Available online on www.ijppr.com
International Journal of Pharmacognosy and Phytochemical Research 2017; 9(5); 685-688

DOI number: 10.25258/phyto.v9i2.8149

ISSN: 0975-4873

Research Article

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

K R Asha[1], S Priyanga[1], S Hemmalakshmi[1], K Devaki[1,2*]

[1]*Department of Biochemistry, Karpagam University, Coimbatore-641 021, India*
[2]*Department of Bioinformatics, Karpagam University, Coimbatore-641 02, India*

Received: 17th February, 17; Revised 29th April, 17, Accepted: 15th May, 17; Available Online:25th May, 2017

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 activities[1]**.** These secondary metabolites are the important source with a variety of structural arrangements and properties[2]**.** Volatile compounds play an important role in health care systems by the medicinal plants. Volatile compounds are identified by the GC-MS analysis[3]. 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 essesntial oil, fattyacids, lipids and alkaloids[4]**.**

*Droseraindica.*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 disorders[5]**.**

The secondary metabolites likephenolics and flavonoids fromthe plants are reported to be potent free radical scavengers. *Drosera indica* L. are reported for the presence of flavonoids in them[6]. 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

**Author for Correspondence:*

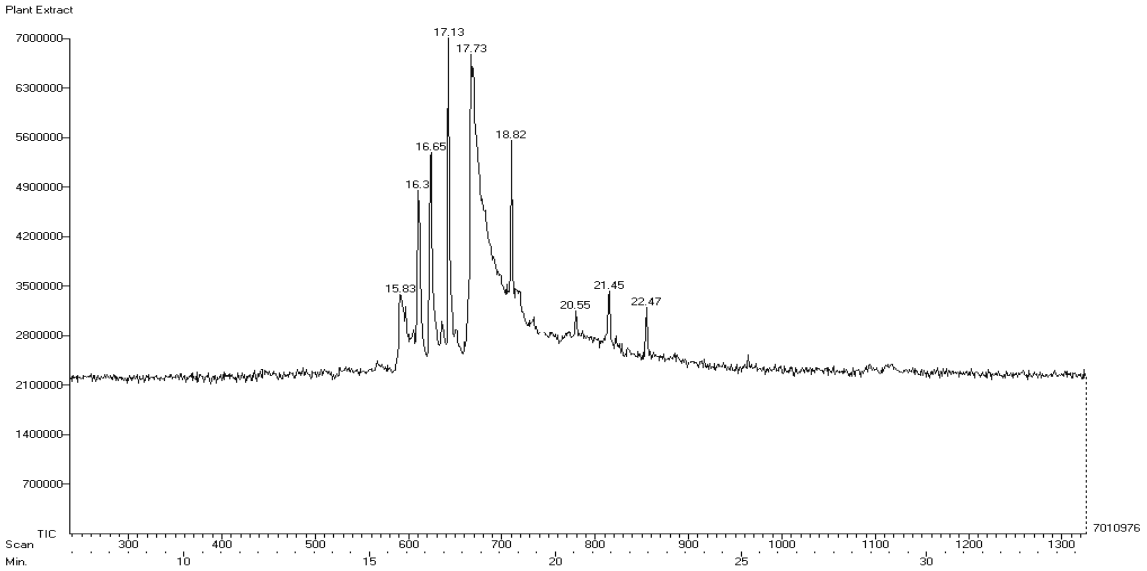


Figure 1: GC-MS Chromatogramof the ethanolic extract of *Drosera indica*. Structure of various phytochemicals present in *Drosera indica* L. which gives the biological effect.

Table 1: Phytocomponents 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	$C_5H_{22}O_4$	278.3435 g/mol	16.73
5	Tetra decanoic acid	$C_{14}H_{25}O_2$	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	$C_{20}H_{24}N_2O_2$	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	Antioxiodant[8]
2	4',5,7-Trihydroxy isoflavone	Antioxiodant[9]
3	1,2-Benzene dicarboxylic acid ,bis [2-methyl propyl] ester	Antioxiodant & Antidiabetic[10]
4	Tetra decanoic acid	Antioxiodant[11]
5	Eicosane, 2,6,10,14,18 –pentamethyl	Antifungal & Antibacterial[12]
6	Tetracosane	Antioxiodant & Antibacterial[13]
7	Lochnerine	Antioxiodant & Antibacterial[14]
8	methyl –n- hexadecylketone	Antioxiodant , Antibacterial & Anticancerous[15]

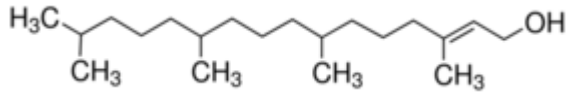
injector temperature, helium is the carrier gas and split ratio is 5:4. The sample (1 µl) is evaporated in a split less injector at 300°C. Run time is 22 min. The compounds are identified by gas chromatography coupled with mass spectrometry. The molecular weight and structure of the compounds of test 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 ascertained[7].

RESULTS AND DISCUSSION

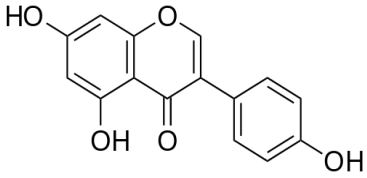
Mass spectrometry becomes a vital tool in the hands of the organic chemists and biochemists because of its potential to supply the definitive, qualitative and quantitative information on molecules based on their structural compositions. Gas chromatography is attached to a Mass Spectrometer (GC-MS) enables 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,

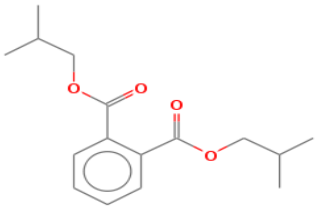
Phytol



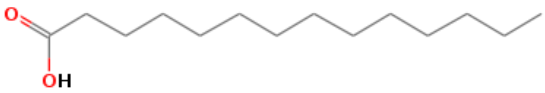
4' 5,7 –Trihydroxyisoflavone



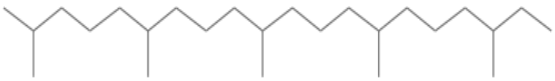
1,2-Benzene dicarboxylic acid , bis [2- methyl propyl] ester



Tetra decanoic acid

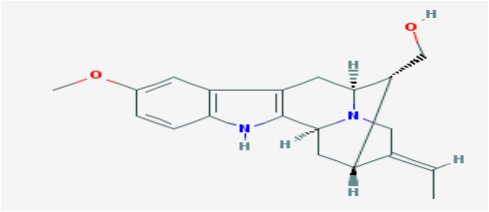


Eicosane,2,6,10,14,18-pentamethyl



Tetracosane

Lochnerine



Methyl –n- hexadecyl ketone

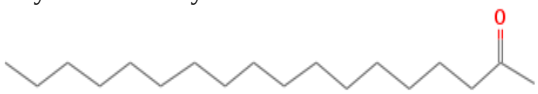


Figure: 2

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 shownine 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, diabetis mellitus, arthritis and inflammation.

ACKNOWLEDGMENT

We, the authors are thankful to the Chancellor, Chief Executive Officer, Vice Chancellor and Registrar of Karpagam University for providing facilities and encouragement to carry out our work.

CONFLICT OF INTEREST

We declare there is no conflict of interest.

REFERENCES

1. Kumari VMH, Manickavasakam K, Mohan S. GC-MS analysis of bioactive components of a siddha polyherbal drug Adathodaichoornam. International journal of Research in Ayurveda pharmacy 2016; 7: 4-7.
2. Pavitra K and Vadivukarasi S. GC-MS evaluation of chemical constituents from methanolic leaf extract of *Kedrostis foetidissima* (Jac). Cogn. Asian jounal of pharmaceutical and clinical 2012; 5: 668-679.
3. Hassanpouraghdam MB. Flower head volatile oil composition of soil less culture grown *Chrysanthemum balsamitta L.* Natural Products Research 2009; 23: 672-677.
4. Xie Z, Liu Q, Liang Z, Zhao M, Yu X, Yang D, Xu X. GC-MS analysis of volatile components extracted by different methods from *Exocarpium citrigrandis*. Journal of Analytical methods in chemistry 2013; DOI: http://dx.doi.org/10.1155/2013/9184406.
5. Asirvatham R, Christina AJM. *Drosera indica* L. potential effect on liver enzyme, lipid profile and hormone change in Dalton's lymphoma ascites (DLA) bearing mice. Journal Intercultural Ethnopharmacology 2012; 1: 69-73.
6. Asirvatham R, Christina AJM. Anticancer activity of *Drosera indica* L., on Dalton's Lymphoma Ascites (DLA) bearing mice. Journal of Intercultural Ethnopharmacology 2013; 2: 9-14.
7. Gnanavel V, Mary Saral A. GC-MS analysis of petroleum ether and ethanol leafextracts from *Abrusprecatorius Linn*. International Journal of Pharma and Bio Sciences 2013; 4: 37-44.
8. De CC, Santos MP, Salvadori MS, Mota VG, Costa LM, Cardoso AA, et al. Antinociceptive and antioxidant activities of phytol i*n vitro* and *in vivo* model. Neuroscience Journal 2013; DOI: http://dx.doi.org/10.1155/2013/949452
9. Dowling S, Regan F, Hughes H. The characterization of structural and antioxidant properties of isoflavone metal chelates. Journal of Inorganic Biochemistry 2010; 104: 1091-1098.

10. Govindappa M, Prathap S, Vinay V, Channabasava R. Chemical composition of methanol extract of endophytic fungi, *Aiternaria*sp of *Tebebuia argentea* and their antimicrobial & antioxidanty activity. International Journal of biological & pharmaceutical research 2014; 5: 861-869.
11. Ismail M, Mariod A, Bagalkotkar G, Ling HS. Fatty acid composition and antioxidant activity of oils from 2 cultivars of cantaloupe extracted by supercritical fluid extraction. Grass Y Aceites 2010; 61: 37-44.
12. Paritala V, Chiruvella K, Thammineni C, Ghante RG, Mohammed A. Phytochemicals and antimicrobial potentials of mahogany. Revista Brasileira De Farmacognosia 2015; 25: 61-83.
13. Huihua Z, Zhicai Z, Hui C, Zhenle T, Weilin Q, Weijie W. Antioxidant activity of ethanol extract from *Ganode rmalucidum* cultivated in the medium supplemented with herbs**.** Academia Journal of Medicinal Plants 2013; 1: 6-13.
14. Rajwar S, Khatri P, Patel R, Dwivedi S, Dwivedi A. An overview on potent herbal anticancer drugs. International journal of research in pharmacy and chemistry 2011; 1: 202-210.
15. Tran TD, Nhuyen TTN, Do TH, Huynh TNP, Tran CD, Thai KM. Synthesis & antibacterial activity of some hetrocyclic chalcone analogues alone and in combination with antibiotics. Molecules 2012; 17: 6684-6696.