Review Article **ISSN: 2349 – 7114**

Asian Journal of Research in Pharmaceutical Sciences and Biotechnology

Journal home page: www.ajrpsb.com

A REVIEW ON ANTIUROLITHIATIC ACTIVITY OF PHYTOCHEMICAL EXTRACTS

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ABSTRACT

Phytochemical extracts square measure perpetually being evaluated for potential antiurolithiatic activity in a very progressive manner. Hyperoxaluria and hypercalciuria square measure among the key risk factors in pathologic process of urinary stone formation; analysis of varied medicative plants square measure done primarily against Ca salt and atomic number 12 ammonium ion phosphate varieties of urinary organ stones, through creating use of varied experimental models of urolithiasis. Try was taken to review the antiurolithiatic activity of bound seasoning extracts to supply info for more analysis.

KEYWORDS

Phytochemical, Antiurolithiatic, Hyperoxaluria and Hypercalciuria.

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INTRODUCTION

Urolithiasis can be described as the mechanism of improvement of stone (calculi) in urinary system. Stone can be formed in any phase of the urinary system like kidney, bladder and ureter and the related illnesses are known as nephrolithiasis, Cystolithiasis and Uterolithiasis respectively. Disorder of kidney stones leads to significant health and monetary burden. Kidney stone disorder is linked with other disorders like fractures, hypertension, metabolic disease, chronic kidney disorder, excessive danger of coronary artery disorder (CAD) and diabetes (Insulin dependent diabetes), so it is referred as systemic disorder.

Urolithiasis end result in hematuria (blood in urine), dysuria (painful urination), pyuria (pus in urine), renal colic and oliguria (reduced urine excretion) which are triggered due to blockade of urethra. The final result of this blockade is condensation of phosphate and oxalate salts which are less soluble and insoluble salts. India is the nation where naturopathy has been considered as the practicable remedy considering the fact that Vedic instances 1500-1000 B.C. Kidney stone formation in such is a prevalent problem with increased reoccurrence which is unfold all over the world[1].

Causes for stone formation

Stone formation normally take place due to inadequate urinary discharge, microbial contamination in urinary tract, weight-reduction plan with excess oxalates and calcium, nutrition abnormalities like vitamin A deficiencies, excess vitamin D, and metabolic ailments like hyperthyroidism, cystinuria, gout, intestinal dysfunction etc.,. Kidney stone formation or urolithiasis is a complicated procedure that takes place due to imbalance between promoters and inhibitors in the kidneys. The thing affecting stone formation are urine output (hence the concentration). The concentration of specific constituent, urine pH, and infection or damage inside the urinary tract[2].

Pathogenesis

Pathogenesis of renal stone can additionally be termed as biomineralization. It is essentially the organic technique that interact the physiochemical shifts, alternation in the partitions of collecting gadget and attention of urine in kidney. Urine in most cases contains crystalloids such as ammonium, calcium carbonate, cysteine, magnesium, potassium, urea, uric acid and so forth and colloids such as mucin, chondrotin etc. Any change in the attention of these constituents leads to precipitation and adhesion of the free ions. Urinary infection, altered muco-protein attention and pH leads to physiochemical changes. Urinary stasis, concept of Randall's plaque and deficiency of vitamin A leads to the alternations in accumulating structures walls.

Crystallization is an essential phenomenon of stone formation relying on the thermodynamics, nucleation and the rate of nucleation. An imbalance of urinary inhibitors and urinary promoters involved in crystallization are regarded as the governing elements of biomineralization. This imbalance leads to oxidative stress accompanied through harm and rupture of cells leading to nucleation. Stone formation happens in organic activities such as the crystal nucleation, crystal growth, crystal aggregation and crystal retention.

Depending upon the kind of stones and urine constituents, the sequence of activities varies. Biomineralization is also induced due to ulceration observed by pus formation and crystallization[1].

Treatment of urolithiasis

Include drugs such as Thiazide diuretics (e.g. Hydrochlorothiazide), Alkali (e.g. Potassium citrate), Allopurinol, Sodium cellulose phosphate (SCP), Penicillamine (Cuprimine), Analgesic (Diclophenac sodium), Bisphosphonates, oxalobacter and other probiotics.

But these drugs gives only symptomatic relief but which does not prevent the formation of the stones they just reduce the pains or helps in excretion of the stones. Hence there is a need of anthilithiatic medicine which is of natural origin and shows a greater potency and also has the capability to avoid crystallization have been gained much importance.

Phytochemical extracts

***Solanum xanthocarpum* (Figure No.1)**

Family: Solanaceae

Parts used: Fruits

Beneficial effects:

Used in the treatment of cough, fever and heart disease, juice of the extract used in sore throat and rheumatism

Antiurolithiatic activity

A common place regular herb *Solanum xanthocarpum* is widely used in India for the management of unique illnesses consisting of urolithiasis. The study was designed to rationalize the use of *Solanum xanthocarpum* in kidney stone and to look into its mechanism of action.

The saponin wealthy fraction ready from fruits of *Solanum xanthocarpum* (SXS) was evaluated for antiurolithiatic activity by in vitro and in vivo studies. In ethanediol (EG, 0.75% in potable for twenty eight days) elicited urolithiasis model, 2 totally different experimental doses (20 mg/kg and

forty mg/kg, p.o., for twenty eight days) of saponin wealthy fraction were designated by dose fixation study. Once twenty eight days, varied organic chemistry parameters were measured in urine, serum and urinary organ material. Kidneys were additionally subjected to histopathological analysis[3].

***Cucumis sativus* (Figure No.2)**

Family: Cucurbitaceae

Parts used: Fruits

Beneficial effects

Widely used in ayurvedic treatment for difficulty in urination, excessive thirst, headache, insomnia.

Antiurolithiatic activity

Cucumis sativus fruits are claimed for their antiurolithiatic activity in typical device of medicine. Lithotryptic impact the usage of hydro-alcoholic extract of *Cucumis sativus* (HCS) was conducted. Ethylene glycol (0.75% v/v) was once used to result in calculi in Wistar albino rats. Assessed a variety of parameters like, Biochemical, Histopathological and events urine analysis. Results: Treatment with preventive and curative doses of HCS was once discovered to exert dose dependent antiurolithiatic action. Increased urine extent in HCS treated corporations as in contrast to diseased group was once indicative of diuretic property. Elevated calcium, phosphate and oxalate degrees in diseased team animal have been located to be diminished in animals treated with HCS. Increased levels of serum creatinine, BUN and uric acid had been considerably added down in the direction of everyday values in percentage to HCS doses administered. Histopathology of kidney displays severe renal harm due to performed crystals. Animals dealt with HCS showed first-rate recovery, suggestive of prevention of nucleation and aggregation of stone forming components[4].

***Hibiscus sabdariffa* (Figure No.3)**

Family: Malvaceae

Parts used: Leaves

Beneficial effects

Used in the treatment of hypertension, weight loss, bladder infections.

Anti urolithiatic activity

The ethanolic extract of leaves of Hibiscus sabdariffa Linn. The ethanolic extract of leaves of *Hibiscus sabdariffa* was evaluated for its antilithiatic exercise in rats. Lithiasis was once prompted through oral administration of ethylene glycolated water (0.75%) in adult male albino Wistar rats for 28 days. The ionic chemistry of urine used to be altered through ethylene glycol (EG), which increased the urinary concentration of quintessential ions, viz. calcium, phosphate, uric acid and oxalate thereby contributing to renal stone formation. The ethanolic extract of leaves of Hibiscus sabdariffa, however, drastically ($P< 0.05$) decreased the improved stage of these ions in urine. Also, it expanded awareness of urinary magnesium, which is regarded as one of the inhibitors of crystallization. All these observations revealed that ethanolic extract of leaves of Hibiscus sabdariffa has healing effect on stone formation prompted by ethylene glycol[5].

***Pergularia daemia* (Figure No.4)**

Family: Asclepediaceae

Parts used: whole plant

Beneficial effects

In the treatment of jaundice, as anthelmintic, laxative, antipyretic expectorant.

Antiurolithiatic activity

The whole-plant, *Pergularia daemia*, extract (50% alcohol) was investigated for its antiurolithiatic and diuretic activity. Ethylene glycol (0.75% in water) feeding resulted in hyperoxaluria as properly as increased renal excretion of calcium and phosphate. Alcoholic extract (400mg/kg) of *P.daemia* was given orally in curative and preventive regimens over a duration of 28 days. Supplementation with extract significantly ($P < 0.001$) reduced the urinary excretion and kidney retention ranges of oxalate, calcium and phosphate. Furthermore, excessive serum tiers of urea nitrogen, creatinine and uric acid had been extensively ($P < 0.001$) reduced via the extract. The effects were comparable with the popular drug, cystone (750mg/kg). The discount of stone-forming components in urine and their lowered kidney retention reduces the solubility product of crystallizing salts such as calcium oxalate and calcium phosphate, which should make a contribution to the antiurolithiatic property of the extract. The extract exhibited sizeable diuretic pastime at dose of 400 mg/kg physique weight as

evidenced by using improved whole urine extent and the urine attention of Na+, and K+. These findings affirm assertions made concerning the effectiveness of the extract of this plant against urinary pathologies in the Indian folks medicine[6].

***Phyllanthus niruri* (Figure No.5)**

Family: Phyllanthaceae

Parts used: Leaves

Beneficial effects

It is having antioxidant properties, anti-microbial properties, anti-inflammatory properties.

Anti-urolithiatic activity

Aqueous extract was conducted to in this *in vivo* study to assess the urolithiatic effect by using two general pills namely, Neeri and Cystone as control. Two methods, turbidity method and calcium oxalate dissolution techniques had been practiced to get entry to the inhibition of stone formation and dissolution of stone crystals respectively. Microscopic find out about was done for the comparative assessment of crystal density and measurement in each remedy in turbidity method. Water extract of plant leaves proved its conceivable statistically equal to the standard drug, cystone in dissolving the exiting calcium oxalate crystals. Water extract should dissolve 56.8% crystals whilst cystone dissolved 58.4% crystals *in vitro* learn about and located statistically at par. Water extract also should inhibit up to 53.09% aggregation of calcium oxalate crystals as in contrast to the cystone with 76.54%. Among other extracts, methanol extract received 2nd role in anti-lithiatic activity[7].

***Achyranthus aspera* (Figure No.6)**

Family: Amaranthaceae

Part used: Root

Beneficial effects

Used as anti-inflammatory agent, in treatment of indigestion, cough, asthama.

Anti urolithiatic activity

Achyranthes aspera L. var. aspera. Hook. f.. (family: Amaranthaceae) normally known as Putkhanda and Prickly chaff flower (English), Kadaladi, Vankadaladi, Valiyakadaladi (Malayalam) is a very important healthful plant employed in people medication for the treatment of urolithiasis. It's a very important supply of bioactive compounds viz., flavonoids, alkaloids and saponins. The shoots contain 4-methoxyheptatriacont-1-en-10-ol (C33H76O) and tetracontanol-2 (C40H82O). The seed oil contains carboxylic acid like lauric, myristic, palmitic, stearic, arachidic, behenic, oleic and linoleic acids. A poring over of literature unconcealed that excretory organ stones have their origin on inorganic phosphate precipitate. Moreover, metal element phosphate dihydrate (CaHPO4·2H2O, CHPD) or brushite have a frequent occurence (75-95%) in most of the metal containing urinary stones. during this context, an endeavor was created to guage the antilithiatic property of the liquid root extract of *Achyranthes aspera* (Aar) on in vitro crystallization and growth patterns of metal element phosphate dihydrate crystals victimisation single diffusion gel growth technique. Reduction in growth of CHPD crystals was noticed with increasing concentrations of extract. The morphology of CHPD or brushite crystals was studied by research. The structural changes of the treated crystals were assessed by SEM, FT-IR, XRD and TGA/DTA analysis. It's expected that this multidisciplinary approach for *in vitro* crystallization and characterization of CHPD crystals can offer a higher understanding of the mechanism of crystallization and also the role of plant additives for interference or dissolution of urinary stones[8].

***Tamarindus indicus* (Figure No.7)**

Family: Fabaceae

Parts used: leaves

Beneficial properties

In treatment of stomach disorders, as hypolipidemic, hepatoprotective.

Antiurolithiatic activity

The study was carried out to evaluate the antilithiatic exercise of ethanolic extract of *Tamarindus indica* L. on mice. Antilithiatic undertaking of the ethanolic extract of the *Tamarindus indica* leaves at a dose of 250mg/kg, 400mg/kg and 500mg/kg was once evaluated against the general drug Cystone was given orally 750mg/kg. Adult Wister Albino rats of either intercourse of divided in six companies of six animals every as undertaken for learn about and evaluated by means of Rat fashions of calcium oxalate urolithiasis brought on by means of either

ethylene glycol (EG) are most generally used to study the pathogenesis of urolithiasis.

Ethanolic extract of *Tamarindus indica* (at 250, 400 and 500mg/kg) exhibited a dose dependent enormous anti-lithiatic activity on treatment. The extract dose of 250mg/kg also prompted partial reduction of Uria, Uric acid, calcium, Potassium, oxalates, phosphorus and creatinine in blood serum level the outcomes have been observed statistically insignificant. The antilithiatic effect of ethanol extract at used to be observed much less efficient than the reference standard[9].

Figure No.1: ***Solanum xanthocarpum***

Figure No.2: ***Cucumis sativus***

Figure No.3: ***Hibiscus sabdariffa***

Figure No.4: ***Pergularia daemia***

Figure No.5: ***Phyllanthus niruri***

Figure No.6: ***Achyranthus aspera***

Figure No.7: ***Tamarindus indicus***

CONCLUSION

Kidney stones square measure rife in several communities in Asian country like India that additionally forms an underlying cause for the event of the many diseases. The speed of reoccurrence of Urolithiasis is high of the patients that are treated with the artificial medication. These medication provoke several aspect effects inflicting distress to the patients. Therefore, the seasoner therapies of those medication that are studied showing anti-urolithiatic activity are compiled, because the different technique of treatment as so much to world are far and away additional helpful, economic and providing lesser aspect effects.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to Department of Pharmacognosy, RR College of Pharmacy, Bangalore, Karnataka, India for providing necessary facilities to carry out this review work.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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Please cite this article in press as: Yogeeshwar S M *et al.* A review on antiurolithiatic activity of phytochemical extracts*, Asian Journal of Research in Pharmaceutical Sciences and Biotechnology,* 7(3), 2019, 45-52.