CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187
http://doi.org/10.5281/zenodo.4307775

Avalable online at: http://www.iajps.com *Review Article*

A REVIEW ON HERBAL TREATMENT FOR KIDNEY STONES

Harshad Suryawanshi[1*], Mayuri Suryawanshi[2], Gaurav Patil[3]

[1*]Department of Pharmaceutical Chemistry and Technology, Institute Of Chemical Technology, Mumbai, India

[2]Department of Quality Assurance Techniques, AISSMS College of Pharmacy, Pune, India

[3]Bacheolor of Pharmacy, Divine College of Pharmacy, Satana, India

Article Received: October 2020 **Accepted:** November 2020 **Published: December** 2020

Abstract:

Today a wide-ranging number of population in the world is enduring from disease like a kidney stone, the most usual cause of the kidney stone is a poor lifestyle, less water intake, and inappropriate dietary habits. This Problem is, very obsolete and these stones are found in various parts of the body, such as the urinary bladder, kidney, ureter, and urinary tract. Herb plants have been used since old times due to their additional safety, and efficacy as well as subsidiary side effects in comparison with current synthetic drugs. Consequently, in this article, we have provided an outline of the several herbal plants which inhibit the process of stone formation and show stone dissolving activity due to their diuretic, anti-inflammatory, and anti-oxidant-like properties and various phytoconstituents like sterols, alkaloids, flavonoids, and saponins, etc.

Keywords: *Urolithiasis, Crystallization, Renal calculi, Nucleation, Antioxidants, Phytoconstituents.*

Corresponding author:

Harshad Suryawanshi[*],

Department of Pharmaceutical Chemistry and Technology, Institute Of Chemical Technology, Mumbai, India

E-mail: pht20hh.suryawanshi@pg.ictmumbai.edu.in

Tel: +918308755505

QR code

Please cite this article in press Harshad Suryawanshi et al, ***A Review On Herbal Treatment For Kidney Stones****., Indo Am. J. P. Sci, 2020; 07(12).*

INTRODUCTION:

The process of formation of the urinary stone in the renal tract is called Urolithiasis or Nephrolithiasis [1,2]. The usual cause of kidney stone is a poor lifestyle, less water intake, and inappropriate dietary habits [3,4]. If the individual possesses a kidney stone subsequently within the time of 5 years person may develop another stone obesity i.e. For such condition increased body mass might be a significant factor [2]. Around 75% of kidney stones are composed of calcium oxalate crystals [5]. The development of stones in the kidney in the urinary tract system with a recurrence rate of 50% in a period of 5 to 10 years. The male to the female proportion of kidney stones is 2:1, and the generality of the disease appears between 1 to 5 globally [6]. Following the prostatic pathology disorders and urinary infections, Nephrolithiasis is the third major widespread urinary disease [6,7].

People nowadays mainly prefer to utilize herbal drugs due to their small number of side effects, and additional safety and efficacy [8]. WHO registered around 20000 medicinal plants globally, in which India contributes 15-20% and also 80% of worldwide countries depend on medicinal plants [5,9]. The inexpensive source of drugs can be provided by the medicinal plants for global residents, The medicinal plants also furnish beneficial chemical compounds which might be used for the synthesis of several new drugs which are having additional pharmacological properties [8]. Consequently, today also the mainstay for the numerous pharmacopeias is held by the comprehension of the traditional medicines and chemicals prevailed from the botanical plants [10]. Hence, to treat the disease the natural products and also traditional and complementary systems of medicine which are based on ancient knowledge can be important sources [6].

PATHOPHYSIOLOGY:

Kidney stones

Kidney stones are also called renal calculi [5, 7, 11]. Kidney stones are the crystal accumulations (solid concretions) formed in the kidney, they are mostly caused by dissolving urinary minerals and fundamental metabolic conditions such as modularly sponge kidney, hyperthyroidism renal tubular acidosis, and Dent's disease [5, 11]. Whether the stone detected in the kidney is known as Nephrolithiasis, whether the stone is detected in the ureter known as ureterolithiasis, and as soon as the stone moved in the urinary bladder subsequently it is known as cystolithiasis. The stone development is either homogeneous or heterogeneous and is mainly raised by the nucleation, growth, or accumulation of crystals [1]. When urine became concentrated the stones forms along with the crystal formation from the minerals and various substances [11].

Types of stones

Calcium oxalate crystals 80%
Uric acid crystals 5-10%
Struvite crystals –mg, NH4, and PO4 crystals
Cysteine crystals and Calcium phosphate [5, 11, 12, 13].

Mechanism of Stone formation

Inappropriate dietary supplements, less water intake, sex, stress, age, mentality, poor lifestyles [5, 3, 4].

↓

Genetic factors, metabolic deformities, distributed urine flow, Inappropriate renal morphology, concentrated urine [5, 11]

↓

Increase in stone-forming elements (calcium, cysteine, uric acid, phosphate, and creatinine)
A decrease in the excretion of crystallization inhibitors (magnesium and citrate pyrophosphate) [5, 12, 13]

↓

Supersaturation (development of microscopic clusters of precipitation of solute) [5, 12, 13].

↓

Accumulation of crystals and crystal growth [5]

↓

Stone formation [5].

HERBAL PLANTS FOR KIDNEY STONE

Medicinal plants which possess an antiurolithic activity are mainly member of the families like Amaranthacaceae, Malvaceae, Meliaceae, Shatavari, Oxalidaceae, Crassulaceae, saxifragaceae [14, 15].

Helichrysum: Helichrysum extract, also known as folk medicine can be used for the treatment of urolithiasis, it is mainly used for sodium oxalate induced urolithiasis [7].

Raspberry: Rubus ideas belonging to the family Rosaceae are a fruit crop capable of expelling stones from the urinary tract on small administration, they are a rich source of citrate, glycosaminoglycan, and magnesium. Raspberry exhibits a prophylactic effect on the calcium oxalate renal stone development [16]. And glycosaminoglycan hinders crystal growth as well as aggregation, which prevents stone formation [17].

Parsley: Petroselinum crispum belonging to the family Umbelliferae and commonly known herb having various pharmacological activities such as antioxidant, enzyme-modulatory, diuretic, nephroprotective, anti-inflammatory, [18, 19]. The ethanolic extract of the plant prevents the nucleation, urine supersaturation, precipitation of calcium oxalate, and urinary protein excretion in rat models [20]. As well the parsley is
plentiful in magnesium, which shows an obstructive effect of calcium oxalate crystals [21], Therefore this plant is usually used in the anti-urolithiasis remedy.

Pedalium Murex (L): It is a small herb which is commonly known as Yaanai Neriji it contains several flavonoids, alkaloids, glycosides, aromatic oils, tannins, nitrates, and stereos. The plant also possesses several pharmacological activities such as hypolipidemic, anti-inflammatory, nephroprotective, antimicrobial, etc. Palladium Murex act as anti urolithiasis by inhibiting the growth of struvite crystals and dissolution rate and also reduce crystal deposition and renal damage [9].

Aerva Lanata (L): It is an extensively used medicinal plant in India belonging to the family Amaranthaceae having the common name Gokhabundi [5, 11]. The plant possesses pharmacological activities such as a diuretic, anti-inflammatory, and antioxidant [22]. A. Lanata use in the treatment of kidney stone is reported in Ayurveda, Siddha, and Unani [1]. Effect of Aerva Lanata in rodents has concluded from the preclinical studies that they lowered the amount of phosphate, calcium, and raises the extent of magnesium ions in the urine sample [22, 23], Magnesium ions dissolve the calcium and by obstructing the nucleation step inhibits the further development of stone and increases the discharge of calcium in urine [1].

Pomegranate: (Punica granatum) is a fruit which possesses the characteristics of scavenging free radicals and it is a great source of alkaloids, polyphenols, anthocyanin's, and flavonoids, etc. [24, 25], For the management of urinary discharge and a burning sensation of urine, seeds of the pomegranate were used [25, 26]. Phytochemicals in the pomegranate exhibit muscle relaxation in the biliary and urinary tract due to which the stones might be comfortably eliminated from the kidney [27]. From the result of the animal experimentation, it was conferred that the pomegranate extract exhibits a nephron-protective role in the calcium-containing lithiasis development in humans. Pomegranate extract on everyday supplementation to the patients caused remarkable downregulation of serum paraoxonase1 (PON1) arylesterase activity with reducing supersaturation of calcium oxalate, which shows that it might profitably control the threat of development of renal stone [28].

Achyranthes Aspera L: It is an important medicinal plant that possesses the characteristics of reducing inflammation and free radicals [29]. The roots and leaves of the plant Achyranthes Aspera contain vital phytoconstituents and they act by a mechanism of inhibition of nucleation and growth of calcium crystals. Which controls renal epithelial cell damage [30].

Alcea rosea L: It is a decorative and medicinal plant that possesses the characteristics of reducing inflammation. The plant extract exhibits the effect of scavenging the free radical formed throughout the crystal interaction and encouraging the stone formation [31]. The gum material like a polysaccharide present in the plant extract forms covering throughout the crystal which hinder the crystal adhesion to the renal epithelial cells [32].

Ammi Visnaga: It is the plant member of the carrot family Apiaceae [11], It is the medicinal plant consumed in Egypt for renal stones. The fruits contain essential components like choline and visnagin, this component exhibits a favorable effect on kidney stone caused by hyperoxaluria in male rats [33]. Khella is the constituent used to elapse the urinary calculi [2]. It is mostly used for the cysteine stones, the aqueous extract of the fruits stimulates their dissolution rate [1, 34].

Bergenia Lingulata Wall: It is a member of the family Saxifragaceae and usually known as 'Asmabhedaka' [1]. It is an extensively used plants for medicinal motives and it has several phytoconstituents such as catechin, coumarin, Gallic acid tannic acid, etc. Which are responsible for anti-urolithiasis property and anti-inflammatory activity [35, 36]. The extract possesses several phytoconstituents as an anti-inflammatory and antioxidant activity that averts oxidative stress [37]. The in vivo study was executed by using the aqueous methanolic extract of the rhizome on ethylene glycol induced urolithiasis in rats, and it exhibits an outcome that lowered calcium oxalate crystal accumulation and lithogenic signs increase in urinary magnesium ions, due to which it exhibits an anti urolithiasis effect [38].

Azadirachta Indica A-Juss: It is an extensively used medicinal plant in India as the general name 'neem' possesses several phytoconstituent such as Nimbin, qedunin, azadirachtin, azadirone, Mahmood, and salannin. The plant has antioxidant and anti-inflammatory characteristics due to a plentiful amount of Flavonoids and polyphenolic compounds. Hence, the plant leaf extract lessens the development of kidney stones by defeating free radical anti-inflammatory mediators and shows an anti-urolithiasis effect [39].

Dolichos Biflorus: It is a vernacular medicinal plant in India and generally known as 'Horse gram. The seed of the plant exhibits, free radical scavenging and anti-nephrotoxic activities [40-42]. In the seed of the plant, several phytoconstituents such as glucosides, alkaloids, phytosterols, saponins, phenolic compounds are present [42, 43]. The hydroalcoholic extract of seeds showed a restrictory effect on nucleation and aggregation of calcium oxalate monohydrate crystals, in the synthetic urine system of calcium oxalate crystallization [43]. A reduction in the reformation of calcium oxalate stones had noticed in the patients who administered D. Biflorus [40].

Herniaria Hirsuta L: Herniaria Hirsuta L is a member of the family Caryophyllaceae [1], it is the traditional medicinal plant possesses several chemical constituents such as saponins, flavonoids, triterpene, tannins, phenolic acids, and Ferulic acid, etc. The plant possesses antioxidant and anti-inflammatory activities due to which exhibits an anti-urolithiasis property. Hence Herniaria hirusta L extract defeated the oxidative stress and inflammation which causes inhibition of the stone formation process [44]. Under in vitro calcium oxalate crystallization experiment, Aqueous extract at separate concentration hinders calcium oxalate crystal accumulations and also controlled the size of calcium oxalate crystal and promote the formation of calcium oxalate dehydrate crystals [1]

Tribulus Terrestris: Tribulus Terrestris is a member of the family Zygophyllaceae, and is usually known as 'Gokharu' or 'Gokshur' in India. The aqueous extract of Tribulus Terrestris fruit hinders the nucleation and growth of calcium oxalate crystals [1]. Succeeding administration of Tribulus Terrestris extract lowered the amount of oxalate, citrate, glycosaminoglycan, and proteins in renal stone patients which specifies the benefits of T. Terrestris extract for the treatment of kidney stone [45]. During animal experimentations, it averts the formation of stones as well as assist reversing premature urolithiasis, and also averts calcium oxalate induced renal injury [2].

Hibiscus sadariffa: It is a conventional medicine mostly consumed for prophylaxis and urinary stones [46]. Several phytoconstituents are present in Hibiscus sadariffa such as L-ascorbic acid, hibiscus anthocyanin, quercetin, protocatechuic acid, and polyphenols. The Aqueous extract of the plant lowered the deposition of stone developing constituents in the kidney of ethylene glycol-induced urolithic rats and exhibits anti-urolithic activity [2, 47]. Also, the plant extract exhibits antilithiatic activity by lowering oxalate withholding time in kidneys and increasing excretion in urine in rats on a glycolate diet [48].

Asparagus racemosus wild: It is a medicinal plant in India member of the family Asparagaceae and is usually known as Shatavari, or shatamull [5]. A Racemosus plant is a plentiful source of antioxidants and anti-inflammatory activities. The ethanolic extract of the plant is effectual on lithiasis. It decreases the oxidative stress caused by the adherence of crystal to renal endothelial cells and hinders the stone development due to the existence of flavonoids, polyphenols, and saponins. It also increases the extent of magnesium ions and dissolving the stone formation [49].

Nigella sativa: Nigella sativa is generally called Black cumin seed [2]. It is an Iranian conventional medicine used for kidney stones [50-52]. In the ethylene glycol–induced lithiasis rats the ethanolic extract of seeds lessens the amount of calcium oxalate deposits and lowered the concentration of calcium oxalate in the urine [51]. The phytochemical compound like thymoquinone present in the seed

lowered the number and size of calcium oxalate deposits in the renal tubules of rats [52].

Bryophyllum pinnatum (lam): Bryophyllum pinnatum is a member of the family Crassulaceae and generally called 'Life plant' or 'Air plant' [1]. It is folk medicine that possesses urolithic activity. As well the plant possesses antioxidant and anti-inflammatory characteristics, the plant extract decreases the amount of calcium, oxalate, and phosphorous which are responsible for the development of stones and act by hindering reactive oxygen species generating inflammatory mediators that lead to endothelial cells damage which additionally acts as a matrix for the development of stone [53, 54].

Phyllanthus niruri: Phyllanthus niruri is a member of the family phyllanthaceae, It is one of the crucial plants in the Ayurvedic system. Its Aqueous extract exhibits a restrictive effect on calcium oxalate crystal adherence by obstructing premature calcium oxalate growth and aggregation [1, 11]. An experiment was executed by administering an Aqueous extract of P. Niruri and it exhibits the depletion in the number of calculi by decreasing the calcium oxalate and uric acid in the patients [55].

Cassia fistula: Cassia fistula is a member of the family Caesalpinioideae and generally called the 'golden shower tree [5]. In Cassia fistula, several chemical constituents such as terpenoids, beta-sit sterol, fatty acid, and proanthocyanidin, etc. As well it possesses antioxidant and anti-inflammatory activity [56]. The extract of cassia fistula exhibits anti-urolithiasis activity, it decreases the reactive oxygen species and inflammatory mediators, and exhibits a restrictory effect on stone development due to antioxidant and anti-inflammatory activity [57].

Ononis Spinosa L: In the in vitro study of the Ononis Spinosa L, to assess its straight effect on human kidney stones it has been shown that it might have a litholytic effect on kidney stones and uric acid compound [58].

Fluids for the prevention of kidney stones

Institute of Medicine has published a perspective concerning everyday consumption of fluids for the genuine functioning of kidney, IOM recommended for men 3 liters/day and for women, 2.2 liters/day of fluid is adequate for the survive and flourish. A person might maintain a healthy kidney by being 'Water Wise' this means an everyday person should take a large amount of water. Since dehydration causes kidney damage [59].

Several fruit juices might be used to avert kidney stones, Orange juice and pomegranate juice prevent stone development, freshly prepared tomato juice (without added salt) found to be a plentiful source of citrate and magnesium therefore it inhibits stone formation [2]. As well the Lemon juice helps to prevent kidney stone formation [2, 11].

CONCLUSION:

Urolithiasis is a crucial health issue that gives rise to pain and inflammation as a consequence of the recurrence of kidney stones due to supersaturation of urine. Herbal plants play an essential role in kidney stone disease as the unpleasant effects of modern medicines have already rerouted people from present medicines to herbal plants because they are safer and less poisonous. And those plants, mainly possess anti-inflammatory, diuretic, and antioxidant activities. The health care system will become more and more costly, hence to control this problem we have to introduce herbal medicines and their uses in the health care system.

REFERENCES:

1. Deepak M. Kasote, et al. Herbal Remedies for Urinary Stones Used in India and China: A Review, *J. Ethnopharmacology*, 2017;203;55-68.
2. David Winston, Herbal and Nutritional Treatment of Kidney Stones. Journal of the American Herbalists Guild.,10(2).
3. Sampath, A., et al. Kidney stones, and the ketogenic diet: risk factors and prevention. *J. Child Neurol*., 22(4);375-378.
4. Kohjimoto, Y., Et al. Association of metabolic syndrome traits and severity of kidney stones: results from a nationwide survey on urolithiasis in Japan. *Am. J. Kidney Dis.* 61(6);923-929.
5. Shashi Alok, Pathophysiology of the kidney, gallbladder and urinary stones treatment with herbal and allopathic medicine: A review. *Asian. Pac. J. Trop. Dis* 2013;3(6);496-450.
6. Bahmani Mahmoud, Zargaran Arman., Ethno-botanical Medicines Used for Urinary Stones in the Urmia, Northwest Iran. *EUJIM.*, 2015;7(6);657-666.
7. Metin Onaran, Successful Treatment of Sodium Oxalate Induced Urolithiasis with Helichrysum Flowers, *J. Ethnopharmacology*, 2016;186;322-328.
8. Basant Ballabh, Traditional medicinal plants of cold desert Ladakh—Used against kidney and urinary disorders. *J. Ethnopharmacology* 118 (2008) 331–339.

9. B. Kaleeswaran, et al. Evaluation of the anti-urolithiasis potential of ethyl acetate extract of Pedalium Murex L. On struvite crystal (kidney stone). *J. Trad. Comp. Med.*, 2019;9; 24-37.
10. Corinne Isnard Bagnis, et al. Herbs and the Kidney. *AJKD*. 2004;44(1)
11. K. Manjula, et al. Herbal Remedy for Urinary Stones, Scientific Publishers (India) 4806/24, Ansari Road, Daryaganj NEW DELHI – 110 002 (India).
12. Markazi, S., et al. Report of SLC3A1/rBAT gene mutations in Iranian cystinuria patients: A direct sequencing study. *J Res Med Sci*., 2017; 22-33.
13. O'Kell, A.L., Grant, D.C., Khan, S.R. Pathogenesis of calcium oxalate urinary stone Disease: species comparison of humans, dogs, and cats. *Urol.*, 2017;45(4);329-336.
14. Al-Mamoori. F., Al-Samydai, A., Aburjai, T., Medicinal Plants for the Prevention and Management of Nephrolithiasis: A Review. *IJSTR*., 2019;8;2700-27005.
15. Khan, S. R. Reactive oxygen species, inflammation, and calcium oxalate nephrolithiasis. *Transl Androl Urol*., 2014;3(3);256.
16. Ghalayini, I.F.; Al-Ghazo, M.A.; Harfeil, M.N. Prophylaxis and therapeutic effects of raspberry (Rubus idaeus) on renal stone formation in Balb/c mice. *Int. Braz. J. Urol*., 2011;37;259–267.
17. Gupta, A.K., Dobriyal, R., Victorian, T.D. In vitro evaluation of antiurolithiatic activity of Euphorbia thymifolia *L.* Plant extracts. *IRMHS*., 2018;1(1);3-7.
18. Farzaei, M.H., Parsley: A review of ethnopharmacology, Phytochemistry, and biological activities. *J. Tradit. Chin. Med*., 2013;33;815–826.
19. Moazedi, A. ; Mirzaie, D. ; Seyyednejad, S. et al. Spasmolytic effect of Petroselinum crispum (Parsley) on rat ileum at different calcium chloride concentrations. *Pak. J. Biol. Sci.*, 2007;10;4036–4042.
20. Al-Yousofy, F.; Parsley! The mechanism as antiurolithiasis remedy. *Am. J. Clin. Exp. Urol.*, 2017;5;55.
21. Kuzma, P.; Druzy ´nska, B. ; Obiedzi ´nski, M. Optimization of extraction conditions of some polyphenolic ˙ compounds from parsley leaves (Petroselinum crispum). *Acta Sci. Pol. Technol. Aliment*., 2014;13;145–154.
22. Sharma, N., Tanwer, B.S., Vijayvergia, R. Study of medicinal plants in Aravali regions of Rajasthan for treatment of kidney stone and urinary tract troubles. *Int. J. Pharm. Tech. Research*., 2011;3(1);110-113.
23. Goyal, M., Aerva lanata: A review on Phytochemistry and pharmacological aspects. *Pharmacognosy reviews.*, 2011;5 (10);195.
24. Bhandari, P.R. Pomegranate (Punica granatum L). Ancient seeds for a modern cure? Review of potential therapeutic applications. *Int. J. Nutr. Pharmacol. Neurol. Dis*, . 2012;2;171–184.
25. Tugcu, V. The protective effect of a potent antioxidant, pomegranate juice, in the kidney of rats with nephrolithiasis induced by ethylene glycol. *J. Endourol*., 2008; 22;2723–2732.
26. Sadeghi F.,.et al. Protective effect of pomegranate flower extract against gentamicin-induced renal toxicity in male rats. *J. Ren. Inj. Prev*., 2015;4;45–50.
27. Rathod, N.; Biswas, D. ; Chitme, H.; Ratna, S. ; Muchandi, I. ; Chandra, R. Anti-urolithiatic effects of Punica granatum in male rats. *J. Ethnopharmacol.*, 2012;140;234–238.
28. Tracy, C.R.; Oxidative stress and nephrolithiasis: A comparative pilot study evaluating the effect of pomegranate extract on stone risk factors and elevated oxidative stress levels of recurrent stone formers and controls. Urolithiasis., 2014;42;401–408.
29. George, K.V., Diana, K.V., In-vitro Studies on the antilithiatic property of Achyranthes Aspera. *J. Pharm. Res*., 2012;5;4366-4370.
30. Jayakumar, T., et al. Experimental studies of Achyranthes Aspera (L*)* preventing nephrotoxicity induced by lead in albino rats. *Journal of Health Science* 2009;55(5);701-708.
31. Ahmadi, M., et al. Alcea rosea root extract as a preventive and curative agent in ethylene glycol-induced urolithiasis in rats. *Indian J Pharmacol*., 2012 44;304.
32. Koriem, K.M. Review on pharmacological and toxicological effects of oleum azadirachtin oil. *Asian Pac. J. Trop. Biomed*., 2013;3(10);834-840.
33. Vanachayangkul P., et al. Prevention of renal crystal deposition by an extract of Ammi visnaga L. And its constituents khellin and visnagin in hyperoxaluric rats. *Urol. Res*., 2011;39;189–195.
34. Meiouet, F. E Kabbaj, S. Daudon, M., In vitro study of the litholytic effects of herbal extracts on cysteine urinary calculi. *Prog. Urol*., 2011;21;40–47.
35. Ruby, K.M., et al. Polypharmacological activities of Bergenia species. *Int. J Pharm. Sci. Rev. Res*., 2012;13(1);100-110.
36. Singh, M., et al. Antioxidant, antimicrobial activity and bioactive compounds of Bergenia Ciliata Stern. A valuable medicinal herb of Sikkim Himalaya. *J. Trad. comp. med.*, 2017;7(2);152-157.

37. Nadhiya, K., Haripriya, D., Vijayalakshmi, K., Pharmacognostic and preliminary Phytochemical analysis of Benincasa hispida fruit. *Asian J. Pharm Clin Res*., 2014; 7(1);98-101.
38. Christina, A., Ashok, K., Packialakshmi, M. Antilithiatic effect of Asparagus racemosusWilld on ethylene glycol-induced lithiasis in male albino Wistar rats. *Methods Find. Exp. Clin. Pharmacol.,* 2005;27;633–638.
39. Rabiu, H., Subhasish, M. Investigation of in vitro anthelmintic activity of Azadirachta Indica leaves. *Int J Drug Dev Res.,* 2011;4(3);94-100.
40. Singh, R.G. Behura, S.K. Kumar, R. Litholytic property of Kulattha (Dolichos biflorus) vs. Potassium citrate in renal calculus disease, comparative study. *JAPI.,* 2010;58;286–289.
41. Mathew, L.E. Sindhu, G. Helen, A. Dolichos biflorus exhibits anti-inflammatory and antioxidant properties in an acute inflammatory model. *J. Food, Drug Anal*., 2014; 22; 455–462.
42. Atodariya, U. Barad, R. Upadhyay, S. Anti-urolithiatic activity of Dolichos biflorus seeds. *J. Pharmacogn. Phytochem*., 2013;2;450-451.
43. Saha, S. Verma, R.J. Evaluation of hydro-alcoholic extract of Dolichos biflorus seeds on inhibition of calcium oxalate crystallization. *J. Herb. Med.*, 2015;5;41–47.
44. Atmani, F., Slimani, Y., Mimouni, M., Effect of aqueous extract from Herniaria hirsuta L. On experimentally nephrolithiasis rats. *J. Ethnopharmacology*., 2004;95(1);87-93.
45. Arasaratnam, V., Balakumar, S., Senthuran, A. A study of Tribulus Terrestris extracts on risk factors for urinary stone in normal subjects and urolithic Patients. *J. National Science Foundation of Sri Lanka.,* 2010;38(3);187–191.
46. Prasongwatana, al. Uricosuric effect of Roselle (Hibiscus sabdariffa) in normal and renal-stone former subjects. *J. Ethnopharmacol*., 2008;117;491–495.
47. Laikangbam, R. ; Devi, M.D. Inhibition of calcium oxalate crystal deposition on kidneys of urolithiatic rats by Hibiscus sabdariffa L. Extract. *Urol. Res*., 2012; 40;211–218.
48. Wootton, S. Hossain, R.Z., Yachantha, C., Effects of Orthosiphon grandiflorus, Hibiscus sabdariffa, and Phyllanthus amarus extracts on risk factors for urinary calcium oxalate stones in rats. *J. Urol*., 2011;185;323–328.
49. Negi, J.S., et al. Chemical constituents of Asparagus. *Pharmacogn. Rev*., 2010; 4(8);215.
50. Hayatdavoudi, P. Rad, A.K., Rajaei, Z., Renal injury, nephrolithiasis, and Nigella sativa: A mini-review. *Avicenna J. Phytomed.*,2016;6;1–8.
51. Khoei, A., Hadjzadeh, Z., Parizady, M., Ethanolic extract of Nigella Sativa L seeds on ethylene glycol-induced kidney calculi in rats. *Urol. J*., 2009;4;86–90.
52. Hajzadeh, M., et al. The effect of thymoquinone on ethylene glycol-induced kidney calculi in rats. *Urol. J.*, 2008;5;149–155.
53. Anadozie, S. O., et al. Bryophyllum pinnatum inhibits arginase II activity and prevents oxidative damage occasioned by carbon tetrachloride (CCl4) in rats. *Biomedicine & Pharmacotherapy.,* 2018;101;8-13.
54. Shukla, A.B., et al. Evaluation of the anti-urolithiatic effect of aqueous extract of Bryophyllum pinnatum (Lam.) Leaves using Ethylene glycol-induced renal calculi. *Avicenna j. Phyto MED.*, 2014;4(3);151.
55. Pucci, N.D., et al. Effect of Phyllanthus niruri on metabolic parameters of patients with kidney stone: a perspective for disease prevention. *Int. Braz. J. Urol*., 2018; 44(4);758-764.
56. Santhoshi, B., Chidrawar, V.R., Rao, V.U., A brief review on the potential medicinal Plants and screening models of urolithiasis. *Int. J. Appl. Biol. Pharm. Technol*., 2015;6(1);37-45.
57. Ramesh, C., John, W.E. Antiurolithiatic activity of wood bark extracts of Cassia fistula in rats. *JPBMS*., 2010;2;1-9.
58. Ibrahim Bashana, Murat Bozlub. The possible litholytic effect of Ononis Spinosa L. On various human kidney stones—an in vitro experimental evaluation. *J. Herb. Med.*, 2020;22;100-345.
59. National Kidney Foundation. Six tips to be water-wise for healthy kidneys. Available at: https://www.kidney.org/content/6-tips-be-water-wise-healthy-kidneys. Accessed August 25, 2020.

.