ABSTRACT

*Cordia macleodii* Hook. (Boraginaceae), known as Sikhari/Phanki by the tribals of Orissa, is a plant of ethnomedicinal importance and is available in Gandhamardana hills ranges of Orissa. Stem bark of this plant is used for healing wounds and for treating jaundice. In this study, an attempt has been made to study pharmacognostical characters of the stem bark which includes its macroscopic and microscopic characters and preliminary phytochemistry including TLC and HPTLC. Bark shows microscopic characters like cork, cortex, medullary rays, sclerenchyma fibres, phloem, cambium and crystals. The phytochemical tests show presence of alkaloids, glycosides, tannins and HPTLC profile shows presence of 9 spots and 8 spots at 254 and 366 nm respectively.

**Key words:** *Cordia macleodii*, ethnomedicine, pharmacognosy, jaundice, wound healing, Gandhamardan hill.

INTRODUCTION

*Cordia macleodii* Hook. (Boraginaceae), native to India, is a small sized tree. It has been reported that the tribal people use this plant as an aphrodisiac and also to treat mouth sores and jaundice\(^1\). Leaf of this plant is being reported as a wonderful wound healing drug\(^2\). Researches have been carried out to evaluate hepatoprotective activity\(^3\), pharmacognostical evaluation\(^4\) and pharmacological evaluation of wound healing activity\(^5\) of its leaf. Though the stem bark of this plant has been highlighted for different ethnopharmacological properties\(^6\) research study report on its stem bark, except its phytochemical constituents\(^7\), is lacking\(^8\). In the present study an attempt has been made to evaluate the pharmacognostical characters of its stem bark.

Materials and Methods

Stem bark of *C. macleodii* Hook was used as material.

Collection of Sample

The plant was identified by local traditional practitioners and authenticated by expert taxonomist, on the basis of characters given in Flora of Orissa\(^9\). Stem bark of the plant was collected from its natural habitat in the month of November and shade dried. The shade dried bark was pulverized and sieved through 80 mesh and preserved in an airtight glass container for future physicochemical and phytochemical anlysis.

Preservation of wet sample

Fresh stem bark sample was preserved in a solution prepared from glacial acetic acid, alcohol, formalin and distilled water following standard procedures\(^10\).

Microscopic evaluation

Thin sections of the stem bark portion were taken by maceration method\(^11\). They were treated with respective reagents for detection of chemicals\(^12\).

Photographs

Photomicrographs were taken by using Canon digital camera attached to Zeiss microscope.
Physicochemical investigation

The preserved sample as mentioned above was used for the physicochemical and preliminary phytochemical investigations by the standard procedure adopted by Ayurvedic Pharmacopoeia of India\textsuperscript{[13]}. Fluorescence analysis was done as per Chase and Pratt (1949)\textsuperscript{[14]}.

HPTLC

Sample preparation

Hydrolyzed alcohol extract was used which was collected by Soxhlet extraction process. The filtrate was filtered and evaporated to dryness and the residue was dissolved in hydro alcohol.

<table>
<thead>
<tr>
<th>Mobile phase</th>
<th>Ethyl acetate: Methanol: Water [100:17.5:12.5]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary phase</td>
<td>Precoated Silica gel G\textsubscript{254} (Merck)</td>
</tr>
<tr>
<td>Detection</td>
<td>(1) Day light</td>
</tr>
<tr>
<td></td>
<td>(2) Short U.V. (254 nm)</td>
</tr>
<tr>
<td></td>
<td>(3) Long U.V. (366 nm)</td>
</tr>
<tr>
<td></td>
<td>(4) Spraying with 10% Methanolic KOH</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

Morphology\textsuperscript{[15],[16]} (Plate 1)

It is a small tree of 9-12 m. height, trunk about 50-60 cm in diameter. Bark is light green, 12-15mm thick; curved inside with longitudinal striations along with large amount of fibres, reddish brown colour inside, cut surface darker in colour. On injury, it forms exudate which is reddish brown in colour. Branchlets are white tomentose.

Microscopic Study

T.S. of stem bark: (Plate 2)

Bark brownish with a thickness of 12-15 mm shows a well developed outer cork which comprises about 1/3\textsuperscript{rd} of the thickness of entire bark and the remaining portion is composed of a very thin/undifferentiated cortex and a very wide phloem which occupies the major portion of the bark followed by a narrow cambium.

Cork (Fig.2a)

Cork is made of 8-12 layers of rectangular shaped tangentially elongated radially arranged cells with brownish colouring materials in 5-10 rows.

Cortex (Fig.2a)

Cortex is very narrow and cannot be differentiated from the inner phloem.

Medullary rays (Fig.2e)

Wide medullary rays start just below from the narrow cortex and reach up to the region of cambium. The medullary ray cells are mostly radially elongated, rectangular shaped cells and bi to multisieriate. Most of the medullary ray cells are multisierate and 3-5 cells wide and several of them also contain prismatic crystals of calcium oxalate. One or two large groups of sclerenchyma cells are also found in this region. They also contain prismatic crystals of calcium oxalate and brownish contents.

Crystals (Fig.2c)

Some of the parenchyma cells surrounding them contain prismatic crystals of calcium oxalate embedded with brownish colouring materials.

Parenchyma (Fig.2e)

Middle bark is narrow and comprised of a thin phalloderm consisting of thin walled parenchyma.

Inner bark (Fig.2d)

Inner bark occupies the major part of the living tissue which constitutes the phloem, medullary rays and tangential rows of sclerenchyma fibres in groups. Outer zone consists of many radial as well as tangential strips of compressed parenchyma cells associated with phloem tissues and group of sclerenchyma fibres and secretory cells containing brown contents and prismatic crystals of calcium oxalate. Many radial rows of crushed phloem elements are also present on either sides of radially running medullary rays.

Phloem (Fig.2g)

Phloem is formed by a large number of fibre groups arranged in tangential rows alternating with parenchyma and phloem tissues. The fibre cells are much thick walled and lignified. Most of the fibre groups are rectangular in outline and each group contains 30-80 fibre cells and rarely 100-150 cells may also be seen. The cells of the phloem alternating with these fibre groups are smaller in dimension and thin walled with regularly arranged radial rows. Secretory cells filled with brown contents and prismatic crystals are common throughout this region.
**Sclerenchyma fibres (Fig.2e)**

Fibre groups are lignified and on application with phloroglucinol followed by HCl show reddish/pinkish colour formation establishing all of them are lignified sclerenchyma fibres. In the phloem region, some of the parenchyma cells are also found with pitted walls and some of the cells are also found filled with orange reddish contents.

**Cambium**

A cambium is present just inner to the phloem region. The cambium is made up of thin walled rectangular shaped cells arranged in radial rows.

**Physicochemical tests**

Physicochemical analysis of the leaf shows the following results and could be taken as standard for further study. Loss on drying shows the moisture of the drug which was found to be 9.21% w/w. Total ash content shows the presence of inorganic materials in the drug. Acid insoluble ash was

**Starch grains**

Few simple and compound starch grains are also found in parenchyma cells particularly phloem region. On application of iodine shows blue colouration indicating the presence of starch in few of parenchyma cells.
found to be 0.73% w/w. Water soluble and alcohol soluble extractive values denote the percentage of that can mix with the solvents which were found as given in the table 1. Qualitative tests show presence of alkaloids, glycosides, phenols, flavonoids, terpenoids and tannin. HPTLC of the leaf powder shows 9 spots under short UV (254 nm) while it shows 8 spots under long UV (366 nm) radiation.

CONCLUSION

Table No. 3 shows 9 spots when scanned at 254 nm and 8 spot at 366 nm. After spraying with 10% FeCl3 it shows 8 spots. This spray reagent is used for Phenolic and Flavonoid type compound which means Phenolic and Flavonoid type compounds are present in drug sample.

On the basis of the pharmacognostical characters bark of Cordia macleodii Hook. can be identified and its identity, purity and strength can be assessed.

ACKNOWLEDGEMENT

Authors are thankful to Mr. B.N Hota, Malaya Das,(both are forest officers) Pareswar Sahoo and Sunil Sen(both are plant taxonomy expert), Bargarh, Orissa for their help in identification and collection of the drug from forest of Orissa.

REFERENCES

4. Bhargav Bhide, RN Acharya, APG Pillai, VJ Shukla; Pharmacognostic evaluation of Cordia macleodii Hook., leaf, an ethnomedicinally important plant; paper accepted for publication to AYU International peer reviewed journal

Table 1: Physicochemical analysis C.macleodii bark

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Stem bark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Matter</td>
<td>Nil</td>
</tr>
<tr>
<td>Loss on Drying % w/w</td>
<td>9.21</td>
</tr>
<tr>
<td>Total Ash Content % w/w</td>
<td>11.07</td>
</tr>
<tr>
<td>Acid Insoluble Ash % w/w</td>
<td>0.73</td>
</tr>
<tr>
<td>Water Soluble Extractive Value % w/w</td>
<td>7.8</td>
</tr>
<tr>
<td>Alcohol Soluble Extractive Value % w/w</td>
<td>13.75</td>
</tr>
<tr>
<td>pH</td>
<td>6.01</td>
</tr>
</tbody>
</table>

Table 2: Qualitative tests of C.macleodii bark

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Stem Bark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids (M.E.)</td>
<td>+</td>
</tr>
<tr>
<td>Glycosides (W.E.)</td>
<td>+</td>
</tr>
<tr>
<td>Phenols (M.E.)</td>
<td>+</td>
</tr>
<tr>
<td>Flavanoid (M.E.)</td>
<td>+</td>
</tr>
<tr>
<td>Terpenoids (Cl.E.)</td>
<td>+</td>
</tr>
<tr>
<td>Tannin (W.E.)</td>
<td>+</td>
</tr>
<tr>
<td>Saponin (W.E.)</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 3: Showing consolidated data of HPTLC profile of C.macleodii bark

<table>
<thead>
<tr>
<th>Conditions</th>
<th>No. of spots</th>
<th>Max. Rf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short UV (254 nm)</td>
<td>9</td>
<td>0.18,0.27,0.34,0.44,0.48,0.55,0.63,0.67,0.76</td>
</tr>
<tr>
<td>Long UV (366 nm)</td>
<td>8</td>
<td>0.18,0.27,0.36,0.42,0.55,0.63,0.69,0.75</td>
</tr>
<tr>
<td>After spray with 10% FeCl3</td>
<td>8</td>
<td>0.18,0.27,0.44,0.48,0.55,0.63,0.67,0.76</td>
</tr>
</tbody>
</table>

Diagram 1: Showing HPTLC profile of C. macleodii bark (A-254 nm, B-366nm)

6. Ibidem 1


10. Ashok Bendre; Practical Botany, Rastogi Publication, Meerut 2007, page 8-11

11. Ibidem 4


15. Ibidem 8