

GC-MS Analysis of the Ethanolic Extract of the whole Plant *Drosera indica* L.

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ABSTRACT

Aim: The present study is carried out to explore the phytoconstituents present in the ethanolic extract of the whole plant *Drosera indica* L. by GC-MS analysis. **Methods:** The ethanolic extract of the whole plant of *Drosera indica* L. is used for the GC-MS analysis. JEOL GCMATE II GC-MS (Agilent Technologies 6890 N Network GC system for gas chromatography) is used for the analysis. The compounds are identified by the gas chromatography coupled with the mass spectrometry. The molecular weight and structure of the compounds of test materials are ascertained by interpretation of the mass spectrum of GC-MS using the database of National Institute Standard and Technology (NIST). **Results:** GC-MS analysis of *Drosera indica* L. reveal the presence of the nine biological active compounds which include phytol, 4 methyl-4-nonadecene, 4',5,7-Trihydroxyisoflavone, 1,2-Benzene dicarboxylic acid, bis [2-methyl propyl] ester, Tetra decanoic acid, Eicosane, 2,6,10,14,18-pentamethyl, Tetracosane, Lochnerine and methyl-n-hexadecylketone. **Conclusion:** The results specify that the ethanolic extract of the whole plant, *Drosera indica* contains various bioactive compounds and therefore has various medicinal properties which can be used for the treatment of various diseases.

Keywords: GC-MS analysis, Phytoconstituents and *Drosera indica* L.

INTRODUCTION

Plants are the richest sources of secondary metabolites with varying biological activities¹. These secondary metabolites are the important source with a variety of structural arrangements and properties². Volatile compounds play an important role in health care systems by the medicinal plants. Volatile compounds are identified by the GC-MS analysis³. Recently GC-MS analysis is increasingly applied for the analysis of medicinal plants and this technique prove to be a valuable method for the analysis of nonpolar components and volatile essential oil, fatty acids, lipids and alkaloids⁴.

Drosera indica L. is an annual, insectivorous, herbaceous plant native to tropical countries of the world and consists approximately of 170 species. This is used in several clinical manifestations including loss of memory, defective eyesight, infertility, overall body weakness and incidence of early aging. It is also used for the treatment of diseases like bronchial asthma, rheumatoid arthritis and nervous disorders⁵.

The secondary metabolites like phenolics and flavonoids from the plants are reported to be potent free radical scavengers. *Drosera indica* L. are reported for the presence of flavonoids in them⁶. The present study is carried out to find the bioactive chemicals from *Drosera indica* L. by GC-MS analysis.

MATERIALS AND METHODS

Collection of plant material

The plant specimens (whole plant) for the proposed study are collected from Wagamon hills, Idukki district, Kerala, India. The plant is taxonomically authenticated from Jawaharlal Nehru Tropical Botanical Garden And Research Institute, Palode, Thiruvananthapuram district, Kerala, India, with the voucher number (JNTBGRI/PS/215/2015, No-76853).

Sample extraction

Dried powdered (whole plant) material of *Drosera indica* is subjected to the solvent extraction for 16 hours with the solvents of increasing polarity such as petroleum ether, chloroform, ethyl acetate, ethanol and water. 50 g of dried plant powder is extracted in 250ml of each solvent and kept in a shaker for 72 hrs. Extraction is repeated with the same solvent till the clear colourless solvent is obtained. Each time before extracting, with the next solvent the residue is dried thoroughly to remove the solvent used. Finally the extract is evaporated and stored at 0-4°C in an air tight container for further use.

GC-MS analysis

The ethanolic extract of the whole plant of *Drosera indica* L. is used for the GC-MS analysis. 2 µl of the ethanolic extract of the whole plant of *Drosera indica* L. is dissolved in HPLC grade methanol and subjected to GC and MS. JEOL GCMATE II GC-MS (Agilent Technologies 6890 N Network GC system for gas chromatography). The column (HP5) is fused silica 50 m x 0.25 mm I.D. Analysis conditions are 20 min, at 100°C, 3 min at 235°C for column temperature, 240°C for

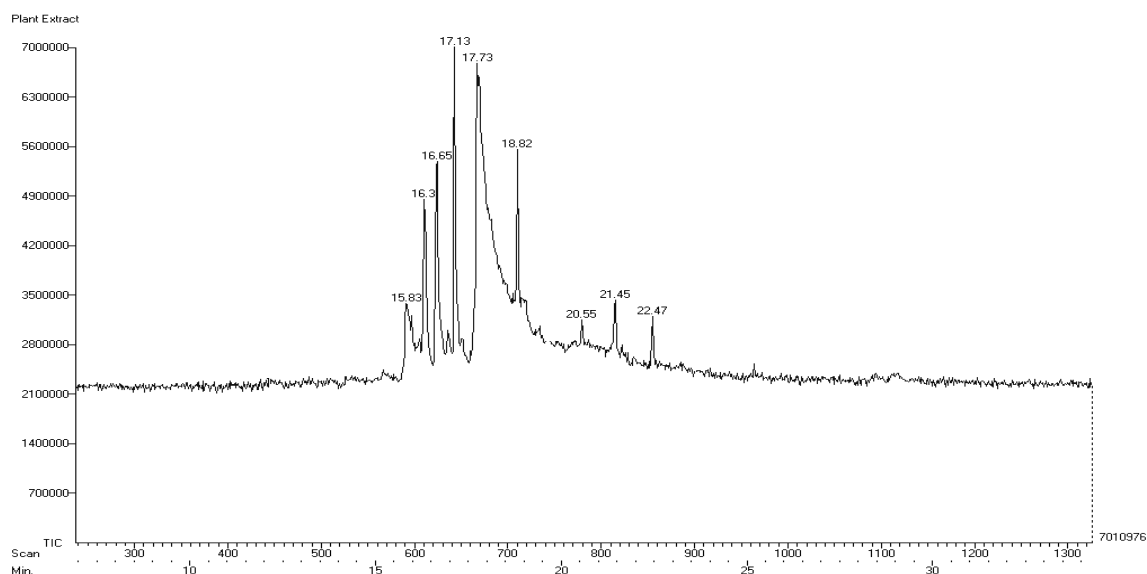


Figure 1: GC-MS Chromatogram of the ethanolic extract of *Drosera indica*. Structure of various phytochemicals present in *Drosera indica* L. which gives the biological effect.

Table 1: Phytochemicals identified in the ethanolic extract of *Drosera indica* L. by GC-MS analysis

S.No	Compound	Molecular formula	Molecular weight	Retention time
1	Phytol	C ₂₀ H ₄₀ O	296.531 g/mol	18.82
2	4methyl-4-nonadecene	C ₂₀ H ₄₀	280.5316 g/mol	17.73
3	4',5,7-Trihydroxy isoflavone	C ₁₅ H ₁₀ O ₅	270.24 g/mol	17.13
4	1,2-Benzene dicarboxylic acid, bis [2-methyl propyl] ester	C ₅ H ₂₂ O ₄	278.3435 g/mol	16.73
5	Tetra decanoic acid	C ₁₄ H ₂₈ O ₂	226.35504 g/mol	15.83
6	Eicosane, 2,6,10,14,18-pentamethyl	C ₂₅ H ₅₂	352.6804 g/mol	22.47
7	Tetracosane	C ₂₄ H ₅₀	338.6538 g/mol	21.45
8	Lochnerine	C ₂₀ H ₂₄ N ₂ O ₂	324.41676 g/mol	20.55
9	Methyl-n-hexadecyl ketone	C ₁₈ H ₃₆ O	268.47784 g/mol	16.3

Table 2: Biological activity of identified compounds of *Drosera indica* L.

S.No	Compound	Biological activity
1	Phytol	Antioxidant ⁸
2	4',5,7-Trihydroxy isoflavone	Antioxidant ⁹
3	1,2-Benzene dicarboxylic acid, bis [2-methyl propyl] ester	Antioxidant & Antidiabetic ¹⁰
4	Tetra decanoic acid	Antioxidant ¹¹
5	Eicosane, 2,6,10,14,18 -pentamethyl	Antifungal & Antibacterial ¹²
6	Tetracosane	Antioxidant & Antibacterial ¹³
7	Lochnerine	Antioxidant & Antibacterial ¹⁴
8	methyl -n- hexadecylketone	Antioxidant , Antibacterial & Anticancerous ¹⁵

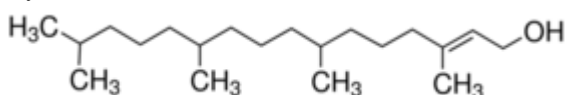
injector temperature, helium is the carrier gas and split ratio is 5:4. The sample (1 µl) is evaporated in a split less injector at 300°C. Run time is 22 min. The compounds are identified by gas chromatography coupled with mass spectrometry. The molecular weight and structure of the compounds of test materials are ascertained by the interpretation of mass spectrum of GC-MS using the database of National Institute Standard and Technology (NIST). The mass spectrum of the unknown component is compared with the spectrum of the known components stored in the NIST library. By making use of this the name, molecular weight and structure of the components of the test materials is ascertained⁷.

RESULTS AND DISCUSSION

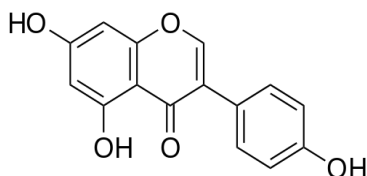
Mass spectrometry becomes a vital tool in the hands of the organic chemists and biochemists because of its potential to supply the definitive, qualitative and quantitative information on molecules based on their structural compositions. Gas chromatography is attached to a Mass Spectrometer (GC-MS) enables mixture of small molecules mainly organic compounds of low molecular weight (<600) which can be analysed.

The GC-MS analysis shows the presence of nine compounds in the ethanol extract of the whole plant,

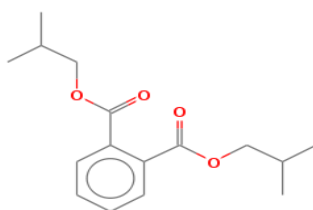
Phytol



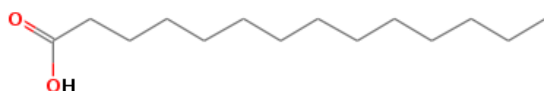
4',5,7-Trihydroxyisoflavone



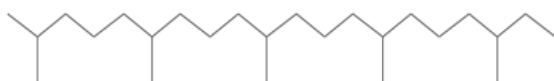
1,2-Benzene dicarboxylic acid, bis [2- methyl propyl] ester



Tetra decanoic acid



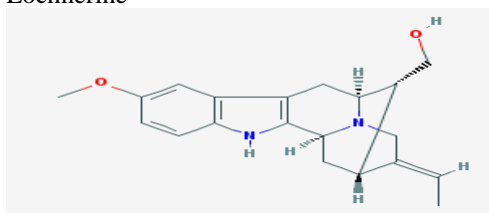
Eicosane,2,6,10,14,18-pentamethyl



Tetracosane



Lochnerine



Methyl -n- hexadecyl ketone



Figure: 2

Drosera indica L. by comparing their retention times and by interpretation of their mass spectra. The compounds are identified and their retention time, molecular formula and molecular weight (MW) are presented in the Table-1. The results pertain to the GC-MS analysis of the phytocomponents shown nine peaks - Fig -1. The structure of the various phytochemicals (Fig -2) which contribute to the medicinal activity of the plant ethanol extract of *Drosera indica* L. are listed in the Table 2. The available literature supports that the identified compounds of *Drosera indica* L. has the biological

activities like antioxidant, antibacterial, antifungal, antidiabetic and anticancer activities.

CONCLUSION

The results of the study clearly indicate the presence of active principles with the pharmacological activities in the ethanolic extract of *Drosera indica* L. So, this can be effectively used to treat diseases like cancer, diabetes mellitus, arthritis and inflammation.

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CONFLICT OF INTEREST

We declare there is no conflict of interest.

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