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Isolation and characterization of active compounds from *Jasminum multiflorum* leaves

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Abstract

Jasminum Multiflorum is a shrub having many medicinal values. Its chemical constituents were extracted with methanol by column chromatography. The components were isolated by TLC and characterized using spectral techniques such as FTIR, C^{13} NMR and H^{1} NMR. The isolated phenolic compounds are tannin and flavonoids.

Keywords: Flavanoid, FTIR, *Jasminum multiflorum*, Tannin, TLC

1. INTRODUCTION

Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years, and have served humans well as valuable components of seasonings, beverages, cosmetics, dyes, and medicines [1]. Research on medicinal plants has attracted considerable attention since they are rich source of natural compounds. Recently the usage of herbal remedies has been increased among the people. The leaves, roots, and fruits of plants have been used as traditional medicine. Natural products are phytochemicals that occur naturally in plants. These phytochemicals are responsible for colour and organoleptic properties, such as the deep purple of blueberries and smell of garlic. The term is generally used to refer to those chemicals that may have biological significance but are not established as essential nutrients [1, 2]. Jasminum multiflorum is a species of Jasmine in the family Oleaceae. It is an ornamental shrub native to India and Southeast Asia with different biological activities [2–4]. Jasmine flower forms a vital ingredient of almost all ayurvedic medicines owing to its diverse curing qualities [5]. The present study was carried to detect the phytoconstituents, followed by the spectroscopic characterization of *Jasminum multiflorum*.

2. MATERIALS AND METHODS

2.1. Chemicals and methods

Solvents and chemicals used for the present study obtained from Merck, Calbiochem. UV Spectra was taken in DMSO from 200 to 800 nm using UV–1800(Shimadzu). FT–IR Spectra was

taken dissolving in DMSO. H^1 NMR and C^{13} NMR was obtained from National Institute for Interdisciplinary Science and Technology (CSIR), Thiruvananthapuram.

2.2. Preparation of methanolic extract

The leaves of Jasminum Multiflorum were air dried and pulverized to get powder. From the powder 40g is weighed and extracted using methanol in a Soxhlet apparatus. Methanol is evaporated, by using rotary vacuum evaporator (Buchi).

2.3. Column chromatographic separation of compounds

Chromatography is a simple analytical technique used for the separation of the compounds in a mixture. In column chromatography, the sample is adsorbed in silica and passed through the column by eluting with different solvents. Compounds are eluted based on the polar nature of the solvent and the sample component. Silica gel of 100–200 mesh is packed using ethyl acetate. After packing, column is kept for 60 minutes. Methanolic extract of *Jasminum multiflorum* is adsorbed in silica. The column is eluted with solvents petroleum ether, toluene, chloroform, ethyl acetate followed by gradient elution of methanol and water (90:10, 70:30, 50:50 and 30:70).

2.4. Identification of compounds by TLC

The TLC plate coated with silica gel is used for the separation. Solvent system used is Ethyl acetate, Methanol: Water (81:11:8). Developed plate is kept in iodine chamber for the visualization of the compounds.

2.5. Phytochemical analysis

The qualitative analysis for the phytoconstituents such as Tannins, Flavonoids, Saponins, Cardiac glycosides, Steroids and Terpenoids was performed by reported methods [6, 7].

3. RESULTS AND DISCUSSION

3.1. Phytochemical analysis of *Jasminum multiflorum*

The active constituents of plants are responsible for their chemotherapeutic value. The methanolic extract of *Jasminum multiflorum* was subjected to phytochemical screening for various phytoconstituents, which revealed the presence of tannins and flavonoids. Phenolic compounds have been reported to be potential free radical scavengers [8]. The plants rich in tannins have significant activity in cancer prevention and are used in treating intestinal disorders [9, 10]. Flavonoids are known to possess a wide range of biological activities such as antioxidant, antimicrobial, anti–inflammatory and anticancer activities [8, 11–13].

3.2. TLC separation

TLC separation (Fig.1) using Track 13 of Methanol: Water (50:50) shown single spot and R_f value at 0.6206. This fraction is characterized by spectroscopic techniques.

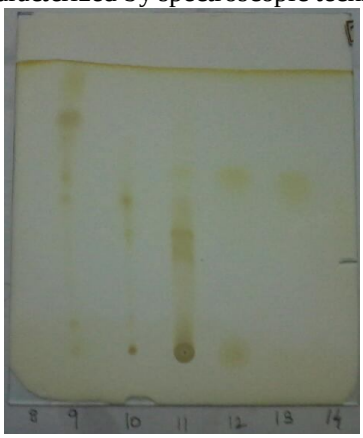

Fig. 1: TLC separation of plant extract

Table 1: Track and Solvent used

Track	Solvent
8	Chloroform–d
9,10	Ethyl acetate
11	Methanol: Water (90:10)
12	Methanol: Water (70:30)
13	Methanol: Water (50:50)
14	Methanol: Water (30:70)

Table 2: TLC Separation of various fraction

Fraction	R_f
9	0.7930, 0.5862, 0.5172
10	0.4137, 0.5172
11	0.6206, 0.4137
12	0.6206
13	0.6206

3.3. UV– Visible Spectra

UV Spectrum of the plant extract was taken in DMSO (Fig.2) at a wavelength range of 200 to 800 nm. A single peak was obtained at 276 nm. The spectra for phenolic compounds (tannins) and flavonoids typically lie in the range of 230–290 nm [14,15]. The result of UV–vis spectroscopic analysis confirms the presence of tannins and flavonoids in the methanolic extract of *Jasminum multiflorum*.

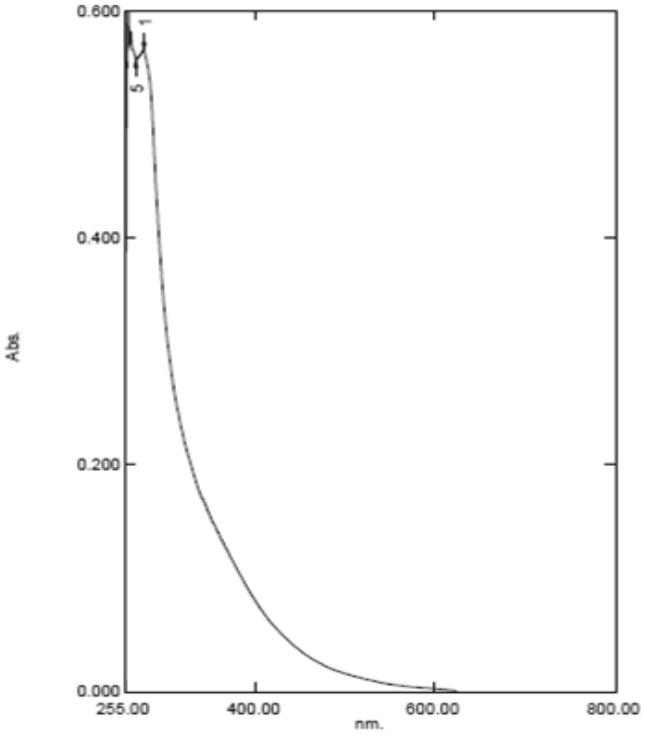

Fig. 2: UV–vis Spectrum of the plant extract

3.4. FT–IR Spectra

The FT–IR spectrum (Fig. 3) was recorded to identify the functional groups present in *Jasminum Multiflorum* based on the peak values in the region of infrared radiation.

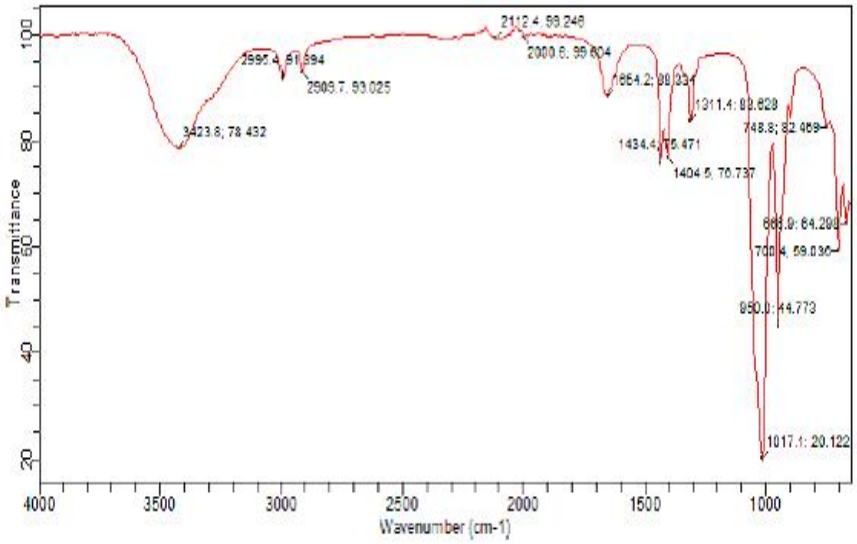

Fig. 3: FTIR Spectrum of the plant extract

FTIR studies enable the identification of the chemical constituents and elucidation of the structures of compounds [8, 9]. The major bands were observed at 3423.8, 1654.2, 1434.4, 1404.5, 1017.1 cm^{-1}. The peak at 3423.8 cm^{-1} indicates the O–H stretching. The bands 1654.2 cm^{-1}, 1434.4 cm^{-1} and 1404.5 cm^{-1} corresponds to the C–C stretch, confirming the presence of aromatic compounds. The peak at 1311.4 cm^{-1} represents C–O stretch which shows the presence of alcohols, carboxylic acids, esters and ethers. In addition, some weak absorption bands were also recorded in the spectra [8,9].

3.5. NMR studies

The C^{13} and HNMR spectra are shown in Fig. 4 and Fig. 5 respectively. The C^{13} NMR spectrum gave peaks at 71, 163, 172, 207, 209 ppm. The peak at 71ppm corresponds to carbon of C–O group and those at 163,172,207 and 209 ppm values correspond to C=O group.

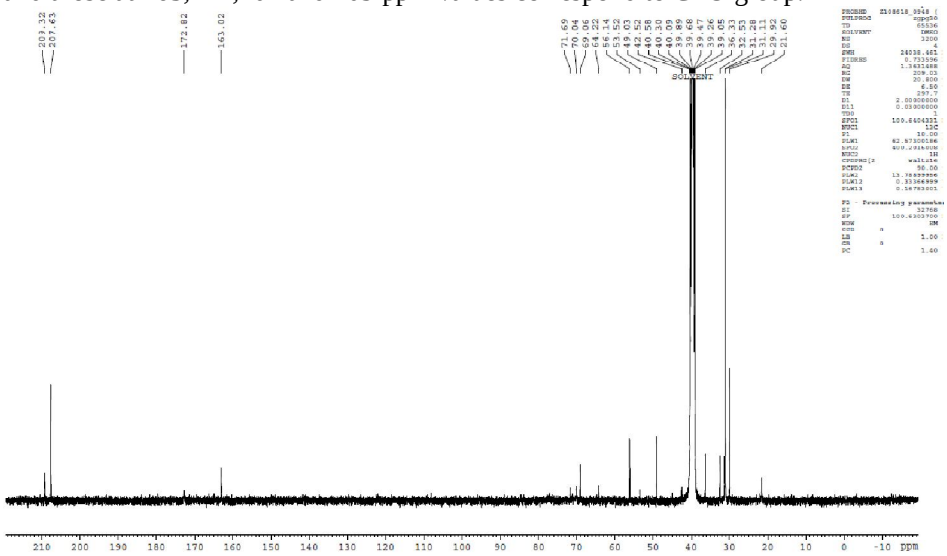

Fig. 4: ^{13}C Spectrum of the plant extract

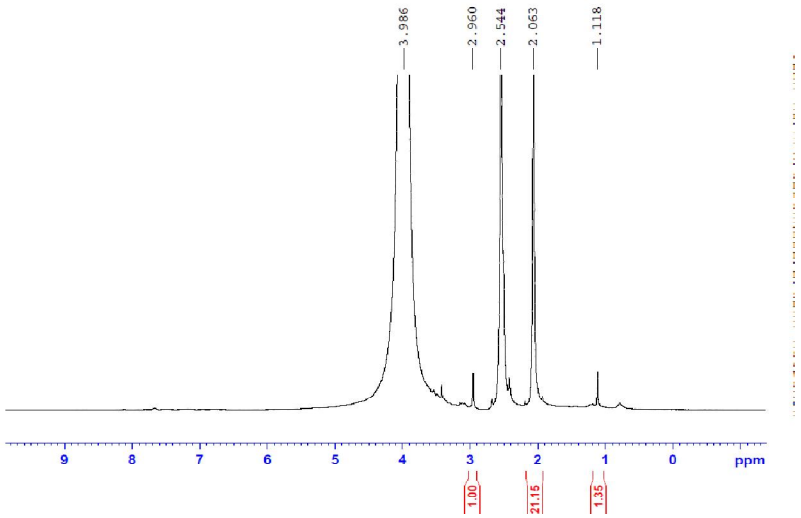

Fig. 5: ^{1}H NMR Spectrum of the plant extract

4. CONCLUSION

The extract obtained from *Jasminum multiflorum* was subjected to phytochemical analysis, which shows the presence of tannin and flavonoids. Using column chromatography and TLC the components were extracted and isolated. Spectral analysis also showed the presence functional groups that may be present in these chemical constituents. Further studies can be carried out regarding its anti–bacterial activity and other medicinal applications.

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