Review on medicinal value of *Jasminum multiflorum*

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Abstract:

The Oleaceae family includes the Genus Jasminum, which is a widely spread medicinal plant that has been utilized for therapeutic purposes since ancient times. Numerous historically beneficial and pharmacologically active species have been identified from the genus Jasminum. Plants are grown for religious and bioactive purposes. The jasmineum species include *Jasminum multiflorum*, Jasminum sambac and polyanthum, Jasminum grandiflorum, Jasminum flexile, and Jasminum pubscens. Traditionally, these species' leaves and petals have been employed for their laxative, cardiotonic, alexipharmic, depurative, analgesic, antidepressant, anti-inflammatory, antiseptic, aphrodisiac, sedative, and expectorant properties. These species have therefore become a valuable source for traditional medicines. The pharmacological effects of the chemical substances that were extracted from these species have been documented. The glycosides classified as secoiridoid include multifloroside, mutiroside, jusmultiside, multiflorin, sambacosides, jaspolyside, jaspolyoleoside, isojaspolyoside, augustifolioside, oleopolyanthoside, jaspofoliamoside, jaspolinaloside, etc. The review will assist the researchers in choosing Jasminum species with potential for medicinal use in future investigations.

Key words: *Jasminum multiflorum*, Phytochemicals, Chemical constituents, Pharmacological activity

Introduction:

Herbs have been used traditionally for a very long time, and they are currently being considered as treatments. Roughly 25% of prescribed medications are thought to have botanical origins. There are 252 medications on the WHO essential medicine list, with 11% solely derived from plants. Around the world's tropical and subtropical regions are home to 200 species of the Jasminum genus (Oleaceae). Asia, India, and the Mediterranean are the places where the species are found. There are sixteen taxa that are native to India; they are primarily found in the Deccan Penisula, the Eastern and Western Himalayas, and the Andaman and Nicobar Islands [1]. The flora of Presidency Madras is known to contain 20 species [2]. These species are characterized by shrubs, vines, and trees. While some jasmine bushes have unscented blossoms, many have prominent white, yellow, or pink flowers with a pleasant perfume [3]. Many medicinal qualities, including depurative, analgesic, diuretic, antibacterial, expectorant, anti-depressant, and sedative, are exhibited by Jasminum officinale [4]. Plants containing jasmine have been

suggested as a treatment for intestinal worms and sexually transmitted infections.[5]The *J. sambac* plant has been utilized historically. The *J. multiflorum* flowers have bitter refrigerant, laxative, cardiotonic, alexipharmic, depurative, and digestive properties. They are also beneficial in vitiated disorders involving pitta, rheumatism, and cephalalgia. Aphrodisiac, expectorant, analgesic, antibacterial, anti-depressant, and sedative are among the properties of J. sambac [6]. Kariyat is prominent in twenty six Ayurvedic formulations as evidenced from Indian Pharmacopoeia while in Traditional Chinese Medicine it is an important "cold property" herb used to release body heat in fever [7]

Scientific Classification:[8]

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Lamiales

Family: Oleaceae

Genus: Jasminum

Species: Grandiflorum Linn.

Classical names: Jati, Sauanasyayani, Sumama, Chetika, Hridyagandha, Malati,

Vernacular: Hindi- Jati, Cameli

Name : Tamil- Jatimalli, Kotimalligai, Pitchi

Sanskrit- Jati, Malati

English- Spanish jasmine, common jasmine, Catalonian jasmine.

Fig . *Jasminum multiflorum*

Traditional uses:

***Jasminum multiflorum*:**

The multiflorous jasmine Andr. synonym *J. pubescens,* also known as star jasmine in English, Hindi, Bengali, Sanskrit, and Bengaliphul, is a native of Southeast Asia and the Western Ghats region of India. It is found in woods there and in the sub-Himalayan range up to 1500 meters [9]. The pharmacological properties of the flowers and leaves have been reported to be cardiotropic and capable of dilating blood vessels [10]. It has been claimed that the pharmacological qualities of the leaves and flowers are cardiotropic and have the ability to dilate blood vessels [11]. The leaf juice is used to cure typhoid and stomach problems, and the dried leaves are used to treat slow-healing ulcers. The plant's roots are utilized as an antidote to snake poison and as an emetic [12]. According to certain claims, the pharmacological properties of the flowers and leaves are cardiotropic and can widen blood vessels. [13] Typhoid and stomach issues are treated with the leaf juice, while ulcers that take a long time to heal are treated with the dried leaves. Both an emetic and an antidote to snake poison are made from the roots of the plant [14].

***Jasminum Sambac*:**

The national flower of the Philippines is *jasminum sambac,* also known as Indian jasmine, Philippine jasmine, pikake in Hawaii, gunda mallige in India, and Arabian jasmine in the continental United States. Philippines, Thailand, China, and India are the countries where it is grown for commerce [15]. They are strongly scented and close early in the morning.The essential oil is produced via hydro-distillery, supercritical carbon dioxide extraction, and steam distillation with simultaneous solvent extraction [16] .Tea leaves are flavored with the blossoms of J. sambac to give them a distinct jasmine flavour [17].

***Jasminum polyanthus*:**

It becomes a dense bush and fills each space it touches with aroma. It is also considered an invasive species in several areas due to its rapid growth. The leaves were ground into a juice and used as a sedative, mild anesthetic, and astringent to treat urinary tract infections. The jasmine species is also used to make perfumes and fragrances and is found in cosmetics. Flowers are used as a skin conditioner and in lotions, shampoos, and soaps, among other products. In China, jasmine blooms are frequently used as decorations. blooms were also utilized as a traditional cure for hepatitis, stomatitis, and duodenitis [18]. Native to China and Myanmar, *J. polyanthum* is a type of flowering plant known as the many-flowered jasmine, or pink jasmine. In a subtropical climate, it grows nicely. The plant is a robust evergreen twining

climber that is well-known for its profusion of fragrant, pink to white, fragrant blossoms. Early spring brings pinkish-white flower buds, which are followed by five 2 cm in diameter, mixed-pink petals [19].

Jasminum officinale:

Though its precise beginnings are unknown due to many eras and centuries of cultivation, it is thought that *Jasminum officinale* originated in the region that stretches from Persia to northern India. The sturdy, twining deciduous climber *Jasminum officinale* has finely pointed pinnate leaves and clusters of starry, pure white blossoms in July that emit a sweet perfume. Leaflets range in number from five to nine. Jasmine tea in small doses is probably safe to drink while nursing. Allergy reactions can be brought on by jasmine. It's the national flower of Pakistan, too. It is a favorite of temperate gardeners worldwide because of the powerful aroma of its summer blossoms. The leaves, bark, and roots of Jasminum have all shown measurable antibacterial action against reference bacteria, making them useful in treating urinary tract infections and diuretics [20].

***Jasminum grandiflorum*:**

Jasminum grandiflorum is a natural jasmine species found in East and Northeast Africa, South Asia, the Arabian Peninsula, and Yunnan and Sichuan, China. Guinea, the Maldives Islands, Mauritius, Réunion, Java, the Cook Islands, Chiapas, Central America, and the Caribbean are among the places where it is reportedly commonly grown and has naturalized. With close ties to *Jasminum officinale*, it is thought of as a subspecies of the latter. "Saman pichcha" or "pichcha" is the name given to the plant in Sri Lanka. It is a sprawling, 2-4 meter-tall deciduous shrub. Each of the opposite, pinnate, 5-to 12-cm-long leaves has five to eleven leaflets. The white single blooms feature five 13–22 mm lobes and a single 13–25 mm basal tube. In open cymes, the blooms are created. In Pakistan, it grows naturally in the Rawalpindi District and the Salt Range at elevations between 500 and 1500 meters above sea level. The plant is said to have anti-ulcer, cytoprotective, chemopreventive, anti-inflammatory, anti-microbial, antioxidant, and anti-acne properties [21].

Phytochemicals from Jasminum species: [22-37]

Species	Chemical compounds
J. multiflorum	multifloroside, mutiroside, 10-hydroxy-oleoside-11-methyl ester, 10-hydroxyoleuropein, 10-hydroxyligustroside, jusmultiside, multiflorin. Secoiridoid lactones- jasmolactone A, B, C and D and their derivatives, nerolidol, benzyl benzoate, jasmolactone, jasmine, hexenyl benzoate and βfarnesene. [22-24]

J.officinale	Saponins-[3-O-α-L-Rha[1→2]-β-D-Xyl hed-28-O-β-D-Gal[1→6]-β-D-Gal-ester; hed-3- O-β-D-Glc[1→3]-α-L-Ara; 2α,3β,23-trihydroxyolean-12-en-28-oic-O-β-D-Glc ester; hed3-O-β-D-Xyl[1→3]-α-L-Rha [1→2]-α-L-arabinopyranoside;2α,3β,23-trihydroxyolean12-en-28-oic-O-α-L-Rha [1→4]-β-D-Glc[1→6]-β-D-glucopyranosyl ester and hederagenin-3-O-α-L-Rha[1→2]-α-L-arabinopyranoside.Iridoids glycosidesjasgranoside B,6-O-methy-catalpol, deacetyl asperulosidic acid, aucubin, 8-dehydroxy shanzhisideand loganin.Secoiridoids glucosides-[20R]-20-methoxyoleuropein, [20S]-20- methoxyoleuropein, oleuropein, ligstroside, demethyloleuropein and oleoside dimethyl ester. jasgranoside, jaspolyoside, 8-epi-kingiside, 10-hydroxy-oleuropein,10-hydroxyligstroside and oleoside-7, 11-dimethyl ester.[25-28]
J.sambac	linalyl 6-O-malonyl-β-D-glucopyranoside, benzyl6-O-β-D-xylopyranosyl-β-Dglucopyranoside (β-primeveroside), 2-phenylethyl β-primeveroside, 2-phenylethyl 6-O-αL-rhamnopyranosyl-β-D-glucopyranoside (β-rutinoside) , dotriacontanoic acid, dotriacontanol, oleanolic acid, daucosterol, and hesperidin. The compounds isolated from leaves contain sambacosides A, E and F , and flowers contain molihuaside A-E, sambaeoside A .[29-31]
J. polyanthum	jaspolyside, oleoside-11-methyl ester, 7,11oleoside dimethyl ester, methylglucooleoside, augustifolioside, oleuropein, isonuezhenide. jaspolyoside, jaspolyanthoside, GI5 , augustifolioside, isojaspolyoside A, isojaspolyoside B, isojaspolyosideC, polyanoside , jaspolyoleosideA, jaspolyoleosideB, jaspolyoleosideC, oleopolyanthosideA, oleopolyanthosideB , jaspofoliamosideC, jaspofoliamosideD, jaspogeranoside A, jaspogeranoside B, jaspo- foliamoside G, jaspofoliamoside E, jaspofoliamoside F, jaspolinalosideB , jaspofoliamosideB, jaspofoliamosideA, jaspolinaloside, neopolyanthoside .[32-34]
J. mesnyi	Essential oil- coumarin, monoterpenol, linalool, α terpinol and geraniol. Secoiridoids-jasmoside, jasmesooside, 9- hydroxy jasmesoside. 9-hydroxy jasmesosidic acid, Jasminum 10-α β-D glucoside, 2 hydroxy jasminin, iso jasminin, jasminin, 4 hydroxy isojasminin and jasmosidic acid, Phenolic glucoside- syringing and rutin. Flavoniods and steroids-cerylalcohol, α

	amyrin, β sitosterol, ursolic acid, mannitol, quercetin, poliumoside and forsythoside. [35-36]
J. amlexicaule	Secoiridoid glucisides- Jasamplexosides A, B and C, 10- hydroxyligstroside and Jasminosid .[37]

Isolation of Chemical Constituents:

In 1962, the hunt for *Jasminum grandiflorum's* chemical ingredients began with the isolation and identification of a fragrant lactone molecule from the oil and wax part of the plant. Flavonoids, triterpenoids, secoiridoids, and their glycosides are found to be the main compounds that the plant elaborates. Tiny substances such as terpene molecules and long-chain aliphatic alcohols and esters have also been identified.

Constituents of Leaves: The results of the investigation demonstrated the value of the plant extract above separate, isolated chemicals.[38] Isolecitrin [C11], ursolic acid [C12], 2- (3, 4-dihydroxyphenyl) ethanol [C10], and oleacein [C9], an angiotensin converting enzyme inhibitor, were extracted from the aerial portions of Jasminum grandiflorum. [39] In addition to the four known secoiridoid glucosides, oleeuropein [C1], demethyl oleeuropein [C4], ligstroside [C5], and oleoside di-methyl ester [C6], olivil [C7], and p-hydroxyphenethyl alcohol [C8], two new secoiridoid glucosides, (2"R)-2"-methoxy oleuropein [C2] and (2"S)-2"-methoxy oleuropein [C3], were also isolated from the dried leaves of *Jasminum grandiflorum.*[40]

Constituents of Flower Buds: The 70% alcoholic extracts of flower buds yielded six flavonoid glycosides, whose structures were identified as follows: kaempferol-3,7-O-diβ-D-glucopyranoside [C26], kaempferol-3-O-(6"- O-acetyl)-β-D-glucopyranoside [C27], quercetin-3- O-sambubioside [C28], sulfurein [C29], butin-7-O-β-D-glucopyranoside [C30], and acacetin-7-O(αD-apiofuranosyl) (1→6)D-glucopyranoside -β- [C31] 12. The following are characteristics of secoiridoid compounds that have been identified from flower buds: aucubin [C34], 6-O-methycatalpol [C32], aucubin B, aucubin [C34], 8-dehydroxy shanzhiside [C35], and loganin [C36]. [41]

Constituents of Flowers: The following small molecules were found in the n-hexane extract of flowers: cis-3-hexenol, 2-vinylpyridine, myrcene, benzyl alcohol, p-cresol, linalool, methyl benzoate, benzyl cyanide, benzyl acetate, αterpineol, linalyl acetate, geraniol, indole, eugenol, methyl dihydrojasmonate, methyl anthranilate, cisjasmone, methyl N-methylanthranilate, vanillin, nerolidol, cis-3-hexenyl benzoate, farnesol, benzyl benzoate, methyl palmitate, isophytol, geranyllinalool, methyl linoleate, and phytol [42].

Pharmacological activities from Jasminum species : [ref 43 to 59]

Activity	Species	Extract/Isolate	Bioactive Dose	Positive Control	Animal Tested	Experimental Model
Antimicrobial	J. officinale	Ethanol	2 mg/ml	ampicillin	Bacterial strains	agar dilution methods
	J.grandiflorum	Ethanol (10 µg/ml)	MIC = 6.25 µg/ml	-	Bacterial strains	agar dilution methods
	J. sambac	Essential oil	-	-	Bacterial strains	Disc diffusion & micro dilution method
	J. polyanthum	Water	MIC = g/ml, ZOI=89,13,13, 8	-	Bacterial strains	Disc diffusion method
Antioxidant	J.grandiflorum	Water, Ethanol	IC50= µg/ml 150.57, 38.27, 397.0 IC50= 15, 98	DPPH, NO H2O2 DPPH, NO	Ascorbic acid, Curcumin	In vitro
	J. mensyi	Ethyl acetate F n-Butanol	IC50 µg/ml 153.45,6.22	Ascorbic acid, Rutin	DPPH, NO	In Vitro
	J. officinale	Aqueous Ext	IC50 76.62 µg/ml	Ascorbic acid	DPPH, NO, superoxide	In Vitro
	J. multiflorum	methanol	IC50= 81 µg/ml	DPPH, BHT	DPPH, BHT	In vitro
	J. polyanthum	Methanol 10-30 mg	-	Ascorbic acid	DPPH	In vitro
Anti inflammatory	J. sambac	Ethanol (100-400 mg/kg)	400 mg/kg ($p < 0.05$)	Diclofane	albino rats	carrageenana nd subchronic inflammation model
Antifungal	J. officinale	n-Butanol Ext	2 mg/ml	Standard Antifungal drugs	Fungal strains	Disc diffusion and broth dilution model

Antiviral	J. officinale	Oleuropein	IC50 80 mg/kg	-	[HBV] HepG2 2.2.15 cell line - and [DHBV] in vivo	well diffusion method
Analgesic	J.amlexicaule	Methanol Ext	100-400 mg/kg	Aspirin	Swiss albino rats	Hot Plate Test, Writhing and Formalin test
Anti diarrhoea	J.amlexicaule	Methanol Ext	100-400 mg/kg	Barberenine	Swiss albino rats	Oral Administration
Antiulcer	J.mesnyi	Ethanol	200, 400 mg/kg	Aspirin	Wister rats	Aspirin induced ulcer mode
Anthelmintic	J.mesnyi	Ethanol	20,40 mg/ml	Albendazole	Eisenia fetida	Petri Dish Expt
Insecticidal	J. officinale	Hexane Chloroform	62-8000 mg/l	-	larvae of mosquitoes	Force feeding methods

Pharmacological activities from Jasminum species:

Antioxidant Activity: Both in-vitro and in-vivo methods have been used to thoroughly examine the antioxidant capacity of the polar extracts of *Jasminum grandiflorum* leaves. Significant free radical scavenging potential of the leaves was found by in vitro antioxidant activity investigations. The 50% inhibitory concentration of 15 µg/ml of the crude 70% ethanolic extract was shown to be equally powerful as 12 µg/ml of ascorbic acid in the DPPH experiment. The crude extract's reductive ability at IC50 settings was 19.5 µg/ml, which is equivalent to 15.5 µg/ml of quercetin. At half-half concentrations, nitric oxide radical scavenging was 98 µg/ml, which was similar to curcumin's 92 µg/ml. [60]

Anti-inflammatory Activity: In comparison to the control group, the gel treatment greatly decreased swelling and increased skin suppleness in individuals with post-surgical edema. Escin has strong anti-inflammatory and antioxidant qualities, as demonstrated by Belcaro et al.'s research, which establishes it as a potential natural treatment for a variety of illnesses [61]. When aqueous extracts from two herbal teas were tested for their ability to reduce inflammation and their relationship to phenolic compounds, it

was found that aglycones were more effective than their corresponding glycosides at inhibiting nitric oxide (NO) and phospholipase A2 (PLA2), with quercetin being the most potent (IC50 = 7.47 and 1.36 µM, respectively). Analogously, 5, Ocaffeoylquinic acid (about 35%) may similarly be inhibited at 1.56 µM. Inflammatory illnesses may be avoided by consuming both herbal teas, according to the study.[62] It is commonly recognised that the inducible ISO version of COX (COX-2) overproduces inflammatory prostaglandins, and that this overproduction is a major pathophysiological factor in the development of inflammatory pain.[63]

Antibacterial Activity: In order to create silver nanoparticles with strong antibacterial and antioxidant properties, the study advises using leaf extract as a natural reducing agent. A sustained drug release mechanism may potentially be possible with the produced nanoparticles. [64]

Antimicrobial Activity: When the fruit methanolic extract was compared to the standard used, it demonstrated a considerable inhibitory action against the plant disease Xanthomonas campestris and the animal pathogen Aeromonas hydrophila, with zones of inhibition of 18.33 ± 0.47 mm and 13.66 ± 0.47 mm at 100 µg/ml, respectively. [65] Gram-positive and Gram-negative bacteria, as well as the yeast Candida albicans, were examined for antibacterial activity against the *J. grandiflorum* sample using agar dilution and agar diffusion procedures. Together with three synthetic antibiotics and eugenol, the compounds in the jasmine absolute demonstrated medium to high activity against the yeast Candida albicans, the Grampositive bacteria Enterococcus faecalis, the Gramnegative bacteria Escherichia coli, Pseudomonas aeruginosa, and Klebsiella pneumonia [66]

Anti-Acne Activity: In vitro toxicity against three human cancer cell lines and anti-acne efficacy against Propionibacterium acnes were assessed for *J. grandiflorum* essential oil. The findings indicated that the essential oil had considerably more cytotoxicity on human prostate cancer cell (PC-3) compared to human lung cancer (A549) and human breast cancer (MCF-7) cell lines. Additionally, the essential oil shown good anti-acne action against Propionibacterium acnes [67]

Anthelmintic activity: Indian adult earthworms were used to test the anthelmintic activity of several extracts from *Jasminum grandiflorum* flowers. There was notable anthelmintic action in the ethanolic extract [68]

Analgesic Activity: The hydroalcoholic leaf extract's antinociceptive properties were assessed using the tail-flick and acetic acid-induced writhing methods, while its anticonvulsant properties were evaluated using the maximum electroshock and pentylenetetrazol methods. In experimental animals, the extract exhibited notable analgesic and anticonvulsant effects at dosages of 50, 100, and 200 mg/kg. [69]

Antiviral Activity: Analyzing the replication of the hepatitis B virus (HBV) in the HepG2 2.2.15 cell line and the duck hepatitis B virus (DHBV) in ducklings in vivo allowed researchers to assess the in-vitro antiviral efficacy of the secoiridoid oleuropein taken from *Jasminum grandiflorum* flowers. An evaluation of the chemical 8-epi-kingiside, which is extracted from buds, was conducted in a related study to determine its impact on hepatitis B virus infection [70]

Anticancer Activity: The modified zeolites were found to exhibit anticancer activities against a range of different cancer cell types, including lung adenocarcinoma, hepatocellular carcinoma, and leukemia. The finding that escin may improve the efficacy of chemotherapy medications currently in use provided additional evidence of escin's potential as an adjuvant treatment. Spectral analysis was done to find out more about the structural and chemical changes made to the modified zeolites [71]

Conclusion:

A few of these customary and folk uses have been studied, indicating that Jasminum species may have medical applications. This paper reviews the several species of Jasminum that have been shown to have antioxidant and antiaging, antiulcer, antimicrobial, anti-inflammatory, antiacne, spasmolytic, lipid peroxidation, ACE inhibitor action, vasodilation impact, wound healing, and protective function.. The aforementioned data indicates that the majority of the therapeutic potential action is attributed to phenolic compounds, despite the fact that they were present in minor amounts relative to terpenoids. Last but not least, these plants may be important future sources of pharmaceuticals and therapeutic chemicals due to their inclusion of antioxidants and free radical scavengers. Ayurvedic Personal Health Formulations (PHFs) have remained popular over the years because of their holistic approach to treating illnesses, which is in line with Ayurvedic concepts like Trishas and Panchamahabhutas. Scientific discoveries of phytoconstituents and synergistic herbal combinations have improved these formulations and increased their effectiveness as legitimate substitutes for allopathic medication [72,73]

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