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DEVELOPMENT AND ASSESSMENT OF A POLYHERBAL SYRUP FOR KIDNEY STONE MANAGEMENT

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ABSTRACT

Various syrups are now on the market to treat kidney stones, however they are only effective as a barrier against foreign particles and stimuli. They offer no pharmacological advantage in treating or inhibiting an infection. The purpose of this study was to formulate and assess a polyherbal syrup that contains herbal medications for the treatment of kidney stones. In order to cure kidney stones, we have created a medicinal herbal syrup that contains Ghokaru, and Kalanchoe Pinnata. Since ancient times, kidney stones have been treated using medicinal plants. As everyone knows, Kalanchoe pinnata has the strongest antiurolithiatic properties. Calcium stone prevention is significantly aided by kalanchoe pinnata. We have chosen herbal medications since they have historically been thought to be safer than other medications because they don't have any adverse effects that are equivalent to those of allopathic medications. According to a previous study report, during the screening of therapeutic plants, the presence of vital phytochemical components was noted. The blend of herbal medications has been moved into syrup to make sure it is ready for usage. The commercially available cystone syrup is employed in the comparative analysis. Additional research has been done on the organoleptic qualities of herbal syrup. It was discovered that herbal medicines had a smooth texture, a uniform blend, no grit, and a greenish hue.

KEYWORD

Kidney stones, herbal medicinal syrup, and antiurolithiatic action

INTRODUCTION

The development of hard mineral deposits in the kidneys is a hallmark of kidney stones, also known as renal calculi, one of the most prevalent illnesses of the urinary system. Side effects or a return of stone formation are common with traditional therapies including surgery and lithotripsy. For the treatment and prevention of kidney stones, herbal medicine provides a safer and more efficient option.Multiple herbs are combined in polyherbal preparations to enhance efficacy, minimize adverse effects, and provide synergistic medicinal benefits. To help control kidney stones, a polyherbal syrup was created in this study utilizing powdered gokharu (Tribulus terrestris), kalanchoe pinnata, and other excipients.Urolithiasis, the technical term for kidney stones, is one of the most common and excruciating conditions affecting the urinary tract. The precipitation of minerals and salts, primarily calcium oxalate, uric acid, or phosphate, within the kidneys or urinary system results in the formation of these solid crystalline masses. Millions of individuals worldwide suffer with the illness, which can cause extreme discomfort, infection, urine blockage, and, if left untreated, kidney impairment. The pathophysiology of kidney stone development includes crystal nucleation, growth, aggregation, and retention in the urinary system, as well as supersaturation of urine with stone-forming substances. Stone development is caused by a number of factors, including infections, metabolic abnormalities, food choices, and dehydration.Traditional treatment methods, including as lithotripsy, surgical excision, and synthetic medication usage, frequently offer short-term respite and may be linked to adverse effects or stone recurrence. Due to these drawbacks, there is now more interest in herbal and polyherbal formulations, which are thought to be safer, more affordable, and able to stop recurrence by treating the root reasons. For generations, herbal remedies have been utilized to treat kidney stones and urinary problems in traditional systems like Ayurveda, Siddha, and Unani. Multiple plant extracts combined in a polyherbal formulation provide synergistic therapeutic benefits through a variety of mechanisms, including protection of renal tissue, facilitation of stone breakdown, and suppression of crystal nucleation and aggregation. Because they are easier to administer, more palatable, and absorb more quickly than other dose forms, herbal syrups are very beneficial. Thus, the goal of creating and testing a polyherbal syrup to treat kidney stones is to create a safe and efficient herbal therapy that not only helps dissolve and evacuate renal calculi but also keeps them from coming back and enhances renal function in general. Nephrolithiasis, or kidney stones, are becoming more common globally, particularly in women and as people age. A kidney stone is a solid mass that forms in the kidneys as a result of minerals from urine building up . Chronic renal disease is linked to kidney stones . About 80% of kidney stones are calcium-containing stones, which are the most frequent form. These stones usually include calcium oxalate (CaOx), either by itself or in conjunction with calcium phosphate. There are two types of calcium oxalate stones: calcium oxalate dihydrate (COD) and calcium oxalate monohydrate (COM). There is a strong suspicion that a high dietary calcium consumption increases the likelihood of kidney stone formation.

ROLE OF EXCIPIENT

Excipients are essential to the stability, delectability, safety, and remedial efficacity of a polyherbal order gravestone saccharinity. Although they're inactive constituents, they're pivotal for patient adequacy and expression quality.

1. Vehicle/ Detergent Example Glycerin, Sorbitol Solution, or Purified Water serves as the primary medium for the dissolution or dissipation of all active factory excerpts. guarantees that the constituents are distributed unevenly. also, sorbitol or glycerin function as humectants to enhance mouthfeel and retain humidity.

2. enhancing Agents For case, liquid glucose, sorbitol, or sucrose enhances the saccharinity's flavor and delectability. helps cover up the unwelcome taste of herbal excerpts. increases patient compliance and provides density, particularly for senior and pediatric cases.

3. Preservatives- potassium sorbate, sodium benzoate, and methyl paraben. Their function is to stop spoiling and microbial impurity while being stored. increases the saccharinity's shelf life. preserves waterless compositions' microbiological safety.

4.Thickening/ density Agents Example CMC(Carboxymethyl Cellulose), Xanthan Gum, or Tragacanth Role Provides desirable thickness to the saccharinity. stops suspended herbal patches from laying. improves invariant lozenge and mouthfeel.

5. The part of softening and pH- conforming agents, similar as sodium citrate and citric acid, is to maintain the ideal pH for the stability of active substances. keeps the factors of sauces from pouring or deteriorating. hardly improves flavor(citric acid adds a hint of acidity). 6. spicing agents, similar as orange, peppermint, and bomb canvases, ameliorate flavor and scent to increase adequacy. covers up obnoxious herbal smells.

7. Colorings(Optional) exemplifications include caramel and natural fruit colors. offers a product identity and a pleasing appearance. It must be safe and authorized for operation in medicinals.

8. Antioxidants(Optional) For case, the places of citric and ascorbic acids ensures long- term stability by precluding the oxidation of herbal factors. prevents the deterioration of active phytochemicals.

BENEFITS OF HERB-HERB COMBINATION

Due to its synergistic, balanced, and multi-targeted therapeutic activity, a polyherbal formulation—a combination of many herbs—is frequently more successful than a single herb. Combining particular herbs with kidney stone syrup increases its antiurolithiatic, diuretic, anti-inflammatory, antioxidant, and nephroprotective properties. Synergistic Effect (Increased Effectiveness) The phytoconstituents of two or more plants combine to create a more potent therapeutic effect than any one herb alone. For instance: Together, Varuna (Crataeva nurvala) and Pashanbheda (Bergenia ligulata) can break down and eliminate stones. Tribulus terrestris, or gokshura, amplifies other plants' diuretic and anti-inflammatory properties.Action with Multiple

Targets Inflammation, oxidative stress, crystal aggregation, and urinary infections all contribute to kidney stone formation. A combination of herbs covers several pathways, whereas a single herb may only target one. For instance: Punarnava (anti-inflammatory and diuretic) Amla (antioxidant) Varuna (antiurolithiatic) Together, they preserve renal cells, cleanse the kidneys, and remove stones. Balanced and Safer Formulation By blending multiple herbs, individual doses can be reduced, thereby minimizing the potential for toxicity.Herbs that offer calming or cooling properties (such as Amla and Tulsi) counterbalance those with potent diuretic effects (like Punarnava and Gokshura), helping to preserve kidney equilibrium. Mitigation of Side Effects The minor drawback of one herb can be offset by the safeguarding qualities of another. For instance, if a diuretic herb triggers excessive urination, an inclusion of a soothing herb in the blend can alleviate irritation or discomfort. Enhanced Bioavailability and Absorption Specific compounds in certain herbs improve the uptake and processing of active ingredients from others. For instance, piperine derived from Piper longum boosts the bioavailability of key phytochemicals present in companion herbs. Broad-Spectrum Symptom Management Targets a range of symptoms linked to urolithiasis, including: Painful or burning urination Discomfort in the abdomen or flank Urinary tract infections Presence of blood in urine (hematuria)Tendency for stones to reform Recurrence Prevention Certain herbs work to dissolve current stones, while others modify urine chemistry to block the development of new ones.Examples:Varuna → fragments existing stones Kulattha (Dolichos biflorus) → suppresses crystal formation Gokshura → supports overall kidney health Better Taste and Shelf Life Herbs with agreeable flavors (such as Amla and Tulsi) help conceal the bitterness of less palatable components, encouraging consistent use.

Antioxidant-rich herbs further protect the blend by slowing the breakdown of active plant compounds.

PLANT PROFILE

Kalanchoe pinnata

Synonym – Bryophyllum calycinum, Bryophyllum pinnatum

B.S. –It is Obtained from the fresh or dried leaves of Kalanchoe pinnata Bryophyllum pinnatum

Family – Crassulaceae

Uses – Kidney stone, Jaundice, Wound healing, Pain relief

C.C. – Quercetin, Gallic acid, Palmitic acid

Physical Properties- Color – Dark green

Stem – Tall, cylindrical, hollow, thick

Shape – Broadly thick

Size – 10–20 cm long & 5–12 cm wide

Texture – Smooth

Odor – Slight

Taste – Slightly sour & astringent

2.Gokharu

Synonym – Caltrop fruit

B.S. – The smaller or Chota Gokharu is the dried ripe seeds of Tribulus terrestris Linn.

Family – Zygophyllaceae

C.C. – Steroidal saponin,Terrestrosin A, B, C, D & E

Tribulosin, Trillin, Gracillin, Chlorogenin

Uses – Anti-inflammatory, Anti-arthritic ,Diuretic ,Painful micturition

Stimulating effect on reproductive organs

Physical properties-

Color – Yellowish brown or dark brown

Shape – ovoid or oblong

Size – about 2 cm long, 1–2 mm wide

Surface – smooth, hard

Odor – odourless

Taste – slightly bitter & mucilaginous

3.Honey –

Synonym – Madhu, Madh, Purified Honey

B.S. – It is a viscid & sweet secretion stored in the honey comb by various species of bees such as Apis mellifera.

Family – Apidae

C.C. – Glucose (30–47%), Fructose, Gluconic Acid, Sucrose, Dextrose (23–36%), Maltose (10.4–16%).

Uses –Laxative Bactericidal Sedative Antiseptic.

It is used for cold, cough, fever, throat, tongue, constipation, diarrhoea, kidney & other urinary disorders.

Honey works quicker than many antibiotics because it is easily absorbed into the bloodstream.

Physical Properties-

Color – Pale yellow, dark brown

Consistency – Thick, viscous liquid

Odor – Pleasant

Taste – Sweet, Astringent

Texture – Smooth, sticky

THERAPEUTIC APPLICATION

Polyherbal syrups for kidney stones are formulated to prevent, dissolve, and expel renal calculi while alleviating related urinary discomfort. They typically include herbs that provide diuretic, antiurolithiatic, anti-inflammatory, and antioxidant effects.

1. Antiurolithiatic Activity

Prevents the formation and recurrence of kidney stones. Aids in dissolving existing stones and breaking them into smaller fragments for easier expulsion. Example herbs: Punarnava (Boerhaavia diffusa), Pashanbheda (Bergenia ligulata), Varuna (Crataeva nurvala).

2. Diuretic Effect

Promotes increased urine production to flush out small stones, crystals, and toxins.

Minimizes urinary retention and stagnation.

Example herbs: Gokshura (Tribulus terrestris), Kulattha (Dolichos biflorus).

3. Anti-inflammatory and Analgesic Action

Alleviates inflammation and pain resulting from stone passage through the urinary tract. Eases burning sensation, dysuria (painful urination), and flank pain.

Example herbs: Varuna bark, Punarnava.

4. Antioxidant and Nephroprotective Effect

Shields kidney tissues from oxidative damage and cellular injury. Supports healthy kidney function and promotes nephron cell regeneration.

Example herbs: Amla (Emblica officinalis), Tulsi (Ocimum sanctum).

5. pH Balancing and Crystallization Inhibition Helps maintain optimal urinary pH and prevents crystal aggregation in the urinary tract.

Reduces the precipitation of calcium oxalate and uric acid crystals.

6. Relief from Associated Symptoms

Diminishes urinary frequency, urgency, hematuria (blood in urine), and burning during urination.

Offers a cooling and soothing action on the urinary mucosa.

7. Supportive in Other Urinary Disorders

Beneficial for urinary tract infections (UTI), prostatitis, and cystitis owing to its antimicrobial and anti-inflammatory effects.

CONCLUSION AND RESULT

The developed herbal syrup demonstrates promising antiurolithiatic activity and may serve as a faster-acting alternative to existing commercial products for kidney stone management. It exhibits strong antiurolithiatic efficacy and represents the first pharmacologically active, fully herbal-based syrup of its kind. This medicated herbal syrup is both safe and effective, offering antiurolithiatic benefits with immediate market-ready potential.Phytochemical screening of the herbal product confirms the presence of key chemical constituents consistent with established standards.The formulation maintains a pH range of 6–7, which is acceptable and free from adverse effects.

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