Pharmacognostical evaluation of *Strobilanthes ciliatus* Nees.

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Abstract: *The Microscopic evaluation of the different morphological part of the Strobilanthes ciliates has been carried out in order to confirm the botanical identity of the plant. The transverse section characters of the major morphological parts like leaf, root and stem has been carried out along with the powder characters. From these findings, important diagnostic characters that might be useful in determining the authenticity and identifying adulteration of the plant drug can be observed.*

Key Words: Microscopic characters, *Strobilanthes ciliates*

1. INTRODUCTION:

Strobilanthes ciliatus (Acanthaceae), commonly known as *Sahacarah* is an important medicinal plant used in Kerala (India). Traditional system of medicine for neurological disorders, leprosy and other skin diseases, cough, edema etc. *Strobilanthes ciliatus*, commonly known as *Sahacarah*, is an important in ayurveda, widely used against neurological disorders such as paraplegia, sciatica etc. This drug also helps to heal ulcers, glandular swellings, poisonous affections, itching, leprosy and other skin diseases. Though widely used in the indigenous system of medicine, there is however no available data with pharmacognostical report on the macro and microscopic characters of the drug [1,2,3]. A systematic pharmacognostic study was carried out on the plant to describe it more scientifically and to identify specific characteristics, if any, which will be helpful in the quality assurance and standardization of the plant drug.

2. PLANT MATERIAL:

The whole plant *Strobilanthes ciliatus* was collected from Edapal, Malappuram dist, Kerala, India during the month of August 2007. Its botanical identity was confirmed by botanist Dr. Gopalakrishna Bhat, Professor of Botany, Poorna Prajna College, Udupi, Karnataka. The voucher specimen No(PP557) has deposited at the Department of Pharmacognosy, Manipal College of Pharmaceutical Sciences, Manipal.

3. MACRASCOPIC AND MICROSCOPIC ANALYSIS:

The macroscopy and morphology of the plant were studied [4] microscopical studies, cross sections were prepared and stained [5].

4. POWDER ANALYSIS:

The powder analysis was carried out as per the standard procedure [6,7].

5. RESULTS:

Taxonomic description of the plant

A small shrub; stems and branches subquadrangular, often fimbriate at the nodes. Leaves 10-18 by 2.5-5 cm., lanceolate, acuminate, lineolate, glabrous or nearly so, serrate, base attenuated into the petiole; main nerves 6-7 pairs; petioles 1.3-3.8 cm. long ; sometimes obscure. Flowers in axillary slender, glabrous, jointed and bracteate below the middle and there deflexed; bracts 6mm. long, ovate, subacute, glabrous, lineolate, the margins often obscurely toothed; bracteoles 4mm. long shorter than calyx, linear, subobtuse, mucronulate, lineolate, glabrous. Calyx 6 mm. long, glabrous or nearly so; tube about 1.25mm. long; segments subequal, linear, subobtuse. Corolla white, 13-16 mm. long; tube narrow in the lower part, companulately swollen in the upper half; lobes 3 mm. long, oblong, rounded at the apex, spotted with lilac at the base. Stamens 4, exserted; filaments of longer stamens bearded, anthers purple. Ovary glabrous; style glabrous. Capsules not seen.

Fig 1 *Strobilanthes ciliates*

Macroscopy

Stems and branches sub quadrangular, often fimbriate at the nodes. Non-aromatic in odour, Leaves 10-18 by 2.5-5 cm. , lanceolate , acuminate, lineolate. Flowers pale rose in short.

Microscopic characters of the whole plant of *Strobilanthes ciliatus*

T.S of leaf shows the following structure

Fig. 2 Transverse section of leaf

I.Epidermis

The leaf is dorsiventral with upper epidermis on the dorsal surface and lower epidermis on the ventral surface. The epidermal cells of upper epidermis are biconvex cells without stomata; outer walls are coated by cuticle. Below the upper epidermis there is a palisade layer made up of palisade cells. Lower epidermis is made of biconvex cells without cuticle and is discontinuous due to the presence of stomata. Stomata are of rubiaceous type.

II Mesophyll

In between the upper and lower epidermis lies the mesophyll tissue made up of dorsal palisade tissue and ventral spongy tissue.

III Palisade tissue

It consists of palisade cells which are vertically placed below the upper epidermis with compactly arranged cells . They are green in colour due to the presence of chloroplasts.

IV Spongy tissue

These are loosely arranged parenchymatous cells, enclosing intercellular spaces which are many layers in thickness. The spongy parenchyma cells enclose storage product called cystoliths, a characteristic feature in many species of Acanthaceae. The cystoliths are solitary structures or sometimes they are rounded compound.

V Mid rib

Midrib of the leaf is prominent having collenchyma tissue below the epidermis on either sides. Some of the cells enclose cystolith. There is a prominent vascular bundle in the midrib consisting of upper xylem and lower phloem.

Transverse section of the stem

Stem is angular, roughly square in cross sectional view when the plant is young. The stem anatomy shows the following structures.

Fig 3 Transverse section of the stem

I Epidermis

It is the outermost layer consisting of 2-3 layers of cells. The cells are rectangular in shape.

II Hypodermis

It is a fibrous layer present below the epidermis made of hard, old cells, protective in function. A cork tissue arises immediately below the epidermis in *Strobilanthes*, at the time of secondary growth.

III Cortex

Below the hypodermis, there is a many layered cortex, formed by parenchyma cells. Some of the parenchyma cells store cystoliths. There are stone cells in the inner part of cortex including fiber cells or fibrous cells.

IV Endodermis

There is a conspiquous endodermis having casparian thickenings. Below the endodermis there is layer of pericycle including strands of fiber.

V Vascular bundles

There are four prominent vascular bundles at four angles of the stem. Vascular bundles are collateral and open with inner endarch xylem and outer phloem. The cambium lies in between xylem and phloem.

VI Pith

There is a large pith in the center of stem made up of parenchyma cells enclosing cystoliths and stone cells frequently. At times some crystal cells are also seen in the pith.

VII Secondary growth

At the time of secondary growth the four vascular bundles are connected by vascular tissue formed by the origin of inter fascicular cambium. This inter fascicular cambium, cuts off cells on either side, vascular tissues which differentiate internally into xylem, externally into phloem. Thus the secondary stem possesses a continuous ring of vascular tissue. It is also observed that there will be formation of intra xylery phloem and inter xylery phloem in the secondary stem. This leads to an anomalous structure in the secondary stem.

Transverse section of the root

A generalized description of the root is given below.

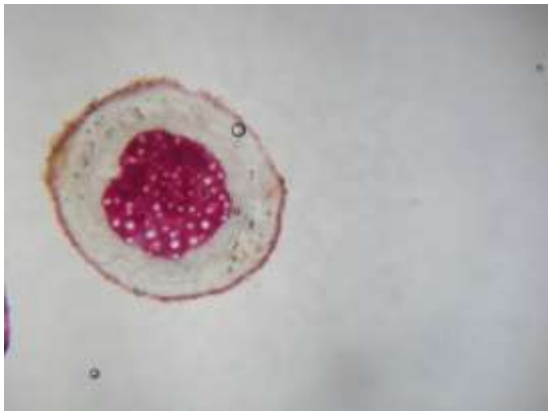


Fig 4 Transverse section of the root

The root is surrounded by an outermost lining called epiblema. It has cells with barrel shape and contains root hairs. Below that there is a many layered cortex made of parenchyma, consisting of storage products like cystoliths, crystals etc.

The cortex is internally lined by endodermis made up of one layer of cells having passage cells opposite to vascular bundles. Vascular bundles are four in number arranged in radial continuous, in the primary stem (young stem). Phloem and xylem alternate each other. The pith in the center is made up of parenchyma cells.

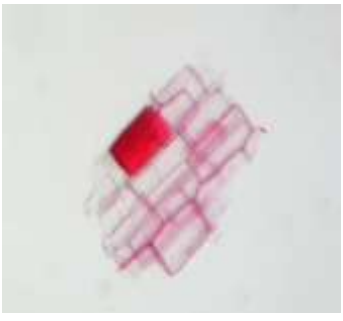
Secondary growth

As the stem becomes older there is a secondary growth in thickness in the root system. A ring of cambium arises in between xylem and phloem which will give rise to secondary tissues on either side. Finally it gives rise to a continuous secondary mass of xylem in the center eliminating the pith. The secondary xylem gets surrounded by secondary phloem. On the outer periphery a cork cambium arises forming secondary cortex towards inside and cork cells towards the outer sides.

Powder microscopy

On microscopic examination the powder revealed the presence of fibers, stone cells, cystolith, rubiaceous stomata, parenchyma, ray parenchyma and sclerenchyma.

Rubiaceous stomata



Stone cells

Fibers

Fig 4. Powder microscopy of *Strobilanthes*

6. CONCLUSION:

Presence of cystolith, casparian strains and stone cells can be used to determine the authenticity of the plant. Pharmacognostic evaluation of the plant does not have any correlation with pharmacological and phytochemical behaviour. But before proceeding to evaluate the pharmacological activity or phytochemical evaluation, a researcher must confirm the botanical identity of the plant if the researcher cannot confirm the botanical identity of the plant, the entire phytochemical and pharmacological work on the plant becomes invalid. Thus the botanical identity of a crude drug threshold in the process of pharmacological investigations.

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