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Research Article

PHARMACOGNOSTIC EVALUATION AND PHYTOCHEMICAL STUDIES ON THE STEMS OF *JASMINUM SAMBAC* LINN.

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KEYWORDS: *Jasminum sambac* Linn, Pharmacognostic standardisation, Phytochemical analysis, Fluorescence analysis.

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ABSTRACT

Jasminum sambac (L.) Aiton (Family: Oleaceae), an ornamental plant extensively used in perfumery and religious purposes, is a herb which shows shrub-like appearance after two years. It is locally known as 'Motia' and produces white flowers with a very pleasant fragrance. Traditionally Jasminum species has been used to treat dysmenorrhoea, amenorrhoea, ringworm, leprosy, skin diseases and also as an analgesic, antidepressant, anti-inflammatory, antiseptic, aphrodisiac, sedative, expectorant. The aim of the present studies was to establish standardization parameters for the authentication and quality control of the stems of *Jasminum sambac* linn. So the pharmacognostical study and parameters related to physico-chemical properties have been evaluated as per WHO guidelines. Preliminary phytochemical screening in different solvents showed the presence of carbohydrates, starch, glycosides and steroids. Total ash, acid insoluble ash, water soluble ash, ethanol soluble extractive and water soluble extractive values were found to be 6%, 1%, 4%, 5.6% and 12.8% w/w respectively. Microscopic studies of transverse section of stem of *Jasminum sambac* stems showed the presence of covering and glandular trichomes, cortex, sclerenchymatous cells, phloem, lignified xylem, medullary rays, pith parenchymatous cells and lignified fibre cellular bundles. Powder microscopy of *Jasminum sambac* Linn. stem showed the presence of parenchymatous cells, trichomes, stomata, pitted vessels, lignified fibre cells, lignified fibre bundles. The results of the study can serve as a valuable source of information by providing suitable standards for identification of this plant material and can also be useful in setting some diagnostic indices for the identification and preparation of a monograph of the plant.

INTRODUCTION

(*Jasminum sambac*) of the family Oleaceae is a genus comprising approximately 600 species of small trees and shrubs and is a native of India.[1] It is a suberect or scrambling shrub, 1-3 m tall with young pubescent branches. Leaves are opposite, membranous 3.8-11.5 by 2.2-6.3 cm, variable in shape, broadly ovate or elliptic, acute, obtuse or acuminate, entire, glabrous, base rounded or subcordate, rarely acute, main nerves 4-6 pairs, petioles 3-6 mm long and hairy. Flowers are white, very fragrant, solitary, usually in 3-flowered, terminal cymes, bracts linear-subulate, pedicals 6 mm long. Calyx 1-1.3 cm long, hairy, teeth 5-9 and linear-subulate 6-10 mm long. Corolla tube 1.3 cm long, lobes as long as tube, narrowly oblong, acute or obtuse in cultivation orbicular, ripe carpels 1-2, subglobose, 6 mm diameter, black and surrounded by the suberect calyx teeth.[2-4] Its various parts such as the leaf, stem, bark, flower and root are very useful and important in pharmaceutical industries and have been reported to possess medicinal value. Traditionally leaves are used in fever, cough, indolent ulcer, abdominal distention, diarrhoea, lowering the blood glucose level, regulating

menstrual flow, to clean kidney waste, inflamed and blood shot eyes.[5] Plant possess various activities like antiulcerative, anti cancer, antileprotic, skin diseases, wound healing, antidiabetic, antitumor, antimicrobial, antioxidant, anti-acne, suppression of puerperal lactation, A.N.S stimulating effect.[6] The plant contains sambacin, jasminin, sambacoside A, sambacolingoside, quercetin, isoquercetin, rutin, kempferol, luteolin, Methyl jasmonate, benzyl benzoate, linalool, linalyl acetate, benzyl alcohol, indole, jasmone, methyl anthranilate, *p*-cresol, geraniol, racemic (*5*-pent-*2*-enyl)-*5, 1*-pentanolide, benzyl benzoate, nerol, *1*-*α*-terpineol, *d* and *dl*-linalool, *α*-jasmolactone, farnesol, nerolidol and eugenol.[7-8]

MATERIALS AND METHODS

The plant material *Jasminum sambac* was collected from the Herbal Garden, Ambala Cantt. The plant was authenticated by Dr. H.B Singh, Scientist F and Head, Raw Materials Herbarium and Museum, NISCAIR, New Delhi under the NISCAIR/RHMD /Consult /-2010-11/1696/294 and a specimen was submitted to the Department of Pharmacognosy and Phytochemistry, Hindu College of Pharmacy, Sonipat, Haryana (India).

Chemicals and Instruments

Solvents viz. petroleum ether, chloroform, methanol, acetone and reagents, viz. phloroglucinol, glycerin, chloral hydrate, iodine and sodium hydroxide were procured from RFCL, Mumbai, India. Compound microscope, Camera Lucida, Stage and eyepiece micrometer, glass slides, cover slips, watch glass and other common glassware were the basic apparatus and instruments used for the study. Microphotographs were taken using Labomed ATC-200 microscope attached with Sony digital camera.

Preparation of Extracts

The collected sample was washed thoroughly dried, powdered and successively extracted with different solvents like petroleum ether, chloroform, methanol and water so as to get the respective extracts. All the extracts were filtered individually, evaporated to dryness using the rotatory evaporator, weighed and percentage yields were calculated. Colour and consistency of the extracts were observed.

Macroscopic and Microscopic Evaluation

The shape, size, colour, odour, taste, surface texture and fracture characteristics of stems were determined. Microscopy was done by taking the thin hand sections of the stem. The thin sections were cleared with chloral hydrate solution and stained with phloroglucinol and hydrochloric acid, then mounted in glycerin for the identification of various regions. Powder of the dried whole plant was separately treated with phloroglucinol, hydrochloric acid and glycerin to study various characteristics.[9-10]

Fluorescence Analysis

The powdered material and different extracts were exposed to visible and ultraviolet light (U.V. short and U.V. long) to study their fluorescence behaviour.[11-12]

Physicochemical Parameters and Phytochemical Evaluation

The moisture content, total ash, water soluble ash, acid insoluble ash, sulphated ash, crude fibre content, alcohol and water soluble extractive values were determined as a part of its physicochemical parameters.[10,13] Petroleum ether, chloroform, methanol and aqueous extracts were subjected to phytochemical analysis for the presence of various secondary phytoconstituents using standard procedures.[14-16]

RESULTS

Jasminum sambac Linn. stem showed yellowish green color having slight odour, cylindrical shape and smooth fracture having 2-3 mm diameter and 10-20 cm length. The stem also possessed nodes and internodes.

Macroscopic and Microscopic Evaluation

Morphologically, stems of J*asminum sambac* Linn. appeared green in colour having slight odour,10-20 cm long and 2-3 mm diameter in size, cylindrical in shape, smooth in touch. The stem also possessed nodes and internodes. Transverse section of stem of *Jasminum sambac* showed the presence of continous layer of epidermal cells. The uniserate, unicellular and multicellular covering trichomes were present. It also showed the presence of glandular trichomes. Below the epidermis layer next region was cortex, sclerenchymatous cells, phloem, lignified xylem, medullary rays, pith parenchymatous cells and lignified fibre cellular bundles. Powder microscopy of *Jasminum sambac* Linn. stem showed the presence of parenchymatous cells, trichomes, stomata, pitted vessels, lignified fibre cells, lignified fibre bundles.

Table 1. Macroscopic study of fresh and dried stem of *Jasminum sambac* Linn.

S.No.	Parameters	Fresh stem	Dried stem
1.	Color	Green	Yellowish green
2.	Odour	Slight	Odourless
3.	Shape	Cylindrical	Cylindrical
4.	Nodes	Present	Present
5.	Internodes	Present	Present
6.	Fracture	Fibrous	Smooth
7.	Touch	Smooth	Smooth

Figure 1.Morphology of whole plant of *Jasminum sambac* Linn.

Figure 2.Morphology of dried (1) and fresh stem (2) of *Jasminum sambac* Linn.

Microscopic Examination

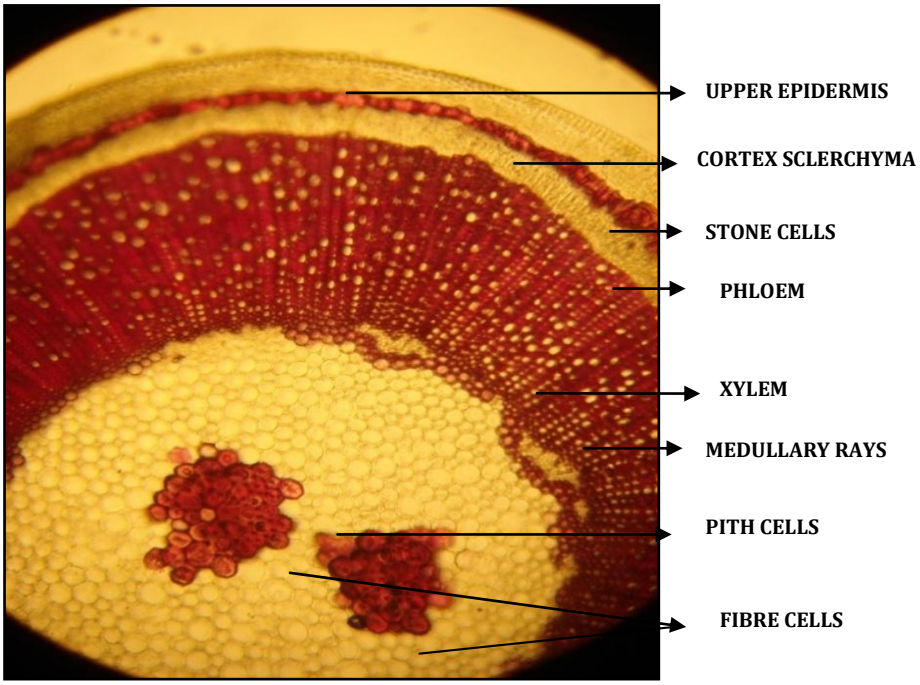

Figure 3. T.S. of *Jasminum sambac* Linn. stem

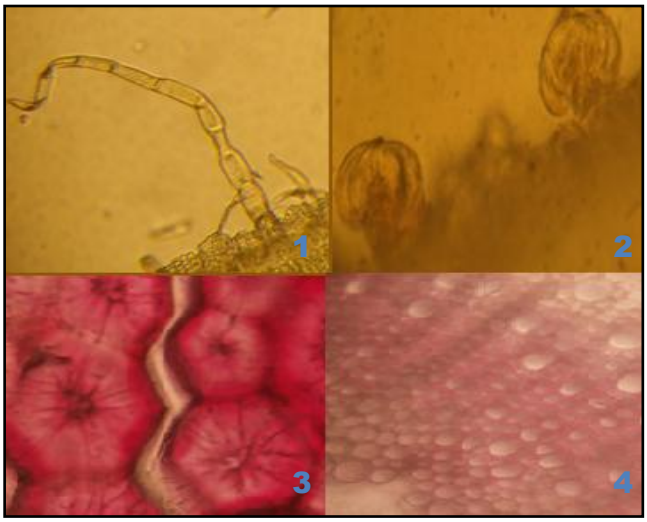

Figure 4. T.S. of *Jasminum sambac* Linn. stem showed (1: Covering trichome, 2: Glandular trichome, 3: Fibre cells, 4: Xylem and Medullary rays)

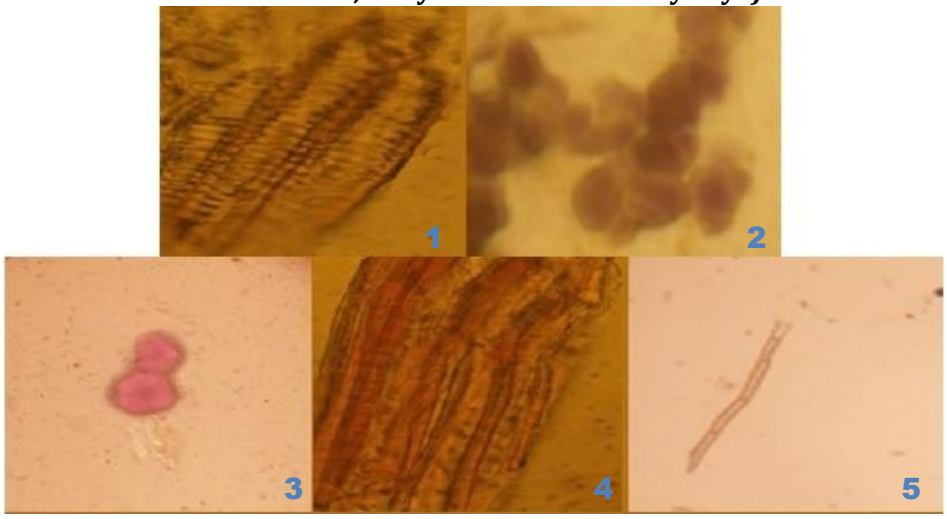

Figure 5. Powder microscopy of *Jasminum sambac* Linn. stem (1: Pitted vessels, 2: Starch grains, 3: Lignified fibre transverse view, 4: Lignified fibrous bundle and 6: Covering trichome)

Fluorescence Study

Fluorescence analysis of the various solvent extracts and powdered drug after treatment with different reagents like 1N NaOH in methanol, 1N NaOH in water, 1N HCl, 50% H_2SO_4, 50% HNO_3, 50% HCL was observed in the day light and UV light and colours were observed. The results are shown in Table 3 and Table 4.

Physicochemical Evaluation

Physicochemical parameters are important parameters in detecting adulteration and are adopted to confirm the purity and quality of drug. Ash values are particularly important parameter as it shows the presence and absence of foreign matters like metallic salts or silica etc. The percentage of total ash, acid insoluble ash, water soluble ash and sulphated ash were carried out. Extractive values are primarily useful for the determination of exhausted or adulterated drugs. The water soluble, alcohol soluble extractive values were calculated. The results are tabulated in Table 5.

Preliminary Phytochemical Evaluation

Phytochemical screening showed the presence of carbohydrates, starch, glycosides steroids. (Table 6).

Table 2: Percentage yield, colour, consistency of the successive extracts of stems of *Jasminum sambac* Linn.

S.No.	Solvent used	Color of extract	Consistency of extract	% Extractive value (in % w/w)
	Petroleum ether	Dark green	Semisolid	0.462
	Chloroform	Dark green	Semisolid	1.28
	Methanol	Light brown	Semisolid	7.80
	Water	Dark brown	Semisolid	5.1

Table 3: Fluorescence analysis of different stem extracts of *Jasminum sambac* Linn.

S.No.	Extract	Color of extract under visible light	U.V. light	
			Under Short Wavelength	Under Long wavelength
1.	Petroleum ether	Dark green	Dark green	Black
2.	Chloroform	Dark green	Dark green	Black
3.	Methanol	Light brown	Dark green	Black
4.	Water	Dark brown	Dark green	Black

Table 4: Fluorescence behavior of stem powder with different Reagents

S.No.	Powder + Reagent	Visible light	U.V light	
			Short wavelength	Long wavelength
1.	Powder + 1N NaOH in Methanol	Green	Dark green	Black
2.	Powder + 1N NaOH	Greenish yellow	Green	Black
3.	Powder + 1N HCl	Greenish yellow	Green	Black
4.	Powder + 50% HCl	Light green	Green	Black
5.	Powder + 50% $HN0_3$	Light green	Green	Black
6.	Powder + 50% H_2S0_4	Light green	Green	Black
7.	Powder + 5% $FeCl_3$ in Alcohol	Light green	Dark green	Black
8.	Powder + Picric acid	Yellowish green	Dark green	Dark green
9.	Powder + Acetic acid	Light green	Dark green	Black

Table 5. Physicochemical parameters of *Jasminum sambac* Linn.

Parameters	Stem
Foreign organic matter (w/w)	0.2%
Total ash (w/w)	6%
Water soluble ash (w/w)	4%
Acid insoluble ash (w/w)	1%
Sulfated ash (w/w)	1%
Alcohol soluble extractive (w/w)	5.6%
Water soluble extractive (w/w)	12.8%
Moisture content (w/w)	9%
Crude fibre content (w/w)	1%
Swelling index (ml)	Nil
Foaming index (ml)	Less than 100 ml

Table 6: Preliminary phytochemical screening of stem extracts of *Jasminum sambac* Linn.

S.No.	Tests for constituents	Petroleum ether extract	Chloroform extract	Ethanol extract	Aqueous extract
1.	Alkaloids	-ve	-ve	-ve	-ve
2.	Carbohydrates	-ve	-ve	-ve	+ve
3.	Flavanoids	-ve	-ve	-ve	-ve
4.	Tannins and Phenolic compounds	-ve	-ve	-ve	-ve
5.	Proteins and Amino-acids	-ve	-ve	-ve	-ve
6.	Mucilages	-ve	-ve	-ve	-ve
7.	Steroids	+ve	-ve	+ve	+ve
8.	Glycosides	-ve	-ve	+ve	+ve
9.	Saponins	-ve	-ve	-ve	-ve
10.	Fats	+ ve	-ve	-ve	-ve
11.	Starch	-ve	-ve	-ve	+ve

+ve = Present, -ve = Absent

DISCUSSION

Jasminum sambac Linn. stems are currently being used in the treatment of various disease conditions without standardization. The standardization of a crude drug is an integral part of establishing its correct identity. Before any crude drug can be included in a herbal pharmacopoeia, pharmacognostic parameters and standards must be established. Like the allopathic medicine, the standardization of the herbal medicines is also necessary to assure the quality of the drug because substitute or counterfeit herbal materials are often found in the market. This analysis will help to ensure the identity, quality, purity and safety of drug for the human use. In the present work the macroscopic and microscopic study of stems of *Jasminum sambac* Linn. was carried out. Various parameters studied are microscopic analysis, macroscopic analysis and fluorescence analysis. Microscopic analysis is one of the cheapest methods to correctly identify the particular drug and the surety of raw material. Morphological and microscopical studies of root will be helpful in the identification of these parts of *Jasminum sambac* Linn. Quantitative analysis of some pharmacognostic characters are helpful to establish quality standards of the plant. Different parameters used for identification of different plant parts are so important for drug evaluation. The results of all type analysis are helping in establishing quality control standards and purity assurance of drugs. Phytochemical is also the part of drug quality parameters. These simple, inexpensive but reliable

standards can be useful even for a untrained person whenever using the drug as folk medicine. These studies will also be helpful for manufacturer for assessing the purity of raw material. Briefly, the aspects described here can be considered as characteristic to identify and authenticate this drug.

CONCLUSION

The present work was taken up with a view to show the standards which could be useful to detect the authenticity of this medicinally useful plant *Jasminum sambac* linn.. The pharmacognostic features examined in the present study may serve as a tool for the identification of the plant for the validation of the raw material and for the standardization of its formulations.

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