

PHARMACOGNOSTICAL AND PHYTOCHEMICAL EVALUATION OF STEM OF *ABUTILON INDICUM*

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ABSTRACT

Abutilon indicum (Linn.) a Malvaceae member is used in our traditional system of medicine for healing various diseases. It is used in the treatment of piles, uterine discharge, and febrifuge and in cases of pulmonary tuberculosis. In the present investigation an attempt was made to study its pharmacognostical features, including macroscopic, microscopic features, physico-chemical parameters, stem constituents and to investigate the phytochemical presence in the preliminary level.

Key words: *Abutilon indicum*, Febrifuge, Piles

INTRODUCTION

Herbal medicines derived from plant extracts are being increasingly utilized to treat a variety of clinical diseases, though relatively little knowledge about their mode of action is available. To explore the possibility of using the traditional medicine with proper chemical and pharmacological profiles, there has been a large volume of work aimed at scientific validation of efficacy of herbal drugs used in the traditional medicine [1]. The use of plants to promote health care and treatment of various diseases has become accepted rapidly. Currently plant based drugs are researched and formulated in modern framework in new ways of medicine. Thousands of plant species growing throughout the world have medicinal uses, containing active constituents that have a direct pharmacological action on the body. *Abutilon indicum* is a small shrub which is being medicinally used since ancient times and was a part of therapeutic regimen for a range of maladies. This article provides an overview of key concepts regarding the pharmacognostical and preliminary phytochemical screening of stem of *Abutilon indicum*.

Abutilon indicum (family: Malvaceae) is extensively grown in India, Bangladesh, Pakistan, Sri Lanka [2]. The plant is considered as astringent, antibacterial, anthelmintic, carminative and diuretic. It is used locally for colds, high fever, mumps, tuberculosis, bronchitis, diabetes, carbuncle, haemorrhoids, hernia, diarrhoea and various types of worm infections.[2]. Previous phytochemical investigation of the plant revealed the presence of chemical constituents namely luteolin, chrysoeriol, apigenin 7-O-beta rhamnopyranosyl, quercetin, triacontanoic acid, methyl stigma sterol, glucopyronoside etc [3].

MATERIALS AND METHODS

Plant material

Abutilon indicum stem were collected during the month of January 2011, from Children's park, Guindy, Chennai, India and authenticated by Dr. P. Jayraman, Director of plant Anatomy Research Centre Chennai. The fresh stem were separated and kept for shade drying. Dried stem material was powdered using mechanical grinder and passed through 60 mesh sieve to get the powder of desired coarseness. Powdered material was preserved in an air tight container.

Pharmacognostical studies

Morphological studies were done by using simple microscope to determine the shape, size, taste and odour of the stem. Microscopic studies were done by preparing a thin section with the help of Rotary Microtome with the thickness of 10-12mm and stained [4,5], and photographed using Nikon lab photo 2 and described [6]. The section was cleared with chloral hydrate solution and was stained as per the protocol. Histochemical reactions were applied with concentrated hydrochloric acid and phloroglucinol and were mounted in glycerine for the identification of lignified elements, iodine solution for identification of starch grains, ruthenium red for mucilage, 60% sulphuric acid for calcium oxalate crystals by reported methods [7,8].

Physico chemical parameters

The parameters were done to evaluate the proceedings of total ash; water soluble ash; acid insoluble ash and sulphated ash were calculated as per Indian pharmacopoeia[9]. Extracts of the powdered stem was prepared with different solvents for the study of extractive value. Fluorescence analysis was also carried out for the powder and for extract as per standard procedure [10].

Powder analysis

Preliminary analysis of the stem powder of stem of *Abutilon indicum* with different chemical reagents was carried out microscopically [11,12].

Extraction of Plant material

For preliminary phytochemical analysis, extract was prepared by weighing 600grams of the dried powdered stem were subjected to hot successive continuous extraction with different solvents as per the polarity, petroleum ether, benzene, chloroform, ethanol and finally with aqueous. The extracts were filtered in each step using Whatman filters paper. The filtrate was concentrated using a rotary evaporator at low temperature (40-45 °C) and pressure. The presence or absence of the primary and secondary phytoconstituents was detected by usual prescribed method[13].

RESULTS AND DISCUSSION**Microscopic features of the stem****Young stem**

The young stem is circular in transverse sectional view with dense matter of epidermal trichomes which are two types, glandular and non-glandular (fig I). Stem consists of wide outer collenchymatous cortex, measuring 150µm thick and inner cortex is equally wide and parenchymatous (fig II and III). There are 9 or 10 discrete triangular collateral vascular bundles with wide medullary rays. The vascular bundle consists of prominent discontinuous masses of bundle cap fibres, thin layer of phloem and several short parallel lines of xylem elements. The pith is wide and parenchymatous (fig IV and V).

Thick and old stem

The thick stem exhibits well developed secondary growth having closed vascular bundle with secondary xylem and phloem. The outer border of the phloem is surrounded thick masses of sclerenchyma (fig VI and VII). Xylem cylinder comprises radial rows of vessels and thick walled xylem fibres. The pith is wide, parenchymatous with starch grains and mucilages.

Powder Microscopy

The stem powder was characterised on its morphological feature having light green with astringent odour having characteristic taste. The dried fine powder was stained with chloral hydrate to detect the presence of calcium oxalate druses, 20µm wide, prismatic in nature and located in phloem rays (fig VIII). Glandular trichomes and non-glandular trichomes were visible in glycerine mount. The size of the gland is 140µm in height; the mid part is 20µm thick. Vascular bundles and fibres were observed, when stained with ploro glucinol and concentrated hydrochloric acid.

Physico chemical parameters

The powdered drug was evaluated for its physico-chemical parameters like total ash values, acid insoluble ash, water soluble ash and loss on drying, and the results were tabulated (Table I)

Fluorescence analysis of the extracts

The extracts were prepared as per their polarity in hot successive extraction technique, and they were treated with reagents and the colour changes were observed under Ultra Violet light and the results were tabulated (Table II)

Extractive values

The extracts were prepared according to the polarity and they were concentrated and their values were calculated with reference to air dried drug and the results were tabulated (Table III).

Preliminary phytochemical analysis

The stem powder and various extracts such as petroleum ether extract, benzene extract, chloroform extract, ethanol extract and aqueous extract were subjected to preliminary phytochemical screening for their presence or absence of the constituents and the results were tabulated (Table IV).

The plant *Abutilon indicum* is used from ancient time for its great medicinal values as a remedy for various ailments in day to day life. Alkaloids, flavonoids, steroids, terpenoids and saponins have been isolated and characterized from genus *Abutilon indicum*[14,15]. Previous phytochemical investigations of *Abutilon indicum* showed the presence of seven flavonoids, two sesquiterpene lactones, gallic acid, β-sitosterol, geraniol and

caryophylline[16]. can be used in the treatment of infectious diseases. Powder analysis of the crude drug revealed the presence of prismatic crystal of calcium oxalate, fibres, mucilage's and glandular and non-glandular trachoma's. Fluorescence analysis and micro chemical colour indicative tests were also carried out with a view to establish the authenticity of the drug. Besides these tests, ash values, extractive values and preliminary phytochemical screening were also carried out. The total ash, acid soluble ash and water insoluble ash were 25.08%, 6.10% and 7.55% respectively. The maximum extractive value was found in distilled water (18%) followed by ethanol (7.2%) Petroleum ether (3.2%) Benzene (2.8%) Chloroform (2.4%). All the extract of the drug was subjected to different tests for detecting the presence of various phyto constituents present in the drug, which revealed the presence of alkaloids, glycosides, steroids, and tannins. Barring the anatomical details and preliminary phytochemical screening, rest of the pharmacognostical parameters have been studied for the first time in stem of *Abutilon indicum*. Moreover the action of antimicrobial agents is poorly understood and remains debatable. On the other hand, the chemical constituents of these extracts may have a causal role *in vivo* prevention of diseases caused by bacteria, fungi and virus. The presence of steroids, tannins and alkaloids in various extracts give the route that this common weed in Indian subcontinent may be used to treat cancer[17].

CONCLUSION

In conclusion, further extensive phytopharmacological studies are necessary to find out the active principles responsible for treating cancer. Nevertheless, this scientific information can serve as an important platform for the development of further safe and effective natural medicine.

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“Figure Legends”.

- Fig I. Section with Epidermal trichomes
 Fig II. T.S of Young stem
 Fig III. T.S of Young stem- portion enlarged
 Fig IV. T.S of old (thin) stem
 Fig V. T.S of old (thin) stem- portion enlarged
 Fig VI. T.S of old (thick) stem
 Fig VII. T.S of old (thick) stem- portion enlarged
 Fig VIII. Section showing Calcium Oxalate crystals

Figures and tables

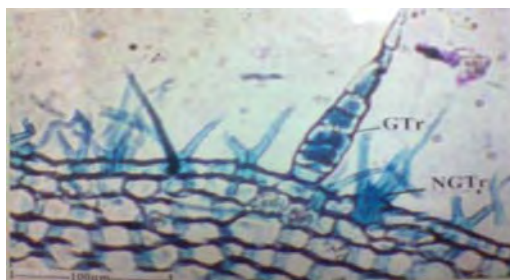


Fig I. Section with Epidermal trichomes

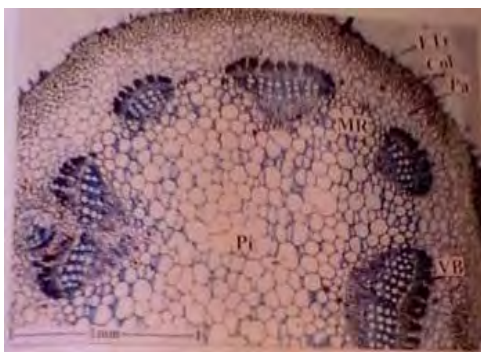


Fig II. T.S of Young stem

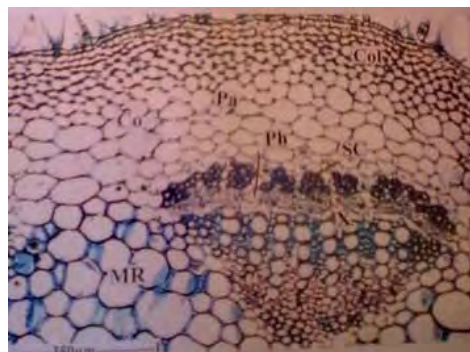


Fig III.T.S of Young stem- portion enlarged

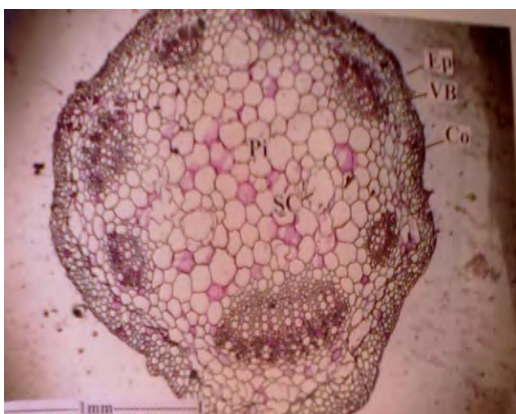


Fig IV. T.S of old (thin) stem

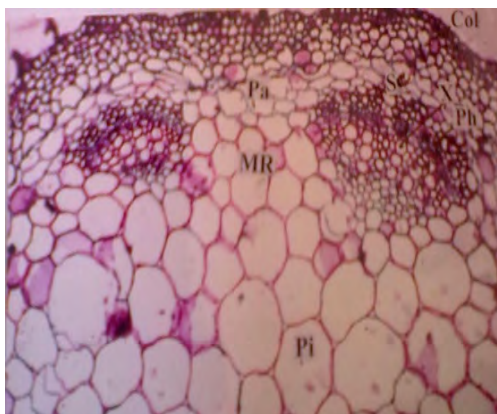


Fig V. T.S of old (thin) stem- portion enlarged

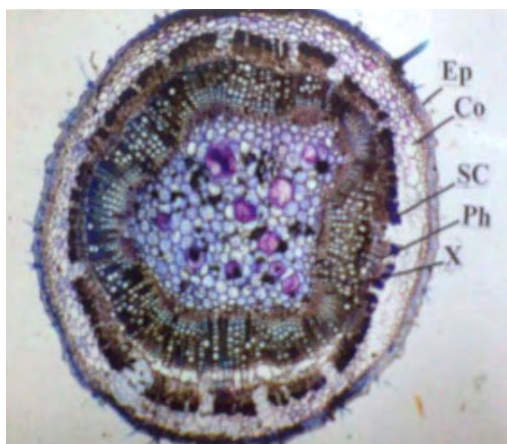


Fig VI . T.S of old (thick) stem

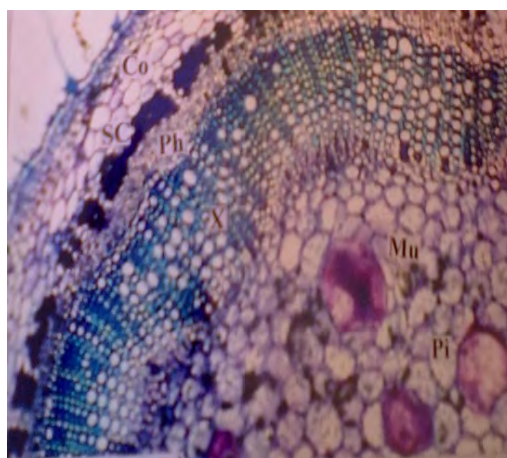


Fig VII. T.S of old (thick) stem- portion enlarged

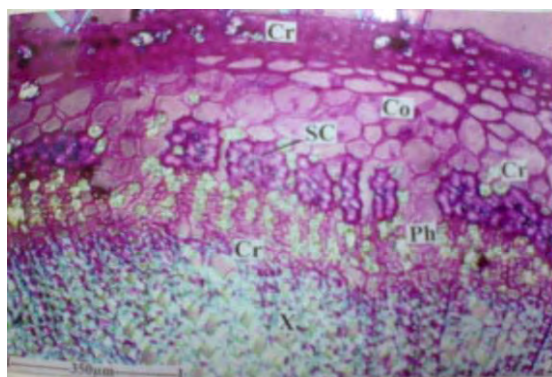


Fig VIII. Section showing Calcium Oxalate crystals

Ep-Epidermis, Etr-Epidermal trichomes, GT-Glandular trichomes, NGT-Nonglandular trichomes, Co-cortex, col-collenchyma, pa-parenchyma, sc-sclerenchyma, Cr-Crystals, Sc-Secretory canal, Vb-Vascular bundle, X-Xylem, Ph-Phloem, Ph-Pith, MR-Medullary rays, MU-Mucilage.

List of tables

Table I: Physico chemical evaluation of the crude drug of stem of *Abutilon indicum*

Table II: Fluorescence analysis of the stem extract of *Abutilon indicum*

Table III: Extractive values of stem extracts of *Abutilon indicum* with different solvents

Table IV: Preliminary phytochemical tests for drug powder and various extracts

Table I: Physico chemical evaluation of the crude drug of stem of *Abutilon indicum*

S.No	Standardization parameters	% W/W
1	Total Ash	25.08
2	Acid Insoluble Ash	6.1
3	Water Soluble Ash	7.55
4	Loss on Drying	0.4

Table II: Fluorescence analysis of the stem extract of *Abutilon indicum*

S.No	Sample	Colour in Day light	Colour in UV light
1	Petroleum ether extract	Brown	Dark green
2	Benzene extract	Green	Green
3	Chloroform extract	Dark green	Dark green
4	Ethanol extract	Dark green	Dark green
5	Aqueous extract	Brown	Green

Table III: Extractive values of stem extracts of *Abutilon indicum* with different solvents

S.No	Extracts	Extractability (%)
1	Petroleum Ether Extract	3.2
2	Benzene Extract	2.8
3	Chloroform Extract	2.4
4	Ethanol Extract	7.2
5	Aqueous Extract	18

Table IV: Preliminary phytochemical tests for drug powder and various extracts

Test	Drug powder	Petroleum Ether	Benzene	Chloroform	Ethanol	Aqueous
Sterols	Present	Present	Absent	Absent	Absent	Absent
Terpenoids	Absent	Absent	Absent	Present	Absent	Absent
Carbohydrates	Present	Absent	Absent	Absent	Present	Present
Flavanoids	Present	Absent	Absent	Absent	Present	Present
Proteins	Present	Present	Present	Present	Present	Present
Alkaloids	Present	Absent	Present	Absent	Present	Present
Glycosides	Present	Present	Present	Present	Present	Present
Saponins	Present	Absent	Absent	Absent	Present	Present
Tannins	Present	Absent	Absent	Absent	Absent	Present
Mucilages	Present	Absent	Absent	Absent	Absent	Present
Volatile oil	Absent	Absent	Absent	Absent	Absent	Absent