PHARMACOGNOSTICAL EVALUATION OF CASTOR LEAVES

Bindu Gopalkrishnan* and Shinvetra Rampally

*Department of Botany, Mithibai College, Vile Parle (West), Mumbai – 56.

ABSTRACT

Ricinus communis Linn. is commonly known as Castor. It is a perennial shrub. Castor belongs to the family Euphorbiaceae. The oil obtained from the seeds is well known for its medicinal properties. The therapeutic potential of the castor leaves are less known. The leaf juice is a purgative, lactagogue and emmenagogue. In order to introduce castor leaves for its medicament the current study is undertaken. The present investigation deals with the pharmacognostical studies on castor leaves. For Pharmacognostical evaluation macroscopy, microscopy, powder study and histochemical analysis of leaves were performed. Physicochemical constants such as ash and extractive values were determined. The Physicochemical analysis showed ash values 3.3 % in which the acid insoluble ash is 1 % and water soluble is 8%. The preliminary phytochemical studies revealed the presence of saponin, terpenoids, anthraquinone and cardiac glycosides.

KEYWORDS: Ricinus communis, Castor, Euphorbiaceae, pharmacognosy.

INTRODUCTION

Castor is botanically named as Ricinus communis Linn. belongs to family Euphorbiaceae. It is also known as ‘Eranda’ in Sanskrit.[1] The plant is a tall, stout and glaucous perennial shrub. The plant is a native of Africa. It is extensively cultivated for its oil bearing seeds. It has become naturalized in many parts of India. The castor oil and its uses are well known to all, but the use of leaves as medicine is less known. The leaf juice is given as an emetic in narcotic poisoning. The decoction of leaves is a purgative, lactagogue and emmenagogue.[2] A poultice of the leaves is applied to boils and swellings. The hot leaves are applied over the abdomen of children to relieve flatulence. In women the leaves promote menstrual flow. Tender leaves cure pain in bladder.[3] Leaves are also recommended to relieve headache and
joint pains.\(^{[4,5,6]}\) The castor seeds are studied for its pharmacognosy but, there are no reports on leaves of the said plant. The present study was therefore undertaken to put forth the pharmacopeial standards for the Castor leaves. Fig. 1

**MATERIAL AND METHODS**

**Procurement of Plant material**

Authentic leaf samples of *Ricinus communis* Linn. were collected from Bhavans College Campus, Andheri with prior permission. The sample was authenticated for its botanical identity with the help of Dr. Suchandra Datta. A voucher specimen has been deposited in Botany Research Laboratory of Mithibai College, Thane, Mumbai, India (MIT 0056).

**Processing of Plant material**

The fresh leaves of *Ricinus communis* Linn. was used for macroscopic and microscopic studies. The leaves were subjected to artificial drying at 40°C. They were ground into powder which was found to be moderately coarse as seivable through mesh no. 710 with 0.710 mm size of aperture. The coarse powder was subjected to powder microscopy, physicochemical parameters and preliminary phytochemical screening.

**Macroscopy**

A systematic examination of the shape, size, surface, texture, colour, taste and odour of the leaves of *Ricinus communis* was carried out. The external features of leaves were observed using dissecting microscope.\(^{[7,8,9]}\)

**Microscopy**

Transverse hand cut sections of authenticated samples were taken and made permanent with suitable stains. For the measurement of cell contents like, starch grains, vessels, calcium oxalate crystals, stomata etc. ocular and stage micrometer were used. Photographs were taken using Motic microscope.\(^{[10,11,12,13]}\)

**Histochemical studies**

The histochemical studies for the cell contents were performed as per the standard methodology of Krishnamurty.\(^{[14]}\)

**Powder microscopic study**

The powdered drugs were soaked in aqueous solution of chloral hydrate and mounted in 50% glycerin for microscopical studies. Photographs were taken.\(^{[15]}\)
Physicochemical parameters
The determination of various physicochemical parameters such as total ash, acid insoluble ash and water soluble ash; water and alcohol extractive values were determined and estimated in percentage using the method recommended by Indian Pharmacopoeia.[16, 17]

Preliminary Phytochemical screening
For the preliminary phytochemical screening a known quantity of dried powder was extracted with alcohol and water. These extracts were tested for different constituents like saponins, triterpenoids, glycosides etc. [18, 19]

RESULTS AND DISCUSSION
Macroscopic studies
The castor leaves are petiolate, alternate, large, palmately lobed, lobes 7-8, serrate margin and reticulate venation. The upper surface of leaf is dark green while the lower surface is light green in colour. It measures 22-23.2-24.5-25cm in length and 11-12.2-15.1-16.5cm in breadth. It is brittle in fracture, odourless and bitter in taste. Figs. 2.

Microscopic studies: T.S of mature leaf shows.

Lamina region: It consists of upper and lower epidermis. They are covered with thin cuticle and interrupted with stomata and uniseriate trichomes. Each epidermal cell is tangentially elongated. The mesophyll region shows presence of elongated closely packed palisade cells filled with chloroplast. The palisade cells are single layered below the upper epidermis but are three layered close to the midrib region. It is followed by three layers of polygonal chlorenchymatous spongy tissues. Poorly developed vascular bundles are observed within the mesophyll region.

Midrib region: This region shows upper and lower epidermis similar to that of lamina. The collenchyma cells of 7-8 layers are observed just below the upper epidermis while it forms 2-3 layers above the lower epidermis. The collenchyma cells at the lower region are interrupted with oil ducts at intervals. The collenchyma cells are followed by polygonal parenchyma cells. It is filled with starch grains, few tannin filled cells and spharaphide type of calcium oxalate crystals. The large vascular bundle is semicircular with a small vascular bundle at the upper side facing the larger one. The vascular bundle consists of xylem facing towards the upper epidermis and phloem downward. Figs. 3-6
The upper and lower epidermis of castor leaves shows, the presence of paracytic stomata. Fig.7,8

**Histochemistry**

The histochemical analysis using various reagents showed the presence of primary and secondary metabolites like starch, lipids, proteins, tannins, saponins, glucosides and calcium oxalate crystals respectively.

**Powder study**

Microscopic examination of powder shows the presence of paracytic stomata, palisade tissue, collenchymas cells, parenchyma cell, tannin filled cell, fibers, starch grains, calcium oxalate crystals, oil globules and trichomes Figs,9,10,11.

**Physicochemical parameters of Ricinus communis Leaves**

Table 1: Ash values.

<table>
<thead>
<tr>
<th>Ash values</th>
<th>Values in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash</td>
<td>Not more than 3.3%</td>
</tr>
<tr>
<td>Acid insoluble ash</td>
<td>Not more than 1 %</td>
</tr>
<tr>
<td>Water soluble ash</td>
<td>Not more than 8%</td>
</tr>
</tbody>
</table>

Table 2. Extractive values

<table>
<thead>
<tr>
<th>Extractive values</th>
<th>Values in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water soluble extractive value</td>
<td>Not less than 7 %</td>
</tr>
<tr>
<td>Alcohol soluble extractive value</td>
<td>Not less than 1.6 %</td>
</tr>
</tbody>
</table>

Table 3: Preliminary phytochemical screening Ricinus communis Leaves

<table>
<thead>
<tr>
<th>Test for phytoconstituents</th>
<th>Water extract</th>
<th>Ethanol extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test for Starch</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Terpenoids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Proteins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Mucilage</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Test for Alkaloids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Anthraquinone glycoside</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Cardiac glycoside</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Saponin</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Test for Tannins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Steroids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for Flavonoids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Test for phenols</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

+ Present, - Absent
Fig 1: Habit of *Ricinus communis*

Fig 2: A-Upper & B-Lower surface of leaf

Fig 3; T.S. of leaf showing upper portion of mid rib

Fig 4; T.S. of leaf passing through mid rib

Fig 5; T.S. of leaf passing showing lower portion of mid rib

Fig 6; T.S. of leaf passing through lamina

[pa-parenchyma cells; t-tannin filled cell; col-collenchyma cell; ca-calcium oxalate crystal; x-xylem; phl-phloem; pal-pallisade tissue; sp-spongy tissue; lwe-lower epidermis, upe-upper epidermis; od-oil duct]
CONCLUSION

The seed oil of *Ricinus communis* is a traditionally used and potent medicinal plant. The leaves of Castor too have medicinal properties. The current investigation is based on leaf macroscopy, microscopy, histochemistry, powder study, physicochemical parameters and preliminary phytochemical analysis. Macroscopic and microscopic study was carried out for identification of the plant. The authenticity of the crude drug could be equally judged by these physicochemical constants providing a reliable aid for detecting the adulteration. Ash values are used to determine quality and purity of drug. The extractive values are useful to evaluate the chemical constituents present in crude drugs and also help in estimation of specific constituents soluble in particular solvent. Histochemical and preliminary phytochemical analysis is useful in determining the chemical constituents present in the said plant drug. The detailed phytochemistry and pharmacological studies need to be further carried out in order to prove the therapeutic uses of Castor leaves.
REFERENCES

15. Iyengar MA. Pharmacognosy of powdered crude drugs. Edn 1, Manipal, 1974.