



Pharmacognostic and Phytochemical Evaluation of Hibiscus hirtus Linn.

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Abstract

The present initiative is to evaluate pharmacognostic characteristics and phytochemical evaluation of leaves of Hibiscus hirtus Linn. belonging to family Malvaceae. These studies give the information about Transverse Section (TS) of leaf and powder characters like xylem vessels, calcium oxalate crystals, and the quantitative microscopical characters like vein islet, vein termination, stomatal index. Physicochemical parameters like ash values and extractive values were determined. The results obtained from standardization of Leaves of Hibiscus hirtus Linn. give the details of microscopical, macroscopical and physicochemical characters which are useful in specifying standards. On the other hand, phytochemical examination gives the information about different phytoconstituents present in the herb.

Keywords: Hibiscus hirtus Linn, Pharmacognostic, Physiochemical, phytochemicals

Introduction

Plants are actually conscious, sentient life forms connected in complex and mysterious ways to the health of our bodies and minds. Since ages, plants are being used to maintain human health. At both national and international levels medicinal plants are being extensively researched. In current pharmacopoeias, plants form the major natural sources of medicinally active compounds. For quality control of herbal drugs, necessary pharmacognostic studies are carried out. Pharmacognostic evaluation of herbal drugs constitute macroscopic, microscopic and physio-chemical constant analysis of experimented parts and to specify standards of those drugs and their preparations in order to validate genuineness of the crude drugs of plant, mineral and animal origin [1].

According to WHO (1998), the macroscopic and microscopic description of a part (e.g. leaves) of medicinal plant is the initial step for establishing its purity and identity and must be carried before any tests

are done. Therapeutic potency, chemical constituents and botany is unique for each plant drug. From generation to generation, by the use of folkloric medicine, various ailments are being cured [2].

Hibiscus is a genus of flowering plant in family malvaceae. The genus is very large comprising 679 species that occur in warm temperate, tropical and subtropical regions all over the world [3]. The sub shrub "*Hibiscus hirtus Linn.*" (lesser mallow plant) is of the same family and has its own importance in the Hindu tradition. It is a diminutive species from the East Indies and Malaysia. It is an easy to grow tropical sub-shrub.

Classification

Kingdom: Plantae
Division: Tracheophyta
Class: Magnoliopsida
Order: Malvales
Family: Malvaceae

Genus: *Hibiscus*
Species: *hirtus* L

Materials and Methods

Collection and authentication

Leaves of *Hibiscus hirtus* Linn. with petioles were collected in the month of October from Karimnagar district, Telangana. The plant specimen was authenticated, and herbarium was deposited at Botanical Survey of India, Kolkata, India, for further reference. The collected plant material was made free from any foreign matter. Leaves were separated, shade dried and powdered with laboratory mixer. Pharmacognostic studies were conducted with fresh leaves and leaf powder.

Macroscopy

The following macroscopic characters for the fresh leaves were noted: size and shape, colour, surfaces, venation, presence or absence of petiole, apex, margin, base, lamina, texture, odour and taste.

Microscopic evaluation

It is generally done for the powder and the fresh leaves. Powder analysis is done for a powder to procure the information about the epidermis, xylem, phloem, calcium oxalate crystals etc. and the fresh leaves are used for the examination of leaf constants like stomatal number, stomatal index, vein islet number, vein termination number, palisade ratio and transverse section of leaf and these helps for identifying adulterated drug from the genuine one [5,11].

Transverse section of leaf

A transverse section of the leaf is biconvex in outline. It shows upper and lower epidermis carrying glandular trichomes. The lamina has dorsiventral structure with one row of upper palisade being discontinuous in the midrib region. The midrib is embossed on the both surfaces exhibiting sub-epidermal collenchyma, cortical tissues and large central collateral vascular bundle. Crystals of calcium oxalate are dispersed in the cortical tissue inclusive in the mesophyll and phloem. The upper epidermis consists of polygonal, slightly elongated cells. The lower epidermis consists of polygonal cells with slightly wavy, thin cellulosic anticlinal walls. Both upper and lower epidermises are covered with smooth cuticle (Figure 1).

Powder analysis of leaf

Little quantity of leaf powder is taken on microscope slide and added a small amount of phloroglucinal and hydrochloric acid then a small drop of glycerol to the slide and observe under 45X magnification of microscope, and the powder characters are observed like xylem, phloem, calcium oxalate crystals and starch grains which are identified by adding a drop of iodine and they are observed in blue color [6,9].

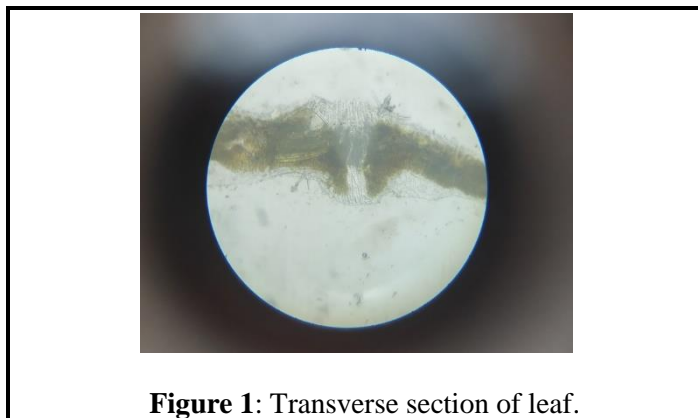


Figure 1: Transverse section of leaf.

Physiochemical analysis

Physiochemical values such as the percentage of ash values and extractive values were determined according to the official methods [7].

Moisture content determination (loss on drying)

Weigh about 5 g of the drug powder and place in the clean and dry china dish and dried in the oven at 105°C for 3 hours and weigh the drug continuously, with an interval of 1 hour until the difference between two successive weights is NMT 0.01 g.

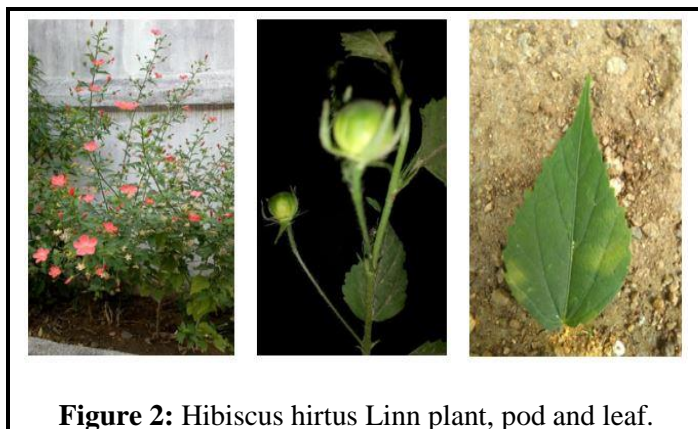


Figure 2: Hibiscus hirtus Linn plant, pod and leaf.

Table 1: Pharmacognostic evaluation of *Hibiscus hirtus* Linn.

Parameters	Leaves	Flower	Fruit
Colour	Dark Green	Orange	Fresh-Light Green, Dry-Light Yellow or brown
Shape	Simple alternative palmilobed sometime unlobed broadly ovate	Bisexual pedicel slender, joined below or slightly above the middle, stellate pubescent.	Capsule, Globose, many seeds, cottony nature.
Size	3.5-7 × 1.5-3 cm	1-1.5 Inch	12-15 Seeds, 2-3 mm
Taste	Characteristic	Characteristic	Characteristic
Odour	Characteristic	Characteristic	Characteristic
Fracture	Brittle when dry	Brittle when dry	Brittle when dry
Colour	Dark Green (Extract)	Dark Green (Extract)	Dark Green (Extract)
Odour	Pungent	Pungent	Pungent
Taste	Slight bitter	Slight bitter	Slight bitter
Texture	Slight Greasy	Slight Greasy	Slight Greasy

Table 2: Quantitative Microscopy of Leaf Powder of *Hibiscus hirtus*. Linn.

Parameter	Value		
	Minim um	Maxim um	Avera ge
Starch Grains	8	28	15.84
Phloem Fibers (Width)	12	36	20
Phloem Fibers (Length)	60	420	176.16
Calcium Oxalate Crystals (Width)	4	28	14.24
Calcium Oxalate Crystals (Length)	60	400	176.96
Type of Stomata (Paracytic)	Upper	Lower	
Stomatal Number	22	12	
Stomatal Index	50	48	
Vein Islet Number	37		
Vein Termination Number	58		
Palisade Ratio	1.925		

Preliminary phytochemical screening

It is done in order to disclose the data regarding the nature of phytoconstituent present in the material under experimentation. The various qualitative tests done detected the presence of carbohydrates, alkaloids, tannins and phenol compounds etc. [8,10].

Results and Discussion

Pharmacognostic evaluation

Organoleptic evaluation

It gives the description of organoleptic characteristics like colour, odour, taste, texture size, shape of crude drug (Figure 2 and Tables 1 and 2).

Powder analysis

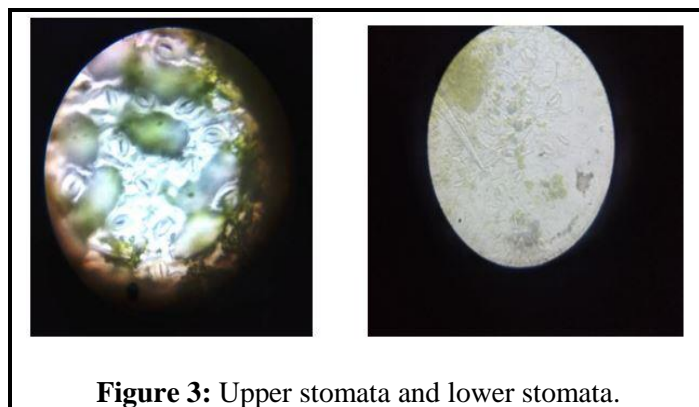


Figure 3: Upper stomata and lower stomata.

Physical evaluation

The Physical parameters like total ash water soluble ash and extract values such as alcohol extractive, chloroform extractive and moisture content are determined the results are given in the following table (Table 3).

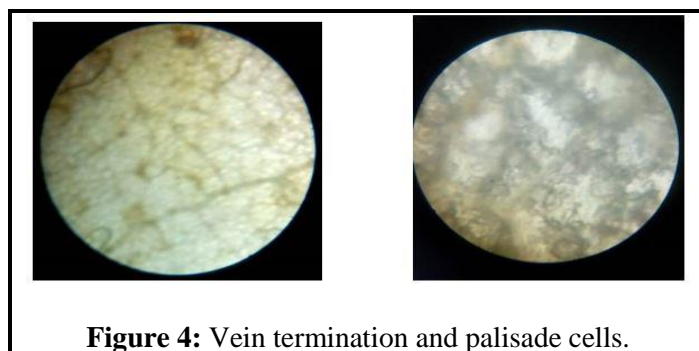


Figure 4: Vein termination and palisade cells.

Table 3: Physical Parameters of *Hibiscus hirtus*. Linn.

Parameter	Value (% w/w)
Total Ash	19.5
Water Soluble Ash	12
Acid insoluble Ash	17
Alcohol Extractive	1.2
Chloroform Extractive	1
Moisture content	0.25

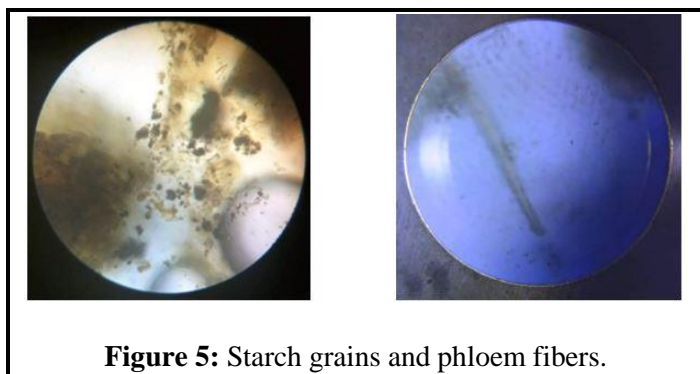


Figure 5: Starch grains and phloem fibers.

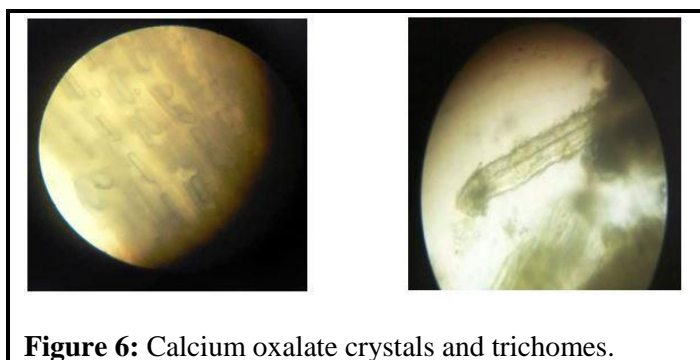


Figure 6: Calcium oxalate crystals and trichomes.

Table 4: Phytochemical screening of *Hibiscus hirtus* Linn.

Chemical Tests	Results
Alkaloids	+ve
Glycosides	+ve
Flavonoids	+ve
Proteins	+ve
Steroids	+ve
Amino acids	+ve
Carbohydrates Test	+ve
Tannins and phenolic compounds	+ve

Phytochemical screening

The physiological activity of crude drug is due to the presence of chemical constituents for the identification for the chemical constituents phytochemical screening is

done (Figures 3-6 and Table 4). The following chemical constituents are evaluated they are alkaloids, glycosides, amino acids, flavonoids, steroids, carbohydrates, tannins and phenolic compounds.

Discussion

Before any crude drug can be added in a herbal pharmacopoeia pharmacognostic parameters must be established. The estimation of organoleptic characters gives an idea about external appearance of plant and helps in easy identification in comparison with other plants.

The pharmacognostic protocols such as morphology, micro morphology physical evaluation helps in identifying the genuine drugs. Physical evaluation also helps to set the standards of crude drug it also helps in identifying the adulterants and substituents of crude drugs.

Chemical constituents of the drug are identified by photochemical screening.

The *Hibiscus hirtus* Linn. subjected to pharmacognostic studies to determine the organoleptic characters like colour, taste, texture, shape, size, odour, microscopical characters like stomatal number, stomatal index, vein termination, vein islet number palisade ratio, physical parameters like total ash, water soluble ash, acid insoluble ash, extractive values moisture content helps in the identification, standardization and establishing chemical constituent's physiological activity of *Hibiscus hirtus* Linn.

Conclusion

The Pharmacognostic studies like organoleptic parameters, microscopic parameters and powder analysis, physical parameters and phytochemical screening useful in the standardization of crude drug. The given data in the present investigation helps in preparation of crude drug's monograph and inclusion in various pharmacopoeia's.

Conflict of Interest

None declared.

Funding

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