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Research Article

PHARMACOGNOSY AND PHYTOCHEMICAL PROFILE OF GIRI KADALI [*Ensete superbum* (Roxb.) Cheesman]

Reju Krishnan[1*], Pradeep HR[2], Harivenkatesh KR[3]

1. *Associate Professor, Dept. of Dravyaguna, J.S Ayurveda Mahavidyalaya, Nadiad,Gujarat, India.*
2. *Professor, Dept. of Dravyaguna, A.L.N. Rao Memorial Ayurveda Medical college, Koppa, Karnataka, India.*
3. *Manager, R&D-Healthcare, Sriveda Sattva pvt. Ltd., Kanakapura road, Bangalore, India.*

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Abstract

It is quite interesting and very important to study about the folklore drugs for a student of Dravyaguna. A system of knowledge is accepted every where only when it is modified and improved as per time. The same idea is highlighted by Ayurveda acharyas as "Yuganu roopatha" and this proves the importance of studying folklore drugs. *Ensete superbum* (Roxb.) Cheesm. is such a drug which was in dark till recent times in India, but shows a wide range of utility when folk treatment is referred. The process of absorbing newer piece of information into the system has taken a different shape after 17th century and it is based on research parameter. Based on the concept of Anukta Dravyas, evaluating and scientific updating of new drugs used in ethno medicine would help to increase the bulk of Ayurvedic Pharmacopoeia and also serves in documenting and proving the folklore claims which is a part of Ethno-medical study. Pharmacognostical and Preliminary Phytochemical analysis of seeds of *Ensete superbum* (Roxb.) Cheesm The seed powder exposes various structures under compound microscope like cells filled with Aluron grains, starch grain and Albumin and oil globules in abundant. A good quantity of flavanoids, Reducing sugar and proteins seen in qualitative tests.

Key words: Anukta Dravya; Phytochemical; Pharmacognosy; Ethno medicine.

***Address for correspondence:**
Dr. Reju Krishnan, M.D. (Ayu)
Associate Professor,
Dept. of Dravyaguna,
J.S Ayurveda Mahavidyalaya,
Nadiad,Gujarat, India – 387 001
E-mail: rejukrishnanr50@gmail.com

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INTRODUCTION

Folk medicines also known as Traditional medicines or indigenous medicines where the medical knowledge developed over generation with in various society before the era of modern medicines. In India people follow a vast knowledge of Folk medicines and practicing in primary health care needs. It is purely based on the experience, belief, etc and documentation may not be there. Inappropriate use of folk medicine can bring dangerous effects. So further study or research is required to check the safety and efficacy of medicinal plants used by the traditional system of medicines. There are many such drugs in dark and some serious measures are needed to bring its efficacy and safety to the world.

Ensete superbum (Roxb.) Cheesm. is such a drug which was used by folk practitioners of South India for many health alignments like kidney stone, diabetes etc.[1][2] Is commonly known as "Kalluvazha" in local language , much resemblance with kadali (banana plant) , and the name may be due to its habit (seen in rocky barren area) or action to cure kidney stone.[3][4] There is no direct mentioning of this drug in Ayurveda samhitas and nighantus.

Cliff banana - *Ensete superbum* (Roxb.) Cheesm., have been selected with the aim of evaluating the Pharmacognostical and Preliminary Phytochemical analysis of seeds and also to trace the information available in Ayurveda books.

MATERIAL AND METHODS

The whole work was undertaken in 2 main parts as:

- Taxonomical study
- Pharmacognostical study
- Collection and preparation of drugs
- Source of the drug: 500 g of botanically identified fresh seeds *of Ensete superbum* (Roxb.) Cheesm. were collected from J.N.T.B.G.R.I, Palode, Thiruvananthapuram.
- Preperation of the drugs: Blackish brown Ensete seeds were powdered using khalva yanthra and the seed coat was removed by sieving through fine mesh and well preserved in air tight container.

Taxonomical study

The selected drugs were identified with help of various Floras viz., Flora of British India, Flora of Upper Gangetic Plain, Flora of Madras Presidency etc. by observing the habit, morphological characters and structures of floral components, fruit components and seeds. The flower was dissected to observe the necessary floral characters to differentiate the genus and species once reaching up to family with help of mentioned Floras. For all the purposes dissecting microscope was preferred to, along with some help of compound microscope. To get the availabilities of same race of drugs, selected plants were germinated and the parts used were collected for purpose of other segments of study.

Interpretation of *Ensete superbum* (Roxb.) Cheesm. as Giri kadali

Among all the Nighantus only Raja Nighantu and Dhanwanthari Nighantu mentions about Kadali vishesa.

Giri kadali according to Raja Nighantu[5]

Girikadali - grows more in hilly region.
Parvatamocha - mocha is synonym for kadali as it sheds off the leaf sheaths. Thus parvatha mocha is the type of kadali seen more on hills.
Aranyakadali - Seen wild.
Bahubeeja - Has many seeds.
Gajavallabha - Pseudo stem or Peduncle appears similar to elephant trunk.

Properties are said to be madhura (sweet taste), sheeta (cold potency), poshaka

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(nourishing), balya (promote strength), ruchya (promote taste), guru (heavy), durjara (hard to digest), trishna (alleviates thirst), pitta, daha (burning sensation), shosha (swelling) etc.

Kashta kadali according to Raja Nighantu

Kastakadali- strong stem.
Shilarambha - grows in rocky areas.
Darukadali - Pseudo stem as strong as a tree.
Phaladaya - Posses many fruits.

Kashta kadali according to Danwanthari Nighantu[6]

Sweta - Pulp or pseudostem white.
Swadukadali - Svadu indicates sweetness of fruit pulp.
Vishagni - It has a additional property to act against visha.
Kashtakadali - strong stem.
Pashanakadali - process stony hard seeds.
Aranyakadali - Seen wild.

The word meaning of Girikadali given in vachaspatyam is "Badabijayam vanarambhayam" which means the one which has bigger or larger seeds and is a wild variety (not cultivated).[7]

When the synonyms of Giri kadali (Raja nighantu) & Kashtakadali (Danwantari nighantu) are compared, we can conclude that they are synonymous, as *Ensete superbum* (Roxb.) Cheesm. is the only grown wild species in the Plantain groups which is not commonly cultivated, and the synonyms mentioned go very well with that of *Ensete superbum* (Roxb.) Cheesm. Considering these, entire *Ensete superbum* (Roxb.) Cheesm. can be considered as *Giri kadali* or kashta kadali.

Morphology[8][9]

Habitat

Genus Ensete, a native of tropical region of Africa and Asia comprises nine species out of this Ensete superbum *(Roxb.) Cheesm.* is found in India, commonly known as Cliff banana. Although reported endemic to the Western Ghats, however it is also sporadically reported from Assam, Ogna forest range, Rajasthan and Dindigul District, Tamil nadu.

Family characters of Musaceae

Habit

Plants are mostly perennial herbs, perennating by underground rhizomes, root-stocks or stoloniferous stem; aerial pseudostems composed of convolute leaf sheaths. Root adventitious. Leaves simple, spirally arranged; leaf sheaths rolled up and over lapping; lamina large, oblong with a thick midrib and pinnately parallel veins.

Inflorescence

A terminal peduncled spike with flowers in groups, each suspended by a large coloured spathaceous bract, lower clusters females and upper males. Perianth: 6 in 2 whorls of 3 each free or united; very often outer 3 and inner 2 lateral tepals united in to a tube, split down on one side, inner position one free, embracing the base of stamens or style. Stamens in male flowers: 6 in 2 whorls of 3 each, 5 Stamens fertile, 6^{th} (i.e. Inner posterior) absent or rudimentary; anthers 2-celled. Ovary in female flower: inferior tricarpellary, 3- celled; ovules many, axile; Style filiform; Stigma subglobose, 3-6 lobed. Fruit a berry or capsule.

Characters of the genus – *Ensete* Horan

Monocarpic erects herbs, dying after flowering. Pseudostem swollen at base, gradually narrowed at apex. Leaves alternate, petioled; lamina oblong-lanceolate, acute or acuminate or retuse; sheaths convolute, persisting to form basally dilated pseudo bulb; venation striate. Inflorescence terminal long peduncled spike with clusters of male and female flowers covered by large deciduous

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bracts, Perianth 6, outer 3 and inner 2 unite to form a split tube, with 5 lobes, one inner tepals free. Stamens usually 5. Ovary inferior, 3-locular; ovules many axile; style slender; stigma 6-lobed. Berry elongate; seeds many, sub angular.

Characters of the species - *Ensete superbum*

Erect massive herbs; pseudostem to 4cm tall, swollen at base. Leaves oblong, apex acute, base narrowed; petiole short, stout. Inflorescence: terminal spike with interrupted flower clusters; each cluster with 20-30 flowers in 2 rows covered with brownish, deciduous bract. Perianth 6; outer 3 tubular, spathaceously split on one side; inner 2 absent or connate with the outer, 3rd inner tepal free. Stamens 5. Ovary 3-celled; placentae axile; style slender; stigma 6-lobed, Berry oblong trigonous; seeds angular, brown.

Note: The plant is very hard and prefers rocky barren areas. It is non stoloneferous and doesn't produce suckers.

Pharmacognostical study

Any plant which is used medicinally requires detail study prior to its use since the therapeutic efficacy is absolutely depends on the quality of the plant drug used. The detailed pharmacognostical study helps us to differentiate between closely related species of the same genus or related genera of the same family. It is also the first step in the standardization of any crude plant drug which is need of the day.

Apart from this, by the help of pharmacognostical study one can suggest substitutes to the rare species, thus conserving the plant from being extinct.

Hence, before using a drug it is very much essential to carry out its detailed pharmacognostic study as it is not only helpful in correct identification of the plant but also will get a hint for its Phytochemical, Pharmacological and Medicinal properties. Following analysis was performed:

a) Organoleptic character analysis
b) Microscopical study (component drug)
c) Phytochemical analysis.

- Physico-chemical analysis
- Qualitative tests
- Chromatographic study – TLC

A) Organoleptic character analysis

The organoleptic character of the plant drugs is very important to give a general idea regarding the genuinity of the sample. It can be read along the Panchendriya pareeksha of Ayurvedic classics. The characters like colour, odour, taste and consistency were noted.

B) Microscopical studies

Freehand sectioning technique was adopted for the microscopical study of selected drugs. The used part that is seed is taken longitudinal section and transverse section and cells are exposed for proving genuinity of the sample. The sections were mounted with glycerin after staining with iodine, saffaranine green and Phloroglucinol and Hydrochloric acid separately to find out the nature of cell-walls, cell-inclusions etc. Chloral hydrate was used as clearing agent.

Phytochemical analysis of Churna

Physico-Chemical Analysis[10]

Loss on drying (Gravimetric method)

About 2-5 g of prepared air dried material was placed, or the quantity specified in the test procedure for the plant material concerned, accurately weighed in a previously dried and tarred flat weighing bottle. The sample was dried by one of the following techniques.

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In an oven at 100-105° C.

In a desiccator over phosphorous pentoxide R under atmospheric pressure or reduced pressure and at room temperature.

It was dried until two consecutive weighing do not differ by more than 5 mg., unless otherwise specified in the test procedure. The loss of weight in mg/gm. of air dried material was calculated.

Determination of ash values

The determination is useful for detecting low grade products, exhausted drugs and excess of sandy and earthy matter.

Total ash

4 g of air dried weighed material was taken in a previously ignited tarred crucible. It was spread to expose the maximum surface area. Then it was brought to oven and was incinerated at 500°C till the constant weight was achieved. Now, it was brought to desiccators to absorb any moisture and weighed again. The percentage of ash was calculated with reference to the weight taken for the drug.

Acid-insoluble ash

To the crucible containing the total ash, 25ml of hydrochloric acid was added and was covered with a watch glass. Now, it was gently boiled for 5 min. Then the watch glass was rinsed with 5 ml of hot water and the liquid was added to the crucible. The insoluble matter was collected on an ash less filter paper and washed with hot water until the filtrate was neutral. Then to the original crucible the filter paper containing the insoluble matter was transferred, dried on a hot plate and ignite to constant weight. The residue was allowed to cool in a suitable desiccator for 30 min, and then weighed without delay. Then the content of acid-insoluble ash in mg per gm of air dried material was calculated.

Water soluble ash

To the crucible containing the total ash, 25 ml of water was added and boiled for 5 min. the insoluble matter in a sintered glass crucible or on ash less filter paper was collected. It was washed with hot water and ignited in a crucible for 15 min. at a temperature not exceeding 450 ° C. the weight of this residue in mg was subtracted from the weight of total ash and the content of water soluble ash in mg/gm. of air dried material was calculated.

Determination of extractible matter

4 g of coarsely powdered air dried material was placed and accurately weighed, in a glass-Stoppard conical flask. It was macerated with 100 ml of the solvent specified for the plant material concerned for 6 hrs, shaking frequently and then was allowed standing for 18 hrs. Filter was done. Rapidly taking care not to lose any solvent, then 25 ml of the filtrate was transferred to a tarred flat bottomed dish and evaporated to dryness on water bath. It was dried at 105°C for 6 hours, cool in a desiccator for 30 min. and weighed without delay. This content of extractable matter in the percentage (w/w) with reference to air dried material was calculated. In water soluble extractable matter, only water was used as solvent. In alcohol extractable matter, methanol was used as solvent here.

Qualitative tests[11]

1) Test for detection of Carbohydrates

Fehling's test

To the prepared methanol extract of seed powder drop by drop a mixture of equal parts of Fehling's solution was added. A Brick-red precipitate was expected to confirm the presence of reducing sugars.

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2) Test for detection of proteins

Biuret test

To the 2-3 ml of methanol extract of seed powder, equal volume of 10% NaOH was added. Then, 0.5% Copper sulphate was added drop by drop till the purple-violet colour is formed to confirm the presence of protein.

3) Test for detection of alkaloids

Dragendroff's test

To the 2-3 ml of methanol extract of seed powder/flower powder, equal volume of 2N Hcl was added till the solution showed Reddish brown colour.

4) Test for detection of glycosides

Borntrager's test

2-3 ml of methanol extract of seed powder/flower powder was macerated with Ether and aqueous caustic soda was added. The presence of pink or red or violet was to affirm the presence of Anthraquinone derivatives.

5) Test for detection of flavanoids

Shinoda test

2-3 ml of powder was extracted with Methanol and was dissolved in 10% Hcl and Zinc dust was added to get pink colour to affirm the presence of Flavanoid.

Chromatographic study[12]

Thin layer chromatography was done for the prepared methanol extract of seed powder of Giri kadali - *Ensete superbum* (Roxb.) Cheesm. The solvent system for the purpose was selected by hit and trial method. At last the plate was run with solvent system, Toluene: Ethyl acetate in the ratio of 93:7 respectively.

Anisaldehyde sulphuric acid was used as spraying agent. Then the Rf was calculated.

RESULT

1. Physico-chemical Tests
***Ensete superbum* (Roxb.) Cheesm (endosperm)**

Loss on Drying	:	8.50%
Total Ash	:	4.00%
Water soluble ash	:	3.00%
Acid insoluble ash	:	1.00%
Water soluble extractives	:	12.11%
Alcohol soluble extractives	:	2.44%

2. Qualitative Tests
***Ensete superbum* (Roxb.) Cheesm**

Reducing sugar	:	++++
Protein	:	++++
Anthraquinone glycoside	:	+++
Cardiac glycoside	:	+
Tannin	:	++
Alkaloid	:	+
Flavonoid	:	++++
Steroid	:	++++
Triterpenoid	:	++

+: very low quantity; ++: low quantity; +++: moderate quantity; ++++: Good quantity

3. Thin Layer Chromatography

Solvent System: Toluene: Ethyl acetate = 93:07
Spraying Agent: Anisaldehyde Sulphuric acid (Table 1)

DISCUSSION

The ethno botanical uses of *Ensete superbum* is documented from different part of India. In Ayurveda we can consider it as a Kadali vishesha (Variety of plantain).

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Table 1: Rf of *Ensete superbum*

Ensete superbum	Before derivatization	After derivatization
0.05	Pale yellow	Pale fluorescent green
0.11	Pale yellow	Pale fluorescent green
0.19	Pale yellow	Pale fluorescent green
0.41	Pale green	Pale fluorescent green

The identification of Ensete based on Ayurvedic classics is a difficult task, since Ensete is endemic to western ghat, and is separated to a new genus from 'Musa' very recently. But looking into a few classical references we could ascertain the possibility of it being explained by our Acharyas with the following. A nearer explanation can be seen under Giri kadali and kashta kadali of Raja nighantu and Dhanwantari nighantu, based on which an attempt had been made here to equate Giri kadali with *Ensete superbum* after analyzing the synonyms based on Morphology.

CONCLUSION

Though *Ensete* and Musa have been divided into different genera by taxonomists, there are many similarities in both which have made us to take *Ensete superbum* as Giri Kadali, as the synonyms mentioned in the nighantus goes very well with *Ensete superbum*.

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