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Phytochemical Screening, In-Vitro Antioxidant & Anti-Bacterial Activity of Ethanolic Extract of Jasmine grandiflorum.(Oleaceae)

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ABSTRACT: The total objective of our study must be to identify drugs to estimate human illness by a thorough analysis of plant Ayurveda and modern medicine techniques must be coupled in order to bring out high quality of herbal product with rapid onset of action and good bioavailability. **Aim**; The aim of the study is to investigate Physico-chemical and Phytochemical screening of the Ethanolic Extract of Jasminum grandiflorum.(Oleaceae) **Result & Conclusion**; It has total ash 7% w/w, water soluble ash 1.25 % w/w, acid insoluble ash 2.6% w/w, water soluble extractives 1.25 % w/w and alcohol soluble extractives 8.18 % w/w. The plant showed loss on drying 0.6 % w/w. The extractive value of Ethanolic was 14.62%. Qualitative phytochemical study of Jasminum grandiflorum showed that Ethanolic extract shows positive response for alkaloid, glycosides, flavonoids, Tanins etc and shows negative response for Steroids and Sterols, Proteins and Amino Acids etc. The IC_{50} for standard Ascorbic acid was found to be 59.69µg/ml and for Jasminum grandiflorum was found to be 185 µg/ml. Thus the anti-oxidant activity of sample was less than that of standard ascorbic acid. Leaf extract of Jasminum grandiflorum showed the zone of inhibition (16.66 mm) against S. aureus and the zone of inhibition (18.33 mm) against P. aeruginosa bacteria. Extract of Jasminum grandiflorum showed almost similar antibacterial activity against both the tested bacteria. The highest zone of inhibition (18.33mm) of ethanolic extract of Jasminum grandiflorum against P. aeruginosa is an indication that this plant extract is more effective against gram negative bacteria.

KEY WORD: Jasminum grandiflorum, Traditional use Physico-chemical, phytochemical screening, Antioxidant, Anti microbial activity

I. INTRODUCTION

Ayurveda is one of the traditional medicinal systems with an established history of many centuries. Furthermore, known as Ayurvedic Medicine, this ancient Vedic knowledge is considered to be one of the oldest healing sciences and has survived until the present generation over many centuries of tradition. An herb is a plant or part of a plant valued for its medicinal, aromatic, or savoury qualities. Herbs can be viewed as biosynthetic chemical laboratories, producing a number of chemical compounds. Herbal remedies or medicines consist of portions of plants or unpurified plant extracts containing several constituents, which often work together synergistically [1,2]. Jasminum grandiflorum Linn. (Oleaceae) is commonly known as Jasmine. It is a well-known glabrous twining shrub widely grown in gardens throughout India. The flower is acrid, bitter with a sharp taste. The leaves of J. grandiflorum are used in the treatment of odontalgia, fixing loose teeth, ulcerative stomatitis, leprosy, skin diseases, otorrhea, otalgia, strangury, dysmenorrhea, ulcers, wounds, and corns.

PLANT PROFILE:

Jasminum grandiflorum is a climbing shrub. The leaves are opposite, with 3 to 7 lance-shaped, entire ovate to somewhat elliptic in shape with acuminate mucronate apex, petiole almost lacking, imparipinnately compound, with three paired foliates ending with a single leaf at the tip. The leaflets are elongate-lanceolate, acute, 7 to 11 terminal leaflet somewhat large than laterals, narrowing at the base, ovate-lanceolate, acute or acuminate, laterals ovate,terminal one larger than laterals and often partially united with surfaces with a ciliate margin. Flowers are terminal and axillary cymes, calyx lobes long and linear, more than half as long as the corolla tubes. The fruit is a black berry, elliptic, globose berries when ripe [3].

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Fig- 1 Whole plant of J.grandiflorum


Fig-2 Leaves and flowers.

Table No.1:- Morphological characteristics of Jasminum grandiflorum leaves

S.No.	Character	Observation
1	Color	Green
2	Odour	Characteristic
3	Taste	Acrid
4	Size	4-5.5 cm. length
5	Texture	Smooth

Taxonomical classification

Kingdom :Plantae
Subkingdom :Tracheobionts
Division :Magnoliophyta
Class :Magnoliopsida
Order :Scrophulariales
Family : Oleaceae
Genus :Jasminum
Species :grandiflorum

Vernacular name

Hindi :Chameli
English :Jasmine
Sanskrit :Rajaputrika
Malayalam :Malati

OCCURRENCE AND DISTRIBUTION

Jasminum grandiflorum, also known variously as the Spanish jasmine, Royal jasmine, Catalonian jasmine, is a species of jasmine native to South Asia, the Arabian Peninsula and eastern Africa and the Yunnan and Sichuan regions of China. Jasmines are a group of shrubs grown commercially for production of their fragrant flowers and essential oil. The bulk of the flowers are used as such in garlands and decorative branches for religious offerings, and a small quantity is used for production of oils and attars.

Jasmine concrete and absolute is used in high-grade perfumes, and come next to rose in order of importance. Jasminum grandiflorum is a large scrambling sub erect twining evergreen shrub, which grows up to 10 to 15 m. high. It is native of Asia, Kashmir, Afghanistan and Persia ascending to an altitude of 700- 2700 m, cultivated in India, wild in sub tropical North-West Himalayas, Western Ghats, Nilgiris, hill of Tinnavally above 1400 m, France, Italy, China, Japan, India, Morocco [4,5].

PHYTOCHEMICALS [6, 7]

Very little phytochemical work has been carried out with the plant J. grandiflorum. Some of the important phytoconstituents e.g. flavonoid, glycoside, alkaloid, tannins present within the plant is as follows

Leaves: 2-epifraxamoside, demethyl-2-epifraxamoside, jasminanhydride, oleacein, 2-(3, 4-dihydroxy phenyl)-ethanol, isoquercitrin, ursolic acid, resin, salicylic acid, jasminine, indole oxygenase, 3,4-dihydroxy benzoic acid, 2-hydroxy-, 40-dihydroxyacetophenone and oleanolic acid.

Flowers: Cis-3-hexenol, 2-vinyl pyridine, indole, myrcene, linalool, geranyl linalool, α-terpineol, geraniol, linalyl acetate, nerolidol, phytol, isophytol, farnesol, eugenol, benzyl alcohol, p-cresol, methyl benzoate, benzyl cyanide, benzyl acetate, methyl dihydrojasmonate, methyl anthranilate, jasmone, methyl- N-methyl anthranilate, vanillin, cis-3-hexenyl benzoate,

Jasmine oil: 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, γ-jasmolactone, farnesol, nerolidol and eugenol.

TRADITIONAL USES [6]

The plant is traditionally used as bitter, astringent, acrid, thermogenic, aphrodisiac,

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antiseptic, anodyne, depurative, emmenagogue, emollient, diuretic, anthelmintic, deobstruant, dentrifrice, suppurative and tonic. Use of different parts of plant traditionally was as follow.

Roots: They are useful in cephalalgia, vitiated condition of vata, paralysis, facial paralysis, mental debility, chronic constipation, flatulence, strangury, sterility, dysmenorrhoea, amenorrhoea, ringworm, leprosy, skin diseases and giddiness.

Leaves: They are useful in odontalgia, fixing loose teeth, ulcerative stomatitis, leprosy, skin diseases, ottorhoea, otalgia, strangury, dysmenorrhoea, ulcers, wound and corns.

Flowers: They are useful in stomatopathy, cephalopathy, odontopathy, ophthalmopathy, leprosy, skin diseases, pruritis, strangury, and dysmenorrhoea, ulcers, as refrigerant, ophthalmic and vitiated conditions of pitta.

II. MATERIALS AND METHODS

The following drugs and chemicals were used for the different experimental study. The Mayer's, Hager's, Barfoed's, Benedict's and millon's reagent were purchased from S.D. Fine Chemical, Mumbai. The solvents petroleum ether, Chloroform was purchased from Hi Media Laboratories Pvt. Ltd., Mumbai. Methanol and Petroleum ether was purchased from Qualigens chemicals. Mumbai. And all others chemicals, solvents and reagents were of analytical grade and procured from authorized dealer.

Plants collection, Identification and processing:

The plant was collected from locally Sambalpur, Odisha in the month of June on dated 15-06-2021. The plant was identified by Botanist Prof. (Dr.) Santosh Kumar Dash, Retired Professor and H.O.D, P.G Dept. of Biosciences, C.P.S, Mohuda, Berhampur, Ganjam, Odisha. The leaves of Jasminum grandiflorum was dried under shade in laboratory. They were pulverized to make coarse powder. The coarse powder of leaves was passed through sieve No. 16 to maintain uniformity and stored in cool and dry place for further study.

Fig 3: - Shed dried

Fig 4: - Coarsely Powdered leaves

PHYSIOCHEMICAL ANALYSIS [8-10]

Physiochemical screening of powdered leaves was done by the standard reported methods.

Table No.2:- Physiochemical analysis of powder of Jasminum grandiflorum leaves

S.No.	Parameters	Observation (%)
1	Loss on drying	0.6
2	Total ash value	7
3	Acid insoluble ash value	2.6
4	Water soluble ash value	1.25
5	Foaming index	22 (ml)
6	alcohol soluble extractives	8.18

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Preparation of extracts [11]

The leaf of Jasminum grandiflorum was shade dried and coarsely powder. The leaves of the plant were extracted by decoction with the ethanol (60-80^{o}C) for 72 hours and then extract were dried at room temperature for 5 days. Then extract was collected and was stored in vacuum desiccators.

Ethanolic extract

The powder of the leaf was extracted with ethanol (60-80^{0} C) by heating in refluxed condenser for 18 hours. The extract was evaporated to dryness under vacuum. The dried extract was stored in vacuum desiccators. The Percentage yield of leaf extract Jasminum grandiflorum is as follows.

Table No.3 Percentage yield of leaf extract Jasminum grandiflorum.

Extract	Percentage Yield	Colour	Consistency
Ethanolic	14.62%	Dark Green	Semi Solid

PRELIMINARY PHYTOCHEMICAL SCREENING [12-14]

The powder leaf material was extracted with ethanol in soxhlet extractor for 72 hours at 60-80^{0} C. The extract was kept solvent free using vacuum filtrations. The crude extract obtained by solvent extraction with ethanol was subjected to various qualitative tests with standard reported methods to detect the presence of common phytochemical constituents. All the chemicals and reagent used in phytochemical testing was of analytical grade.

Table No.4:- Phytochemical screening of ethanolic extract of Jasminum grandiflorum leaves

Sl.No.	Phytochemical Test	Ethanolic extract
I Test For Alkaloids -		
a.	Mayer's Test	Negative
b.	Wagner's Test	Positive
c.	Hager's Test	Positive
II. Test for Glycosides		
a.	Borntrager's Test	Negative
b.	Killer- Killani Test	Positive
c.	Foam Test	Positive
d.	Sulphuric acid Test	Positive
III .Test for Carbohydrates		
a.	Molisch's Test	Positive
b.	Fehling's Test	Negetive
d.	Sulphuric acid Test	
IV. Test for Flavonoids		
a.	Ammonium Test	Positive
b.	Alkaline reagent test	Positive
c.	Aluminum chloride test	Positive
V. Test for Steroids and Sterols		
a.	Libermann-Burchard	Negetive
b.	Salkowski Test:	Negetive
VI. Test for Proteins and Amino Acids		
a.	Biuret Test:	Negetive
b.	Precipitation Test:	Negetive
c.	Xanthoprotic Test	Positive
VII.Test for Tanins		

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a.	Vanillin- HCL Test	Positive
b.	Ferric chloride Test	Positive

ANTIOXIDANT ACTIVITY OF ETHANOLIC EXTRACT [15-17]

Results of In Vitro free radical scavenging Activity of DPPH

DPPH scavenging activity has been used by various researchers as a rapid, easy and reliable parameter for screening the in vitro antioxidant activity of plant extracts. DPPH is a stable free radical and accepts an electron to become a stable diamagnetic molecule. The absorption maximum of a stable DPPH radical in methanol was at 517nm in U.V spectrophotometer. It was observed that with the increase of concentration, there is decrease of absorbance value. The decrease in absorbance of DPPH radical caused by antioxidants, because of the reaction between antioxidants molecules and radical, progresses, which results in the scavenging of the radical by electron donation.

In the present investigation, Free radical scavenging of DPPH, percentage of different concentration of standard ascorbic acid in shown in the Table No. 5 and that of Jasminum grandiflorum in table no. 5.8.

Table No 5. Result in vitro free radical scavenging activity (2, 2-diphenyl-1-picrylhydrazyl – DPPH) of standard and Table No 6 for Ethanolic extract.

Ascorbic acid		
For Conc.	Absorbance	% of inhibition
10	0.512	49.4
20	0.419	58.4
40	0.323	68.1
60	0.241	76.1
80	0.112	88.9
100	0.095	90.6

Ethanolic Extracts	
For Conc.	% Inhibition Jasminum grandiflorum
10	61.9
20	65.4
40	69.8
60	71.8
80	75.8
100	80.7

Absorbance of 0.1mM DPPH (Ao) = 1.101

IC_{50} for standard Ascorbic acid was found to be 59.69µg/ml and for Jasminum grandiflorum was found to be 185 µg/ml. Thus the anti-oxidant activity of sample was less than that of standard ascorbic acid.

Free radicals are the cause for several major disorders. So, evaluation of antioxidant activity in plants could result in the discovery of natural antioxidants with pharmacological and food value. The importance of phenol compounds in plants as natural antioxidants and their use as substitutes to synthetic antioxidants in food additives is well known. Therefore there observation can be used in pharmaceutical to explore new drugs. Thus the present aim is to assess the antioxidant activity of conventional and non conventional species of Jasminum grandiflorum by DPPH method and also to compared the their % antioxidant activity with standard ascorbic acid.

In-vitro (Anti-microbial) activity [18]

Antibacterial Sensitivity test by Disk Diffusion Susceptibility method where the test microorganisms used are Staphylococcus aureus, and pseudomonas aeruginosa which were obtained

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from the Kalinga Biomedical Research Institute, Sambalpur (Odisha). Antibacterial Sensitivity test by Disk Diffusion Susceptibility Testing (Kirby-Bauer Method).

Culture media:

The medium used for the activation of the microorganisms was nutrient broth. The nutrient agar media was used for the antimicrobial test. All the culture media were prepared and treated according to the manufacturer guidelines (Hi Media Lab. Ltd., Mumbai, India). The standard antibiotic Cefoxime (For Gm +) - 10µg/ml and Gentamicin (For Gm-) - 10µg/ml.

Table No.7. Anti-bacterial activity of ethanolic extract of Jasminum grandiflorum against Staphylococcus aureus and Pseudomonas aeruginosa**.**

Sl No	Name of microorganisms	Zone of inhibition (mm)		
1		EEJG	Cefoxime	Gentamicin
1	S. aureus	16.66±1.65	24.0±1.25	-
2	P. aeruginosa	18.33±1.15	-	23.0±1.23

Values are mean ± SEM

Anti-microbial Photographs

Cefoxime (G+) Gentamicin (G^-)

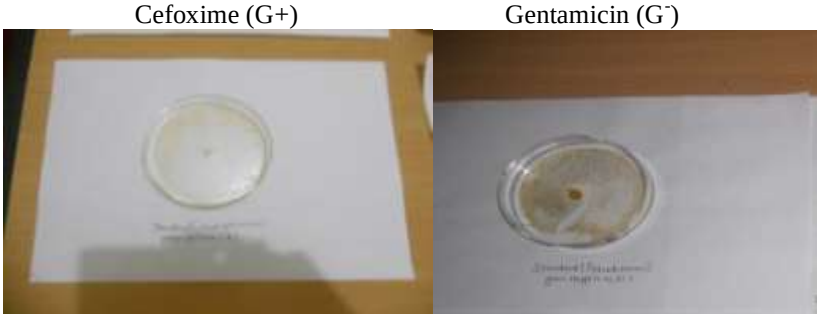
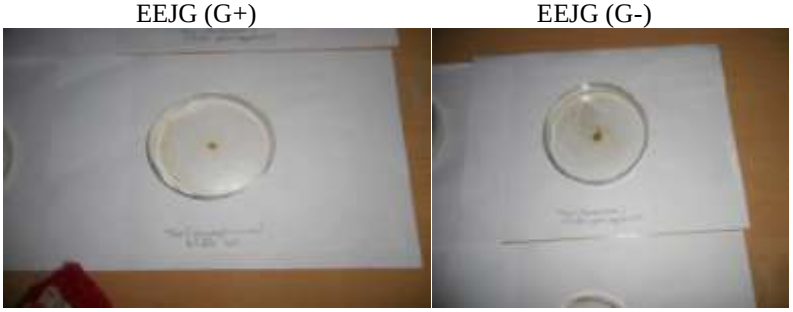


Fig-5

EEJG (G+) EEJG (G-)



III. RESULTS AND DISCUSSIONS:

The coarse powder of the shed dried parts of the plant Jasminum grandiflorum was subjected to extraction by using soxhlet apparatus using ethanolic as solvent. In the extract yield was obtained in alcoholic extract that was 14.62%.

After the extraction, phrmacognostical evaluation was done including determination of Ash value and moisture content was determined. Extract was subjected to various chemical tests for preliminary identification of various phytoconstituents. The extract contains carbohydrates, tannins, flavonoids, glycosides, alkaloids etc.

Phytochemical constituents such as tannins, flavonoids, alkaloids and several other aromatic compounds are secondary metabolites of plants that serve as defence mechanisms against predation by many microorganisms, insects and herbivores. This may therefore explain the demonstration of antimicrobial activity by the leaf extracts of Jasminum grandiflorum. The demonstration of antibacterial activity against both gram positive and gram negative bacteria may be indicative of the presence of broad spectrum

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antibiotic compounds (Srinivasan D, 2001). This will be of immense advantage in fighting the menace of antibiotic refractive pathogens that are so prevalent in recent times.

Leaf extract of Jasminum grandiflorum showed the zone of inhibition (16.66 mm) against S. aureus and the zone of inhibition (18.33 mm) against P. aeruginosa bacteria. Extract of Jasminum grandiflorum showed almost similar antibacterial activity against both the tested bacteria. The highest zone of inhibition (18.33mm) of ethanolic extract of Jasminum grandiflorum against P. aeruginosa is an indication that this plant extract is more effective against gram negative bacteria.

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