenopodium album</i> (L) Cheonopodiaceae	Lamb's Quarters	Leaves	Leaf dried powder is given during burning urination.
<i>Coculus hirsutus</i> (L.) (Menispermacca)	Cocculus Indicus	Leaves	Crushed leaves given orally
<i>Costus speciosus</i> (Costaccae)	Keukand	Tubers	Decotion of tubers given orally for stones
<i>Cyanodon dactylon</i> (L.)	Dog's tooth grass	Roots	Root decoction of tubers
<i>Chimaphila numbellata</i>	Pinxcw's pine	Flower	Diuretic, Expectorant, Stimulant
<i>Curcuma longa</i> (Zingiberaceae)	Haldi	Rhizomes	Diuretic, Choloretic, Hepatoprotective
<i>Desmodium styracifolium</i>	Osbeck	Rhizome	Emmenagogue, Stomachic
<i>Didymocarpus pedicellata</i>	Stone Flower	Leaves	Lithontriptic
<i>Daucas carota</i> (L.)	Wild carrot	Rhizome	One glass juice is given for night to remove kidney stone.
<i>Digera Muricata</i> (L) Amaranthaceae	<i>Digera Muricata</i>	Leaves	Once in a day for urinary complains
<i>Diospyrose melaoxylon</i>	<i>Digera Muricata</i>	Fruit and bark	Fruit is given in urinary disorders

Dolichos biflorus	Horse gram	Seeds	Diuretic, Astringent, Tonic,
Dichrostachys Cinerea (L.) (Mimosaceae)	Bell mimosa	Roots	Urolithiasis, Urinary tract
Elettaria Cardamomum (Zingiberaceae)	Cardomom	Seeds	Diuretics, Carminative, Aromatic Stimulant
Eleusine coracana (Gaern.) (Poaceae)	Finger millet	Grains	Urolithiasis, Urinary tract
Fogonia bruguieri	Fagonia	Fruit	Diuretic, Mildly carminative
Ficus carica	Fig	Fruit latex	Destroy urinary and gall stone
Gomphrena celosioidest Amaranthaceae	Gomphrena Weed	Whole plant	Juice is given twice a day for ten days.
Grewia flavescens	Sandpaper Resins	Root	Decoction of root powder to stop bleeding in urine.
Homonoia riparia (Lour)	Water Croton	Root	Urolithiosis , urinary tract
Hygrophilia Spinosa	Gokulakanta	Leaves	Strongly diuretic
Herniaria hirsute	Hairy rupturewort	Whole plant	Urolithiasis, Urinary tract
Hygrophilia spinosa	Gokulkanta	Leaves	Strongly diuretic
Herniaria hirsute	Hairy rupturewort	Whole plant	Urolithiasis
Lantana camara (L) (Verbinaceae)	Big-sage	leaves	Urolithiasis, urinary tract
Lawsonia inermis (L) (Lythraceae)	Henna	Leaves	Urolithiasis, urinary tract
Mentha Piperita	Peppermint	Entire herb	Treatment of stone.
Mimosa pudica 9mimosaceae	Touch-me-not	Leaves	Gravel, urinary tract
Musa paradensis (L.) (Musaceae)	Banana	Ripe kernel juice	Urolithiasis, urinary tract
Olea europeae	Olieve	Oil	Treatment of kidney stone
Pimpinella unisum	Anise	fruit	Treatment of kidney stone
Pedaliium murea	Burra Gokhru	Fruits	Decoction of fruits used in

			urinary complication
<i>Tinospora cardifolia</i> (Wild L) (Menispermaceae)	Goduchi	Stem	Crushed stem to expel the stone
<i>Tridax procumbens</i>	Coat buttons	leaves	Used in the treatment of kidney stone
<i>Zea mays</i>	Maize	Seeds Oil	For bladder and kidney spasm. Given orally to expel the stone.

Researchers reported for stone dissolving activity

Aqueous and alcoholic extract of *Jasminum auriculatum* vahl (oleaceae) lowers are reported for kidney stone. Aqueous extract of *Herniaria hirsute* reported for nephrolethiasis. Ethanol extracts of leaves of *Hibiscus sabdariffa* Linn are used for kidney stone. The acute diuretic effect of the water extract of the aerial parts of *Retama raetam* are used for the kidney ailments. Protective effect of standardization extract of *Biophytum sensitivum* against calcium oxalate urolithiasis in rats.²⁵ In Vitro evaluation of *Rotula aquatic* lour for antiurolithiatic activity.²⁶ In vitro study of *Rotula aquatic* lour, for antiurolithiatic activity.²⁷

In vitro study of aqueous leaf extract of *Chenopodium album* for inhibition of calcium oxalate brushite crystallization.²⁷ Protective effect of ethyl acetate fraction of *Biophytum sensitivum* extract against sodium oxalate induced urolithiasis in rats.²⁸ Antilithotic potential of *Vernonia cinera* against calcium oxalate calculi in experimental rats.²⁹ Evaluation for the antilithotic activity of *Launaea procumbens* against ethylene glycol induced renal calculi in rats.³⁰

Plant acting on Kidney Stones: Various types of plants and its species are used in the treatment of kidney stones. The plants used for kidney problem are *Allium sativum*, *Apium graveolens*, *Armoracia Iopathifolia*, *Barbarea vulgaris*, *Capsella bursapastori*, *Citrus japonica*, *Ficus carica*, *Olea europaea*, *Pimpinella anisum*, *Rosmarinus officinalis*, *Theobroma cacao*, *Chamaesyce hirta*, *Flemingia strobilifera*, *Peperomia rotundifolia*, *Petiveria alliacea*, *Nopalea cochinellifera*, *Apium graveolens*, *Cynodon dactylon*, *Eleusine indica*, *Gomphrena globosa*, *Pityrogramma calomelanos* and *Vetiveria zizanioides*. The genus *Phyllanthus* has a long history of use in the treatment of kidney stones. Some related species in this region with medicinal significance are *P. Epiphyllanthus*, *P. Niruri* *P.urinaria*, *P acuminatus* and *P.emblica*, *P. Nururia* are used in the treatment for kidney and gallstone.³¹115

Plants acting on Gall stones: Different types of plants used in the treatment of gallstones are *Apium graveolens*, *Bauhinia cumanensis*, *Bauhinia excise*, *Costus scaber*, *Chamaesyce hirta*, *Cissus vericillata*, *Capraria biflora*, *Cocus nucifera*, *Eleusine indica*, *Ficus carica*, *Gomprena globosa*, *Kalanchoe pinnata*, *Portulaca oleraceae*, *Soanum melongena*.³² 116

Plant acting on Gentio-urinary system : Plants and its species that are used in the treatment of urinary stone are *Apium graveolens*, *Bauhinia cumanensis*, *Bauhinia excise*, *Costus scaber*, *Chamaesycehirta*, *Cissus verticillata*, *Capraria biflora*, *Cocos nucifera*, *Eleusine indica*, *Ficus carica*, *Gomphrena globosa*, *kalanchoe pinnata*, *Portulaca oleraccae*, *Solanum melogena*.³³

Future prospects of medicinal plants: Today medicinal plants are very important for the growth of new drugs. People are using herbal drugs because of its safety, efficacy and lesser side effects. Plants and plant products have utilized for the treatment of different diseases. At present demand of natural plants derived products used increased day by day. The significance of medicinal plants in national economy and its potential for the rapid growth of herbal products have been emphasizing frequently.³⁴118

Conclusion:- As evident from the above discussion, nature is the best combinatorial chemist and has possible answers to all disease for mankind. Medicinal plants play a vital role in stone diseases. The undesirable effects of the modern medicine has already diverted the attention of the people towards herbal medicines. To increased the acceptability and awareness among the people, there is an urgent need to develop trust and faith towards the safer indigenous system by establishing its validity in treatment for various diseases. Health care systems are going to become more and more expensive, therefore we have to introduce herbal medicine system in our health care. Lets us hope that in future natural products will be competing modern medicines with added advantages of more safety and lower costs.

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