Pharmacognostical and Phytochemical Evaluation of stem of Abutilon indicum (Linn.)

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ABSTRACT

Abutilon indicum (Linn) family (Malvaceae) commonly known as Atibala is used in our Traditional System of Medicine for healing various diseases. It is used in the treatment of piles, uterine discharge, 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, Quantitative analysis and to investigated the phytochemical present in the extracts in the preliminary level. Thus it was thought worthwhile to explore the plant on the basis of its standardization parameters. The study will provide referential information for the correct identification of the crude drug.

Keywords: Abutilon indicum, Standardization, microscopy, phytochemical analysis.

INTRODUCTION

Alternative System of Medicine like Ayurveda, Siddha, Unani and Traditional Chines Medicine has gain its importance in the recent few years for its high potential in curing various disease with lesser side effects as compared with the synthetic drugs. These are due to the mainly presence of the secondary metabolites like proteins, flavonoids, alkaloids, steroids and phenolic substances which are in turn used to restore health and heal many diseases. Natural products of plant and animal origin offer vast resource of newer medicinal agents with potential in clinical use.

Abutilon indicum (Linn) family Malvaceae, commonly known as Atibala is an important medicinal plant used in our Traditional System of Medicine to treat various health ailments. The plant is used as demulcent, aphrodisiac, laxative, diuretic, pulmonary and sedative. The leaves are used as astringent [1], bark is used as diuretic and seeds are used as laxative, expectorant and demulcent. [2] The plant contains mucilage, tannins, asparagines, gallic acid and sesquiterpenes. [3] Thus the present investigation was aimed at evaluating the pharmacognostical features and phytochemical analysis for authentication and identification of the plant and also to evaluate the exact extract responsible for the biological activity.

MATERIALS AND METHODS

Plant Material

The fresh stems of the plant Abutilon indicum were collected from the wild sources of the Dhulia district of Maharashtra, in the month of July and were identified from the authentic sources. The collected stems were washed; shade dried and was pulverized with a mechanical pulverizer for the size reduction. It was then passed through Mesh no: 100 and the fine powder was collected and was used for the experiment for powder microscopy and preparation of extract. The fresh stem sample was used for the microscopy identification.

Pharmacognostical Studies

Morphological studies were done by simple visualizing with naked eye to determine the surface, texture, Fracture, taste, colour and odour of the stem. Microscopic studies were done by preparing a thin section of the stem region of Abutilon indicum. The section was cleared with chloral hydrate solution and was stained with different chemicals to observe the changes in the cells. Histochemical reactions were carried out by Concentrated Hydrochloric acid and phloroglucinol mounted in glycerin for the identification of lignified elements, iodine solution for identification of starch grains, ruthenium red for mucilage, 60 % sulphuric acid for calcium oxalate crystals and ferric chloride for the phenolic compounds in the powdered bark by reported methods. [4-5] As a part of quantitative microscopy, length and width of...
trichomes and lignified fibers were determined by using fresh stem powder of the plant. **Physico-chemical parameters** The parameter were done to evaluate the percentage of Total ash, water soluble ash, acid insoluble ash and sulphated ash were calculated as per Indian Pharmacopoeia. [9] Extract of the powdered stem was prepared with different solvents for the study of extractive value. Fluroescence analysis was also carried out for the powder as well as for different extracts. **Powder Analysis** Preliminary analysis of the powder of stem of *Abutilon indicum* was carried out with different chemical reagents. [7-8] **Preliminary Phytochemical Analysis** For Preliminary phytochemical analysis, extract was prepared by weighing 1 kg of the dried powdered stem and were subjected to hot successive continuous extraction with different solvents as per the polarity, methanol, hydro alcoholic and finally with aqueous. The extracts were filtered in each step, concentrated and the solvent was removed by rotary evaporator. The extracts were dried over dessicator and the residues were weighed. The presence or absence of alkaloids, carbohydrates, flavonoids, glycosides, phenolic compounds, saponins, steroids, sterols, tannins and gums were confirmed by chemical reagents like Hydrochloric acid, Sodium hydroxide 0.1 N, Acetic acid, Phloroglucinol-HCl, Hydrochloric acid, and iron chloride. **Results** The macroscopical studies of stem revealed certain characters: 
Fracture: Regular 
Shape: Cylindrical 
Texture: Smooth and bulbous. 
Surface: Fine and smooth. 
Colour: Pale yellow. 
Taste: Characteristic 
Odour: Odourless. 

**Microscopy** The Transverse section should the following characteristic features: The outer region consisted of epidermis and was made up of elongated continuous cells. To the epidermis trichomes were observed which unicellular, uniserate in nature. This is rarely seen in this species of plant. The next region was the arrangement of parenchyma cells which were closely packed and were arranged in 8-9 layers. Below this layer the arrangement of pericyclic fibers were seen. The vascular bundles were arranged radially consisted of 6-7 layers of xylem. Both lignified and nonlignified fibers were observed in this region. The central petiole consisted of pith made up of tightly packed parenchyma cells. In between the vascular bundles and pith loosely packed collenchyma cells were observed and shown in Fig. 1. 

**Powder Microscopy** The powder was characterized on its morphological features as colour: pale yellow, odour: odourless and taste was characteristic in nature. The dried fine powder was stained with chloral hydrate to detect the presence of calcium oxalate crystals. They were prismatic in nature. When stained with phloroglucinol and concentrated hydrochloric acid vascular bundles, spiral vessels, parenchyma cells, lignified fibers and non lignified fibers were observed. With glicerin mounting trichomes were observed which were of covering. All the results are figured in Fig. 2a, 2b, 2c and 2d respectively 

**Fluorescence Analysis** The powder was subject to fluorescence analysis as per the standard procedure and shown in Table 1. 

**Physico-chemical Parameters** The powdered drug was evaluated for its physico-chemical parameters like Ash values: Acid Insoluble ash, Water solubale ash, Water Insoluble ash, Extractive values (Alcohol and water soluble values) and loss on drying. All the results are tabulated in Table 2. 

**Quantitative Analysis** The fresh stem samples were subjected to quantitative analysis for length and breadth of fibers of both lignified and non lignified fibers are tabulated in Table 3. 

**Fluorescence Analysis of the powdered stem of *Abutilon indicum*** 

| S. No. | Sample | Colour in day light | Colour in Short UV 256 nm | Colour in Long UV 480 nm |
|-------|--------|---------------------|--------------------------|-------------------------|
| 1.     | Powder | Light Brown         | Pale Yellow              | Yellowish Brown         |
| 2.     | Powder + Sodium | Yellow | Pale Yellow              | Yellowish Black         |
| 3.     | Powder + 0.1 N Hydride | Light Brown | Pale Yellow              | Brown                   |
| 4.     | Powder + 2 M Hydrochloric acid | Yellow | Pale Yellow              | Dark Yellow             |
| 5.     | Powder + Water | Light Brown | Pale Yellow              | Pale Yellow             |
| 6.     | Powder + Acetic Anhydride | Pale Brown | Lemon Yellow             | Light Brown             |

**Table 2: Physicochemical Evaluation of the crude drug *Abutilon indicum*** 

| S. No. | Standardization Parameters | % w/w |
|-------|-----------------------------|-------|
| 1.     | Total Ash                   | 13    |
| 2.     | Acid Insoluble Ash          | 0.33  |
| 3.     | Water Soluble Ash           | 10    |
| 4.     | Water Insoluble Ash         | 3     |
| 5.     | Alcohol Soluble Extractive Value | 1.6   |
| 6.     | Water Soluble Extractive Value | 21.6  |
| 7.     | Loss on Drying              | 11.37 |

**Table 3: Quantitative Analysis of leaf constants of *Abutilon indicum*** 

| S. No. | Particulars | Values (μm) |
|-------|-------------|-------------|
| 1.     | Length of Fibers | 206.25     |
| 2.     | Width of Fibers  | 10          |
| 3.     | Length of Trichomes | 150.56   |
| 4.     | Width of Trichomes | 6.75      |

**Table 4: Fluorescence Analysis of the stem extract of *Abutilon indicum*** 

| S. No. | Sample        | Colour in day Light | Colour in Short UV 365 nm | Colour in Long UV 480 nm |
|-------|---------------|---------------------|--------------------------|-------------------------|
| 1.     | Petroleum Ether Extract | Brown | Emerald Green          | Orange                   |
| 2.     | Ethyl Acetate Extract | Pale | Greenish Yellow        | Brown                    |
| 3.     | Chloroform Extract | Pale | Emerald Green          | Yellowish Brown          |
| 4.     | Methanolic Extract | Greenish Yellow | Light Green             | Yellow Brown             |
| 5.     | Hydro- Alcoholic Extract | Brown | Emerald Green          | Dark Brown               |
| 6.     | Aqueous Extract | Brown | Greenish Yellow        | Brown                    |
non lignified and trichomes. The results are shown in Table 3.

Fluorescence Analysis of the extracts
The extracts were prepared as per their polarity in hot successive extraction technique. Further they were treated with reagents and the colour changes were observed under Ultr Violet light. All the results are tabulated in Table 4.

Preliminary Phytochemical Analysis
The various extracts were subjected to preliminary phytoconstituents analysis for their presence or absence of the constituents. The results are shown in Table 5.

DISCUSSION
Now a day the standardization of crude drugs has become very important for identification and authentication of a drug. But due to certain problems the importance was not up to the mark. Thus the lack of standardization techniques fails to identify the drug from its originality which thereby exploits the usage of drug from its Traditional System of Medicine. The plant Abutilon indicum is used widely from its ancient time for curing many diseases and gives a helping hand to the humans. Thus a perfect protocol was designed for its authentication and identification on the basis of microscopy and chemical analysis. Thus the present investigation was aimed and the results were found to be significant and encouraging towards the goal for standardization.

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