

PHARMACOGNOSTICAL STANDARDIZATION OF LEAVES OF PARNAYAVANI (*COLEUS AMBOINICUS* LOUR.)

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ABSTRACT:

Background: *Coleus amboinicus* commonly known as Pattaajwain is a perennial herb with hairy, succulent, aromatic leaves smelling like thyme. Its leaves are extensively used in Indian traditional system as well as tribal medicines for the treatment of bronchitis, asthma, diarrhoea, epilepsy, renal calculi & fever etc. **Objectives:** It is necessary to ascertain the authenticity of this drug when it is used for therapeutic purpose. Hence the present study was undertaken for systematic pharmacognostical evaluation of the leaves of *Coleus amboinicus*. **Methods:** The study includes macroscopical, microscopical evaluation along with estimation of its physico-chemical parameters such as ash value, extractive values and preliminary phytochemical screening. **Results:** Preliminary phytochemical screening showed the presence of carbohydrate, alkaloids, protein, glycosides & phenolic compounds. **Conclusion:** The study would be of immense value in botanical identification and authentication of plant drug and may help us in preventing its adulteration.

Key Words: Parnayavani, *Coleusamboinicus*, Pharmacogonosy, Standardization, Physicochemical standards.

INTRODUCTION:

The use of traditional medicine as therapeutic agents is gaining popularity throughout the world during the past decade. Hence quality control standards of various medicinal plants used in indigenous system of medicine are becoming more relevant unlike in the past. Varied geographical conditions, many vernacular names, easy availability of cheap & substandard drugs of the same genus are some of the factors responsible for adulteration encountered in the market. Lack of proper standards of medicinal plants results in the usage of improper drugs which in turn cause damage not only to the individual using it, but also defames the well known ancient system of medicine. Hence scientific methods must be resorted for proper authentication and identification of medicinal plants used in the indigenous system of medicine.

Standardization is a system which starts right from the collection of raw materials to the extreme clinical application. A multidimensional approach should be followed to standardize a drug, covering every minute aspect specifically the name, botanical source, and geographical source, organo-leptic, morphological, anatomical, physical, chemical and biological. Standardization was given importance even in our ancient texts. Charaka in vimanasthana has describe the parameters of standardization like name of the drug, its morphology, family, habitat, collection and preservation methods, collection time, nature, taste, and potency, dose, action on *doshas*, therapeutic

effect on body etc. by which we can design the method of drug evaluation^[1].

Coleus amboinicus Lour. Synonym *C. aromaticus* Benth. Or *Plectranthus amboinicus* Lour. Belongs to Lamiaceae family. It is commonly known as *Parnayavani* in Sanskrit, Pattaajwain in hindi, *Karpurvalli* in South India & country borage in English^[2-3]. This plant is distributed throughout India, and is cultivated in gardens. It is an erect highly aromatic pubescent herb with distinct smelling leaves. Its leaves are traditionally used for the treatment of bronchitis, asthma, diarrhoea, epilepsy, renal & vesicle calculi & fever etc.^[4]. The phytochemical study reveals the presence of various flavinoids like quercetine, apigenin, luteolinetc, carvacrol, triterpinoids, thymol and volatile oil in the leaves.^[5] It has been reported to exhibit antilithotic^[6-7] antiepileptic^[8], anti tumour, antimutagenic^[9] radioprotective,^[10] antioxidant, ^[11] antimicrobial,^[12-13] antibacterial^[14] and antifungal properties. ^[15] There are many reports on the geographical distribution, habitat, morphological characters and therapeutic uses of this

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Received on: 14/10/14, Revised on: 08/12/14, Accepted on: 12/12/14

plant. However, less work has been carried out regarding the pharmacognostic aspects of the leaves of this plant therefore the present work was undertaken.

MATERIAL AND METHODS:

Collection and Identification

The plant has many spreading branches with fleshy pubescent stem and leaves smelling like thyme. Leaves are 5-8 cm long, aromatic, ovate or cordate in shape, and thickly studded with hairs on both surfaces. Fresh leaves of *Coleus amboinicus* Lour. were collected from the medicinal herbal garden of NIA Jaipur where it is cultivated. The Botanical identification was carried out by BSI, Jodhpur letter no.BSI/AZC/A.19014/SE-1/Estt./162 dt.23.6.2010. Leaves were washed in water, dried under shade, moderately coarse powder (40 mesh size) was made & then packed separately in air tight containers. Fresh leaves were then studied for pharmacognostical evaluation, including macroscopical, microscopical characteristics and some preliminary phytochemical evaluation.

Pharmacognostic Study

The Macroscopy and microscopy of the plant was studied according to the methods of Brain and Turner^[16]

Macroscopic study - It comprises of shape, size, surface characteristics, texture, color, consistency, odour, taste, etc.

Microscopic study- Transverse section of leaves were cut and stained including the portion of midrib and lamina. Photographs of different magnifications were taken.

Physicochemical analysis

The leaf powder was extracted with alcohol (95%) and water. The total ash, water-soluble ash, acid-insoluble ash, loss on drying, moisture content, fluorescence, extractive values were determined by employing standard methods of analysis as described in the Indian Pharmacopoeia.^[17] Preliminary phytochemical screening was carried out by using standard procedures described by Kokate et.al.^[18] and Harbone.^[19]

RESULTS AND DISCUSSION:

1. Macroscopical characteristics of *Coleus amboinicus* Lour.

The plant grows to a height of around 50cm. It has many spreading branches with fleshy and pubescent stem and leaves smelling like thyme. Macroscopical study was done by means of organoleptic examination, viz. naked eye vision, smell, taste, touch and gross measurements. The following observations were made.

- **Colour** : Bright Green.
- **Odour** : Refreshing & strong smelling like that of thyme (ajwain).
- **Taste** : Bitter & acrid
- **Texture** : Hairy, tomentose.
- **Size** : Leaves are 5-8 cm long
- **Shape** : Leaves are simple, opposite, long petioled, broadly ovate or cordate, acute apex, dentate margin, fleshy thick and very aromatic. They are thickly studded with hairs, on the lower surface the glandular hairs are most numerous and give rise to a frosted appearance. (Fig. 1)

Stem: Stem is fleshy, tomentose, hispidly villous & is about 30- 90 cm. **Flowers** : Flowers are shortly pedicelled, 3mm long, pale purplish in dense whorls at distant intervals in a long slender raceme. Upper calyx are lip ovate, acute membranous, lower acuminate. Corolla are pale purplish, tube short, throat inflated, lips short. Stamens are shortly exerted. **Fruits:** Fruits are orbicular or ovoid in shape.

2. Microscopical characteristics of *Coleus amboinicus*Lour.

Petiole

Transverse section of petiole of *Coleus amboinicus* Lour. is concave on the upper side and convex on the lower side. Trichomes of both glandular and non-glandular type are present all over the surface. The outer layer epidermis consist of a single layer of laterally elongated cells, followed 3-4 layers of cortical cells which are round & collenchymatous. The rest of the cortical cells are polygonal to round. The vasculature comprises of a ring of eight collateral vascular bundles, of which the two are larger in size. The ground tissue consists of thin walled parenchymatous cells. (Fig. 2)

Midrib

Transverse section of leaf passing through the midrib appears as hemispherical on the ventral side and slightly depressed on dorsal side. Upper epidermis is single layered and consist of compactly arranged rectangular cells. Below this layer there is palisade parenchyma which is also continuous with the midrib. Vascular bundles are solitary, collateral and consist of 4-6 rows of xylem and a thin arc of phloem runs along the midrib. (Fig. 3)

Lower epidermis is similar to upper epidermis and is discontinuous due to the presence of diacytic stomata (Fig. 4)

On the upper and lower epidermal surface numerous glandular and non glandular trichomes are present.

Lamina

Transverse section of leaf shows dorsiventral character. Upper Epidermis consists of single layer of rectangular cells along with a thin layer of cuticle on it. Numerous Trichomes of both glandular and non glandular nature are present on both upper and lower epidermis.

Mesophyll

The Mesophyll is differentiated into 2 parts – palisade parenchyma and spongy parenchyma. The palisade parenchyma lies toward the upper epidermis and consist of single layer of elongated columnar parenchymatous cells. Towards the lower epidermis there lies the spongy parenchyma which consists of 5-6 layers of loosely arranged spherical cells. (Fig. 5)

Beside these numerous oil globules and prismatic calcium oxalate crystals were present in the ground tissue. (Fig. 6)

Coursing through the mesophyll vascular bundles surrounded by parenchymatous cells is present.

Hairs

The plant is densely covered with hairs of both glandular and non glandular type. The glandular trichomes are of capitate type which consists of a basal epidermal cell, unicellular to bicellular stalk of variable length, a neck cell and a large globular unicellular secretory head. The non glandular trichomes are 3-6 celled, variable length uniseriate, unbranched and progressively tapering with pointed apex. (Fig.7)

a) Powder characteristics

The moderately coarse leaf powder(40 mesh size) is dark green in colour & when studied under different magnifications show the presence of diacytic stomata, epidermal cell, glandular and uniseriate trichomes etc.

b) Physico-chemical characteristics of leaves of *Coleus amboinicus* Lour.

Evaluation of physical constant in a drug is important in detecting adulteration. The total ash is particularly important in the evaluation of purity of the drug i.e. the presence or absence of foreign organic matter such as metallic salts or silica. It also indicated the amount of minerals and earthy matter attached to the drug extractive values are primarily used for the determination of exhausted or adulterated drugs. It also gives an idea about the nature of the chemical constituents present in the crude drug and is useful for the estimation of specific constituents, soluble in that particular solvent used for extraction . The results of Physicochemical studies such as loss on drying, foreign matter, water soluble ash, acid insoluble ash and extractive values of leaves of *Coleus amboinicus* Lour.

were shown in Table 1. The average values are expressed as percentage.

Table 1: Physicochemical parameters of the leaves of *Coleus amboinicus* Lour.

Sl.No.	Physico-chemical constant	Results % w/w
1.	Loss on drying	8.58%
2.	Foreign matter	0.649%
3.	Total ash	23.64%
4.	Water soluble ash	2.80%
5.	Acid insoluble ash	0.69 %
6.	Water soluble extractive value	34.16%
7.	Alcohol soluble extractive value	5.08%

Preliminary Phytochemical studies

Preliminary phytochemical screening showed the presence of carbohydrate, alkaloids, protein, glycosides & phenolic compounds as shown in Table 2.

Table 2: Preliminary phytochemical tests of aqueous & alcoholic extracts of leaves of *Coleus amboinicus* Lour.

Sl. No.	Chemical Constituents	Aqueous extract	Alcoholic Extract
1.	Carbohydrates	+	+
2.	Protein	+	+
3.	Tannin	-	+
4.	Alkaloids	+	+
5.	Glycosides	+	+
6.	Phenol	+	+
7.	Saponin	-	-

+ve : presence of constituent, **-ve** : absence of constituent

The presence of alkaloids, glycosides and phenolic compounds supports its use as a potent anti-oxidant agent.

CONCLUSION:

Empirical knowledge about medicinal plants plays a vital role in primary health care and has great potential for the discovery of new herbal drugs. This study will serve as a ready reference for identification and standardization of *Coleus amboinicus* leaves on the basis of macroscopic, microscopic evaluation and chemical analysis. The preliminary phytochemical investigation of the leaves will further help in isolation of important compounds in future. These findings may be useful to supplement existing information regarding identification and standardization of *Parnayavani* even in the powdered form which distinguish it from its substitutes and adulterants. Further the observed pharmacognostic and physiochemical parameters are of great value in quality control and formulation development.

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Cite this article as: Sharma M, Sahu S, Sapra U. K., Pharmacognostical Standardization of Leaves of Parnayavani (*Coleus Amboinicus* Lour.) *J of Ayurveda and Hol Med (JAHM)*.2014;2(9):22-26.

Source of support: Nil, Conflict of interest: None Declared.



Figure 1

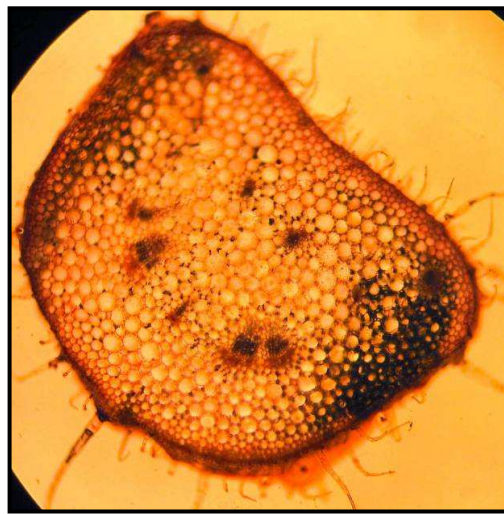


Figure 2

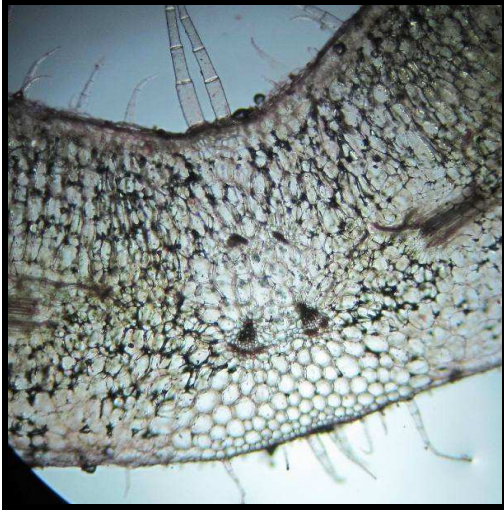


Figure 3

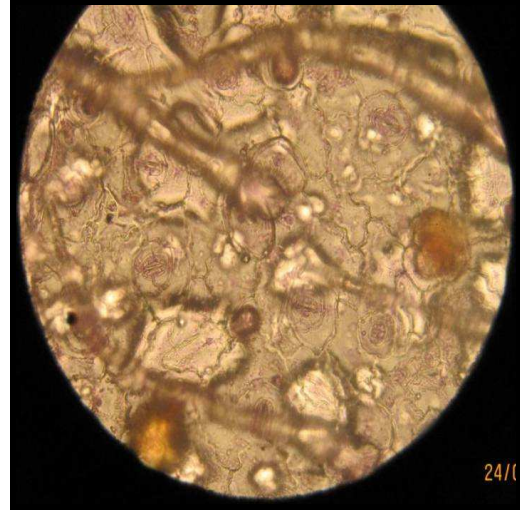


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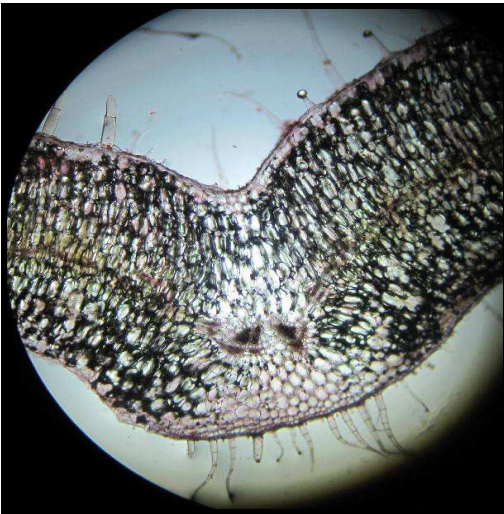


Figure 5

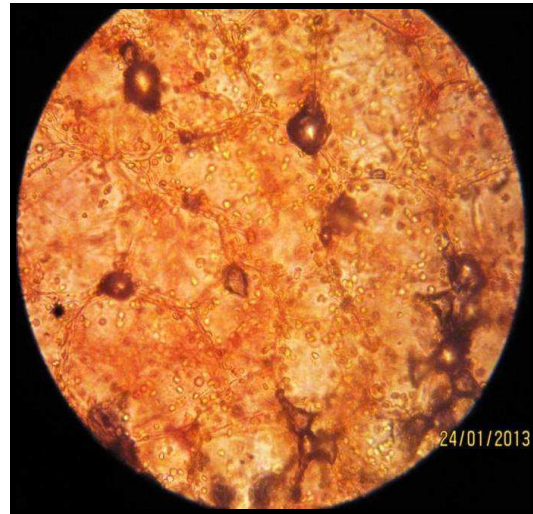


Figure 6

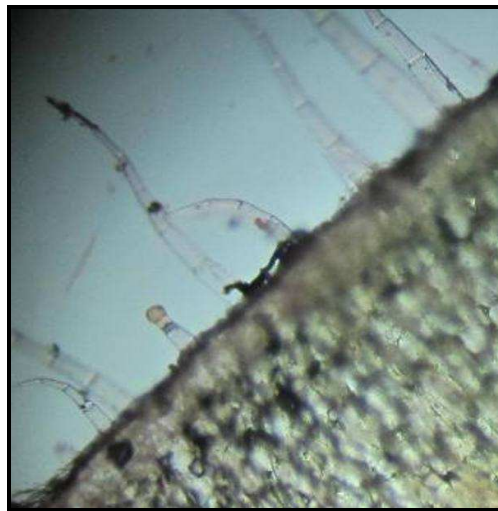


Figure 7