www.jahm.in

(eISSN-2321-1563)

ORIGINAL RESEARCH ARTICLE

PHYTO-PHARMACOGNOSTICAL STUDY OF MUNDI (*SPHAERANTHUS INDICUS* LINN.)

[1]SUMA MALLYA, [2]TANUJA NESARI, [3]PRASHANAT KUMAR ZHA

[1]Associate professor, SDM college of Ayurveda, Kuthpady, Udupi, Karnataka

[2]Additional director academics, Ch. Brahma Prakash Samsthan, Delhi

[3]Head, quality control laboratories, ALN Rao memorial, Ayurvedic Medical College, Koppa, Karnataka

Corresponding author email address: sumamallya@gmail.com

Access this article online: www.jahm.in

Received on: 30/01/14, Revised on: 30/01/14, Accepted on: 04/03/14

Abstract:

Mundi (*Sphaeranthus indicus* Linn.) is a popularly used drug in the texts of Ayurveda. Whole plant is used in therapeutic conditions like krimi, apachi, yoniroga etc. Hence phyto-pharmacognostic standardization forms the base to start any research. **Aims and objectives**: Present study was aimed to record macro-microscopic and phytochemical study of Mundi (Sphaeranthus indicus Linn.)**Methods:** Authentified, matured, fresh plants were collected and both macro-microscopic characters were documented. Chemical study included physico-chemical screening, preliminary phytochemical test and HPTLC. **Results:** Pharmacognostic study of leaf showed anisocytic and anomocytic stomata on upper and lower surface respectively and stem part showed unicellular, multicellular, glandular , eglandular types of trichomes. Physicochemical standards and presence of protein, flavanoids, triterpenoid compounds as secondary metabolites, serve as qualitative data related to this drug. **Conclusion:** The results obtained will prove as standard reference for identification and distinguish it from any admixture.

Keywords: *Mundi*, *Sphaeranthus indicus*, phyto-pharmacognostic, vein-islet number HPTLC

Introduction:

Sphaeranthus indicus Linn. (*Asteraceae*), known as Mundi is a prostrate or procumbent, tomentose or villous annual herb growing in drying moist ground ascending up to 5,000 feet on Himalaya. It is 30-45 cm tall with winged stem. Heads are terminal and 0. 6- 2 x 0.5 – 1.5 cm in size and globose or ovoid in shape. Achenes are nearly 1 mm long, oblong, obconical, angled, subcompressed and almost glabrous[1] (Fig. 1).

Though, it is not classified under Charaka Dashemani[2], Sushruta and Vagbhata considered it under surasaadi gana[3]. It has been identified with some specific synonyms like alambusha, kadmbapushpi, bhukadamba, kulahala[4] to describe the head inflorescence of this plant. The whole plant is used as tonic, deobstruent, alterative and aphrodisiac while flowers are specifically suggested to use as alterative, cooling agent and tonic[5].The aerial parts have shown number of phytoconstituents as essential

oils, glycosides,eudesmanolides, sesquiterpenes, phenolic glycosides,sesquiterpene lactones, flavonoid n-pentacosan, stigmasterol, β-sitosterol, hentriacontane, β-D-glucoside of hentriacontane, n-triacontanol, sphaeranthine[16]etc. Steam distillation of fresh flowering herb yields an essential oil containing methyl chavicol, alpha-ionone, *d*-cadinene, *p*-methoxycinnamaldehyde as major constituents[6]. In Ayurveda, it has been advised specially in problems of krimi, apachi, galaganda, guhyaroga, yoni vyapath etc[7]. It is

used as an ingredient of some important Ayurvedic formulations like shwadamshtradi ghrita, chandanaadi taila, amritaadi taila, parushaka ghirta, tritiyasarpi guda[8] etc.

Materials and methods:

Collection of the sample

Fresh, matured plants of *Sphaeranthus indicus* Linn. were collected in the month of January from their natural habitat. The collected samples were identified and authenticated with the help of different floras and databases.[9] The plants were cleaned under running water to remove adherent soil and dirt. Herbarium specimen was prepared (Herbarium No.74066) and was stored in Pharmacognosy department of the Institute for future reference. For the histological profile the plant was preserved in a solution of FAA (70% ethyl alchohol, Glacial acetic acid, and Formalin in the ratio of 90:5:5. For physico-chemical study rest of the sample was shade dried and coarsely powdered (60 mesh) and preserved in an airtight container.

Pharmacognostic evaluation:

Pharmacognostic evaluation was carried-out by following available standard guidelines.[10,11]

Macroscopic evaluation

The texture, colour, odour and taste of the samples were recorded[10].

Microscopic evaluation

Free-hand sections were taken, stained with phloroglucinol followed by HCl and iodine respectively to test the lignification of cell wall and to check the starch grains. The surface preparation of leaves was done by scrapping method whereas the quantitative microscopy was done as per available standard guidelines[10].

Physicochemical evaluation

Whole plant powder was analyzed for parameters such as loss on drying, ash value, acid insoluble ash, water and methanol soluble extracts[12].

Preliminary phytochemical screening

Both aqueous and methanolic extract of the sample was tested to detect the presence of secondary metabolites like protein, carbohydrate, tannin, saponin, flavanoids, phenols, alkaloids and triterpenoids as per the guidelines mentioned under API.[11,13,14]

High performance thin layer chromatography

Methanolic extract of the sample was taken for this study[13]. The solvent system used for HPTLC was Toluene: Ethylacetate: Diethyl amine: Methanol: Chloroform:: 10:6:2:2:1.

Results

Macroscopic characters: Stem pieces were flattened with toothed wings and longitudinal wrinkles. They were externally brownish green and internally grey in colour. The fracture was fibrous fracture with bitter taste. Leaves were glandular pubescent, 1.2 – 10 x 0.7 – 3.5 cm in size and elliptic-oblong or ovate-oblong in shape with dentate or serrate margin. They were slightly aromatic in odour with bitter taste. (Figure: 1)

Microscopic characters:

Stem: The outline of transverse section exposed enveloping of both glandular and eglandular type of trichomes at places and a central region occupied by pith. It exhibited a layer of epidermis composed of rectangular cells followed by a layer of hypodermis comprised of comparatively larger cells. Below this, comparatively larger parenchymatous cells of

cortex traversed with air sac. The Vascular bundles were capped with discontinued sclerenchymatous fibers. Collateral type of vascular bundle was present. Phloem elements were followed by xylem elements from periphery to centre. Each bundle was separated by 3-8 celled wide medullary rays. Starch grains were distributed over the parenchyma cells of cortex and pith. (Figure: 2)

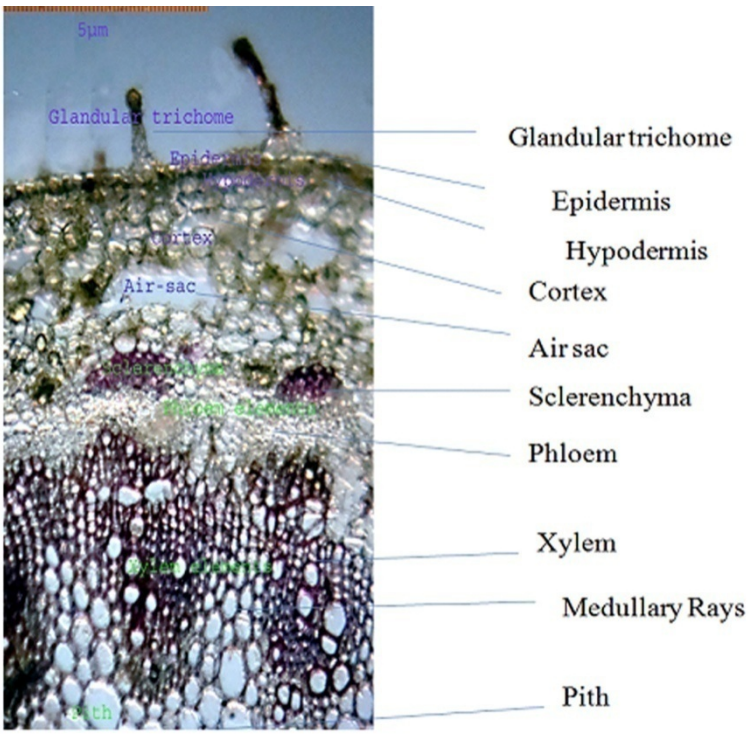
Leaf: The outline of the section exhibited dorsiventral nature of leaf with glandular as well as non-glandular trichomes. It revealed that trichomes were uniseriate, multicellular and thick walled. In midrib region, both upper and lower epidermis was followed by a layer of hypodermis and few layers of chlorenchyma cells. Chlorenchyma cells were more prominent towards the lamina portion. Vascular bundle was found in between the ground tissue. In lamina portion, upper epidermis was followed by 1-2-layered palisade parenchyma cells, continued to spongy parenchyma and lower epidermis. Both glandular and eglandular trichomes were present on upper and lower epidermis. Trichomes found were uniseriate, unicellular to multicellular in nature. Starch grains and prism of calcium oxalate crystals were scattered in ground tissue portion. (Figure: 3)

Surface preparation exposed the anisocytic type of stomata on upper surface while anomocytyic type of stomata on lower surface. The quantity of stomata was more on lower surface. Traces of glandular trichomes were also seen with surface preparation. The details of stomatal number and stomatal index of both surfaces and vein-islet number are given with table no. 1.

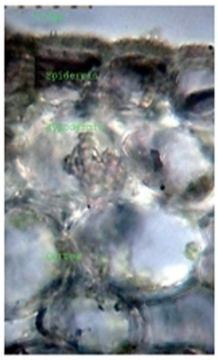
Figure No. 1: Macroscopic appearance

Twig with Inflorescence Showing Shape and Size

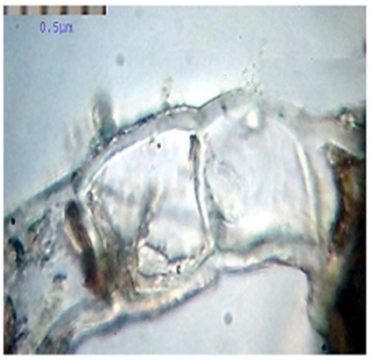
Figure: 2. Stem Microscopy



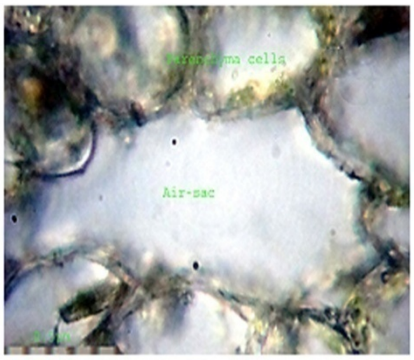
Outline of TS of Stem



Epidermis, Hypodermis and Cortex



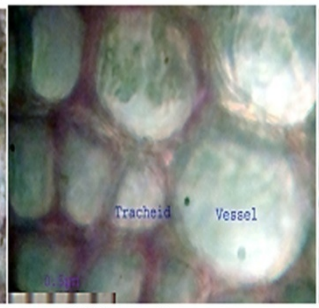
Multicellular Uniseriate Trichome



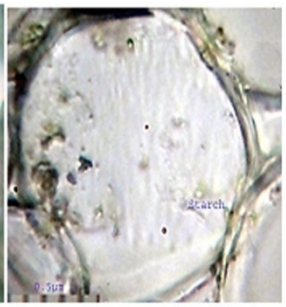
Air sac in Cortex

Sclerenchyma

Phloem elements



Xylem elements



Parenchyma cell of Pith

Figure : 3. Leaf Microscopy

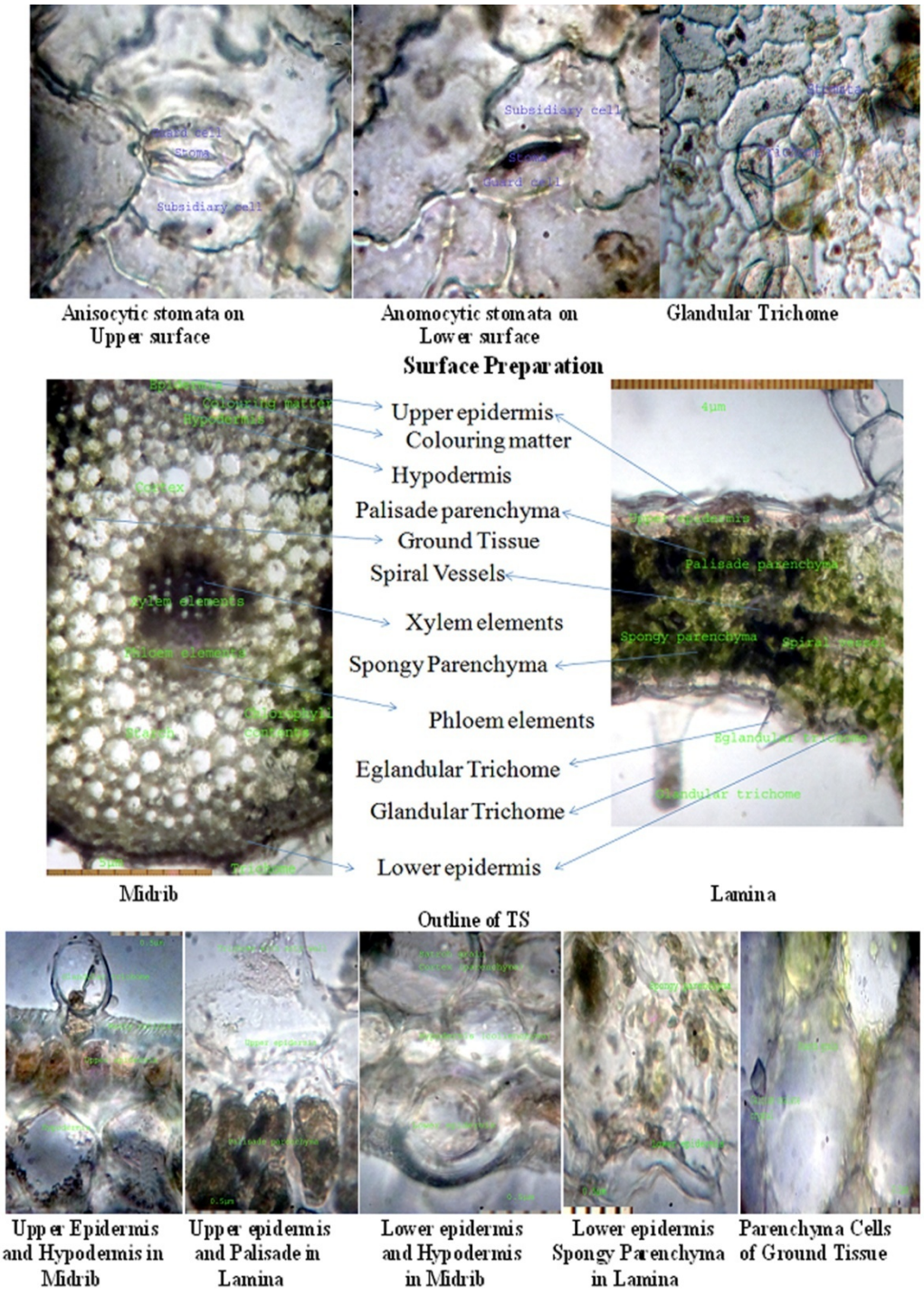


Table Number: 1. Stomatal index of a leaf

Mean ± Standard Deviation

Stomatal Number (Upper Surface) 19.28 ± 2.28

Stomatal Number (Lower Surface) 51.28 ± 3.90

Stomatal Index (Upper Surface) 24.85 ± 2.47

Stomatal Index (Lower Surface) 30.00 ± 1.41

Vein-islet Number 23.00 ±2.00

Physicochemical Parameters: The result obtained after physico-chemical parameters are shown in table number: 2. The presence or absence of primary and secondary metabolites exposed is given with table number: 3. The HPTLC plate under various wavelengths observed are shown in figure number:4 and the Rf values revealed from HPTLC are shown in table number: 4.

Table No. 2; Physico-chemical constants of the drug.

Parameters	*Value*
Loss on drying (% w/w)	6.5
Ash value (% w/w)	12
Acid insoluble ash (% w/w)	3.2
Methanolic soluble extractive (% w/w)	3.5
Water soluble extractive (% w/w)	5

Table No. 3; Preliminary qualitative analysis of the plant extract

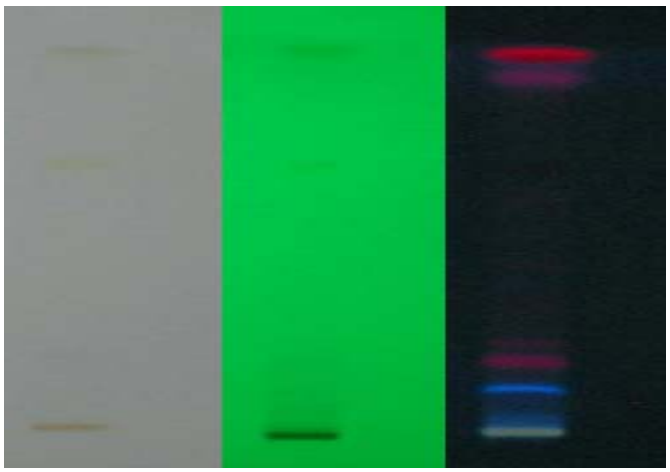
Secondary meatbolites	Aqueous extract	Methanolic Extract
Protein	+	+
Carbohydrates	-	-
Tanin	-	+
Saponin	-	-
Flavanoids	+	+
Phenols	+	+
Alkaloids	+	+
Triterpenoids	+	+

Table No. 4 ; Showing Rf value

S.No.	**UV 254 nm**		**UV 366 nm**		**White light**	
	Color	Rf	Color	Rf	Color	Rf
1.	Green	0.84	Blue	0.12	Pale green	0.95
2.	Pale green	0.90	Pink	0.26	-	-
3.	-	-	Pink	0.86	-	-

Rf- Retention factor

Figure no. 4: TLC Plates of Methanolic extract of the drug under different wavelengths



Visible Light 254 nm 366 nm

Discussion: Mundi(*Sphaeranthus indicus* Linn.) is a popularly known weed available in fields. The drug is known since the time of Charaka and Sushruta having wide therapeutic utility. Aerial parts of the plants are used mainly in medicinal preparations. It is very important that a system of standardization must be established for every plant medicine in the market to assure its quality and prevent spurious market adulteration. Morphological authentication is not sufficient to ensure the quantitative consistency of bioactive compound responsible for the therapeutic effects.

Pharmacognostical evaluation of Mundi (*Sphaeranthus indicus* Linn.) along with physico-chemical value, qualitative tests and HPTLC provided specific parameters that would be useful in identification and authentification of the drug with genuine status.

Macroscopic characters revealed the characteristic feature of stem pieces which were flattened with toothed wings and longitudinal wrinkles. Presence of hairs and aromatic odour are useful in identification of the plant macroscopically. Collateral vascular bundle and presence of glandular and eglandular trichomes are specific findings of the stem microscopy. Whereas distribution of anisocytic and anomocytic stomata on upper and lower surface of a leaf respectively are specific features in its identification.

The physico-chemical parameters help in judging the purity and quality of the drug. The drug powder was evaluated for its physicochemical parameters like loss on drying, total ash, acid insoluble ash and different extractive values. Loss on drying indicates the presence of moisture content of the drug which was found to be 6.5%. The total ash is particularly important in the evaluation of purity of drugs, the presence or absence of foreign inorganic matter such as salts or silica and it was 12%. Presence of secondary metabolites like flavanoids, triterpenoids, proteins further help in identifying its chemical constitution at that particular maturity and time of collection HPTLC findings indicate quantitative estimation of these chemical constituents.

Screening of separate parts for phytochemical parameters can be done. A detailed screening of new compounds exposed from future research with their pharmacokinetics would certainly aid to pharmaceutical and medical science.

References:

1. Sarin, Y.K., Illustrated manual of herbal drugs used in Ayurveda; Council of Scientific and Industrial research & ICMR New Delhi, 1996; p.188.
2. Yadavaji Trikamaji, editor, Charaka Samhita of Charaka, Sutrasthana 4, verse no9/18, 2nd edition, Varanasi; Chaukambha Sanskrit series;2002; p 32-34.
3. Yadavaji Trikamaji, editor, Sushruta samhita of Sushruta, Sutrasthana chapter 38, verse no. 18, 2nd edition, Varanasi; Chaukambha Sanskrit series; 2002; p 165
4. Sharma Priya vrat editor, Dhanvantari Nighantu, Guduchyadi varga, verse no.155-157, 4th edition, Varanasi, Chaukambha Orientalia;2004; p 45.
5. Khare CP. Encyclopedia of Indian Medicinal plants, Springer (India) Private Limited, New Delhi, 2004, p129.
6. Anonymous, The Wealth of India, Raw materials, Volume 10 (Sp-W), CSIR; New Delhi, 1998, p4-6.
7. Harishastri Paradakar, editor, Ashtanga Hridaya of Vagbhata, Sutrasthana chapter 15, verse no. 3o. 8th edition, Varanasi, Chaukamba orientalia; 1998; p237.
8. Sivaranjan V.V., Balachnadran Indira, Ayurvedic drugs and their plant sources; Oxford & IBH publishing company PVT. LTD, New Delhi, reprint 2002; p166.
9. Varier PS Indian Medicinal Plants A compendium of 500 species, Arya Vaidya Shala, Kottakal, Volume 5, Reprint 2007, p180-182
10. Evans WC. Trease and Evans Pharmacognosy, 15th edition, London, WB Saunders Ltd. 2002,p.527-545
11. Wallis TE Textbook of Pharmacognosy, 5th edition, Delhi, CBS Publishers & Distributors, 1997 p571-574.
12. Anonymous, The Ayurvedic Pharmacopoeia of India, 1st edition, New Delhi, Ministry of Health and Family Welfare, Government of India, 2007. p152-170
13. Wagner H, Baldt S. Plant drug analysis- A thin layer chromatography atlas, Berlin,Springer; 1996. p230.
14. Gupta AK, Tandon Neeraj, S Madhu, Quality standards of Indian Medicinal Plants. Volume 6. New Delhi; Indian Council of Medical Research; 2008.p 326-332.

Cite this article as: Suma Mallya, Tanuja Nesari, Prashanat Kumar Zha. Phyto-Pharmacognostical Study of Mundi (*Sphaeranthus Indicus* Linn.). Journal of Ayurveda and Holistic Medicine (JAHM). 2014; 2(2).p.13-20.

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