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Research Article

COMPOSITION OF THE ESSENTIAL OIL FROM *MIMOSA PUDICA* LINN.

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ABSTRACT

Objectives: The objectives of this study were to determine the composition of the essential oil obtained from *Mimosa pudic*a L. (Mimosaceae).

Methods: The essential oil of *M. pudica* was obtained by hydrodistillation using a Clevenger apparatus, and the chemical composition was determined by gas chromatography-mass spectrometry analysis.

Results: About 23 compounds were identified from the essential oil which constitutes about 98.92% of the oil. Among the compounds identified, phthalic acid dioctyl ester (27.76%), α-linolenic acid (20.34%), and cinnamaldehyde (16.24%) are the major compounds. α-linolenic acid is an n-3 fatty acid.

Conclusion: α-linolenic acid is one of the essential fatty acids, which is necessary for health and cannot be produced within the human body. *M. pudica* L. (Mimosaceae) appears to be a promising herb to undergo a wide exploration.

Keywords: Essential oil, *Mimosa pudica* Linn., Mimosaceae, Gas chromatography-mass spectrometry analysis, Fatty acids.

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INTRODUCTION

Mimosa pudica Linn. belongs to the family Fabaceae is a small-sized tree and is used in Ayurvedic medicine. The leaves are very sensitive, both pinnae and leaflets folding when touched [1,2]. It is commonly distributed in roadside, walkway, marsh and hillside areas, so this plant is neglected weed growing in dumps [3]. *M. pudica* relives "Odu vaatham" a kind of vaatha disease [4]. Recently, extracts of *M. pudica* Linn. were found a multitude of therapeutic properties. Diuretic [4], psoriasis cure [5], swelling, wounds healing [6], antioxidant, antimicrobial, anti-inflammatory [7], antidiabetic, anticancer, cardiovascular disease [8], hypolipidemic, antimicrobial activity [9], anticonvulsant [10], antimalarial, antifertility, fistula [11], cough, influenza [12], systemic infections, snakebite areas [13], hepatoprotective activity [14], antidepressant [15], leprosy, hypoglycemic, pulmonary tuberculosis, neurasthenia [16], atherosclerosis, hyperglycemic [17], and various urogenital infections [18] have been attributed in different parts of *M. pudica.* Regarding the secondary metabolite potential of *M. pudica*, it has been reported that it contains nitrogen-containing compounds, phenolic compounds, sitosterols, fatty compounds, and rich source of flavonoids [19]. *M. pudica* Linn. is famous for its anticancer alkaloid mimosine [20] and includes a kind of 5-deoxyflavonols, particularly. Many phytoconstituents were reported from the plant leaves, seed, stem, root, and the whole aerial parts of *M. pudica* [21-24]. Even though a good number of phytoconstituents were isolated and characterized, the chemical composition of the essential oil was not yet carried out. Knowledge of the chemical constituents of plants is desirable to discover new therapeutic agents and to find the actual significance of folkloric remedies [25]. In the present work, the essential oil has been obtained from *M. pudica* Linn., and its chemical composition was determined.

METHODS

Plant material and essential oil extraction

The fresh leaves of *M. pudica* Linn. were collected from Coimbatore, South India, during the winter season in the month of January 2018. The authentication of the plant was done by the Botany Department, Karpagam Academy of Higher Education, Coimbatore, and a voucher specimen was preserved.

The fresh aerial part (1 kg) leaves of *M. pudica* were subjected to hydrodistillation using Clevenger type apparatus (4 × 3 h = 12 h). The resulted aqueous layer from the Clevenger apparatus was collected and extracted with petroleum ether (4 × 25 ml) and dried over anhydrous sodium sulfate and then concentrated in a water bath to yield a slight yellowish oil (0.26% (v/w).

Gas chromatography-mass spectrometry (GC-MS) analysis

GC-MS along with an ESI system with the ionization energy of 70 eV was utilized for analysis. Helium (99.99%) was used as carrier gas, with the flow rate of 1 ml/min. The injection port temperature was set at 250°C, and initial column temperature was kept at 40°C for 1 min and then gradually increased to 230°C at the flow rate of 3°C/min. The components were identified by comparing their mass spectra with those in the GC-MS library and literature and by comparing their relative retention times by those of authentic samples on the HP-5 MS capillary column.

RESULTS AND DISCUSSION

Biological activities of aromatic plants are in part attributed to essential oils which are used as flavoring additives to cosmetics, disinfection agents, and medicinal means for a long time. The essential oil was obtained from *M. pudica* Linn. by hydrodistillation using a Clevenger type apparatus, and the composition is determined by GC-MS analysis for the 1st time. The result is exhibited in the Table 1. Twenty-three compounds were identified from the essential oil which constitutes about 98.92 % of the oil. Among the compounds identified, phthalic acid dioctyl ester (27.76%), α-linolenic acid (20.34%), and cinnamaldehyde (16.24%) are the major compounds. α-linolenic acid is an n-3 fatty acid. It is one of two essential fatty acids because they are necessary for health and cannot be produced within the human body.

Earlier GC-MS analysis was carried out on the methanol extract of *M. pudica* Linn., and 19 compounds were identified and reported.

Table 1: Composition of the essential oil obtained from *M. pudica* Linn.

Compound name	Molecular formula	Molecular weight	Retention index (%)
Ethanol 2-methoxy acetate	$C_5H_{10}O_3$	118	761 (7.1)
Phthalic acid dioctyl ester	$C_{24}H_{38}O_4$	390	2832 (27.76)
Methyl octylester	$C_9H_{20}O$	144	992 (0.36)
3-Pinanone	$C_{10}H_{16}O$	152	1109 (1.9)
α-Linolenic acid	$C_{18}H_{30}O_2$	278	2191 (20.34)
Phytol	$C_{20}H_{40}O$	296	2045 (4.08)
n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	1968 (2.74)
Dibutyl phthalate	$C_{16}H_{22}O_4$	278	2037 (0.7)
7,9-Di-tert-butyl-1-oxaspiro (4,5) deca-6,9-diene-2,8-dione	$C_{17}H_{24}O_3$	276	2081 (1.68)
1, 2-Benzenedicarboxylic acid, bis (2-methylpropyl) ester	$C_{16}H_{22}O_4$	278	1908 (0.38)
Tetradecanoic acid	$C_{14}H_{28}O_2$	228	1769 (0.5)
1-Pentadecene	$C_{15}H_{30}$	210	1502 (0.38)
Dodecanoic acid	$C_{12}H_{24}O_2$	200	1570 (3.36)
1,6,10-Dodecatrien-3-ol, 3,7,11-trimethyl-,	$C_{15}H_{26}O$	222	1564 (0.62)
Phenol, 2,4-bis (1,1-dimethylethyl)-	$C_{14}H_{22}O$	206	1555 (0.86)
3-Buten-2-one, 4-(2,6,6-trimethyl-1-cyclohexen-1-yl)	$C_{13}H_{20}O$	192	1457 (0.8)
Phenol, 2-methoxy-3-(2-propenyl)-	$C_{10}H_{12}O_2$	164	1392 (0.86)
2-Methoxy-4-vinylphenol	C_9H_{10}	150	1293 (5.1)
Indole	C_8H_7N	117	1174 (0.56)
Cinnamaldehyde	C_9H_8O	132	1189 (16.24)
2,3-Dihydrobenzofuran	C_8H_8O	120	1036 (1.44)
Benzene methanol	C_7H_8O	108	1036 (0.43)
3-Hexen-1-ol	$C_6H_{12}O$	100	868 (2.08)

Myoinositol (46.61%), squalene (18.21%), and Vitamin E (12.76%) were the major compounds [26]. In another study, the GC-MS of the oil extract of *M. pudica* Linn. showed that the presence of N-dl-alanylglycine, dl-alanyl-dl-valine, d-alanin, dl-alanin ethyl ester, 1-alanine ethyl amide, 9, 12-octadecadienoic acid (Z, Z), methyl ester, 9, 12-octadecadienoic acid, methyl ester, 11, 13-eicosadienoic acid, methyl ester, and meglumine was reported [27]. In the present study, the major compounds identified from the essential oil were entirely different from the volatile constituents present in the methanol extract [26] or the oil extract of *M. pudica* Linn. [27]. Alpha-linolenic acid is popular for preventing and treating diseases of the heart and blood vessels. It is used to prevent heart attacks, lower high blood pressure, lower cholesterol, and reverse "hardening of the blood vessels" (atherosclerosis) [28]. Cinnamaldehyde possesses antibacterial and antifungal activities and restricts the harmful blood platelet clotting.

CONCLUSION

M. pudica is traditionally very important herb having many important pharmacological activities. Many important phytoconstituents responsible for the activity were identified in the essential oil by GC-MS. Among the compounds identified, phthalic acid dioctyl ester (27.76%), α-linolenic acid (20.34%), and cinnamaldehyde (16.24%) are the major compounds. This proves the therapeutic importance of the plant. Such type of systematic information about the plant is useful for the researchers.

AUTHORS' CONTRIBUTIONS

Vismayaviswan TK and Dharani J have carried out the work and prepared the manuscript. Sripathi R helped in the GC-MS analysis and S. Ravi has guided and has done modification and editing of the manuscript.

CONFLICTS OF INTEREST

The authors declared that they have no conflicts of interest.

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