

Preliminary Pharmacognostical and Phytochemical analysis of *Jasminum grandiflorum*

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Abstract

Jasminum grandiflorum belongs to family Oleaceae. The plant is widely used as traditional medicine in India for curing various diseases. Preliminary phytochemical analysis of *Jasminum grandiflorum* in various solvent ranging from non- polar to polar, viz. n- hexane, chloroform, ethyl acetate, methanol and water, revealed the presence of glycosides, alkaloids, phytosteroids and flavonoids. The present investigation is carried out in leaves and stem of *Jasminum grandiflorum* collected from various places in Jaipur District, Rajasthan, India. The results revealed the presence of various phytochemicals that can further be utilised for curing various ailments.

Keywords

Jasminum grandiflorum, Non- polar solvents, Polar solvents, Phytochemical analysis

Introduction

Medicines derived from plants play a vital role to cover the basic health needs in the developing countries for treating old and emerging diseases that has defied many orthodox drugs. Plant medicines are considered safer and better than synthetic drugs or western medicine. Synthetic drugs are well-known and in use, but at the same time it has created problems due to some side-effects such as carcinogenicity caused by synthetic drugs. Therefore, the interest in search for natural products with medicinal property e.g. naturally occurring antioxidants and antibiotics has increased considerably.

Approximately, 119 pure chemical substances extracted from higher plants are used in medicine throughout the world (Farnsworth *et al*,1985). It is estimated that approximately one third of prescribed drugs contains plant extracts or active ingredients obtained from or molded on plant substances (Tripathi and Tripathi, 2003). According to World Health Organization (WHO), traditional medicine is estimated to be used by up to 80% of the population of most developing countries. WHO's essential medicine list contains 252 drugs out of which 11% is exclusively of plant origin (WHO, 1993). These plant-based medicines are used for primary health care needs (Bulletin WHO, 2002). Several of these drugs are in extensive clinical use (Sofowora, 1982; Roja and Rao, 2000). It is estimated that 300,000 plant species acclaimed worldwide, only about 5% have been investigated scientifically for medicinal properties. Therefore, such

plants should be investigated to better understand their properties, safety and efficacy.

In the present scenario, pharmaceutical companies are involved in research on plant materials for their potential medicinal value as the demand for herbal products is growing exponentially due to its fewer side effects as compare to other system of medicines. (Rao and Sansui, 2001).

The medicinal properties of plants lies in some chemical constituents or group of compounds that have a definite physiological action in the human body. Such chemical substances are known as secondary metabolites. The most important of these bioactive groups of plants are flavonoids, terpenoids, steroids, alkaloids, tannins and phenolic compounds (Edeoga *et al*, 2005). Extraction and characterization of several active phytochemicals from these green factories have given birth to some high activity profile drugs (Jeyachandran and Mahesh, 2007).

Jasmines are an important group of fragrant flowering plants which are found in all over India. They are widely cultivated, especially in the temperate regions and on the temperate Himalayas. and esteemed for there attractive fragrant flowers. This genus belongs to the family Oleaceae. *Jasminum grandiflorum* is commonly known as Chameli. Different parts of the plant such as the leaf, bark, stem, and roots are very useful and important in pharmaceutical industries The leaves of Chameli contain resin, salicylic acid and jasminine an alkaloid . The leaves of *Jasminum grandiflorum* is used in folk medicine for

treating ulcerative stomatitis, toothache, skin diseases, ulcers, wounds, corns and also as gargles (Joseph *et al*, 2011). It has been reported to possess antioxidant, anti-lipid peroxidation and spasmolytic activity. Asian and Indian peoples used Jasmine traditionally as aphrodisiac, antibiotic and anti-fungal treatment. Scientific research has confirmed Jasmine's antibiotic properties and cites evidence of its antibiotic, diuretic and emmenagogic properties (Joy and Raja, 2008).

In the present work, preliminary phytochemical analysis was carried out on *Jasminum grandiflorum*.

Materials and Method

Collection and Identification of Plant Material

Fresh plant parts were collected from Jaipur, Rajasthan region, India in the year 2012. The plant material was identified by the Curator (Herbarium, Dept. of Botany), University of Rajasthan, Jaipur, Rajasthan, India. Herbarium was deposited at our university for further reference. Fresh plant materials were washed in tap water, air dried and then homogenized to fine powder and stored in airtight bottles.

Pharmacognostical Studies

Preparation of plant extract

The powder of leaves and stem of *Jasminum grandiflorum* was extracted successively with the ratio of 1: 20 (100 g of dry powder: 2000ml of solvent) in each of n- hexane, chloroform, ethyl acetate, methanol and water by Soxhlet extraction for relevant period of time. The extracts were concentrated to dryness in the oven. All the extracts were stored in a container for further use. The percentage yields from various solvents are given in Table 1.

Extraction process

The dried leaves as well as stem powder of plant *Jasminum grandiflorum* was extracted with various solvents ranging from non-polar to polar solvents viz. n- hexane, chloroform, ethyl acetate, methanol and water at different temperature for defatting purpose, in a Soxhlet apparatus (continuous hot percolation process) and after complete extraction, the solvent was removed by evaporating in

oven and resulting semisolid, mass was dried in the room temperature to yield a gummy residue.

Preliminary qualitative phytochemical screening

Crude extract of the n- hexane, chloroform, ethyl acetate, methanol and water of *Jasminum grandiflorum* leaves and stem were dissolved in 1: 10 ml of its own mother solvents to obtain a stock solution. The extracts thus obtained were subjected to preliminary qualitative phytochemical screening with the method of Harborne (1998).

Screening Procedure

The n- Hexane, chloroform, ethyl acetate, methanol and water extract of *Jasminum grandiflorum* were subjected to qualitative test for the detection of various plant constituents. The following qualitative tests have been performed for secondary metabolites.

1. **Tests for Glycosides**
 - a) Legal's test (Ramakrishnan and Rajan, 1994)
 - b) Borntrager's test (Evans, 1997)
2. **Tests for Alkaloids**
 - a) Mayer's test (Evans, 1997)
 - b) Hager's test (Wagner *et al*, 1996)
 - c) Wagner's test (Evans, 1997)
3. **Tests for Phyto Steroids**
 - a) Salkowski test (Finar, 1986)
 - b) Liebermann – Burchard test (Finar, 1986)
4. **Tests for Flavonoids**
 - a) Ferric Chloride test (Ramakrishnan and Rajan, 1994)
 - b) Alkaline reagent test (Ramakrishnan and Rajan, 1994)
 - c) Lead Acetate solution test (Ramakrishnan and Rajan, 1994)
5. **Tests for Saponins**
 - a) Foam test (Kokate, 1999)

Table 1. Extractive Values of All Extract of *Jasminum grandiflorum*(Leaves and Stem)

S.No	Solvents	Weight of the extract (g)		w/w % yield	
		Leaves	Stem	Leaves	Stem
1.	n- Hexane	0.410	0.262	4.1%	2.62%
2.	chloroform	0.470	0.300	4.7%	3%
3.	ethyl acetate	0.843	0.258	8.43%	2.58%
4.	methanol	2.02	1.40	20.2%	14%
5.	water	1.98	0.98	19.8%	9.8%

6. Tests for Tannins and Phenolic compounds

- Ferric chloride test (Mace, 1963)
- Lead acetate test (Ramakrishnan and Rajan, 1994)
- Acetic acid test (Ramakrishnan and Rajan, 1994)

7. Test for Fixed Oils and Fats

- Spot test (Kokate, 1999)
- Saponification test (Kokate, 1999)

Results and Discussion

The result obtained in the present investigation (Table 2) of n-hexane, chloroform, ethyl acetate, methanol and water extracts of the leaves and stem of *Jasminum grandiflorum* showed the presence of Alkaloids, Glycosides, Flavonoids, and Phytosterols. Further, extracts of the leaves and stem showed the absence of saponins, tannins & phenolic compounds and fixed oils & fats.

An analysis of the origin of the drugs developed between 1981 and 2002 showed that natural products or natural product-derived drugs comprised 28% of all new chemical entities (NCEs) launched into the market. In addition, 24% of these NCEs were synthetic or natural mimic compounds, based on the study of pharmacophores related to natural products (Newmann *et al*, 2000). This combined percentage (52% of all NCEs) suggests that natural products are important sources for new drugs and are also good compounds suitable for further modification during drug development. The large proportion of natural products in drug discovery has stemmed from the diverse structures and the intricate carbon skeletons of natural products. Since, secondary metabolites from natural sources have been elaborated within living systems, they are often perceived as showing more drug-likeness and biological friendliness than totally synthetic molecules making them good candidates for

further drug development. It is believed that crude extract from medicinal plants are more biologically active than isolated compounds due to their synergistic effects (Jana and Shekhawat, 2010).

Phytochemicals screening of the n-hexane, chloroform, ethyl acetate, methanol and water extracts of the leaves of *Jasminum grandiflorum* used in this study revealed that the crude extracts contained Alkaloids, Glycosides, Flavonoids, and Phytosterols (Table 2). The presence of these four compounds support the use of the plant in folklore medications. Alkaloids are known to contain a lot of pharmacological properties. They are mostly used as anaesthetic (cocaine), antitumor (vinblastine), antidepressant (morphine), antimalaria (quinine), stimulants (caffeine), amoebicide (emetine) and antibacterial (berberine). (Bruneton, 1995; Cowan, 1999; Heinrich *et al*, 2004; Gurib-Fakim, 2006). Flavonoids are known to have Antispasmodic, anti-inflammatory, anti-allergic, antiviral and diuretic effect (Bruneton, 1995; Van wyk *et al* 1997; Cowan, 1999).

Leaves and stems of *Jasminum grandiflorum* shall be investigated for medicinal use particularly as antimicrobial agents. The present study is a preliminary study of the occurrence of certain properties of *Jasminum grandiflorum*; an in-depth study will provide a good concrete base of all the phytochemicals functions.

It was observed that the biologically active phytochemicals were present in all solvent extracts viz., n-hexane, chloroform, ethyl acetate, methanol and water extract of the leaves and stem of *Jasminum grandiflorum*. The medicinal properties of *Jasminum grandiflorum* extracts may be due to the presence of above mentioned phytochemicals. Further studies are in progress in our laboratory to isolate the active components.

Table 2. Qualitative Phytochemical Analysis of Various Extracts of *Jasminum grandiflorum* (Leaves and stem)

Phytoconstituents	n-hexane extract		Chloroform extract		Ethyl acetate extract		Methanol extract		Water extract	
	L	S	L	S	L	S	L	S	L	S
Glycosides	+	+	+	+	+	+	+	+	+	+
Alkaloids	+	-	+	+	+	+	+	+	+	-
Phyto steroids	+	+	+	+	+	+	+	+	+	+
Flavanoids	+	+	+	+	+	+	+	+	+	+
Saponins	-	-	-	-	-	-	-	+	-	+
Tannins & phenolic compound	-	-	-	-	-	-	-	-	-	-
Fixed oils & fats	-	-	-	-	-	-	-	-	-	-

(+) = indicates presence, (-) = indicates absence. L= Leaves, S= Stem

References

- Bruneton, J. (1995) Pharmacognosy, Phytochemistry of Medicinal Plants. Lavoisier, France, pp: 265–380.
- Bulletin of the World Health Organisation (WHO) July 2002 vol.1 80:7.
- Cowan, M. M. (1999) Plants Products as Antimicrobial Agents. *Clin Microbiol Rev* 564-582.
- Edeoga, H.O., Okwu, D.E., Mbaebie, B.O. (2005) Phytochemical constituents of some Nigerian medicinal plants. *Afr J Biotechnol* 4:685-688.
- Evans, W.C. (1997) Pharmacology. Harcourt Brace and company. Asia, Singapore, pp 226.
- Farnsworth, N., Morris R. Herbert J.(1985) Medicinal uses of plants. *Am J Pharm Educ* 148: 46-52.
- Finar, D.D. (1986) Stereo chemistry and the chemistry of natural products. 2: Longman, Singapur pp: 682
- Gurib-Fakim, A. (2006). Medicinal Plants: Traditions of Yesterday and Drugs of Tomorrow. *Mol Aspects Med* 26:1-93.
- Harborne, J.B. (1998) Phytochemical Methods: A guide to modern techniques of plant analysis. 3rd edn. Chapman and Hall, London, ISBN: 0-412-57260-5 pp: 1-302.
- Heinrich M., Bames 1., Gibbons S., Williamsons E.M. (2004) Fundamental of Pharmacognosy and Phtyotberapy. Churchill Livingstone, Elsevier Science Ltd.,UK.
- Jana, S., Shekhawat G.S.(2010) Phytochemical analysis and antibacterial screening of *in vivo* and *in vitro* extracts of Indian medicinal herb: *Anethum graveolens*. *Res J Med Plant* 4: 206-212.
- Jeyachandran, R., Mahesh, A. (2007) Enumeration of antidiabetic herbal flora of Tamilnadu. *Res J Med Plant* 1: 144-148.
- Joy, P., Raja, P. (2008) Anti-Bacterial Activity Studies of *Jasminum grandiflorum* and *Jasminum sambc*. *Ethnobotanical Leaflets* 12: 481-483.
- Joseph, L., George, M., Agrawal, S., Kumar, V. (2011) Pharmacognostical and Phytochemical studies on *Jasminum grandiflorum* leaves. *Int J Pharm Fron Res* 1(2): 80-92.
- Kokate, C.K. (1999) Practical Pharmacognosy. Vallabh Prakashan Publication, New Delhi. India. pp: 111-116.
- Mace, G..S.L. (1963) Anaerobic bacteriology for clinical laboratories. *Pharmacognosy* 23: 89-91.
- Newmann, D.J., Cragg, G.M., Snader, K.M., (2000) The influence of natural products upon drug discovery. *Nat Prod Rep* 17: 215.
- Rao, E.T., Sanusi, S.S.(2001) An Inventory of Medicinal Plants of the Nigerian Savannah. Levianthan Books, Lagos, Nigeria pp: 21-24.
- Ramkrishnan, S., Rajan, R. (1994) Text book of medical Biochemistry. Orient Longman, New Delhi, India. pp: 314-318.
- Roja, G., Rao, P.S.(2000) Anticancer compound from tissue cultures of medicinal plant. *J Herbs Spices Med Plants* 7: 71-102.
- Sofowora, E.A.(1982) Medicinal Plants and Traditional Medicine in Africa. University of Ife Press, Ile Ife, pp: 144-146.
- Tripathi, L., Tripathi, J.N. (2003) Role of biotechnology in medicinal plants. *Trop J Pharm Res* 2: 243-253.
- Van wyk B.E., Van Oudtshoom B., Gericke, N. (1997) Medicinal plants of South Africa. Briza Publication, South Africa.
- Wagner, H.X.S., Bladt, Z., Gain, E.M. (1996). Plant drug analysis. Springer Veralag, Berlin, Germany. pp: 360.
- WHO (1993) Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines. WHO, Manila, pp: 94.