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Research Article

PHARMACOGNOSTIC, PHYTOCHEMICAL, PHYSICOCHEMICAL AND DETAIL MICROSCOPICAL EVALUATION OF LEAVES *ABUTILON INDICUM (L.) SWEET SSP. INDICUM FAMILY (MALVACEAE)*

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ABSTRACT

Abutilon indicum (L.) Sweet ssp. Indicum Family (Malvaceae) popularly known as Atibala is used as one of the most important drug in traditional system of medicine to treat various ailments. The present study deals with pharmacognostic, phytochemical, physicochemical and detail microscopical evaluation of leaves of Abutilon indicum. Abutilon indicum may be attributed to the successful conversion of botanical folklore medicines to modern wonder drugs and to amend the health condition for people and also to used in pharmaceutics and neutraceutics merchandise of commercial significance. Ethnic people use the ethnobotanical important plant species of Abutilon indicum. So there is necessary to study some phytochemical analysis and biological activities of this plant. Phytochemical screening should be carried out by using pure extract of various plant species of Abutilon indicum. Purification and toxicological studies should be carried out with a view of sourcing Antimicrobial agents for drug development. The propose work of present research is to focus on poisonous effect of Abutilon indicum in the form of powder of leaves and prepare the crude extract.

Keywords: Abutilon indicum (L.) Sweet ssp. Indicum, Malvaceae, Atibala, Pharmacognostic.

INTRODUCTION

Indian Mallow is an erect velvety-pubescent shrub with circular-ovate or heart-shaped leaves with coarsely crenate-serrate margins. The plant can reach up to 1-2 m. The leaves are alternately arranged, and have long stalks and have velvety, soft, pale hairs on them. Orange-yellow flowers, 2-3 cm across, occur solitary in axils, on long stalks, 4-7 cm. Orange-yellow petals are triangular-obovate, 1 cm long or slightly more, staminal-tube hairy with stellate hairs. Fruit is quite interesting - it is circular in shape, consisting of 11-20 radiating hairy carpels, brown when dry; each carpel flattened, somewhat boatshaped. Seeds are kidney-shaped. The plant is a weed commonly found on disturbed land. Flowering: September-April. The leaves contain mucilage, tannin, amino acids, glucose, fructose, galactose, gallic acid sesquiterpene alkaloids, flavonoids, sterols, triterpenoids, saponins, cardiac glycosides and asparagin (11.5 %). Asparagin has diuretic activities. Mucilage present in the plant protects the mucous membrane, urinary system and helps in gastro-intestinal inflammations, lesions and ulcers. Mucilage is diuretic and demulcent (relieve irritation of the mucous membranes in the mouth by forming a protective film). It reduces acidity. annin is astringent and stops bleeding on topical application and diarrhea on oral use. Roots contain fatty acids (linoleic, oleic, stearic, palmitic, lauric, myristic, caprylic, capric etc.). Flowers contain seven flavonoid compounds including quercetin and its glycosides. A chemical compound, β-sitosterol, which has been identified as the active ingredient in many medicinal plants, is present in A. indicum and a petroleum ether extract provided larvicidal properties against the mosquito larvae Culex quinquefasciatus.

Below is given medicinal properties along with the meaning.

- Anti-inflammatory: Leaves, Reducing inflammation by acting on body mechanisms.
- Anti-fungal: Leaves, inhibit fungal infections.
- Anti-convulsant: Leaves, Prevent or reduce the severity of epileptic fits or other convulsions.
- Anti-diarrheal: Leaves, gives relief in diarrhoea.
- Antidiabetic: Leaves, controls diabetes level. Hepatoprotective: Whole plant, Prevent damage to the liver.
- Hypoglycemic: Leaves, Reducing level of the sugar glucose in the blood.
- Immunomodulatory: Leaves, Modifies the immune response or the functioning of the immune system. Lipid lowering: Leaves, lowers lipid.

Atibala is used both internally and externally. It possess potent anti-hemorrhagic, diuretic, demulcent and laxative properties. Its topical application stops bleeding from wounds and heals ulcers, wounds and infections. The seeds give strength and vigor. Aphrodisiac, piles, cough: The seeds are used. Bleeding piles: The leaves are cooked and eaten. Dental problems: Leaf juice and root are taken orally. Indigestion: Leaves made into a chutney and consumed. Rheumatism: Paste of leaves prepared with mustard oil applied externally. Toothache and tender gums: As mouthwash decoction of leaves is used. Ulcers: juice of the leaves prepared into an ointment is applied. Urinary problems, strangury and hematuria: The roots of plant are used due to diuretic activities. Vaginal infections, wounds and ulcers: Decoction of leaves is used.

Fig. 1: Leaves and flowers of *Abutilon indicum (L.) Sweet ssp. Indicum*

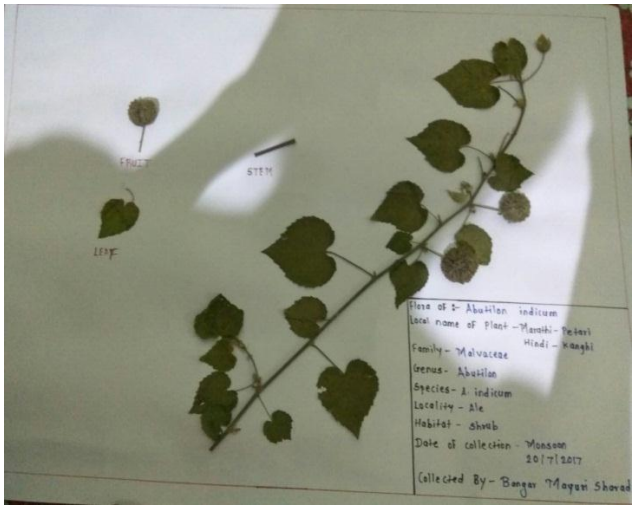

Fig. 2: Herbarium of *Abutilon indicum (L.) Sweet ssp. Indicum*

Vernacular names

Sanskrit: Atibala, Balika, Balya, Bhuribala, Ghanta, Rishiprokta, Shita, Shitapushpa, Vikantaka, Vatyapushpika, Vrishyagandha, Vrishyagandhika
Hindi: Kanghi
Assamese: Jayavandha, Jayapateri
Bengali: Badela
Kannada: Shrimudrigida, Mudragida, Turube
Kashmiri: Kath
Malayalam: Uram, Katuvan, Urubam, Urabam, Vankuruntott, Oorpam, Tutti
Marathi: Chakrabhendi, Petari, Mudra
Maharashtra: Peeli booti, karandi
Oriya: Pedipidika
Punjabi: Kangi, Kangibooti
Rajasthan: Tara-Kanchi, Kanghi, Debi, Jhili, Itwari
Tamil: Nallatutti, Paniyarattutti, Perundutti, Tutti, Vaddattutti
Folk: Kanghi, Kakahi, Kakahiyaa
Arabic: Musht-ul-ghoul
English: Country Mallow, Flowering Maples, Chinese Bell-flowers, Indian mallow

Taxonomical Classification

Kingdom: Plantae – Plants
Subkingdom: Tracheobionta (Vascular plants)
Superdivision: Spermatophyta (Seed plants)
Division: Magnoliophyta (Flowering plants)
Class: Magnoliopsida (Dicotyledons)
Subclass: Dilleniidae
Order: Malvales
Family: Malvaceae – Mallow family
Genus: Abutilon Mill. – Indian mallow
Species: Abutilon indicum (L.)

Part's used – Fruit, leaves, seed and roots
Plant type / Growth Habit: Shrub Subshrub
Duration: Perennial

Distribution

Hotter parts of India, in the sub-Himalayan tract and other hills up to 1200 m.

Habitat

Warm, temperate regions, as a common weed on road sides and other waste places in plains and hills.

MATERIALS AND METHODS

The fresh leaves of Abutilon indicum (L.) Sweet ssp. Indicum Family (Malvaceae), collected at the flowering stages from the most biodiversity area of India at Pune- district , Junnar -Taluka , Maharashtra state where Authenticated by Dr. Mrs. S. S. Rahangdale and the plant a voucher specimen was submitted as herbarium in the Pharmacognosy Department, VJSM's Vishal Institute of Pharmaceutical Education And Research, Ale, Pune412411, Maharashtra-INDIA. The leaves where dried in shades for 20 days & Then powdered to get a coarse powder & then powder pass through the mesh 40 and The dried leaves of Abutilon indicum were subjected to successive solvent extraction using petroleum ether (60-80°C), methanol and distilled water in a soxhlet extraction apparatus and concentrated to get a semisolid residue.(Fig.3)

Fig. 3: Extraction Procedure by Soxhlet

Description

(A)Macroscopic Examination

Macroscopically, (Fig.2) The leaves are alternately arranged, and have long stalks and have velvety, soft, pale hairs on them.

(B) Microscopic Examination

For the study of crystals, starch grains and lignified cells polarized light microscope was employed. Descriptive terms of anatomical features are as given in the standard anatomy books.[4] (Fig.4)

Table 1: Staining / Diagnosis/ Microchemical Test

Sr.No.	Reagents	Observations	Characteristics
1	Phloroglucinol+Hcl(1:1)	Pink	Lignified tissues:xylem(vascular bundle)
2	Sudan Red III	Pink	Cutin/cuticle
3	Ruthenium red	Red	Mucilaginous cells of epidermis
4	Sulphuric acid	Needle shape crystals from calcium sulphate are formed.	Calcium oxalate crystals
5	Alcoholic Picric acid	Yellow	Aleurone Grains
6	Iodine	Blue	Starch

Table 2: Quantitative Microscopy

Sr.No.	Leaf Constant	Mean value
1	Stomatal Index	5.4±0.5
2	Upper Surface	4.9±0.4
3	Lower Surface	15.9±0.5
4	Palisade Ratio	5±1
5	Vein Islet Number	12±1
6	Vein Termination Number	15±2

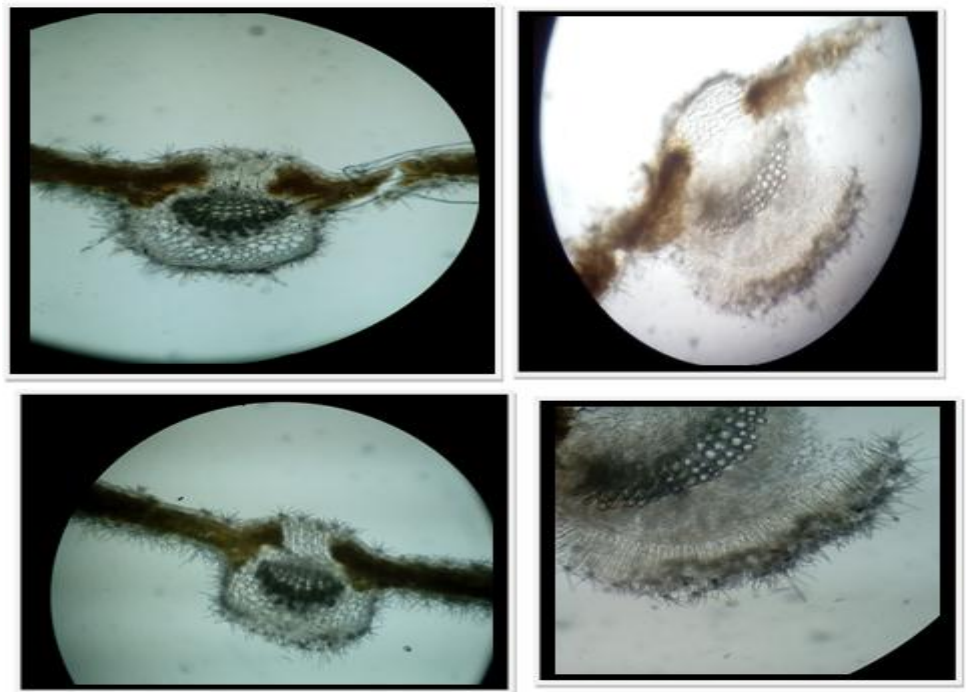

Fig.4: Microscopic Examination of Leaves of Abutilon indicum (L.) Sweet ssp. Indicum

(C) Physico-Chemical Parameter

Crude powdered drug of leaves was used for the determination of various physicochemical parameters such as total ash value, acid insoluble ash value, water soluble ash value, loss on drying, foreign matter, pH, moisture content and extractive values.[5]

Table 3: Physico-Chemical constant of leaves of Abutilon indicum (L.) Sweet ssp. Indicum

Sr. No.	Parameter	Observed Value
1	Acid insoluble Ash	1.53%
2	Water insoluble Ash	2.50%
3	Total Ash	4.44%
4	Water extractive value	4.20%
5	Alc extractive value	5.42%
6	Loss on drying	6.98%

(D) Phytochemical Screening of Leaves exatract

The phytoconstituents present in the alcoholic extract of were expressed in the Table:4 Phytochemical screening procedure

1) Test for alkaloids

To the extract dilute hydrochloric acid will be added and filtered. The filtrate will be treated with various alkaloid reagents

a) Mayer's test

The filtrate will be treated with Mayer's reagent: appearance of cream colour indicates the presence of alkaloids.

b) Dragendroff's test

The filtrate will be treated with Dragendroffs reagent: appearance of reddish brown precipitate indicates the presence of alkaloids.

c) Hager's test

The filtrate when treated with Hager's reagent, appearance of yellow colour precipitate indicates the presence of alkaloids.

2) Test for carbohydrates and reducing sugar

The small quantities of the filtrate will be dissolved in 4ml of distilled water and filtered. The filtrate will be subjected to

a) Molisch's test
A small portion of the filtrate will be treated with Molisch's reagent and sulphuric acid. Formation of a violet ring indicates the presence of carbohydrates.
b) Fehling's test
The extract will be treated with Fehling's reagent A and B. The appearance of reddish brown colour precipitate indicates the presence of reducing sugar.

3) Test for steroids
Liebermann bur chard's test:
The extract will be treated with 3ml of acetic anhydride, few drops of glacial acetic acid followed by a drop of concentrated sulphuric acid. Appearance of bluish green colour indicates the presence of steroids.

4) Test for proteins
a) Biuret test
The extract will be treated with copper sulphate solution, followed by addition of sodium hydroxide solution; appearance of violet colour indicates the presence of proteins.
b) Millon's test
The extract will be treated with Millon's reagent; appearance of pink colour indicates the presence of proteins.

5) Test for tannins
The extract will be treated with 10% lead acetate solution; appearance of white precipitate indicates the presence of tannins.

6) Test for phenolic compounds
a) The extract will be treated with neutral ferric chloride solution; appearance of violet colour indicates the presence of phenolic compounds.
b) The extract will be treated with 10% sodium chloride solution; appearance of cream colour indicates the presence of phenolic compounds.

7) Test for flavonoids
a) 5ml of extract will be hydrolyzed with 10%sulphuric acid and cooled. Then, it will be extracting with diethyl ether and divided in to three portions in three separate test tubes. 1ml of diluted sodium carbonate, 1ml of 0.1N sodium hydroxide, and 1ml of strong ammonia solution will be added to the first, second and third test tubes respectively. In each test tube. Development of yellow colour demonstrated the presence of flavonoids.

b) Shinoda's test
The extract will be dissolved in alcohol, to which few magnesium turnings will beaded followed by concentrated HCL drop wise and heated, and appearance of magenta colour shows the presence of flavonoids.

8. Test for gums and mucilage
The extract was treated with 25 ml of absolute alcohol, and filtered. The filtrate will examine for its swelling properties.

9. Test for glycosides
When a pinch the extract was treated with glacial acetic acid and few drops of ferric chloride solution, followed by the addition of conc. Sulphuric acid, formation of ring at the junction of two liquids indicates the presence of glycosides.

10. Test for saponins
Foam test
About 1 ml of the extract was diluted to 20 ml of with distilled water and shaken well in a test tube. The formation of foam in the upper part of test tube indicates the presence of saponins.

11. Test for Triterpenoids
The substance was warmed with tin and thionyl chloride. Pink colour indicates the presence of triterpenoids.[5-8]

Table 4: Phytochemicals of Extracts of Leaves of Abutilon indicum (L.) Sweet ssp. Indicum

Phytoconstituents	Cold Maceration				Soxhlet Extraction	
	Pet. ether	Chloroform	Ethanol	Water	Pet. Ether	Ethanol
1.Alkaloids	-	-	+	-	+	+
2.Steroids	+	+	-	+	+	+
3.saponins	+	-	+	+	+	+
4.Glycosides	-	+	+	+	+	+
.Tannins & Phenolics	-	+	+	+	-	+
6.Flavanoids	+	-	+	+		+
7. Carbohydrates	-	+	+	+	-	-+
8.Proteins	-	-	+	+	-	+
9.Terpenoids	-	-	-	-	+	+

(-)=Absent (+) =Present

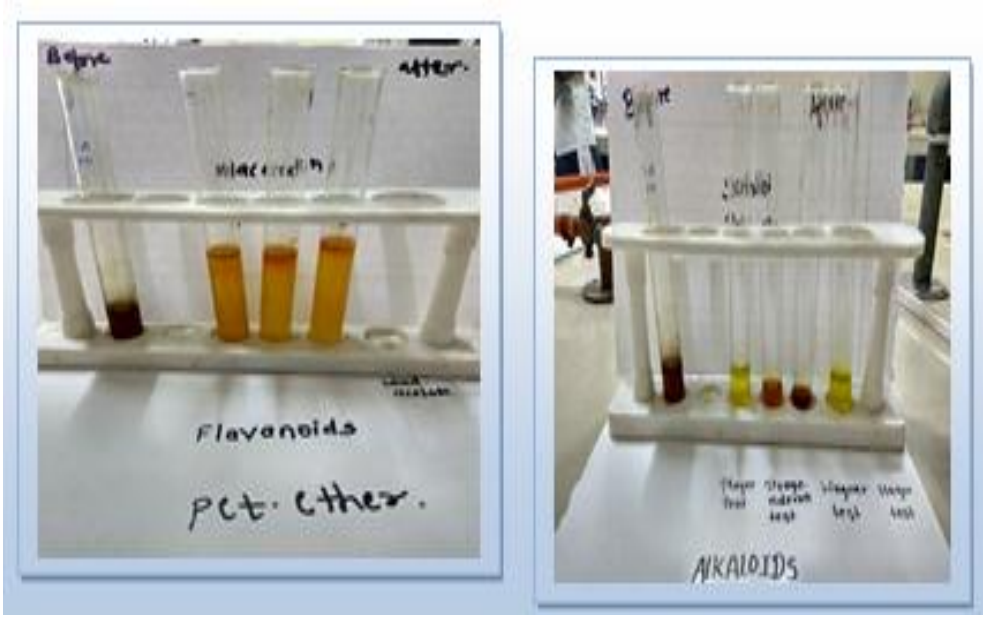

Fig. 5: Phytochemical evaluation of Leaves extract

RESULTS AND DISCUSSION

The above present study gives a modest investigation of leaves Abutilon indicum (L.) Sweet ssp. Indicum. Phytochemical analysis indicated presence of saponins, tannins, alkaloids & flavanoids and in which physical constant evaluation of the drug is an important parameter in detecting adulteration or improper handling of drugs, equally important evaluation of drugs, is ash value & acid insoluble ash value determination. The micro & macro morphological features of leaf described, distinguished. The detail microscopical evaluation was studied. This could also serve in identification & preparation of monograph on plant. This results of investigation could serve as a basis for proper identification, collection & investigation of plants. Despite the availability of modern techniques, it is more reliable to identify a plant drug by pharmacognostic evaluation. A complete and systematic study of a crude drug which comprises of collection, preservation, storage, macroscopical, microscopical, organoleptic characters, etc. is claimed to be the scientific or pharmacognostic evaluation. Standardization is an essential measure for quality, purity and sample identification. Standardization of herbal drugs is a very challenging task for herbal drug industry because of complex nature and variation of chemical constituents. Microscopical evaluation is one of the simplest methods for identification of drugs. According to WHO, the macroscopic and microscopic evaluation is the first step to be carried out to establish its identity and purity. The evaluation of physico-chemical constants is an important parameter in detecting adulteration or improper handling of drugs. The extractive values are immensely useful to evaluate the chemical constituents that are present in the crude drug. These extractive values are also helpful in the estimation of specific constituents soluble in particular solvent. is particularly important in the evaluation of purity of drugs. The aim of performing ash value is to remove all traces of organic matter. The total ash value obtained from the study can be used to detect foreign organic matter and adulteration with sand and earth, therefore, reflecting the kind of care that must be taken in preparing the plant for drug and all the evaluation parameter were mention in Table.1-4.

CONCLUSION

The present study attempts a modest comprehensive investigation of the leaves of Abutilon indicum (L.) Sweet ssp. Indicum as the folklore claims have therapeutic qualities, the present investigation has laid down a set of anatomical features of the leaf which can be employed for its botanical diagnosis. Preliminary phytochemical analysis indicated presence of saponins, tannins, alkaloids and flavonoids which could made the plant useful for treating different ailments as having a potential

of providing useful drugs of human use. The present study on physicochemical parameters and preliminary phytochemicals analysis provides importance information which may be help in authentication and adulteration for quality control of raw material. The present study adds to the existing knowledge of Abutilon indicum (L.) Sweet ssp. Indicum and it will be very useful for development of a formulation for treating various diseases. In this dimension pharmacognostic studies on Abutilon indicum (L.) Sweet ssp. Indicum leaf is a substantial step and it further requires long term study to evaluate pharmacological action as well as therapeutic efficacy and toxicity of the leaves to establish as the drug. This could also serve in the identification and preparation of a monograph on the plant. The results of these investigations could serve as a basis for proper identification, collection and investigation of the plant.

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