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Pharmacognostic studies in leaf drug *Bacopamonnieri*(L.) Wettst.

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ABSTRACT

Bacopamonnieri(L.)Wettst. Commonly known as *Brahmi*is much branched undershrub belonging to family Scrophulariaceae. Its leaves are medicinally exploited to treat several diseases and disorders. Being an important ayurvedic drug it is deliberately adulterated. Adulteration directly effects on quality of drug. Pharmacognostic studies in this leafy drug are carried out to standardize and detect the adulteration in it. Pharmacognostic studies include details of trichomes, stomata, epidermal characteristics and anatomical features of leaves. Physical characters of leaf powder like colour, odour, taste, dry matter and phytochemical characters like nitrogen, crude fat, crude fiber, total ash, acid insoluble ash, acid soluble ash, calcium, reducing sugar, total sugar, non-reducing sugar, cellulose, extractive values etc were also undertaken. The above parameters can be applied in combination to standardize this leaf drug.

Key words-Standardization, Leaf drug, Phytochemical parameters, Adulteration

Introduction

The leaves of*Bacopamonnieri*(L.)Wettst.are medicinally important and are used to cure Asthma (Nadkarni, 1908; Sharma, 2004), Anemia (Kirtikar and Basu, 1918; Uma Devi,1988), Anti-inflammatory (Sharma, 2004), Anticonvulsant (Sharma, 2004), Carminative (Sharma, 2004), Catarrh (Kirtikar and Basu, 1918; Uma Devi,1988) Chest disease (Uma Devi,1988) Cardiac tonic (Ambasta, 1986), Constipations (Sharma, 2004), Epilepsy (Kirtikar and Basu, 1918; Uma Devi, 1988; Sharma, 2004), Insanity (Ambasta, 1986; Kirtikar and Basu, 1918;Uma Devi 1988), Intelligence (UmaDevi, 1988), Mental disorder (Kirtikar and Basu, 1918), Nervine tonic (Kirtikar and Basu, 1918; Uma Devi,1988), Nervous disorder (Jain, 1968) Nervous breakdown (Jain, 1968).The leaves are often adulterated with other leaf samples. During present investigation an attempt was made to standardize the leaves of*Bacopamonnieri*(L.) Wettst.by using various parameters like anatomy and dermatology of leaves and phytochemical characters of leaf powder.

Materials and methods

The leaf samples were collected from the medium sized authentically identified plant species from different localities of Marathwada. The leaves were removed carefully by hand pricking without damaging the plants. The leaves were collected in polythene bags and brought to the laboratory within 2-5 hours. Some leaves were preserved in 70% alcohol for their dermatology and anatomical work. Other were initially dried in shade and later in oven at 60^{o}C till constant weight, then made in to fine powder and stored in sealed plastic container for further analysis (Gambhire, 2008). Morphological and anatomical features of fresh and dried leaves were studied (Eames and Mac Daniels,1992; Metcalf and Chalk, 1950)

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Results and Discussion

A) Anatomy

The transverse section of the leaf shows a more or less isobilateral structure, *i.e.* no differentiation of mesophyll into palisade cells and spongy cells. The epidermis shows the presence of a striated cuticle and the striations are more prominent in the lower epidermal cells. The cells (26.64 X 13.32 to 29.97 X 16.65µ) of upper epidermis are bigger than cells (19.98 X 9.99 to 26.64 X 11.65µ) of lower epidermis. Stomata are found on both surfaces of the leaves. The epidermal cells have more or less wavy walls and show the presence of glandular hairs (40 to 50 X 50 to 60 diameter) on both surfaces. The smaller glandular hairs are born upon a slightly conical stalk and the larger ones possess glandular head of 8 cells, occasionally the epidermal cell adjoining the stalk bulges out and helps in the elongation of the stalk. In surface view these hairs are seen as divided into 4 or 8 cells. The upper surface has more hairs and less stomata than the lower one. Mesophyll is composed of starch containing spongy tissue only. The mesophyll cells (26.64 X 23.31 to 36.63 X 33.3µ). Show intercellular spaces. Some mesophyll cells along both the epidermis appear like palisade tissue in surface view. Some cells impregnated by tannin are noted occasionally. A few prismatic crystals of calcium oxalate are found in the mesophyll cell.

B) Dermatological characters of leaf

Leaf shows- presence of sessile and spherical to oval glandular trichomes (40 to 50 X 50 to 60 µ diameter). Trichomes are more prominent on lower surface.

The stomata are anisocytic, amphistomatic with stoma length 26.64 µ (average) and 24.97 to 28.3µ (range) for upper epidermis and 24.97 µ (average) and 23.31 to 26.64µ (range) for lower epidermis. The average cell size of guard cells is 28.3 X 8.325 µ and range between 28.3 X 6.66 to 28.3 X 9.99 µ for upper epidermis and average cell size 26.64 X 6.66 µ and range between 26.64 X 4.995 to 26.64 X 8.325µ for lower epidermis.

Subsidiary cells for upper epidermis are slightly bigger than those of lower epidermis. These cells are wavy in outline with irregular shape having average cell size 46.28 X 41.12 µ and range between 43.29 X 38.29 to 49.95 X 43.29 µ. For lower epidermis subsidiary cells have average cell size is 42.29 X 36.79µ and range 39.96 X 34.96 to 46.62 X 39.96 µ. The cells are irregular shaped with wavy out line.

The upper epidermal cells (average cell size 48.61X 41.12 µ, range 46.62 X 39.96 to 49.95 X 43.29µ) are slightly bigger in size as compared to lower epidermal cells (average size 48.62 X 35.96 µ, range 39.96 X 31.63 to 46.62 X 38.29 µ). Epidermal cells are wavy in outline.

Leaf shows following values of leaf constants

Leaf constants (Table 1)-

Sr.No.	Leaf constant	Average	Range
1	Stomatal number upper epidermis	99.2	56 to 112
2	Stomatal number lower epidermis	79.8	56 to 112
3	Stomatal index for upper epidermis	9.54	6.66 to 13.33
4	Stomatal index for lower epidermis	15.08	11.11 to 22.22
5	Palisade ratio	1: 1.97	1: 1.50 to 1: 2.50
6	Vein-islet number	6	4 to 9
7	Veinlet termination number	6	2 to 12

C) Phytochemical characters of leaf powder

a) Physical Parameters (Table2)

Sr. No.	Character	Expression
1	Colour	Faint green
2	Odour	Spicy
3	Taste	Intensely bitter

b) Qualitative Analysis (Table 3)

Sr. No.	Character	Expression
1	Alkaloids	+
2	Anthraqinone	-
3	Iridoids	-
4	Saponins	+
5	Steroids	+
6	Tannins	+

c) Quantitative Analysis (Table 4)

Sr. No.	Character	Expression (%)
01	Nitrogen	2.16
02	Crude Fat	14.5
03	Crude Fibre	11.25
04	Total Ash	13.20
05	Acid Insoluble Ash	2.75
06	Acid Soluble Ash	10.45
07	Calcium	0.785
08	Reducing Sugar	1.740
09	Non Reducing Sugar	1.696
10	Cellulose	29.2
11	Extractive value in Water	13.6
12	Extractive value in Acetone	0.8
13	Extractive value in Butanol	4.2
14	Extractive value in Chloroform	1.0
15	Extractive value in Diethyl Ether	0.4
16	Extractive value in Ethyl Alcohol	4.4
17	Extractive value in Methanol	12.6
18	Extractive value in Petroleum Ether	0.4
19	Extractive value in Propanol	2.0
20.	Extractive value in Toluene	0.2

All above mentioned characters were found to be diagnostic to find adulteration in the leaf drug *Bacopamonnieri (*L.) Wettst. Leaf anatomical features like isobilateral structure, dimensions of epidermal cells are 26.64 X 13.32 to 29.97 X 16.65µ and 19.98 X 9.99 to 26.64 X 11.65µ of upper and lower epidermis; starch containing spongy mesophyll cells; dermatological features like 40 to 60µ wide glandular trichomes, on both surfaces, anisocytic,

amphistomatic stomata with stoma length for 26.64µ upper epidermis and 24.97µ lower epidermis; leaf constants like stomatal number 80 to 112 for upper epidermis, 56 to 112 for lower epidermis, stomatal index 6.66 to 13.33 for upper epidermis, 11.11 to 22.22 for lower epidermis, palisade ratio 1: 1.5 to 1: 2.5, vein-islet number 4 to 9, veinlet termination number 2 to 12 (Table 1) form the criteria for the standardization of leaf.

The parameters like faint green colour, spicy odour, intensely bitter taste, presence of Alkaloids,Saponins, Steroids and Tannins give preliminary idea about authenticity of drug (Tables 2 & 3) while quqntitqtive chemical parameters likedry matter 13.8 %, 0.388 mg/cm^3, bulk density ash 13.2 %, acid insoluble ash 2.75 %, acid soluble ash 10.45 %, water soluble ash 6 %, water insoluble ash 7.2 %, nitrogen 2.16 %, water soluble nitrogen 2 %, crude proteins 13.5 %, reducing sugar 1.74 %, total sugar 3.436 %, non-reducing sugar 1.696 %, crude fats 14.5 %, crude fibers 11.25 %, cellulose 29.2 %, gross energy 3.33 K cal/ gm, calcium 0.785 %, phosphorous 0.29 % (Table 4) together can be exploited for making certain that raw material is genuine for predicting quantum of adulteration.
The extractive values in different solvents are: 13.6 % in water, 0.8 % in acetone, 4.2 % in butanol, 1 % in chloroform, 0.4 % in diethyl ether, 4.4 % in ethyl alcohol, 12.6 % in methanol, 0.4 % in petroleum ether, 2 % in propanol and 0.2 % in toluene are conclusive parameters (Table 4).

References:

1. **Ambasta, S.P.**, 1986 Ed. “Useful plants of India”, Publications Div., CSIR, New Delhi, India.
2. **Eames A. and Mac Daniels S.L.,** 1992, “An introduction to plant Anatomy”, Tata Mc Graw Hill Publishing com. Ltd. Bombay.
3. **Esau Katherine,** 1960, “Plant Anatomy”, John wiley and sons, lnc, New York, London.
4. **Gambhire V. S.,** 2008, “Standerdization of Ayurvedic drugs- I Leaf drug studies in Marathwada”, Ph.D. Thesis submitted Dr. B.A.M. University Aurangabad.
5. **Jain S.K.,** 1968, “Medicinal Plants”, New Delhi, India.
6. **Kirtikar K.R. and Basu B.D.,** 1918, “Indian Medicinal plants”, Second ed. 1933. Revised ed. 1975. Lalit Mohan Basu Medicinal plants”, Rewritten by Blatter Caius J.F. and Mhaskar, Lalit Mohan BasuPublication , Allahabad.
7. **Metcalf C.R. and Chalk L.**, 1950, “Anatomy of Dicotyledons,” Oxford, Clarendon press, London.
8. **Nadkarni K. M.** 1908, “Indian Materia Neesa Vol. I and II”, second ed. 1927, third ed. 1954, Popular Prakashan Pvt. Ltd., Bombay, India.
9. **Naik V.N.,** 1998, “MarathwadyatilSamanyaVanaushadhi”, AmrutPrakashan, Aurangabad, (M.S.), India.
10. **Naik V.N.,** 1998, “Flora of Marathwada”, AmrutPrakashan, Auranagabad.
11. **Sharma R.,** 2004, “Agro-technique of Medicinal Plants”, Daya Publishing house Delhi, India.
12. **Uma Devi, A. J.,** 1988, **“**Identification of status survey of Medicinal plant”, of Gujarat. Thesis submitted to the S. G. University, Surat.