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HERBAL TEA BAG FOR UROLITHIASIS: A NOVEL METHODOLOGY

Bhupinder Singh*[1], Aman Kansra[1], Ashima Chandel[2], Sujata Thakur[2], Dr. Rajesh Gupta[2]

1. **Sri Sai College of Pharmacy, Manawala, Amritsar (Punjab) 143109**
2. **Sri Sai College of Pharmacy, Badhani, Pathankot (Punjab) 145001**

rheer9782@gmail.com

ABSTRACT

Kidneys are too large, bean-shaped organs that aid in eliminating waste from blood as urine. One of the most common disorders worldwide is the kidney stones. Kidney stones can develop as a result of dietary variables such as inadequate hydrations and excessive salt consumption. For the treatment of urolithiasis, numerous innovative technologies are being developed as inventive drug delivery systems. A kidney stone treatment in the form of a tea bag is one such developmemt. Gokhru, Punarnava, Suntha, Tulsi, Varuna and Fennel are just a few of the herbal medications that have been shown to be highly helpful in treating urolithiasis in a way that is safe, economical and extremely eco-friendly.

Keywords:- Urolithiasis, Tea bag, Kidney stone, Herbal, Antiurolithiac.

INTRODUCTION

Urolithiasis is defined as a medical condition which affects either one or both of the kidneys along with the characteristic presence of calculi i.e. kidney stone, in kidney itself or in any part of the urinary system. Calcium oxalate and phosphate make up about 80% of this calculi. Males have a 12% lifetime risk and females a 6% lifetime chance of developing urinary stones. Urolithiasis is a complex process that result from an imbalance between promoters and inhibitors in the kidney, which include citrate, magnesium pyrophosphate, Tamm Horsfall protein, urinary prothrombin fragments, glycosaminoglycan osteopontin, and low urione pH and flow. Up to 80% of the stone studied contains calcium oxalate (CaOx)· A complex series of physicochemical process such as supersaturation, nucleation, growth aggregation and retention within the renal tubules lead to formation of kidney stones[1]. Blood pressure regulation and maintaining the body's fluid balance are the major functions of the kidneys. Moreover, it provides the function of removing waste from the body. Compared to the left, the right kidney is a little bit smaller. The back of the abdominal cavity houses the kidneys[2].

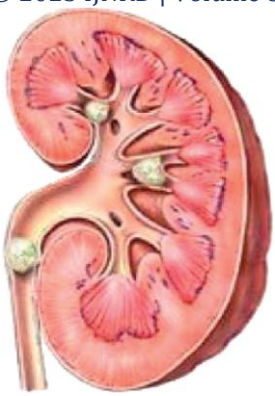

Figure 1: Kidney stone locations in the urinary system[3]

Sign & Symptoms:-

- Overactive bladder(OAB)
- Dysuria
- Hematuria
- Balanitis
- Nausea & Vomiting
- Lower abdominal pain[4].

Risk Factors:-

- Diabetes
- Smoking
- Cardiovascular disease
- Male Gender
- Misuse of Drugs
- Overweight
- Age
- Genetics[2].

Tea bag: A novel drug delivery method

Two-thirds of the world's population drink millions of tea cups every day as a morning refreshment and most of them are tea bags because they are convenient, easy to discard, and allow for the mixing of several ingredients in a single little pack of tea bags. The desire for tea bags is based on a variety of significant characteristics, such as status, age, frugalness, etc. A tea bag is a packed system carrying tea that is manufactured with the help of sludge paper, nylon paper, or any other respectable material that complies with global morals and norms, according to the Tea Marketing Control Order of 2003. Interlaced tea bags and stapled tea bags are the two types of tea bags that are offered in the request (banned by FSSAI)[5].

Figure 2: Tea bag

In recent times, infusion of dry factory corridor especially sauces(Fragaria vesca, Sorbus aucupuria, Filipendula ulmaria, Epilobium anguistifolium Robus idaeus, Cinnamomum zeylanicum Blume, Cymbopogon nardus, Hibiscus sabdariffa,etc.) having multitudinous health benefits are synonymously appertained as " tea " or most particularly Herbal tea. Given the constant rise in the frequency of diseases related to daily living and consumers awareness of the potential for various organic foods and beverages to combat them, herbal teas are enormously significant and are currently becoming more and more fashionable. Herb tea or tisane is more appropriate name for these infusions from other stores[5].

Herbal Plants suitable for tea bag infusion as a treatment for Urolithiasis:-

S.no.	Drugs	Part Used	Activity
1.	Gokhru	Fruit[6]	Antiurolithiac[7]
2.	Punarnava	Root[6]	Antiurolithiac[8]
3.	Suntha	Rhizome[6]	Diuretic[9]
4.	Tulsi	Roots[6]	Blood purifier, Antimicrobial[10]
5.	Varuna	Bark[6]	Antiurolithiac[11]
6.	Fennel	Seeds[6]	Antiurolithiac, Flavouring agent[12]

1) Gokhru

- **Part used:** Fruit
- **Biological source:** Tribulus terrestris
- **Family:** Zygophyllaceae
- **Synonymns:** Gokharu, Gokuri, Kante gokaru
- **Constituents:** glycosides, steroids, alkaloids, flavonoids and saponin derivatives like tigogenin, chlorogenin, sarsasapogenin, diosgenin, ruscogenin, hecogenin.

- **Activity:** anti-urolithiac, anthelmintic, antimicrobial, analgesic, aphrodisiac, diuretic, antidiabetic[7].

Figure 3: Gokhru Fruit[7]

2) Punarnava

- **Part used:** Root
- **Biological name:** Boerhaavia diffusa
- **Family:** Nyctaginaceae
- **Synonymns:** Hog weed, Horse Purslane
- **Constituents:** lirodendrin, hypoxanthine 9-Larabinofuranoside, Punarnavine, ursolic acid, punarnavoside, Boeravinone A-F.
- **Activity:** immunomodulatory effects, immunosuppressive activity, antioxidant, antidiabetic, antiproliferative, analgesic, anti-inflammatory, antibacterial, antistress, adoptogenic, hepatoprotective, anti-viral[8].

Figure 4: Punarnava root[8]

3) Suntha

- **Part used:** Rhizomes of Ginger
- **Biological name:** Zingiber officinale
- **Family:** Zingiberaceae
- **Synonymns:** Adhrak, Ginger, Sunta.

- **Constituents:** gingerols, shogaols, paradols, and zingiberene, zerumbone, zingerone, gingerols, and 1-dehydro-(10) gingerdione.
- **Activity:** antioxidant, anti-inflammatory, anticancer, antimicrobial properties, antiviral activity, anticancer, immunitymodulator, antitussive, antirheumatic, aniurolithiac, diuretic[9].

Figure 5: Suntha(dry ginger)[9]

4) Tulsi

- **Part used:** Roots
- **Biological name:** Ocimum sanctum
- **Family:** Lamiaceae
- **Synonymns:** Tulasi, Holy basil,
- **Constituents:** Eugenol, Rosameric acid, Urosolic acid, p-Cymenene, Carvacrol, Circimaritin, Linalool, isothymusin, Caryophylline, cirsilineol, Estragol, phenolic compounds (antioxidants), apigenin, α-Terpinene, Terpin-4-ol, Carvacrol, α-Humulene.
- **Activity:** Antimicrobial, Anti-inflammatory, Antidiabetic, Anticancer, antitussive, immunity modulator, Antiulcer, Antifungal/anticandidal, Thyroid activity[10].

Figure 6: Plant of Tulsi[10]

5) Varuna

- **Part used:** Bark
- **Biological name:** Crataeva nurvala
- **Family:** Capparidaceae
- **Synonymns:** Barnam, Barun, Bilasi.
- **Constituents:** lupeol and its acetate, ceryl alcohol, friedelin, cadabicine diacetate, betulinic acid, diosgenin, glucocapparin, triacontanol, cetyl and ceryl alcohol, L-stachydrine, dodecanoic anhydride, methyl pentacosanoate, kaemferol-0-α-D-glucoside and quercitin-3-0-α-D-glucoside rutin, quercitin, varunol and β-sitosterol.
- **Activity:** Antiurolithiatic, anti-inflammatory, diuretic, antioxidant, cardioprotective, hepatoprotective, rubifacient, lithonotriptic, anti-protozoal, anti-rheumatic, vesicant[11].

Figure 7: Flower and leaves of Varuna[12]

6) Fennel

- **Part used:** Seeds
- **Biological name:** Foeniculum vulgare
- **Family:** Apiaceae
- **Synonymns:** Saunf, sweet fennel, sweet anise, finnochio
- **Constituents:** -Thujene, fenchone, 1,8-Cineol, cathine, -Ocimene, eucalyptol, Linalool, neochlorogenic acid, Germacrene D, trans-limonene oxide, Anisketone, -Hexadecanoic acid, apiol, Cubebene, hexanal, -,-Pinene, Camphene, -Phellandrene, -Phellanrrene, -Myrcene, 4-Carene, 2-Heptanohe, Limonene, -Terpinene, cis-Limonene oxide, Sabinene hydrate, Fenchyl acetate, Camphor, Dicyclopropyl carbinol, Fenchol, chlorogenic acid, gallic acid, p-coumaric acid, caffeic acid, ferulic acid-7-o-glucoside, quercetin-7-o-glucoside, ferulic acid, 1,5 dicaffeoylquinic acid, hesperidin, cinnamic acid, rosmarinic acid, quercetin and apigenin.
- **Activity:** antioxidant, antimicrobial, antiviral, antiplatelet, anticancer, carminative, antirheumatic, laxative, nephroprotective, antiurolithiatic, hypoglycemic, antispasmodic, hypolipidemic, memory enhancing properties, antibacterial, hepatoprotective, antiinflammatory, antihirusitism, apoptotic, antiulcerogenic, antitumor[13].

Figure 8: Seeds of Fennel[13]

Procedure for making Tea bag containing herbal drugs for Urolithiasis:-

1) **Collection of Plant material**
   - Collect all the Plant materials as per standard procedures.
2) **Authentication**
   - All the collected plant material should be authenticated by a Qualified Pharmacognocist.
3) **Drying**
   - Plant material then be subjected to drying under shade (not under direct sunlight, due to presence of volatile oil).
4) **Grinding**
   - Grind the dried material with the help of manual grinder to obtain a fine powder.
5) **Sieving**
   - Pass the finely powdered drug through sieve no. 40 to obtain uniform particle size for the formulation.
6) **Weighing**
   - Weigh exactly 1 gm of each drug using weighing machine.
7) **Mixing**
   - Properly mix all the weighed drugs in mortar and pestle.
8) **Addition of Excipients**
   - Add fennel as flavouring agent and sugar as sweetening agent in the powdered mixture and mix it again.
9) **Packaging in tea bags**
   - Take 1 gm weight of the prepared powdered mixture and pack it in the tea bags[2].

Evaluation test:-

1) Loss on Drying:- Weigh the petri dish that is empty. Add 2 gm of the powder sample there. Place this petri dish in a hot air oven for an hour while constantly checking the weight of each dish. Continue this process until the petri dish's weight is equal. Keep track of the constant reading of the loss caused by the drying of the herbal kidney stone remedy.

2) **Water Soluble Extractive Value:-** Put 5 gm of the herbal drug's powder sample into the conical flask. To it, add 10 ml of chloroform and 90 ml of water. 6 hours of magnetic stirring, followed by 18 hours of placement, followed by filtering and extraction of 25 ml of the filtrate for evaporation.
3) **Alcohol Soluble Extractive Value:-** Put 5 grams of the powdered sample i.e. the herbal drug mixture into the conical flask, then add 100 millilitres of alcohol, stir with a magnetic stirrer for six hours, filter it, and then evaporate 25 millilitres of the filtrate.
4) **Ash Value:-** Add 2 grams of herbal preparation to the empty crucible, weigh it, and place it in a muffle furnace at 1000ºC, then allow it to cool. Then calculate the weight of the crucible following that subtract the weight of the empty crucible from the weight of the crucible with powder ash.
5) **pH:-** Put a few grams of the sample in a beaker, add a few millilitres of water, and use a pH paper to determine the sample's pH.
6) **Bulk Density:-** The bulk density of a powder is determined by the distribution of particle sizes, the shape of the particles, and their ability to adhere to one another. The Bulk density is calculated by mass of the powder divided by its volume.

   LBD = Weight of powder / Volume of packing

   TBD = Weight of powder / Tapped volume of a packing

   Where TBD stands for tapped density and LBD stands for loose bulk density.
7) **Tapped Density:-** Tapped density is calculated by tapping the bulk volume of powder for 15 minutes. Weight of sample divided by tapped volume.
8) **Hausner Ratio:-** It is defined as the ratio of two parameters i.e. tapped density and bulk density and is given by the formula: Hausner's Ratio = Tapped density/Bulk density
9) **Percent Compressability:-** Carr's compressability index (Carr's index = TBD-LBD/TBD×100) was used to determine a powder mixture's constant compressability[2].

CONCLUSION

One of the most prevalent issues affecting the urinary system in developing nations and the rest of the world is kidney stones. The removal of kidney stones through surgery or the use of allopathic and natural medications are now popular methods of treatment. Yet, due to its safety and affordability, herbal therapy was selected by the majority of patients for the eradication of kidney stones. The usage of tea bags as a cutting-edge medicine delivery mechanism for herbal preparation is one such modern trend. For the treatment of urolithiasis and many other medical disorders, this contemporary technology has proven to be quite helpful, and it has become a successful treatment approach.

REFERENCE

1. Gomase PV., et al. Urolithiasis (Kidney Stones): Current Pharmacological Diagnosis and Management. Journal of Drug Delivery & Therapeutics. 2019; 9(4): 726-737.
2. Bhalekar SD., et al. Formulation and Evaluation of Tea Bags Containing Herbal Drugs for Treatment of Urolithiasis. International Journal of Engineering Science and Computing. 2020; 10(4): 25246-25249.

3. Alelign T., et al. Kidney Stone Disease: An Update on Current Concepts. Advances in Urology. 2018: 1-12.
4. Khan F., et al. A comprehensive review on kidney stones, its diagnosis and treatment with allopathic and ayurvedic medicines. Urology & Nephrology Open Access Journal. Medcrave. 2019; 7(4): 69-74.
5. Bassi P., et al. Importance and prior considerations for development and utilization of tea bags: A critical review. Journal of Food Process Engineering. 2019; e13069: 1-10.
6. Ahmed S., et al. Antiurolithiatic plants: Multidimensional pharmacology. Journal of Pharmacognosy and Phytochemistry. 2016; 5(2): 4-24.
7. Bhuker A., et al. Potential Use of Medicinal Plant Gokhru: A Review. Journal of Ayurvedic and Herbal Medicine. 2022; 8(2): 101-106.
8. Gour R., et al. Boerhaavia Diffusa Linn Plant: A Review – One Plant with Many Therapeutic Uses. International Journal of Pharmaceutical Sciences and Medicine. 2021; 6(4): 25-41.
9. Ozkur M., et al. Ginger for Healthy Ageing: A Systematic Review on Current Evidence of Its Antioxidant, Anti-Inflammatory, and Anticancer Properties. Oxidative Medicine and Cellular Longevity. 2022: 1-16.
10. Gulhane NS., et al. Study of medicinal uses of Ocimum sanctum (Tulsi). Journal of Pharmacognosy and Phytochemistry 2021; 10(2): 1427-1431.
11. Bhattacharjee A., et al. Phytochemical and ethno pharmacological profile of Crataeva nurvala Buch-Hum (Varuna): A review. Asian Pacific Journal of Tropical Biomedicine. 2012: S1162-S1168.
12. Bhardwaj A., et al. A Brief Review on Healing Properties of Varuna – Crataeva Nurvala. Think India Journal. 2019; 22(17): 57-63.
13. Badgujar SB., et al. Foeniculum vulgare Mill: A Review of Its Botany, Phytochemistry, Pharmacology, Contemporary Application, and Toxicology. BioMed Research International. 2014: 1-32.