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Histo-anatomical Study of *Anisochilus carnosus* (L.f.) Wall: An Indian Habitant

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ABSTRACT

Indian habitant *Anisochilus carnosus* (L.f.) Wall is an annual shrub found in the high altitude regions. The plant has been of interest to researchers due to its potency towards various pathological conditions. Pharmacognostical, physico-chemical and phytochemical evaluation of the leaves of *A. carnosus* was carried out to determine its qualitative and quantitative standards. Histological parameters revealed the dorsiventral nature of the leaf shows upper and lower epidermis with numerous multicellular covering and collapsed trichomes. A layer of palisade cells, spongy parenchyma embedded with few vascular strands and yellow color oil cells. Midrib showed the presence of patches of collenchyma, abundant trichomes identical to that of lamina and prominent bicollateral vascular bundles. Physico-chemical parameters were determined and found to be total ash 89.02%, acid-insoluble ash 1.39% and water-soluble ash were 73.3% w/w of dried powder. The extractive values were found to be 6.19% w/w and 7.17% w/w for water and ethanol, respectively. The moisture content of the sample was found to be 15.89% w/w and foaming index was found to be 212.76. Phytochemical screening confirmed the presence of glycosides, saponins, tannins, phytosterols and volatile oil. Histological, physico-chemical and phytochemical evaluations carried out help to lay down the standards to the identification and authentication of this valuable crude drug.

Key words: *Anisochilus carnosus*, macroscopical, microscopical, physico-chemical

INTRODUCTION

Nature has contributed a lot to mankind since its existence and herbs have been used as medicine since ancient practice. Traditional knowledge about plants has been developed which has become treasure trove and cultural heritage of many nations. Therefore, it is very important to preserve and protect the traditional knowledge and also establish a data base of traditional medicine, this will help to conserve and retrieve the information to benefit of mankind (Kamble *et al.*, 2008). Indian habitant *Anisochilus carnosus* (L.f.) Wall is an annual shrub found in the various high altitude regions of Tamil Nadu, Maharashtra and Rajasthan belonging to the family Lamiaceae, commonly known as the mint family (Ignacimuthu *et al.*, 2006). When, the whole plant is rubbed it emanates a strong, sweet and aromatic perfume. The plant is used to treat some slight pathology of the respiratory apparatus and skin. Hepatoprotective and ulcer protective activity of *A. carnosus* has been reported (Venkatesh *et al.*, 2011). The present study describes the pharmacognostical, physico-chemical and preliminary phytochemical evaluation of leaves of *A. carnosus*.

MATERIALS AND METHODS

Plant material: Leaves of *A. carnosus* were collected in September-October 2010 from Udyavar, Udipi and the plant was identified by Dr. Richard Lobo, Pharmacognosist, Manipal College of Pharmaceutical sciences, Manipal, Karnataka. A voucher specimen (PP 583) has been deposited in the Department of Pharmacognosy, Manipal College of Pharmaceutical Sciences, Manipal, India. Fresh leaves were used in histological determination, shade dried leaves were used for physico-chemical evaluations and preliminary phytochemical screening.

Macroscopical and microscopical characterization: The macroscopic and microscopic characters of the plant were carried out (Brain and Turner, 1975) procedure. Powder microscopy of shade-dried leaf powder was carried out using Olympus BX 41 microscope (Khandelwal, 2004). Microscopic characters like stomatal number, stomatal index, vein islet number vein termination number were carried out as per standard technique (Evans, 2003).

Physico-chemical evaluations: Physico-chemical constant of leaf powder such as total ash, water-soluble ash and acid-insoluble ash, moisture content and foaming index was determined as per standard technique (Indian Pharmacopoeia, 1996; WHO, 1992, /PHARM/92.559/rev.1).

Preliminary phytochemical screening: Different extracts were prepared by successive solvent extraction method using Soxhlet apparatus. Phytochemical tests were carried out to detect the phytochemicals present in *A. carnosus* leaf (Harborne, 1998).

RESULTS

Macroscopical study: *A. carnosus* is an aromatic annual herb (Fig. 1) found in the Western Ghats. Stems are 30-60 cm tall and branched. Leaf petioles were found to 1.3-5 cm long, densely white velvety. Leaves are ovate-oblong to circular, heart-shaped to rounded, margin crenulated, tip blunt to rounded. Flower spikes are 3-7.5×1-2 cm long, 4-angled in fruit. Sepal was found about 4.5 mm, tube constricted at mouth. Upper part of lip is ovate and lower is truncate. Flowers are purplish, 8-10 mm and densely velvety outside. Flower tube is slender, recurved at middle (Bhat, 2003).

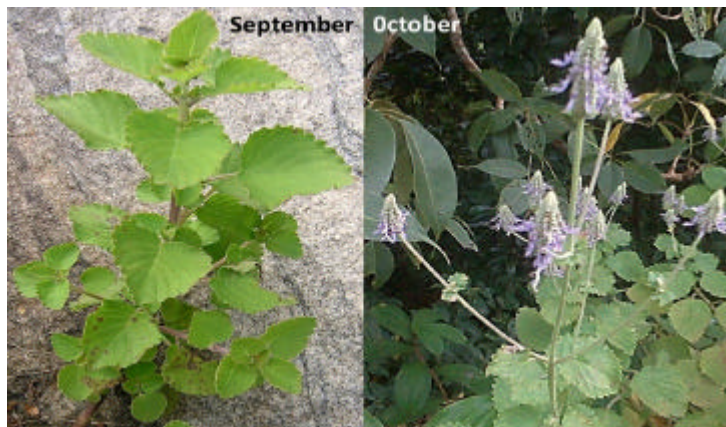


Fig. 1: Macroscopical character of *Anisochilus carnosus*

Microscopical study: Transverse section of the leaf through the midrib revealed the presence of dorsiventral nature of the leaf. The lamina consists of upper and lower epidermis having single layer of small, rectangular cells with thin cuticle which contain abundant straight multicellular covering and collapsed trichomes with pointed apex. Below the upper epidermis a single layer of elongated closely packed palisade cells were seen, below which spongy parenchyma with few vascular strands were seen. The epidermal layer of the lamina continuous over the midrib and consists of a patch of collenchymas cells below the upper and above the lower epidermal cells of the cortical parenchyma of the midrib. Bicollateral vascular bundle occupies the central region of cortical parenchyma. Abundant covering trichomes identical to that of lamina will be seen on the epidermal layer of the midrib (Fig. 2).

Powder microscopy and leaf constants: Powder characteristic shows presence of numerous multicellular and collapsed covering trichomes. It also shows oil globules, palisade cells, vascular strands, heliocytic type of stomata (Fig. 3). Leaf constants like stomatal number, stomatal index, vein islet number, vein termination number has shown in Table 1.

Physico-chemical parameters: Physico-chemical parameters like total ash, acid insoluble ash, water soluble ash, water and alcohol soluble extractive value of *A. carnosus* leaf has shown in (Table 2 and 3). Foaming index of leaf was found to be 212.76.

Table 1: Leaf constants of *A. carnosus*

Microscopic parameter	Value
Stomatal number	125 mm ⁻²
Stomatal index	17.85
Vein islet number	3.25 mm ⁻²
Vein termination number	3.5 mm ⁻²

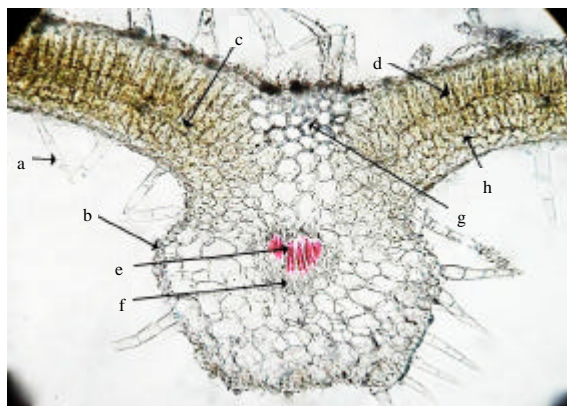


Fig. 2: Transverse section of *Anisochilus carnosus* leaf; a: Multicellular covering trichome, b: Single cell epidermal layer, c: Vascular strands, d: Tangentially arranged palisade cells layer with yellow color oil globules, e and f: Bicollateral vascular bundle; e: Lignified xylem, f: Phloem, g: Collenchyma and h: Compactly packed cells of parenchyma

Table 2: Ash value of *A. carnosus*

Physico-chemical parameter	% w/w of dried leaf
Total ash	89.02
Acid-insoluble ash	1.39
Water-soluble ash	73.30

Table 3: Extractive value and moisture content

Physico-chemical parameter	% w/w of dried leaf
Water-soluble extract	6.19
Alcohol-soluble extract	7.17
Moisture content	15.89

Table 4: Preliminary phytochemical screening of *Anisochilus carnosus* leaf powder

	Extracts					
	Pet. ether	Benzene	Chloroform	Acetone	Ethanol	Water
Alkaloids	-	-	-	-	-	-
Carbohydrates and glycosides	-	-	-	-	+	+
Phytosterols	+	-	-	+	+	-
Fixed oils and fats	-	-	-	-	-	-
Saponins	-	-	-	-	+	+
Phenolic comp. and tannins	-	-	-	-	+	+
Proteins and amino acids	-	-	-	-	-	-
Gums and mucilages	-	-	-	-	-	-
Volatile oils	-	-	-	-	+	-

+: Positive; -: Negative

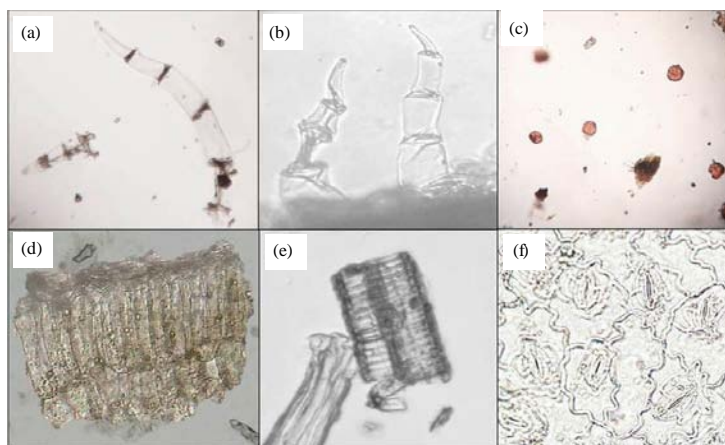


Fig. 3(a-f): Powder microscopy of *Anisochilus carnosus* leaf; (a): Multicellular covering trichome, (b): Collapsed covering trichome, (c): Oil globules, (d): Palisade cells, (e): Vascular strand and (f): Helicocytic type of stomata

Preliminary phytochemical studies: Phytochemical analysis (Table 4) showed the presence of phytosterols, glycosides, tannins, saponins and volatile oil.

DISCUSSION

Macroscopic, microscopic, physico-chemical evaluation of *A. carnosus* helps in confirmation of its identity and determination of its quality, purity and detection of nature of adulteration. Phytochemical studies shows presence of various phytoconstituent and their nature.

CONCLUSION

As, there is no much pharmacognostic anatomical work on record of this traditionally valued drug, the present work taken up with a view to lay down standards which could be useful to detect the authenticity of this medicinally useful plant. Macro and microscopical standards discussed here can be considered as identifying parameters to substantiate and authenticate the drug.

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