ORIGINAL ARTICLE

Pharmacognostical characterization of leaves of *Jasminum elongatum* (P.J.Bergius) Willd. for quality control assessment

Sabeena Hussain Syed, Ajay G. Namdeo

Department of Pharmacognosy, Bharati Vidyapeeth Deemed University, Poona College of Pharmacy, Pune, Maharashtra, India

Abstract

Background: *Jasminum elongatum* belonging to the family *Oleaceae* have been used widely in ethnomedicinal practices for its medicinal value. However, no published work is available till date on pharmacognostical characterization. **Objective:** The objective of the study was to conduct pharmacognostical and phytochemical study of leaves of *J. elongatum*. **Materials and Methods:** Evaluation of leaf samples was performed by determining morphological, microscopical characters, physicochemical, and phytochemical analysis recommended by the World Health Organization. **Results:** Morphologically, the leaves are opposite with ovate to lanceolate in shape and acute apex. Microscopically, the epidermal region shows the presence of glandular and covering trichomes along with anomocytic stomata. The midrib region consists of horseshoe-shaped vascular bundles with spiral-shaped xylem vessels. Powder microscopy revealed the presence of spiral-shaped xylem vessels, spindle-shaped fibers, and stone cells. Physicochemical analysis and phytochemical analysis resulted a valuable data to establish standards for the plant. **Conclusion:** The establishment of pharmacognostical parameters of leaf material will be useful in identification and standardization of *J. elongatum* in obtaining quality formulations.

Key words: Ethnomedical, morphological, microscopocial, phytochemical analysis

INTRODUCTION

Oleaceae are a woody family of trees, shrubs, and climbers, which contain 25 genera and 600 species globally. Its members are cosmopolitan in distribution but occur in great diversity in temperate and tropical Asia. Among the *Oleaceae* family, *Jasminum* is the largest genus comprising around 200 species.[1] Commercially, the genus is cultivated to extract essential oil which play an important role in perfume industry and countries, namely, France, Italy, Morocco, United Arab Republic, and Algeria are the major contributors. In India, it is produced on commercial scale at Coimbatore of Tamil Nadu state.[2]

Conventionally, *Jasminum* species has been used to cure many diseases such as arthritis, hepatitis, conjunctivitis, gastritis, diarrhea, and dysmenorrhea. It has stimulant, analgesic, anti-inflammatory, anticonvulsant, aphrodisiac, antidiuretic, and antimicrobial activity. In aromatherapy, jasmine oil is one of the major ingredients, which produces state of well-being and mental relaxation. It is also used as flavoring agent in preparations such as chewing gum and confectionaries.[3] The most cultivated species of *Jasminum* which are believed to be occurring around the world along with India are *Jasminum sambac*, *Jasminum auriculatum*, *Jasminum grandiflorum*, *Jasminum flexile*, and *Jasminum elongatum*.[4]

Due to the presence of numerous species present in the genus, it becomes necessary to identify the authentic one. Accurate identification of plant source is essential to ensure reproducible quality of herbal drugs, which ensure its safety and efficacy.[5] The World Health Organization (WHO) has

Address for correspondence:
Sabeena Hussain Syed, Department of Pharmacognosy, Bharati Vidyapeeth Deemed University, Poona College of Pharmacy, Pune, Maharashtra, India.
E-mail: sabina.syed10@gmail.com

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also setup guidelines for standardization and quality control of herbal drugs. Therefore, an attempt has been made to evaluate pharmacognostical parameters of *J. elongatum*, syn. *J. amplexicaule*, as literature survey and scientific data revealed that no pharmacognostic studies had been carried out on the leaves of plant. Hence, the objective of the present study is to evaluate the plant by macroscopical, microscopical, physicochemical, and phytochemical parameters.

J. elongatum shrub occurs widely in Asian countries and native to India and inhabiting in Sikkim, Assam, Khasi hills; alt. 300–1700 m. Conventionally, powder of its twigs and leaves has been used as a hydragogue, febrifuge and also has been used for the treatment of dysentery, diarrhea, and bellyache in China.[6] The leaves and the stems of the plant contain some secoiridoid glucosides such as jasamplexosides A, B, and C along with 10-hydroxyligstroside and jasminoside[7] and the leaves also reported to contain jaslanceosides B and E, jasminoside, and isojasminoside.[8] The methanolic extract of the plant reported for analgesic and anti-diarrhea activities.[9]

MATERIALS AND METHODS

Plant Material Collection and Identification

The plant, *J. elongatum,* was collected from Pune district (Maharashtra) during flowering season. The plant was authenticated by Botanical Survey of India, Pune. The leaves of the plant were shade dried, coarsely powdered, and passed through 40 mesh sieve. The powdered material is stored in an airtight container for future use.

Macroscopic Analysis

The macroscopic analysis of the fresh leaves of the plant was done with naked eye and by simple microscope. The leaves are identified for following macroscopical character: Size and shape, color, odor, taste, surfaces, base, apex, margin, venation pattern, lamina, texture, and presence or absence of petiole.

Microscopical Analysis

For microscopical studies, the fresh leaves were removed from the plant and transverse sections were obtained using stainless steel blade. The sections were cleared with chloral hydrate solution, washed in distilled water, and then stained with phloroglucinol-hydrochloric acid (1:1) and toluidine blue. Section was mounted on slide with the help of glycerin and analyzed by light microscope. The photographs of the section were taken using the digital camera attached to microscope.[10,11] The following characteristics were observed for their presence or absence: Type of epidermal cells, stomata, and trichomes. The transverse sections of the fresh leaves through the lamina and the midrib are also cleared, mounted, and observed.

The powdered drug of the leaves was separately treated with solution of phloroglucinol-hydrochloric acid (1:1), acetic acid, and iodine solution to identify the presence of lignified fibers, calcium oxalate crystals, and starch grains.[10]

Physicochemical Analysis

According to the WHO guidelines (2002), physicochemical parameters were analyzed for the powdered dried leaves. Loss on drying, ash values (total ash, acid-insoluble ash, and water-soluble ash), and extractive parameters such as petroleum ether-soluble extractive, alcohol-soluble extractive (90% ethanol), and water-soluble extractive values were determined. All the samples were analyzed in triplicate.[12]

Preliminary Phytochemical Analysis

The air-dried leaves of *J. elongatum* were made into coarse powder. The powdered material was extracted by maceration technique using methanol as solvent for overnight. The obtained extract filtered, evaporated to dryness, and was subjected to phytochemical analysis to detect the secondary metabolites according to standard procedures.[13]

RESULTS

Macroscopic Characteristics

J. elongatum is a shrub, forming large bush up to 3–4 m tall. Macroscopically, leaves are simple, opposite, petiolate with hairs on ventral side. Shape of the leaf is ovate to lanceolate and the base is rounded with acute apex. On each side of midrib, 3–4 primary veins are present. The leaf size is 3–11 cm long and 2–5 cm wide. The leaves are green in color with characteristic odor and slightly bitter in taste [Figure 1].

Microscopic Characteristics

Midrib region

The transverse section of the leaflet passing through the midrib portion is convexly protruding at the lower side and flat

Figure 1: Macroscopical characters of leaves of *Jasminum elongatum*

or slightly elevated at upper side. Epidermal portion consists of both upper and lower epidermis made of barrel-shaped cells and covered with cuticle. The characteristic features of the epidermis are presence of anomocytic stomata, restricted to the lower epidermis, and several covering and glandular trichomes. Glandular trichomes are uniseriate to multiseriate. Epidermis is followed by collenchymatous cells on both sides, which is followed by cortex region of parenchymatous tissue. The stelar region shows presence of horse shape vascular bundles. Vessels have spiral shape thickening and stone cells are present around the phloem [Figure 2].

Mesophyll region

The leaf has dorsiventral mesophyll, with 1–2 layers of compactly arranged, elongated palisade cells under the upper epidermis, followed by 2–3 layers of spongy parenchyma consisting of intercellular spaces. These cells have calcium oxalate crystals [Figure 3].

Powder characteristics

The dried leaf powder showed fragments of epidermis with anomocytic stomata, covering, glandular trichomes, and stone cells. The presence of xylem vessels with spiral thickening and spindle-shaped fibers in vascular region is the characteristic features of powder microscopy of the leaf of *J. elongatum* [Figure 4].

Physicochemical Constants

Physicochemical analysis of powdered leaf, namely, loss on drying, ash value, and extractive value is presented in Table 1.

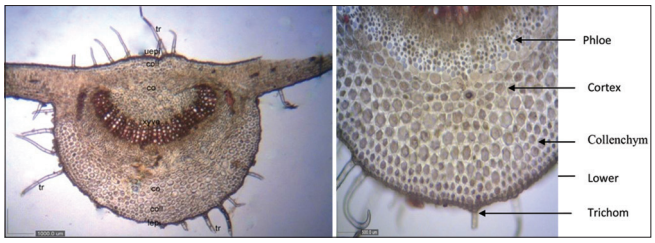

Figure 2: T. S of midrib of leaves of *Jasminum elongatum.* (tr – trichomes, uepi – upper epidermis, coll – collenchyma, co – cortex, xyve – xylem vessels, lepi – lower epidermis)

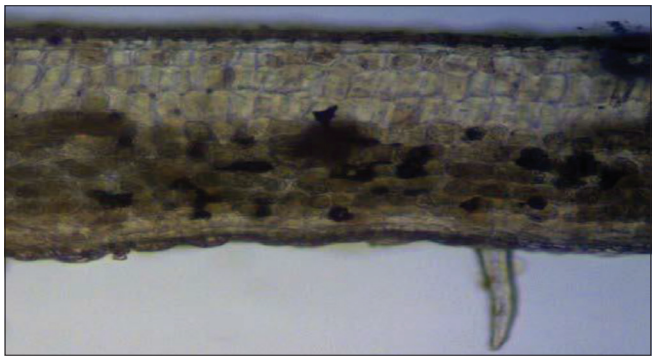

Figure 3: T. S of mesophyll of leaves of *Jasminum elongatum*

Preliminary Phytochemical Analysis

Qualitative analysis of powdered leaves of *J. elongatum* petroleum extract, chloroform extract, methanolic extract, and aqueous extract showed the presence of phytoconstituents such as carbohydrates, saponins, triterpenoids, flavonoids, and phenols in respective test which are mentioned in Table 2.

DISCUSSION

To determine identity, quality, purity, and safety of crude herbal drugs, standardization plays an important role. Standardization of herbal drugs is executed by macroscopic, microscopic, physicochemical, and phytochemical evaluation. According to the WHO protocols, the macroscopic and microscopic analysis of a drug is the prime step to establish the identity and purity. Thus, the present research work was performed to establish the quality parameters of *J. elongatum* which contribute to its efficacy and safety. This is the first

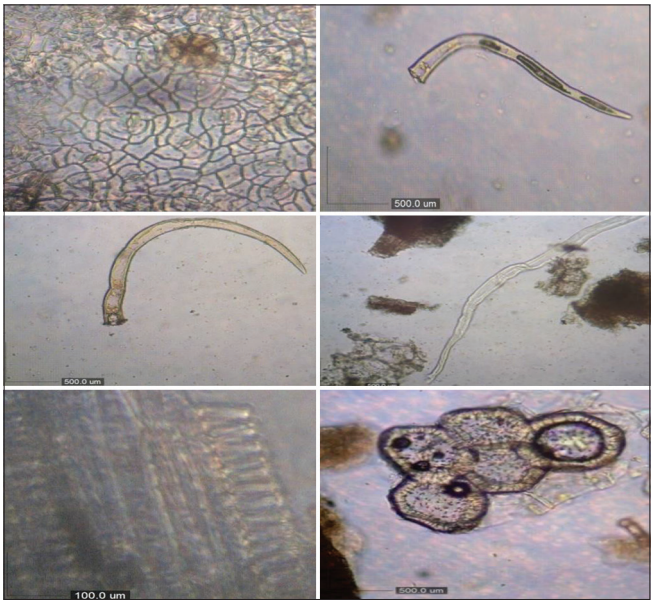

Figure 4: Powdered microscopical characteristic of leaves of *Jasminum elongatum*

Table 1: Physicochemical parameters of *Jasminum elongatum* leaves

S. No.	Parameters	Yield (%w/w)
1	Loss on drying	5.12
2	Total ash	8.21
3	Acid-insoluble ash	3.15
4	Water-soluble ash	4.91
5	Pet ether-soluble extractive	4.12
6	Chloroform extractive	2.13
7	Alcohol-soluble extractive	13.10
8	Water-soluble extractive	15.18

Table 2: Preliminary phytochemical analysis of *Jasminum elongatum* leaf extract

Chemical constituents	Chemical tests	Petroleum ether extract	Chloroform extract	Methanolic extract	Aqueous extract
Carbohydrates	Molisch's test	–	+	+	+
	Fehling's test	–	+	+	+
	Benedict's test	–	–	+	+
Alkaloids	Dragendorff's test	–	–	–	–
	Mayer's test	–	–	–	–
	Wagner's test	–	–	–	–
Saponin glycosides	Foam test	+	+	+	+
Steroidal and triterpenoidal glycosides	Liebermann–Burchard test	+	+	+	–
	Salkowski test	+	+	–	–
Flavonoids	Shinoda test	–	–	+	+
	Lead acetate test	–	–	+	+
Phenols	Ferric chloride test	–	–	+	+
	Bromine water test	–	–	+	+

study to report the pharmacognostical and phytochemical standards for leaves of *J. elongatum.*

Macroscopic or organoleptic evaluation is based on the study of morphological characters of crude drugs. The leaves of *J. elongatum* are opposite in arrangement with ovate to lanceolate in shape and acute apex. The microscopic evaluation revealed the presence of covering and glandular trichomes along with anomocytic stomata in the epidermal region. The characteristic feature of the midrib portion is the presence of horseshoe-shaped vascular bundle where xylem vessels showed spiral thickening. The laminar portion of the leaf showed calcium oxalate crystals. Powder microscopy also plays a major role in authentication of herbal drugs. Powder microscopy revealed the presence of spiral-shaped xylem vessels, spindle-shaped fibers, and stone cells.

Determination of moisture content is important because it adds the physical and chemical stability of the crude drug. Excess moisture favors the growth of microorganism, leading to deterioration of crude drug. Ash value of drug implies the earthly matter or inorganic composition present along with drug and it is useful in determining authenticity and purity of the drug. Percentage ash analysis was carried out and results showed that total ash values of the leaves are higher than other ash values. Extractive values help to determine whether the drug is exhausted or adulterated. It is also useful to find solubility of phytoconstituents in particular solvent. Among the extractive values obtained, alcohol and water extractive values of leaves were found to be higher than pet ether and chloroform extractive values.

Preliminary phytochemical analysis showed the presence of carbohydrates, glycosides, saponins, flavonoids, tannins, and phenolic compounds in various extracts of leaves of *J. elongatum*. This suggests that due to the presences of these phytoconstituents, the plant is used as a traditional medicine.

CONCLUSION

This present study reported for the 1st time, the complete pharmacognostical specifications parameters of leaves of *J. elongatum*. These specifications could be used to authenticate and evaluate the quality of plant and hence differentiating it from closely related species. This work also could be useful in compilation of a suitable monograph of *J. elongatum* and also contributes toward establishing the pharmacopeial standards.

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REFERENCES

1. Kadereit JW, Green PS, editors. *Oleaceae*. In: Flowering Plants, Dicotyledons: Lamiales (Except Acanthaceae Including Avicenniaceae). Vol. 7. New York: Springer-Verlag; 2004. p. 296-306.
2. Panda H. Cultivation and Utilization of Aromatic Plants. New Delhi: Asia Pacific Business Press; 2005. p. 234-6.
3. Preedy VR. Essential Oils in Food Preservation, Flavor and Safety. Netherlands: Elsevier, Academic Press Inc.; 2015. p. 487.
4. Jeyarani NJ, Yohannan R, Vijayavalli D, Dwivedi MD,

Pandey A. Phylogenetic analysis and evolution of morphological characters in the genus *Jasminum* L.(*Oleaceae*) in India. J Genet 2018;97:1225-39.
5. Syed SH, Namdeo AJ. Botanical features for taxonomic evidence of *Erythroxylum monogynum* Dried Leaf. Pharmacogn J 2017;9:395-9.
6. Jain A, Sharma R, Kumar A, Sharma S. *Jasminum* species: An overview. Int J Inst Pharm Life Sci 2011;1:251-6.
7. Tanahashi T, Shimada A, Nagakura N, Nayeshiro H. Jasamplexosides A, B and C: Novel dimeric and trimeric secoiridoid glucosides from *Jasminum amplexicaule.* Planta Med 1992;58:552-5.
8. Shen C, Lin TT, Lu TY, Hung SE, Sheu JH. Secoiridoid glycosides from *Jasminum amplexicaule*. J Chin Chem Soc 1999;46:197-200.
9. Jia Q, Su W, Peng W, Li P, Wang Y. Anti-diarrhoea and analgesic activities of the methanol extract and its fractions of *Jasminum amplexicaule* Buch.-Ham. (*Oleaceae*). J Ethnopharmacol 2008;119:299-304.
10. Khandelwal KR. Practical Pharmacognosy-Technique and Experiments. 19th ed. Pune: Nirali Prakashan; 2008. p. 149-60.
11. O'Brien TP, Feder N, Mc Cull ME. Polychromatic staining of plant cell walls by Toluidine Blue O. Protoplasma 1964;59:364-73.
12. WHO/PHARM/92.559/REV.1. Quality Control Methods for Medicinal Plant Materials. Geneva: Organisation Mondiale De La Sante; 1992. p. 22-34.
13. Harborne JB. Phytochemical Methods. 2nd ed. London: Chapman and Hall Ltd.; 1973. p. 42.

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