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Pharmacognostic Evaluation of the Leaves of *Plumeria pudica*

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ABSTRACT

The exsisting study aims the examination of pharmacognostic parameters of the leaves and leaf powder of plant Plumeria pudica belongs to the family Apocynaceae. The histological studies gives the transverse section (TS) of leaf and powder characters like xylem vessels, calcium oxlate crystals, and the quantitative microscopy like veinislet, vein termination, stomatal number, stomatal index, palisade ratio of the leaves was studied and characters of leaves were documented. Physicochemical parameters like total ash value, water soluble ash value and acid insoluble ash value were determined. The water soluble extractive, ether soluble extractive alcohol soluble extractive and ether soluble extractive were also determined. The results obtained from standardization of Leaves of Plumeria pudica reveals details of the microscopical and macroscopical characters, physicochemical characters that characterize avoiding the adultration from the genuine plant drug. The present study provides pharmacognostical, and physicochemical details of the leaves of Plumeria Pudica which are useful in laying down standardization and pharmacopoeia parameters.

Keywords: *Plumeria pudica*, Leaves, Pharmacognostical, Physiochemical.

INTRODUCTION

Phytoconstituents from plants gives diversity of drugs now days. The plants have the plant drugs also constitute a ability for expand few novel semisynthetic curative agents. Over the past 10 years there has been a increasing attentiveness of plants origin and from the familiar plant species, no activity has been done for phytochemicals and pharmacological activities.

The Plumeria pudica plant has been placed in old literacy texts as laxative, anti-allergic, carminative, also possess cytotoxic activity, anti-inflammatory, anti-microbial activity, anti-ulcer, diuretic, and useful in treating leprosy and ascites, [1,2]. Plumeria species are worn as decorative plant that blossoms perineal. It is indigenous to Mexico and in India normally seen in worship places and burial grounds [3]. The root bark is pungent, bitter, laxative and heating, carminative, used in treatment of leprosy [4,5]. The literacy texts disclose that the systemic study, includes pharmacognostical evaluation of this plant is till now imaginary. There is a necessity for confirmation of investigation work carried out on new therapy. With this loop point, pharmacognostical evaluation becomes very important to prepare the standards for the medicinal plants. The existing study of the present work is to evaluate pharmacognoistic standards of the leaves of plant Plumeria pudica, which will useful for the correct authentication of this plant.

MATERIALS AND METHODS

Procurement of plant material

The leaves of *plumeria pudica* were collected from the wild growing tree in the Botanical Garden, Vaageshwari College of Pharmacy, Timmapur, Karimnagar, Telangana, India Identification and confirmation was performed a qualified taxonomist. A specimen was deposited in the institutional herbarium. The collected plant material was made thoroughly free from any foreign organic matter. Leaves were separated, shade dried and powdered with laboratory mixer and sieved. Pharmacognostic studies were conducted with fresh leaves and leaf powder.

Pharmacognostic evaluation

Organoleptic evaluation: It influences on the color, odour, taste, texture, size of the crude drug which depends on the sense organs also called sensory charcters [6].

Microscopic evaluation: It is mostly done for the powder and the fresh leaves. For the powder the powder analysis is done to get the information about the epidermis, xylem, phloem, calcium oxlate crystals etc. and the fresh leaves are used for the study 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 the identification of the genuine drug from adulteration.

Powder analysis of leaf

Little quantity of leaf powder occupy on microscope slide and small amount of phloroglucinal and hydrochloric acid then a small drop of glycerol to the slide and observe under the microscope with 45X magnification, and the powder characters are observed like xylem, phloem, calcium oxlate crystals and starch grains by adding a drop of iodine the starch grains observed in blue color [7-11].

Measurement of leaf constants

Surface constants like stomata number, stomata index, vein islet number, vein termination number, palisade ratio can be measured. The stomata number, stomata index is present for both upper and lower epidermis and it is done by peeling the epidermal layer and then the transparent layer is slowly kept on the microscopic slide by cutting with the help of the blade, and then add a drop of chloral hydrate to remove if any chlorophyll is present and observe under the microscope at 45X, and the stomata is drawn with the help of camera lucida which is attached to the microscope and stomata number, stomata index is calculated by using the formulas. The vein islet, vein termination, palisade ratio is identified by boiling the leaf pieces in the chloral hydrate for 15-20 min and then place the leaf fragment on the microscopic slide and observe at 45X for vein islet, vein termination, and at 5X for palisade ratio.

Physical evaluation

It is for the determination of physical characters like ash values, extractive values and moisture content and flouoscence analysis [7-12].

Determination of total ash

About 2 grams of the drug is weighed and placed in the china dish and keep in incinerator and kept it for about 5-10 min at 450°C the remained ash is cooled and weighed and percentage of ash is calculated with dried drug.

Acid-insoluble ash: The ash remained in the total ash is taken in 25 ml of dil HCL and it is filtered, the residue remained on filter paper is Acid insoluble ash and the percentage is calculated with the dried crude drug.

Water soluble ash: The total ash is dissolved in 25 ml of distilled water and filter the ash solution, the remained ash is subtracted from the total ash gives the water soluble ash and percentage is calculated to the dried drug.

Determination of alcohol soluble extractive

Weigh 5 gm of the drug and keep in contact with 100 ml of alcohol and kept for 24 hrs for maceration with intermittent shaking and it is filtered after 24 hrs and filtrate is evaporated to dryness and percentage of alcohol soluble extractive is calculated with the dried drug.

Determination of water soluble extractive

It is same with the alcohol soluble extractive but the alcohol is replaced with water with chloroform as preservative.

Determination of ether soluble extractive

Weigh 75 gm of the drug and prepare a thimble and the extracted with petroleum ether in soxhlet apparatus for 6 hrs and then the extract is allowed to evaporate the extract and calculate the percentage of drug.

Moisture content (loss on drying): Weigh 5 gm of the drug and place in the china dish and dried in the oven at 105°C for 5 hrs and weigh the drug continuously, with an interval of 1 hour until the two successive weights was not more than 0.01 gm.

Fluorescence Characteristics

The fluorescence nature of *Plumeria pudica* leaf powder was observed under ultraviolet and visible radiations after treatment with various chemical reagents [13].

RESULTS AND DISCUSSION

Pharmacognostic evaluation

Organoleptic identification shows the color, odour, taste, size of the leaves and leaf powder was studied. External features of the leaves of plumeria are typical and different from other plants in the genus. They have a pointed tip and one or two lobes on each side of the leaves giving them the shape of a fiddle or a spatula, Fresh leaves are green in colour and characteristic in odour with a slightly bitter taste. The leaf powder was also green in colour with characteristic odour and bitter taste.

Powder analysis disclose that the plumeria powder contains countless raphide shaped calcium oxalate crystals, the powder also showed the presence of xylem, Multicellular, long and covering trichomes was seen, and no starch grains and phloem fibers are present.

The quantitative evaluation of plumeria fresh leaves and leaf powder was conducted and the values obtained were given in Table 1 and Figures 1-6. The upper and lower epidermal layers of fresh leaves have shown the presence of stomata with one or more subsidiary cells parallel to the long axis of the pore and guard cells which indicates paracytic arrangement.

Table 1: Quantitative microscopy of leaf/leaf powder of *Plumeria pudica*

Parameter	Value
Calcium oxalate crystals (length)	26.64– 66.6 μ
Stomatal number (lower epidermis)	300/mm2
Stomatal index (lower epidermis)	20
Stomatal number (upper epidermis)	250/mm2
Stomatal number (upper epidermis)	18.51
Vein islet number	13/mm2
Veinlet termination number	18/mm2
Palisade ratio	6.25/mm2

Physical evaluation

The diverse physical parameters of plumeria leaves and leaf powder like ash values like, total ash, water soluble ash and acid insoluble ash, moisture content, and extractive values like ether soluble extractive, water soluble extractive

and alcohol soluble extractive values were determined. The results of this study were shown in Table 2. The results of these studies gives correct identification of the plant and avoid adulteration.

Fluorescence characteristics

It is fast method for the design study of crude drug of unsure specimen, when other methods produce inappropriate results. The plant material may be identified from their adulterants on the basis of fluorescence nature. Results are described in Table 3, Figures 7 and 8.

Table 2: Physicochemical parameters of leaf powder of *Plumeria pudica*

Parameter	**Value % w/w**
Moisture content	60.9
Total ash	5
Foreign organic matter	1
Acid insoluble ash	1.5
Water soluble ash	2.5
Alcohol soluble extractive value	8.7
Water soluble extractive value	12.5
Ether soluble extractive value	8.5

Table 3: Fluorescence characteristics of drug with different chemicals under UV

Powder and Reagent	**Visible light**	**UV light**	
		254 nm	**365 nm**
Powder as such	Green	Green	Green
Powder+ Picric acid	Green	Greenish	Greenish black
Powder+ NaOH	Greenish	Dark Green	Dark Green
Powder+ glacial acetic acid	Green	Green	Blackish Green
Powder+ HCL	Green	Green	Dark Green
Powder+ HNO_3	Dark Green	Greenish black	Dark Green
Powder+ Iodine	Blackish green	Dark Green	Blackish
Powder+ $FeCl_3$	Dark Green	Dark Green	Blackish
Powder+ H_2SO_4	Blackish Green	Dark Green	Blackish
Powder + Methanol	Green	Dark Green	Dark Green

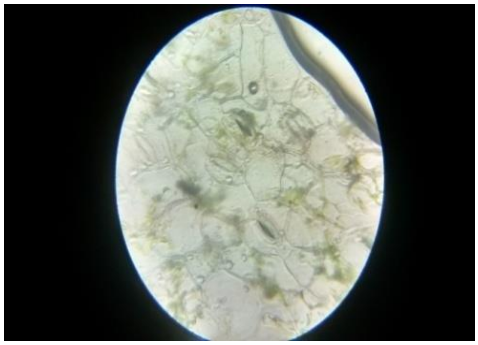

Figure 1: Stomata in lower epidermis

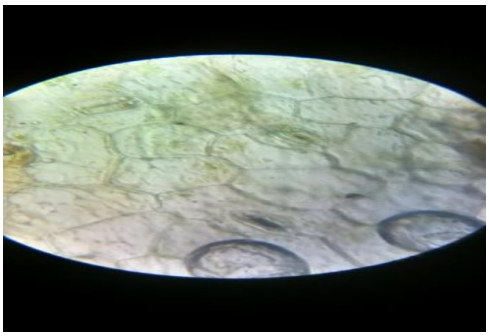

Figure 2: Stomata in upper epidermis

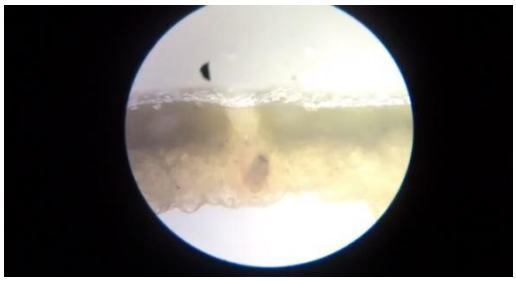

Figure 3: Transverse section of leaves

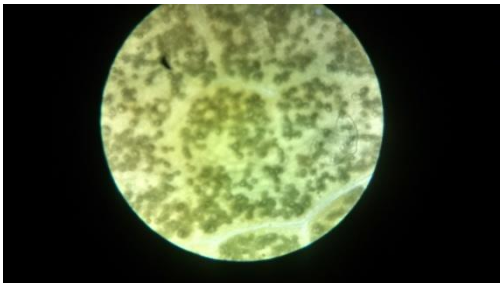

Figure 4: Palisade ratio

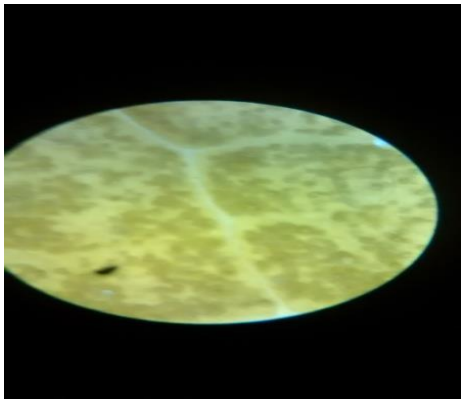

Figure 5: Vien-islets

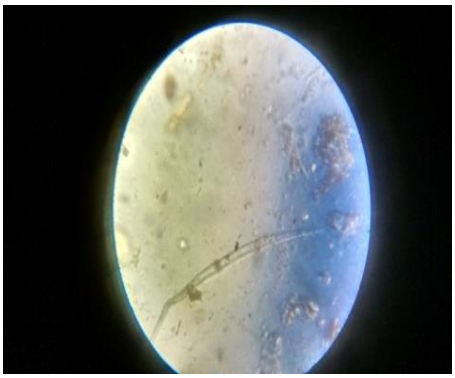

Figure 6: Trichomes

Figure 7: Xylem vessels

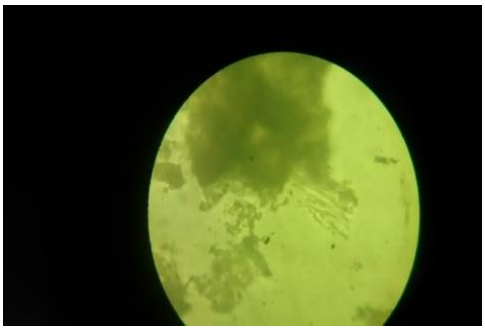

Figure 8: Calcium oxalate crystals

DISCUSSION

Plumeria pudica is used in the treatment of various disease aliments. The evaluation and standardization of a plant is an important part of inaugurating its proper identity. Before any crude drug can be added in a herbal pharmacopoeia, pharmacognostic parameters and standards must be established. The results of the present study could stay as a basis

for proper identification, collection and study of the plant. The pharmacognostical characters of the leaf described, separates it from other plants of the geneus. Numerical values and quantitative leaf microscopy are unique to the plant and are required in its standardization.

CONCLUSION

The pharmacognostic parameters, which are being announced for the introductory, could be useful in the standardization of a crude drug. The data given in the present investigation is also helpful in the preparation of the crude drug's monograph and inclusion in various pharmacopoeias.

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