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Articulation and Analysis of Poly Herbal Churna

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Abstract
According to the Ayurvedic medical system, churna is a powdered medicament or combination of drugs. The drugs listed in Patha are carefully washed, dried, ground, and sieved. The churna can be freely poured and, when kept in an airtight container, retains its efficacy for a full year. Most Indians experience kidney-related issues as their main problem. Urolithiasis is the kidney condition that occurs most frequently (formation of a stone in kidneys or urinary tracts). In India, the illness of kidney stones is treated with a wide variety of medicinal plants. The antiurolithic activity of medicinal plants has been demonstrated in numerous pharmacological studies using either *in vitro* or *in vivo* models. We therefore created a poly herbal churna with three herbal ingredients for this reason.

Keywords: Urolithiasis, Banana stem, colocasia leaves, radish leaves, antiurolithic activity

Introduction

The kidney is the main issue that the majority of the populace in India is dealing with. The primary excretory organ in humans is the kidney. Urolithiasis, which is recognized as the development of a stone mostly in kidneys or renal tubular tracts for a variety of reasons, is the disease most frequently linked to it. More than 10 lakh people in India have kidney stone illness, and at least 1/1000 of Indians need hospitalisation due to kidney stone disease. Recently, 10-12% of people in industrialised countries between the ages of 20 and 40 have urinary stone formation. There is currently no effective medication that is used in clinical therapy, despite significant advancements in the pathogenesis and treatment of urolithiasis. Costly procedures like extracorporeal shock wave lithotripsy and endoscopic stone removal are frequently followed by recurrence. Therefore, a medication that could stop this illness from occurring or from returning would be highly desirable. Various old traditional medical systems have made extensive use of medicinal herbs [1].

Practitioners of the Ayurvedic school of medicine frequently treat urinary stone illness with a variety of Indian medicinal plants [2]. There have also been several reports of plants all around the world that can prevent kidney stones [3, 4]. Since the previous two decades, urolithiasis, or the production of urinary stones, has had a significant negative influence on public health and the worldwide economy. It is also ranked as the third most prevalent urinary tract issue, with lifetime risks ranging from 2% to 5% in Asia, 8% to 15% in North and South America, and 20% in the Middle East. [5]In the Ayurvedic medical system, churna is referred to as a fine powder of medicines or drugs. The drugs listed in Patha are well cleaned, completely dried, ground, and sieved. If kept in an airtight container, the churna is freely flowing and keeps its efficacy for a year. Examples are Triphala Churna, Trikatu Churna, Drakeshadi Churna, and Sudharsana Churna. Churna formulations are comparable to powder formulations used in the allopathic medical system. In order to make dosage adjustments simple, churna is now packaged as tablets. [6]Due to the fact that plant-based medications, health products, pharmaceuticals, dietary additives, cosmetics, etc. are thought to be non-toxic, have few adverse effects, and are widely available at low cost, there is a high demand for primary health care. Churna is the kind of herbal concoction that is utilised the most regularly. A preparation known as churna is made of single or combined, finely ground medicinal plant powders [7, 8].

Materials and Methods

1. Raw Materials

Dried leaves of Taro (*Colocasia esculenta)*, raddish (*Raphanus sativus*) and dried banana stem (*Musa paradisiaca*).

2. Description Profile

a) Musa Paradisiaca L. (Banana) Stem

Fig 1: Banana stem

Biological Source: Stem of Musa paradisiaca L.
Family: *Musaceae*
Kingdom: Plantae

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Description: The hanging clusters of banana fruit are referred to as banana stems or bunches. Before cooking, it is largely chopped and steeped in buttermilk. Sizes vary, but in most marketplaces, it is typically around 10 inches. It comes in a variety of colours, including off white, pale pink, and purple [9].

Active Constituents [10]

Table 1: Phytochemical constituents of Musa paradisiaca

Alkaloids	3-{(2-aminoethoxy)(hydroxy) phosphoryl]oxy}-2-hydroxypropyl palmitate, Dopaminehydrochloride,Choline,3-hydroxypropyl palmitate glc-glucosamine, bis(N,N-diethylethanaminium)-2-acetamido-1,5-anhydro-2-deoxy-1-[hydroxy(phosphonato)methyl]-D-glucitol,2-hydroxy5,8,11,14,17-icosapentaenoyloxy]propyl-2 (trimethylammonio) ethyl phosphate, N-benzylmethylene isomethylamine,Tryptamine, and 3-{[(2-aminoethoxy)(hydroxy)phosphoryl]oxy}-2-hydroxypropyl-9,12octadecenoate
Amino acid and its derivatives	L-(-)-Tyrosine,L-(+)-Lysine,Valine,tryptophan,trans-4-Hydroxy-L-proline,Proline,Phenylalanine,L-2-chlorophenylalanine,L-Glutamic acid, Glutamic acid
Flavonoids	L-Epicatechin, Quercetin-O-rutinoside-O-rhamnoside, (-)-Epiafzelechin, isorhamnetin-O-rutinoside, Luteolin-7-O-rutin, Eriodictyol C-hexoside, Di-O-methylquercetin, Kaempferol 3-O-rutinoside (Nicotiflorin), Quercetin 3-O-rhanosylgalactoside, and 6-Hydroxykaempferol7-O-glucoside
Lignans and coumarins	Pinoresinol-Hex, Pinoresinol-aceGlu Syringaresinol-Hex, Syringaresinol-aceGlu, 6-MethylCoumarin, Coumarin, Esculetin (6,7-dihydroxycoumarin), Bergapten, Scopolin, Esculin hydrate, 3,4-Dihydrocoumarin, 1-hydroxyterpinin monoglucoside, Terpineol monoglucoside, and Ayapin.
Lipid	Elaidic acid, γ-Linolenic acid, 11 octadecanoic (Vaccenic) acid, Myristic acid, and LysoPC (2n isomer),Palmitoleic acid, Punicic acid, α-Linolenic acid, and Lauric acid.
Nucleotide and its derivates	Uridine 5'diphospho-D-glucose, Guanosine, Adenine, Adenosine 5'-monophosphate, 5'-Deoxy-5'-(methylthio) adenosine, Nicotinic acid adenine dinucleotide, Xanthosine, 1-Methyladenine, 2'-Deoxyadenosine-5'monophosphate, and Adenosine.
Organic acids	L (-)-Malic acid, Succinic acid, Kinic acid, Citric acid, Azelaic acid, Sodium valproate, 2,3Dihydroxybenzoic acid, Shikimic acid, Kynurenic acid, and L-Homoserine.
Phenolic acids	Cimidahurinine, Vanillin, 4Hydroxybenzaldehyde, Cis-Coutaric acid, Terephthalic acid, Sinapinaldehyde, trans-4-Hydroxycinnamic acid methyl ester, Protocatechuic acid-4, glucoside, Coniferin, and Phthalic anhydride.
Tannins and terpene	Procyanidin B3, Procyanidin B2, Procyanidin B4, Epicatechin-epiafzelechin, Catechin-catechin-catechin, Procyanidin C1, Procyanidin C2, Arecatannin C1, Procyanidin B1, and Procyanidin A2, 24,30-dihydroxy-12(13)-enolupinol, 2-Hydroxyoleanolic acid, Oleanolic acid-3-O-beta-D, pyran xylose (1→3)-beta-D-pyran glucuronide, Asiatic acid, and Maslinic acid.

Health Benefits of Banana Stem

1. First-line therapy for kidney stones
2. Anemia treatment
3. Care for Diabetics
4. Urinary tract infection treatment
5. Slimming down
6. Constipation treatment
7. Hyperacidity treatment
8. Controls Blood Pressure
9. Facilitates Detoxification
10. Lowers cholesterol
11. Burns belly fat
12. Aids in food digestion
13. Encourages bone growth
14. Decreases morning sickness and nausea

b) *Colocasia Esculenta L.* (Taro) Leaves

Fig 2: Taro Leaves

Biological Source: Leaves of *Colocasia esculenta (L.)*
Family: Araceae
Kingdom: Plantae

Description: The taro plant is herbaceous, tuberous, and has a sturdy, short caudex. It also blooms in clusters and has leaves. The leaves in the cluster are typically fashioned like hearts or long arrows that point earthward [11]. Elephant heads are broad, elongated leaves that are between one and two metres tall. The leaves are acquitted at the end of standing, broad, luscious, 78-inch-tall leafstalks in crowns, and may be 30-90 centimetres long and 23 inches thick [12, 13].

Active Constituents [14]

Table 2: Phytochemical Constituents of *Colocasia esculenta*

Vitamins	Vitamin A, vitamin B,Vitamin C
Minerals	Iron, calcium, potassium phosphorus, magnesium
Flavonoids	Vicenin-2, iso-vitexin, iso-vitexin 30-O-glucoside, vitexin X0-O-glucoside, iso-orientin, orientin-7-O-glucoside, luteolin 7-O-glucoside
Polyphenols	Catechins, cinnamic acid
Polysaccharides	starch
Phenolic acid	caffeic acid,5-0-caffeoylquinic acid,p-coumaric acid,apigenin-8-C-glucoside,apigenin-6-O-glucoside ,luteolin-8-C-glucoside,luteolin-6-C-glucoside ,apigenin-6-C-glucoside-7-0 glucoside,luteolin-3',7-di-O-glucosidechrysoeriol

Health Benefts of *Colocasia* Leaf

1. Urolithiasis treatment
2. Antibacterial properties
3. Diabetes prevention
4. Lower cholesterol levels
5. Lower inflammatory response
6. Aid with digestion
7. Avoid cancer.
8. Avoid anaemia
9. Arthritis, asthma,
10. Diarrhea,
11. Internal bleeding,
12. Skin and neurological conditions

Raphanus Sativus L (Radish) Leaves

Fig 3: Leaves of *Raphanus sativus. L.*

Biological Source: Leaves of *Raphanus sativus. L.*
Family: *Cruciferae* or *Brassicaceae*.
Kingdom: Plantae

Description

Raphanus sativus's leaves. L are simple and linear, the higher leaves are shorter, petiolate, the uppermost simple, sublinear, and they are all roughly pilose and bright green in colour. The basal leaves are long, pinnate, coarsely serrated, and lyrate [15]

Active Constituents [16, 17].

Table 3: Phytochemical constituents of *Raphanus sativus*

Alkaloids	Phenethylamine, Pyrrolidine, 1-(2-pyrrolidinethiol-3-yl)1,2,3,4-tetrahydro-ß-carboline-3-carboxilic acid.
Enzymes	Anionic peroxidase; A1, A2, A3, A4, Arabino galactan protein, catalase, glulathione deravatives,ß-fructosidase(ßF), Superoxide dimutase.
Organic Acids	Caffeic acid, p-coumaric acid, Erucic acid, Erythrobic acid, Ferulic acid, Gentisic acid, Hydrocinnamic acid, p-hydroxy benzoic acid, Salicylic acid, Vanillic acid, Linoleic acid, Linolenic acid, Malic acid, Melanoic acid, Oxalic and Palmitic acid.
Phenolic Compounds	Cyanidins, Isorhamnetin-7-0-rhamnoside, Kaempferol.Gallic acid, Procatechuic acid, p-hydroxy benzoic acid, Chlorogeic acid, Sinapic acid, 2-methoxy-4methylphenol.
Polysaccharide	Pectic substance, Rhamnose, Glucose, Xylose.
Proteins	Arabinogalactan Proteins(AGPs), L-arabino-D-galactan, Sglycoproteins, Arabino-3-6-galactan, Polypeptides RCA1, RCA2, RCA3, Ferredoxin isoprotein,

Health Benefits of Radish Leaf

1. Anticancer
2. Radish leaves can ward against diabetes.
3. Management of piles.
4. Jaundice treatment.
5. Control of Respiratory Disorders
6. Treatment of urological ailments.
7. Radish leaves have a built-in diuretic.
8. Antiscorbutic.
9. Boost resistance while reducing fatigue.
10. Makes the digestive process easier
11. Fungicide and antibacterial.
12. Anti-inflammatory.

3. Combination of Herbal Ingredients

A citric acid solution was used to soak the radish, colacasia leaf, and banana stem in small pieces before drying them in a hot air oven at 500C. Using the grinder, the components of the polyherbal churna were all size-reduced. Powdered banana stem, radish leaf, and colacasia leaf were obtained and individually placed through filter number 60.

4. Preparation of Churna

Indian Ayurvedic Formulary guidelines were followed when creating the churna. Prior to being placed into an airtight container, the three ingredients are blended in an equal amount.

5. Pharmacognostical evaluation of powdered crude drug

a. Macroscopical Evaluation: For samples in the form of Churna, a macroscopic investigation was conducted using colour, smell, and taste.

b. Solubility: In several solvents such water, ethanol, and chloroform, the produced polyherbal churna's solubility was assessed.

c. Determination of Powder Flow Property[18]: The metrics listed below were used to determine the physical characteristics of sample and standard formulations:

i) Bulk and Tap Density

According to USP, the densities of both the bulk and the tapped samples were calculated. In a 25 ml measuring cylinder, a quantity of 10 gm of a powder mixture was added. The starting volume was then recorded, and the cylinder was then permitted to drop from a height of 2.5 cm to a hard surface at intervals of two seconds. As soon as there was no longer any volume adjustment, tapping stopped. Using the following formulae, BD and TD were determined.

BD = Weight of the powder blend/Untapped Volume of the packing

TD = Weight of the powder blend/Tapped Volume of the packing

ii) Carr's Index (Compressibility Index)

Carr's compressibility index was used to obtain the Compressibility Index of the powder mixture. The Carr's Index calculation is as follows:

Carr's Index (%) = [(TD-BD) ×100]/BD

iii) Housner's Ratio

The formula for Housner's ratio is as below:

Housner's ratio = Tape density/Bulk density.

iv) Angle of Repose

The angle of repose of powder blend was determined by the funnel method. The accurately weight powder blend were taken in the funnel. The height of the funnel was adjusted in such a way the tip of the funnel just touched the apex of the powder blend. The powder blend was allowed to flow through the funnel freely on to the surface. The diameter of the powder cone was measured and angle of repose was calculated using the following equation.

Tan q = h/r, Where, h and r are the height and radius of the powder cone.

6. Physico-Chemical Parameters

i) Determination of Ash Values

About 2g of the prepared churna was accurately weighed in a tared silica crucible. The powdered drug should be spread as a fine layer at the bottom of the crucible. The crucible to be incinerated at a temperature not exceeding 450°C until free from carbon. Allow the crucible to cool and weighed. The procedure to be repeated till constant weight is observed.

Determination of Total Ash

Determination of Acid Insoluble Ash: Boil 25 ml of hydrochloric acid for 5 minutes with the ash obtained as instructed in the determination of total ash. Filtering should be used to remove the insoluble ash, which should then be rinsed with hot water. The insoluble ash is put into a tared silica crucible, lit, allowed to cool, and then weighed. Until a steady weight was noticed, the technique had to be repeated.

Determination Water-Soluble Ash: The crucible containing the entire ash should now contain 25 cc of water, which should be added after 5 minutes of boiling. Gather the insoluble material on ashless filter paper or in a glass crucible that has undergone sintered processing. In a crucible, fire for 15 minutes at a temperature no greater than 450°C after a complete hot water wash. This residue's mg weight is calculated by deducting the total ash's weight.

ii) Extractive Values

i) Determination of Alcohol-Soluble Extractive

During the first six hours of the 24-hour maceration, 100 ml of alcohol (90%) was added to 5 g of shade-dried coarse leaf powder, and the flasks were closed. The mixture was shaken often after that, and the flasks were left to stand for the remaining 18 hours. Fast filtration with safety measures to prevent alcohol loss. In a shallow dish with a flat bottom and tarred surface, evaporation was used to dry 25 ml of the filtrate weighed after being dried at 105°C with reference to the shade-dried medication, calculated the proportion of alcohol-soluble extract.

ii) Determination of water soluble extractive

By substituting chloroform water for alcohol in the technique for determining the alcohol-soluble extractive, the same results were obtained. Calculations and records of drug extraction values were made.

iii) Loss on Drying

Mass loss as a percentage of weight upon death is known as loss on dying. Two grammes of powdered medication were placed in tarred petridishes, dried in an oven at 100°C or 105°C, chilled in a desiccator, and weighed. Moisture was then noted as the cause of the loss. At least two common readings were conducted in this manner.

Result and Discussion

1. Macroscopical Examination

Market Churna is dark yellow in colour and has a pungent odour and unpleasant flavour, whereas manufactured Churna is green. The 44th sieve allows all to pass.

2. Powder Flow Properties

For both laboratory and market samples, tests were done to check the samples' flow characteristics, including bulk density, tape density, Carr's index, angle of repose, and Housner's ratio. Indicated as a result is

(a) Formulated churna **(b)** Standard churna

Fig 4: (a) Formulated churna and **(b)** Standard churna

Table 4: Ingredients of Poly Herbal Churna

S. No.	Botanical Name	Common Name	Family	Part Used
1	***Colocasia esculenta***	Taro	Araceae	leaf
2	***Rahanus sativus***	Radish	Brassicaceae	leaf
3	***Musa paradisiaca***	Banana	Musaceae	stem

Table 5: Morphological parameters of various formulations of polyherbal churna

S.No.	Formulations	Appearance	Color	Taste	Odor
1.	Formulated churna	Powder	Dark green	Bitter	Pungent
2.	Standard Churna	Powder	Dark yellow	Pungent	Pungent

Table 6: Solubility

Solvent	Water	Ethanol	Chloroform
Standard churna	Soluble	Soluble	Soluble
Formulated churna	Soluble	Soluble	Soluble

Table 7: Flow properties of samples of polyherbal churna

S. No.	Parameters	Standard churna	Formulated churna
1	True density gm/cm^3	16.25	15.45
2	Bulk density gm/cm^3	0.425	0.235
3	Porosity %	20%	4.9%
4	Angle of Repose	42.87◦	45.57◦
5	Tapped density gm/cm^3	0.546	0.303
6	Hausner’s ratio	2.926	1.289
7	Carr’s Index	25.6%	22.4%

Table 8: Physical and chemical evaluation of samples of polyherbal churna

S. No.	Parameters	Standard churna	Formulated churna
1	Total ash value (%w/w)	4.56	5.3
2	Acid insoluble ash value (%w/w)	1.5	3.5
3	Water soluble ash value (%w/w)	1.87	2.1
4	Alcohol soluble extractive value (%w/w)	15.84	2.52
5	Water soluble extractive value (%w/w)	13.12	5.44
6	Loss on drying (%w/w)	0.4	0.6

Conclusion

The current project, which was to articulate and analyse a polyherbal churna, was effectively finished, and the outcomes were deemed to be satisfactory. The formulation method involved the use of three different herbal medications that had been researched and evaluated and were found to be safe. Additional clinical investigations could move the needle and reveal more benefits of poly herbal churna.

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