Gas Chromatographic-Mass Spectrometric Analysis of Essential Oil of Jasminum officinale L var Grandiflorum Flower

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Abstract

Purpose: To analyze the essential oil composition of the flower of Jasminum officinale L. var. grandiflorum L. (Jasminum grandiflorum) by gas chromatography-mass spectrometry (GC-MS).
Methods: The optimum GC-MS conditions used for the analysis were 250 °C inlet temperature, 150 °C MSD detector temperature, and GC oven temperature program as follows: 100 °C initial temperature, increased to 270 °C at 4 °C/min, final temperature 270 °C and held for 7.5 min.
Results: Thirty compounds were identified, representing 99.28 % of the oil content. The major volatile components of the flower were 3,7,11,15-tetramethyl-2-hexadecen-1-ol (phytol) (25.77 %), 3,7,11-trimethyldodeca-1,6,10-trien-3-ol (12.54 %) and 3,7,11,15-tetramethyl-1-Hexadecen-3-ol (12.42 %).
Conclusion: The results show that phytol is the major volatile component of Jasminum grandiflorum.

Keywords: Jasminum grandiflorum, Essential oil, Gas chromatography-mass spectrometry

INTRODUCTION

Jasminum officinale L. var. grandiflorum (Jasminum grandiflorum) is one of the Jasminum plants used as a folk remedy for the treatment of hepatitis, dysmenorrhea, stomatitis, duodenitis and depression in south China [1]. There are few reports about its chemical constituents and pharmacological properties, such as the hydroalcoholic extract from the buds of Jasminum grandiflorum showing preferable antiviral efficacy against HBV replication in HepG2 2.2.15 cell line in vitro [2].

Six phenolic compounds have been detected from water-methanol extracts of Jasminum grandiflorum which showed potentials for the treatment of psychiatric disorders and antioxidant protection [3]. Iridoid-type compounds, secoiridoid glucosides, triterpenes, flavonoids, lignans, etc, have also been isolated from this herb [4-6]. Ole (Oleaceae) obtained from the flowers of Jasminum grandiflorum blocked effectively hepatitis B surface antigen secretion in HepG2 2.2.15 cells in a dose-dependent manner (IC50 = 23.2 g mL-1) while 80 mg/kg of Ole also reduced viremia in DHBV-infected ducks [7].

Jasminum grandiflorum is aromatic and an excellent source of essential oils. As far as we know, no works on its essential oil analysis has been reported. The objective of this study, therefore, is to evaluate the chemical composition of the flower oil of this plant by GC-MS.
EXPERIMENTAL

Instruments

An Agilent 6890N gas chromatography instrument, combined with an Agilent-5973 mass spectrometer equipped with an electron ionization (EI) and quadrupole analyzer, and Agilent Chem Station data system were used. GC separation was performed on a 30m DB-5 ms fused silica capillary column with an internal diameter of 0.25 mm and a film thickness of 0.25µm (Agilent, USA).

Materials and chemicals

*Jasminum grandiflorum* (Jasminum officinale L. var. grandiflorum L.) samples (batch no. 201301011, from Heshan City, Guangdong Province, China) were purchased from Guangzhou Kangsheng Pharmaceutical Co, Ltd. All samples were identified by Hongwei Zhang (Associate Professor, Department of Medicinal Plants & Pharmacognosy, Southern Medical University, Guangzhou, China) according to pharmacognostic standard documented in Vol 1, 2004 edition, Guangdong Province Chinese Medicine Standards [8]. All samples were kept in a desiccator (silica gel as desiccant) at room temperature in Department of Chinese Medicine Pharmaceutics, College of Traditional Chinese Medicine, Southern Medical University, Guangzhou, China, until used. Ethyl acetate was analytical-reagent grade and purchased from reagent company (Guangzhou, China).

Sample preparation

*Jasminum grandiflorum* (1 kg) was hydro-distilled for 3 h in a volatile oil extractor to yield 0.39 % of essential oil. The essential oil obtained was stored in a sealed glass tube with a screw cap in a refrigerator at 4 °C until analyzed.

Analysis of the essential oil

The essential oil of *Jasminum grandiflorum* was subjected to GC-MS analysis system. The carrier gas was helium (99.99 %) with flow rate of 1.0 mL/min. Inlet temperature was 250 °C and MSD detector temperature was 150 °C. Scan range 30 - 550 amu and scan rate of 2 scans/s were used. The GC oven temperature program was used as follows: 100 °C initial temperature, increased to 270 °C at 4 °C /min, final temperature 270 °C and held for 7.5min. The analysis period was 50 min. The oil was dissolved in 1 mL of ethyl acetate and vortex-mixed for 3 min, and finally, 1 µL was injected using a split technique (0.2:1). Identification of oil components was achieved based on their retention index, and by comparison of their mass spectral fragmentation patterns with those reported in the literature and stored in the MS library (D.02.00.275, version 2.0d).

RESULTS

The total ion chromatogram was obtained and showed in Fig 1. Thirty compounds were identified representing approximately 99.28 % of the oil (Table 1). There were significant differences between the main components of the essential oil. The major volatile components were phytol (25.77 %), 3,7,11-trimethyldodeca-1,6,10-trien-3-ol (12.54%) and 3,7,11-trimethyldodeca-6,10-dien-3-ol (12.42%).

![Fig 1: GC-MS total ion chromatogram of essential oil of the flowers of *Jasminum grandiflorum*](image)
DISCUSSION

The data show that phytol is the major essential component of Jasminum grandiflorum, and this component may have some of the pharmacological effects of Jasminum grandiflorum plant itself [1]. It was reported that phytol exhibits anticonvulsant activity by modulating of neurotransmitter systems in pilocarpine-induced seizures and showed antitubercular activity against M. tuberculosis H37Rv strain at 100 mg mL\(^{-1}\) (MIC) [9,10]. Acute administration of phytol exerts an anxiolytic-like effect on mice by producing sedative and anxiolytic activities [11]. Phytol also directly activates peroxisome proliferator-activated receptor α (PPARα) and regulated gene expression involved in lipid metabolism in PPARα-expressing HepG2 hepatocytes [12]. Furthermore, trans-phytol inhibits the biosynthesis of estrogen in human ovarian granulose cells by aromatase (CYP19) [13].

CONCLUSION

The results reveal that the essential oil of the flower of Jasminum grandiflorum contains thirty compounds in various concentrations, with the major component being phytol.

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