

Polyherbal Instant Premix :A Progressive Step in Combating Kidney Stones

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Abstract: *It is a known fact that over 40 % of the world's population depends on herbal medicines and products for healthy living. The aim of the present work was to investigate the potential of a polyherbal formulation in the management of Renal calculi. This article provides a general idea of the amalgamation of multiple phytoconstituents in a single compound mixture to aid kidney stones. Rather than novel formulations or discovering new moieties for the management of Renal stones, the current review emphasizes upon designing a formulation encompassing a herbal phytoconstituent for enhanced therapeutic benefits. The present study concludes that this ready mix formed can prove to bring about a paradigm shift in the treatment of Kidney stones. Premixed drugs may save time as compared to admixing and instantly ready when you need it. In the present work we tried to explore and exploits various botanical drugs for their*

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I. INTRODUCTION

Nephrolithiasis is a complicated condition with numerous contributing variables. In industrialized countries, the estimated frequency ranges from 14% to 16% depending on the demographics and geographic location. Renal stone occurrence has increased over the last few decades, most likely as a result of dietary and lifestyle choices (1).

Urolithiasis or urinary stones have afflicted mankind since antiquity. Globally 10-15% of people are affected by it.(2,3,4) It is characterized by formation of calcifications in the urinary system, usually in kidneys or ureters, but may also affect the bladder or urethra. It is the multi-factorial disorder that results from a succession of several physico-chemical processes including supersaturation, nucleation, growth, aggregation and retention of the calculi anywhere in the urinary tract.(5,6) It has high morbidity and low mortality but carries significant socio-economic impact and serious consequences like severe pain in the back or belly (renal colic), pain and burning during micturition, blood in urine (haematuria), fever or chills, nausea and vomiting. Various causes of urolithiasis include dehydration, high intake of caffeine, sodium, sugar; lifestyle modification like smoking, alcohol consumption, lack of physical activity, obesity and medical conditions such as Crohn's disease, urinary tract infections, renal tubular acidosis, hyperparathyroidism, medullary sponge kidney, Dent's disease. There are different types of stones named after their chemical composition viz. calcium oxalate, calcium phosphate, uric acid, struvite, cysteine, etc. (7,8) But most of the calculi arise from the common component of urine that is calcium oxalate, representing up to 80% of analyzed stones. Another major problem which is associated with urolithiasis is its recurrence; patients who have already suffered from it are at increased risk of re-developing it in the near future. Recurrence rate after encountering the first episode is reported to be as high as 50% after 5 years and 80-90% after 10 years. Thus, prevention is of prime importance in patients who have already suffered from it. Urolithiasis is a pathological condition of the Genitourinary System which is referred to as formation of calculi or stones in the urinary system. Stones occur usually in kidneys and ureter but may also be present in bladder and ureter. It is the third most common urinary tract disease in humans, following urinary tract infections and prostatic diseases. They are formed when urine is supersaturated with salt and minerals such as struvite, uric acid, cysteine. 60-80% of stones contain calcium. They vary considerably in size from small 'gravel-like' stones to large

staghorn calculi. The calculi may stay in the position in which they are formed, or migrate down the urinary tract, producing symptoms along the way. According to localization in the urinary system, they are called as Nephrolithiasis (in kidneys), ureteral lithiasis (in ureter), bladder lithiasis (in bladder) and urethra lithiasis (in urethra).(5-8)

Signs and Symptoms of Urolithiasis:

- Haematuria
- Flank pain – pain in the side, due to kidney obstruction
- Renal colic – intense, cramping pain due to stones in the urinary tract
- Obstructive uropathy
- Urinary tract infections
- Nausea and vomiting
- Persistent need to urinate
- Fever or chills
- Fatigue

Mechanism of Kidney Stone Formation:

The formation of renal stones is a consequence of increased urinary super-saturation with subsequent formation of crystalline particles.

- **Crystal Nucleation:** The initial step in the transformation from a liquid to a solid phase in a super-saturated solution is called nucleation. This process begins with the combination of stone salts in solution into loose clusters that may increase in size by addition of new components or clusters. Nuclei form the first crystals that do not dissolve and have a characteristic lattice pattern. In urine, nuclei usually form on existing surfaces, a process called heterogeneous nucleation.
- **Crystal Growth:** Once a crystal nucleus has achieved a critical size and relative supersaturation remains above one, the overall free energy is decreased by adding new crystal components to the nucleus. This process is called crystal growth. Crystal growth is one of the prerequisites for particle formation and thus for stone formation.
- **Crystal Aggregation:** The process whereby crystals in solution stick together to form larger particles is called aggregation. Some researchers have proposed that crystal aggregation is the most important step in stone formation.(4,6,7)

Glimpse of the plant selection:

- **LABLAB PURPUREUS METHANOL EXTRACT :** A part of the Fabaceae plant family, Lablab purpureus belongs to the genus Lablab. The results of the phytochemical examination of Lablab purpureus revealed that it included a variety of metabolites, including sugar, alcohols, phenols, steroids, essential oils, alkaloids, tannins, flavonoids, saponins, coumarins, terpenoids, pigments, glycosides, and anthranoids, as well as a variety of minerals. According to preliminary pharmacological studies, lablab purpureus is used to treat iron deficiency anaemia as well as having antidiabetic, anti-inflammatory, analgesic, antioxidant, cytotoxic, hypolipidemic, antimicrobial, insecticidal, and hepatoprotective properties (9).
- **PONTEDERIA CRASSIPES WATER EXTRACT :** A monocotyledonous, free-floating aquatic plant in the family Pontederiaceae, Pontederia crassipes is also known as water hyacinth. Although the plant is indigenous to Brazil and the Amazon, it has naturalised in many tropical and subtropical areas. Eichhornia is one of nine genera in the Pontederiaceae family. Eight species of aquatic plants make up the latter, including Eichhornia crassipes, a synonym for Pontederia crassipes. The mature plant has inflorescences, fruit clusters, roots, leaves, and stolons. Numerous secondary metabolites, including polyphenols (9.73%), flavonoids (10.49%), fatty acids (10.1%), alkaloids (7.4%), sterols (6.17%), and miscellaneous chemicals (19.13%), have been identified in the detailed study of the phytochemical composition of E. crassipes. The plant is also abundant in several bioactive substances, which have a wide range of pharmacological characteristics. These included anti-

inflammatory, anti-tumor, anti-cancer, anti-microbial, hepatoprotective, larvicidal, and wound-healing properties(10).

- **CALOTROPIS GIGANTEA WATER EXTRACT** : *C. gigantea* is a member of the Apocynaceae family, which includes the plants known as gigantic milkweed, erukka, and Sveta arka.90% of *C. gigantea* is found in southern Asian and African nations, as well as all of India. *C. gigantea* is a xerophytic plant that can withstand dryness and salinity, has thick leaves covered in wax, and a well-branched root system.This plant contains phytochemicals such Cardenolides, Benzoylinesolone, Madrine, -Sitosterol, Saponins, Tannins, Alkaloids, Flavonoids, Saponins, and Calotropins.The latex of the *C. gigantea* plant is used to treat a variety of rheumatic disorders, including edema, dental issues, rat bites, and gonococcal arthritis, by applying it to the affected area. Latex is also primarily used to treat fractures and sprains. An herbal decoction is used to treat cough and asthma. The plant powder from *C. gigantea* is used to cure ulcers, syphilis, leprosy, diarrhoea, dysentery, and rheumatism(11).

II. MATERIAL AND METHODOLOGY

Premix

The present study aims to design a polyherbal premix formulation comprising of *Lablab purpureus* , *Pontederia crassipes* and *Calotropis gigantea*. Premix are mixtures of one or more drug substances with a suitable vehicle. Polyherbal premix formulation for the treatment of kidney stones is used because in an individual plant the active constituents are insufficient to achieve the desirable therapeutic effects. When combining the multiple herbs in a particular ratio it will reduce the toxicity and will give a better therapeutic effect(12).Premix may be prepared as powders,pellets or in granulated form(13).

MIC value :

- **FOR LABLAB PURPUREUS** : Both the crude extract from lablab seeds and the crude peptide from *Lablab purpureus* were reported to be able to suppress the growth of *B. cereus* at a dose of 200 mg/mL(14).
- **FOR PONTEDERIA CRASSIPES**: Two fungi (*Asparagillus flavus* and *Asparagillus niger*) and one yeast (*Candida albicans*) were able to be inhibited at a concentration of 250 mg/mL(15).
- **FOR CALOTROPIS GIGANTEA**: The plant extract's MIC concentration is 0.60 to 1.50 mg/mL, making it a moderate inhibitor of *Bacillus subtilis*(16).

Formulation procedure

The premix (1 g) comprised-

- *Lablab purpureus* leaf powder –250mg
- *Pontederia crassipes* leaf powder - 250mg
- *Calotropis gigantea* leaf powder – 250mg
- Diluent:Q.s

Formula table:

SR. NO.	PLANT NAME	CONCENTRATION (g)	USE
1.	LABLAB PURPUREUS	250mg	antidiabetic, anti-inflammatory, analgesic, antioxidant, cytotoxic, hypolipidemic, antimicrobial, insecticidal, and hepatoprotective properties(9).
2.	PONTEDERIA CRASSIPES	250mg	anti-inflammatory, anti-tumor, anti-cancer, anti-microbial,

			hepatoprotective, larvicidal, and wound-healing properties(10).
3.	CALOTROPIS GIGANTEA	250mg	ulcers, syphilis, leprosy, diarrhoea, dysentery, and rheumatism(11).

III. RESULTS AND FINDINGS

3.1 Organoleptic Property

SR. NO.	PLANT NAME	COLOUR	ODOUR	TASTE
1.	LABLAB PURPUREUS	Fruit: Purple Flower: Pink Leaf: green	Peculiarly strong and unpleasant smell	Intensely aromatic
2.	PONTEDERIA CRASSIPES	Flower: purple or blue with smooth texture Leaf: green	Sweet smell	Tasteless
3.	CALOTROPIS GIGANTEA	Flower: Purple Fruit: greyish-green Leaf: green	No	Acrid, bitter taste

Characterization :

The characterization for the polyherbal premix formulation includes

- Bulk density
- Tapped density
- Angle of repose
- Hausner's ratio
- Swelling index
- pH
- LOD

IV. CONCLUSION AND FUTURE SCOPE

The review presented in this manuscript demonstrates advances in the technologies and scientific strategies for better management of kidney stones. This instant premix seems to be a potential and promising approach to combat renal stones. The present review is focused on the advancement of drug delivery over conventional drug delivery, or the traditional approach to providing target specificity and enhancing the bioavailability of phytochemicals. Because of the advantages the active components provide, nanocarrier- based DDSs have received attention in recent years as a potential novel drug transporter. Naturally occurring medicines contained a wide range of therapeutic characteristics that should be investigated using advanced drug delivery methods. So in nutshell from the current review we can conclude that formulating a premix of Lablab purpureus, Pontederia crassipes and Calatropis gigantea can bring about a transformation and serve as a boon to reduce prevalence of Renal calculi.

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