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Research Article

PHARMACOGNOSTICAL AND PHYTOCHEMICAL STUDIES OF STEM BARK OF *MAESA INDICA* (ROXB.)

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ABSTRACT

The present paper deals with pharmacognostical and phytochemical studies of stem bark of *Maesa indica* (Roxb.). It includes macroscopic and microscopic characters, analysis of ash, dry matter, moisture content and phytochemical evaluation of stem bark of *Maesa indica* (Roxb.). *M. indica* is large evergreen much branched glabrous shrub or small tree belonging to family Myrsinaceae. Ethnobotanical studies of Kolhapur district revealed that stem bark of *M. indica* is used in the treatment a diabetes, cellulitis and cough and cold. The sections were taken and cellular structures were studied. The stem bark of *M. indica* were extracted with different solvents and screened for their phytochemical constituents. Phytochemical tests revealed the presence of tannins, phenols, flavones, reducing sugars, xanthoproteins, alkaloids, and glycosides. The behaviors of the powder drug with different chemical reagents and its fluorescence analysis were also observed. The study scientifically validates the use of plant in traditional medicine.

Keywords: Pharmacognostical, Phytochemical, *Maesa indica* (Roxb.), Bark, Traditional Medicine.

INTRODUCTION

Traditional system of medicine has once again become a central theme of health care of modern society of modern age. There has been increasing demand for herbal medicines and the indigenous systems have now regained respectability among the scientific community all over the world. Ayurveda is gaining popularity not only in India but also abroad. The ancient knowledge of herbal medicine is a great source of information for scientific community, researchers and medical practitioners. In last couple of decades a new trend in the preparation and marketing of drugs based on medicinal plants has become increasingly apparent^{1,2}. The curative properties of medicinal plants are mainly due to presence of various complex chemical substances of different composition which occur as secondary metabolites³. Medicinal plants form a large group of economically important plants that provide the basic raw material for pharmaceuticals. *Maesa indica* (Roxb.) commonly called as Atki or Ambat gola belongs to family Myrsinaceae. It grows in evergreen to semi-evergreen and moist deciduous forests. *M. indica* is distributed in Indomalaysia, Pakistan and in the Western Ghat throughout India. Ethnobotanical studies of Kolhapur District reveals that stem bark of *M. indica* is used to cure diabetes, cough and asthma and cellulitis. Review of literature reveals that the plant has not been studied pharmacognostically.

MATERIALS AND METHODS

Ethnomedicinal information was collected through interview with traditional rural practitioners (Vaidus) as suggested by Jain⁴. Fresh plant material was collected from Kolhapur district of Maharashtra (India). Plant was identified with the help of Flora of Kolhapur District⁵. For microscopic studies uniform, thin, free hand sections of stem bark were taken and stained as per the procedure of Johansen⁶. Macro and microscopic character were studied as described by Trease and Evans⁷. Ash value, dry matter and moisture content of the material were determined by following the method of AOAC⁸. Bark material was dried in shade so as to prevent decomposition of active principles and made into fine powder for the studies of powder behavior, fluorescence study and phytochemical tests as per given in Indian Pharmacopeia. Fluorescence analysis of the powder was examined under U.V light according to the method suggested by Chase and Pratt⁹ and Kokoski et al.¹⁰.

RESULTS AND DISCUSSION

Macroscopic characters

Maesa indica is large evergreen much branched glabrous shrub or small tree belonging to family Myrsinaceae (Fig.1). The outer surface of bark was rough, lenticellate with grey colour. The inner part of bark was fairly smooth with brown colour. Young branches subterete, grey, pubescent,

lenticellate. Leaves simple, alternate, petiolate, petiole 2-3cm long, pubescent when young; leaf lamina 8-14 x 4.3-7.2 cm, ovate, oblong to elliptic lanceolate, apex acuminate, base acute to rounded or slightly attenuate, margin coarsely serrate to dentate, mid rib raised above; secondary nerves 8-13 pairs, tertiary nerves broadly reticulate. Inflorescence axillary panicle racemes. Flowers small, polygamous, white, bract and bracteoles ovate, acute. Calyx campanulate. Corolla lobes ovate, obtuse, minutely dentate at margins. Berry globose, creamy white surrounded by persistent calyx, fleshy and seeds angular.

Microscopic Characters

T.S. of bark

T.S. of the bark showed different regions like cork, phelloderm, cortex, secondary phloem and medullar rays (Fig.2). The cork contains 5-7 layers of parenchymatous cells. Following the cork, was the phelloderm which composed of four to five layers of radially arranged parenchymatous cells. Cortex consists of many layers of parenchymatous cells. Parenchymatous cells show crystals of calcium oxalate. The secondary phloem enriches with phloem fibres and parenchyma cells. Phloem parenchyma cells were thin walled and filled with dark brown contents. Medullary rays were multiseriate.

Ash value: 4.6%,

Dry matter: 27.16%,

Moisture content: 72.84%.

Powder study: Powder microscopy shows crystals of calcium oxalate, starch grains, fragments of cork and phloem fibers.

Behavior of bark powder with different chemical reagents

The bark powder behavior with different chemical reagents indicates presence of xanthoproteins, tannins, flavonoids, steroids, glycosides, proteins, oils and alkaloids. Tests for tannins and starch were negative (Table- 1).

Fluorescence character of bark powder under visible and UV light

Bark powder of *M. indica* treated with different chemical reagents produces black fluorescence under 366nm UV light except chemical reagent 5% KOH which produces dark brown fluorescence (Table - 2).

Phytochemical screening

Bark extracts of *M. indica* shows higher concentration of tannins, phenols, flavones, reducing sugars and xanthoproteins; medium concentration of anthraquinones, alkaloids and low concentration of glycosides. The tests for coumarins and saponins were negative (Table- 3).

Pharmacognostical characterization and standardization of *Abutilon indicum* bark was carried out by Das *et al.*¹¹. It belongs to family malvaceae and has medicinal properties like laxative, diuretic, sedative, expectorant and deculcent. The plant material was collected from Barpali, Bargarh, Orissa. The outer surface was brownish grey in colour and inner surface was smooth, light yellow coloured with bitter taste and characteristic odour. Transverse section of the bark of *A. indicum* shows epidermis, cortex, phelloderm, phloem fibres, phloem parenchyma, medullary rays, cambium, xylem vessels and xylem fibres. The results of the present pharmacognostical

study of bark of *Maesa indica* showed that outer surface of bark was rough, lenticellate with grey colour while inner part was fairly smooth with brown colour. T.S. of *M. indica* bark shows outer cork, phelloderm, cortex, secondary phloem and medullary rays. Xylem vessels and xylem fibres which were recorded in *A. indicum* stem bark were not observed in stem bark of *M. indica*.

Saha *et al.*¹² have done pharmacognostical studies of the bark of *Parkinsonia aculeata*. Authors got positive tests for steroids in benzene extract, alkaloids and flavonoids in chloroform and ethanol extract and flavonoids, reducing sugars and tannins in aqueous extract. Result obtained from present work reveals that bark extract of *Maesa indica* which belongs to family Myrsinaceae shows positive tests for phenols anthraquinones, flavones, tannins, alkaloids, reducing sugars xanthoproteins and glycosides. Bark extract of *M. indica* shows higher concentration of tannins phenols, flavones reducing sugars and xanthoproteins; medium concentration of anthraquinones, alkaloids and low concentration of glycosides. The tests for coumarins and saponins were negative.



Figure 1: *Maesa indica* (Roxb.) Flowering twig

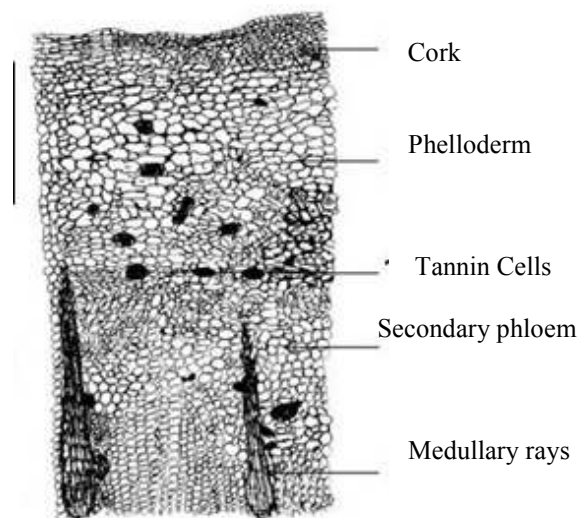


Figure 2: *Maesa indica* (Roxb.) T. S. of stem bark

Table 1: Behavior of powdered drug with different chemical reagents

Sr. No	Treatment / Reagent	Behavior	Inference
1	Powder as such	Brown	--
2	Powder + 1 N NaOH	Black brown	Flavonoid
3	Powder + 5% Iodine	Brown	--
4	Powder + 40% NaOH + Lead acetate	Buff white	-
5	Powder + Conc.H ₂ SO ₄	Dark brown	Steroid
6	Powder + Conc. HNO ₃ + Ammonia	Dark brown	Xanthoprotein
7	Powder + 5% FeCl ₃	Dark green	Tannin
8	Powder + 5% KOH	Dark red	Glycoside
9	Powder + 1% AgNO ₃	Grey	Protein
10	Powder + Sudan III	Brown	Oil
11	Powder + Glacial acetic acid	Brown	--
12	Powder + Picric acid	Yellow	Alkaloid

Table 2: Fluorescence characters of powdered drug under Visible and U.V. light

Sr. No	Treatment / Reagent	Visible	254 nm	366 nm
1	Powder as such	Brown	Forest green	Black
2	Powder + NaOH in water	Dark maroon	Dark reddish brown	Black
3	Powder + NaOH in Alcohol	Seal brown	Dark brown	Black
4	Powder + Conc. HCl	Dark seal brown	Fern green	Black
5	Powder + Conc. H ₂ SO ₄	Reddish brown	Pthalo green	Black
6	Powder + Conc. HNO ₃	Orange red	Pomono green	Black
7	Powder + 10% HCl	Orange	Black	Black
8	Powder + Acetone	Brown	Dark olive green	Black
9	Powder + 5% KOH	Dark maroon	Dark maroon	Dark brown
10	Powder + Iodine	Brown	Dark olive green	Black
11	Powder + FeCl ₃	Grey	Asparagus green	Black
12	Powder + D.W.	Brown	Forest green	Black

Table 3: Phytochemical tests

Chem. constituents	Solvents					
	Methanol	P. ether	Acetone	Chloroform	Ethanol	Aqueous
Phenols	++	-	+++	+	++	+++
Anthraquinones	-	+	++	+	-	-
Flavones	+++	-	+++	-	+++	+++
Tannins	+++	-	++	-	++	++
Coumarins	-	-	-	-	-	-
Saponins	-	-	-	-	-	-
Alkaloids	++	-	+	+	+	-
Reducing sugars	-	-	-	-	-	+++
Xanthoprotein	+++	-	++	++	+++	++
Glycosides	-	-	-	-	-	+

(+ = Low, ++ = Medium, +++ = High, - = Absent)

CONCLUSION

The present study on pharmacognostical and phytochemical evaluation of stem bark of *Maesa indica* (Roxb.) provide useful information for its identification. Macroscopic and microscopic characters, behavior of bark powder analysis, fluorescence characters of bark powder and phytochemical tests can be used as a diagnostic tool in the correct identification of plant. Phytochemical tests revealed the presence of tannins, phenols, flavones, reducing sugars, xanthoproteins, alkaloids and glycosides. The adulterants if any in the plant material can also easily identified by these studies. The study scientifically validates the use of plant in traditional medicine..

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