



A REVIEW ON RENAL CALCULUS ACTIVITY OF MEDICINAL PLANTS

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ABSTRACT

Urolithiasis is a common problem of various centuries with high recurrence. Phytochemical extracts are constantly being evaluated for possible antiurolithiatic activity in a progressive manner. evaluation of various medicinal plants are done mainly against calcium oxalate and magnesium ammonium phosphate types of kidney stones, through making use of various experimental models of urolithiasis. Kidney stones or urolithiasis is a growing global problem. It is a complex phenomenon which results due to physiochemical changes including super saturation, crystallization and retention within the renal tubules. Medicinal plants are found to be useful in this metabolic disorder from ancient days due to its no or low-toxic nature, easily available in rural areas, cheap, there are less chances of recurrence. Urolithiasis is a common disorder expected to occur in approximately 12% of the population, with a recurrence rate of 70-81% in males, and 47-60% in females.

INTRODUCTION

Stone formation is one of the painful urologic diseases. It is the third most prevalent disorder in urinary system. Urinary stones are generally caused by bacterial infection while kidney stones form as a result of physicochemical or genetic derangements leading to supersaturation of the urine with stone-forming salts or, less commonly, from recurrent urinary tract infection with urease producing bacteria like *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Enterobacter* spp., *Serratia* spp., *Staphylococcus aureus*, *Staphylococcus epidermitis*(1). Scientific studies expose the mechanism action, these antiurolithiatic herbal plants and responsible for at different stages of urolithiasis, such as, the diuretic action increases the quantity of fluid going pass through the kidneys as a consequence flush out the deposits. as a result, the increase in urine volume decreases

The saturation of the salts and prevents the precipitation of the crystals at physiological PH.

Reasons for stone formation diseases: Stone formation usually occur due to insufficient urinary discharge, microbial infection in urinary tract, diet with excess oxalates and calcium, vitamin abnormalities like vitamin A deficiencies, excess vitamin D, and metabolic diseases like hyperthyroidism, cystinuria, gout, intestinal dysfunction (2).

ACORUS CALAMUS (3)



Family name: Araceae. **Common name:** Sweet flag. **Part used:** Rhizome. **Extract:** Ethanolic extract, **Standard drug:** Cystone (750 mg/kg), **Chemical constituents:** The major chemical constituents of Acorus calamus rhizome are alkaloids, flavonoids, gums, lectins, mucilage, phenols, quinone, saponins, sugars, tannins, and triterpenes. **Uses:** Antidiabetics, antiproliferative and immunosuppressive, antidiarrheal, hypolipidemic, antioxidant, diuretic, and nephroprotective activities. **Antiuro lithiatic activity:** Ethanolic extract of Acorus calamus produced significant increase in urine volume and urinary excretion of Na⁺ and K⁺ electrolytes in a pattern comparable to that of furosemide. In ethylene glycol induced urolithiatic model, ethanolic extract of Acorus calamus significantly decreased excretion and deposition of various urolithiatic promoters as compared to urolithiatic control in a pattern comparable to that of Cystone. The ethanolic extract of Acorus calamus supplementation also prevents the impairment of renal functions.

DRUG NAME: Aerva lanata (4)



Family: Amaranthaceae. **Common name:** Pashanabheda. **Chemical constituents:** These constituents include alkaloids (ervine, methylervine, ervoside, aervine, methylaervine, aervoside, ervolanine, and aervolanine), flavanoids (kaempferol, quercetin, isorhamnetin, persinol, persinosides A and B), methyl grevillate, lupeol, lupeol acetate benzoic acid, b-sitosteryl acetate and tannic acid **Uses:** Aerva lanata is used traditionally by Ayurvedic physicians. **Extract:** Petroleum ether extract. **Antiuro lithiatic activity:** Ethylene glycol (0.75% v/v) induced urolithiasis model was used for study. Based

on the LD50 of the plant extract (2000 mg/kg) equivalent dose was calculated from their yield. Two isolated compounds (quercetin and betulin) of Avera lanata were screened for antiuro lithiatic potentials used to study the antiuro lithiatic activity in male Wistar albino rats. The animals were divided into five groups in calculi induced (ethylene glycol 0.75% v/v) male Wistar albino rats by administering 2 mg/kg b.w/day orally as test dose.

DRUG NAME: Allium sativum (5)



Family: Liliaceae. **Common name:** Garlic. **Chemical constituents:** Garlic bulbs contain 29% of carbohydrates, about 56% of proteins (albumin), 0.1% of fat, mucilage, and 0.06 to 0.1% of volatile oil. **Uses:** Preventing prostate, breast, lung, and colon cancer Garlic helps boost your body's immune system, reduce high blood pressure, reduce cholesterol levels. **Extract:** Ethanol, ethyl acetate, petroleum ether extract. **Antiuro lithiatic activity:** By comparing the result of different extracts, we have found that ethanol extract of garlic has showed better result in inhibiting precipitation of calcium and phosphate.

DRUG NAME: Bryophyllum pinnatum (6)



Family: Crassulaceae. **Common name:** Cathedral bells. **Chemical constituents:** Alkaloids, flavonoids, triterpenes and sterols, triterpenoids and phenanthrenes, glycosides, and lipids are present in it. **Uses:** Bryophyllum pinnatum leaves are commonly

used in traditional and ethnomedical practice to treat urinary insufficient and stones.

Extract: Ethylene glycol extract.

Antiuro lithiatic activity: The effect of the extract on urine oxalate, creatinine and phosphate retention and excretion in the kidney, as well as serum and biochemical analysis of kidney homogenate and histopathological examinations were studied. Oral administration of *Bryophyllum pinnatum* hydro alcoholic extract at doses of 50,100, and 200 mg/kg to rats with sodium oxalate-mediated renal calculi showed dose dependent substantial Antiuro lithiatic potential.

DRUG NAME: Elettaria cardamomum (7)



Family; Zingiberaceae. **Common name;** “Heel khurd”. **Chemical constituents:** The seeds contain 3 to 6% of volatile oil along with fixed oil, salts of potassium, a colouring principle, nitrogenous mucilage, an acrid resin, starch, ligneous fibre, and ash. The active constituent of the volatile oil is cineole. Other aromatic compounds present are terpinyl acetate, terpineol, borneol, terpinene, etc. **Uses:** “Heel khurd” is used in Unani system of medicine to treat gastrointestinal disorders. Cardamom widely used for flavoring purposes in food and as carminativemedicine it is used to treat gastrointestinal disorders. It also used as antioxidant and anti-inflammatory. **Extract:** ethanolic extract. **Antiuro lithiatic activity:** The present study was explores that evaluation of in vitro antiuro lithiatic activity of *Elettaria cardamomum* seeds. It was observed that the highest calcium oxalate crystals dissolution was observed in the ethanolic extract of seeds of *E. cardamomum*. It was found that ethanolic extract of *E. cardamomum* has more efficient to dissolve

calcium oxalate. In this study Neeri was used as standard drug

DRUG NAME: Hedychium Coronarium (8)



Family: zingiberaceae. **Common Name:** White Ginger or Garland. **Chemical Constituents:** it consists of Eucalyptol, linalool, coronarin. **Uses:** In the indigenous system of medicine, roots of *Hedychium coronarium* J. Koenig are reported to be useful in the treatment of urinary stones. **Extract:** Alcoholic and Aqueous. **Antiuro lithiatic activity:** Alcoholic extracts obtained from roots part demonstrated highest dissolution of standard formulation Cystone was found to be equally effective (39.12%) when compared to alcoholic extract of roots part.

DRUG NAME: Ocimum gratissimum (9)



Family: Lamiaceae. **Common name:** scent leaf. **Chemical constituents:** plant contain alkaloids, tannins, flavonoids and oligosaccharides. **Extract:** Methanol extract. **Uses:** It is used in the treatment of various diseases like cancer, antinociceptive, anti-inflammatory, Anti diarrheal antibacterial, antifungal, wound-healing and as nephroprotective. **Antiuro lithiatic activity:** Calcium oxalate crystallization in-vitro while in synthetic urine method the percentage inhibition and growth of the calcium oxalate monohydrate crystals from synthetic urine at different % concentrations of extract was investigated. In both the assay % inhibition

for calcium oxalate crystal formation was found directly proportional to the increase in concentration of the plant extract with maximum inhibition of 66.08% at 1000 mg/ml, while in synthetic urine assay maximum inhibition was 62.07 % at 100% concentration of extract.

DRUG NAME: Pashasmabedhedad (10)



Family: Saxifragaceae. **Common name:** Bergenia ligulate. **Chemical constituents:** Arbutin, gallic acid, starch, glucose, tannins. **Uses:** Ayurveda, a traditional system of Indian medicine, recommends several medicinal plants and compound medicinal preparations for the treatment of urolithiasis. **Extract:** Methanolic. **Antiuro lithiatic activity:** It is estimated that at least 10% of the population in the industrialized part of the world is afflicted by urinary tract stone disease. Among those, kidney stones are common in industrialized nations with an annual incidence of 0.5-1.9%. About 12% of the population of India is expected to have urinary stones and out of that about 50% of cases encounter loss of one or both kidneys with or without renal damage upto some extent.

DRUG NAME: Pedalium murex (11)



Family: Pedaliaceae. **Common name:** Large caltrops. **Chemical constituents:** Alkaloids, flavonoids, sapogenin, tannins, glycosides. **Uses:** Dissolution and prevention of kidney stone formation, incontinence of urine, gonorrhoea, promote lochial discharge, dysuria, control white discharge, antibacterial, antimicrobial, antioxidant, hyperlipidemic **Extract:** Ethanolic extract. **Antiuro lithiatic**

activity: The present study investigated the anti-urolithiasis activities of ethyl acetate extract of *Pedalium murex* against struvite crystal. The antibacterial activity of EAEP examined against several urease producing bacteria. It showed the minimum bactericidal concentration (MBC) against *Escherichia coli* and *Staphylococcus aureus* (>125). On the other hand, total mass, volume, number, growth rate and dissolution rate of synthesised struvite crystals were observed at different concentrations 0.5%, 0.75%, 1% of EAEP and without EAEP. In which, EAEP addition showed appreciably reduced struvite crystal. Alternatively, MgO (300 mg of EAEP/kg/body weight) induced urolithiasis of Wistar albino rat at the rate of 1 ml for 28 days. Various biochemical parameters in serum, urine and histological analysis of kidney were taken for evaluation. Significant results ($p < 0.05$) were observed in 1% EAEP (300 mg) treated group than cystone treated group.

DRUG NAME: Punica granatum (12)



Family: Punicaceae. **Common Name:** Pomegranate. **Chemical Constituents:** Pomegranate is a potent anti-oxidant. This fruit is rich in flavanoids, anthocyanins, punicic acid, ellagitannins, alkaloids, fructose, sucrose, glucose simple organic acids and other components **Uses:** anti atherogenic, anti-hypertensive, and anti-inflammatory **Extract:** Hydroalcoholic extract.

Antiuro lithiatic activity: In the EG group, crystal depositions were more evident and mild crystalization was observed in proximal tubules on day 10; severe crystalization and granulovacuolar epithelial cell degeneration were observed on day 45. There was limited or no crystal formation in the EG PJ-given groups. There were completely normal renal and tubular structures in the control group. There was no significant difference between

the four groups in serum levels of sodium, potassium, blood urea nitrogen, and creatinine in any sampling time. Hyperoxaluria, a marked increase in MDA and NO levels, and decrease of GSH were observed in the EG-given groups compared with the others. There were marked iNOS and p65 expressions in only the EG-given rats compared with control and PJ groups, immunohistochemically.

NAME: Quercus gilva (13)



Family: Fagaceae. **Common name;** Red Bark Oak. **Chemical constituents:** Lyoniresinol, quercussioside, picraquassioside. **Extract:** Polyphenol extract. **Uses:** Relief of urolithiasis, tremors and inflammation. In the present study, the anti-urolithiasis activity including anti-inflammatory and anti-oxidative activities. **Antiuro lithiatic activity:** In vivo, urolithiasis was induced more effectively in an animal model of acute urolithiasis by the administration of QGB extract.

DRUG NAME: syzygium cumini (14)



Family: Myrtaceae. **Common name:** Jamun. **Chemical constituents:** It contains several phytoconstituents belonging to the category of alkaloids, glycosides, flavonoids and volatile oil. **Uses:** In the Ayurvedic system of medicine in India, plants which belong to 'Pashanabheda' group are claimed to be useful in the treatment of urinary stones. 'Pashanabheda' is the Sanskrit term used for a group of plants with diuretic and

antiuro lithiatic activities. **Extract:** Phenolic extract. **Antiuro lithiatic activity:** Calcium-containing stones, specially calcium oxalate monohydrate, calcium oxalate dehydrate and basic calcium phosphate are the most commonly occurring ones to an extent of 75-90%, magnesium ammonium phosphate (Struvite) to an extent of 10-15%, uric acid 3-10% and cystine 0.5-1%. Out of all the types most common type is calcium oxalate or magnesium ammonium phosphate type which generally occurs commonly. Many medications and remedies have been used during the past many years to treat urinary stones.

CONCLUSION

Within the present observe, some medicinal plants as shown in review for examples *Acarus calamus*, *Aerva lanata*, *Allium sativum*, *Bryophyllum pinnatum*, *Elettaria cardamomum*, *Hedychium Coronarium*, *Ocimum gratissimum*, *Pashamabedhedad*, *Petalium murex*, *Punica granatum*, *Quercus gilva*, *syzygium cumini*, had been proved to possess valuable antiuro lithiatic properties as they comprise a huge range of secondary metabolites together with flavonoids and phenolics. In addition to antioxidant interest, these compounds are also used as anticarcinogenic, antibacterial, antiviral and antifungal, antispasmodic, and antidiabetic.

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