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'The GC MS Analysis of Ethyl Acetate Extract of One Herbal Plant, '*Euphorbia Hypericifolia*'

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Abstract

The present study deals with the GC MS analysis of one medicinal plant, **'***Euphorbia hypericifolia***'.** This plant has many ethno-medicinaluses. The decoction of the leaves and roots are used to gastrointestinal disorders, gonorrhoea, and menorrhagia. The leaf extract is used as antifungal, anti-cancer, sclerosis and warts.This plant was collected from nearby hills of Chengalpattu, Tamilnadu. The ethyl acetate extract of the aerialparts of the plant was subjected to GC MS study following standard protocols. I was observed that some very important molecules such as 1-Amino-2,6-dimethylpiperidine, 4(1H)-Pyridone, 6-Methoxy-2-phenacyloxy-3(2H)-pyridazinone, Cyclopentanecarboxylic acid, 4-nitrophenyl ester, Dodecanoic acid, Tetradecanoic acid , n-Hexadecanoic acid, 17-Octadecynoic acid, Oleic Acid, Methyl 9,10-octadecadienoate, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Stigmasterol were shown in the GC MS profile. These molecules have medicinal roles which are in line with its ethno-medicinal. Further work is warranted to understand the molecular mechanism of action of each of the molecules.

Key words: GC MS, Ethyl acetate, 1-Amino-2,6-dimethylpiperidine, 4(1H)-Pyridone, 6-Methoxy-2phenacyloxy 3(2H)-pyridazinone, Cyclopentanecarboxylic acid, 4-nitrophenyl ester, Dodecanoic acid, Tetradecanoic acid , n-Hexadecanoic acid, Stigmasterol

INTRODUCTION

Euphorbia hypericifolia is plant belonging to Euphorbiacee family which has many ethnomedicinal values. The decoction of the leaves and roots are used to gastrointestinal disorders, gonorrhoeaand menorrhagia. The leaf extract is used as antifungal, anti-cancer, sclerosis and warts. Not much work has been undertaken on the medicinal role of this plant. Saini and Intekhab, 2016 have studied the phytochemicals present in this plant. Mwine and van Damme, 2011 have reviewed the medicinal significance of Euphorbiaceae as a family. The present works deals with the GC MS analysis of the ethyl acetate extract of the aerial parts of this plant. This work is in continuation of our work to establish the efficacy of the herbal plants, Ayurvedic and Sidhha medicines. (Priyadarshini*et al,* 2017; Jayakumari*et al*, 2017; Rao*et al,* 2018; Vijayalakshmi and Rao, 2019; Yuvaraj*et al*, 2019; Mutteyi*et al,* 2019, Rao*et al*, 2019; Mutteyi*et al,* 2020; Vijayalakshmi and Rao, 2020; Janaki*et al*, 2021).

MATERIALS AND METHODS

The plant '*Euphorbia hypericifolia'*was collected from the nearby hills at Chengalpattu, Tamil Nadu. The plant was identified by a qualified botanist at Chennai. The ethyl acetate extract of the shade dried whole plant was collected after 48 h of soaking. The extract was evaporated and the dried powder was used for GC-MS analysis by standard procedures.

GC-MS Procedure

Instrument: GC (Agilent: GC: (G3440A) 7890A. MS/MS: 7000 Triple Quad GCMS) was equipped with MS detector.

Sample Preparation

About 100 ml sample was dissolved in 1 ml of suitable solvents. The solution was stirred vigorously using vortex stirrer for 10 s. The clear extract was determined using GC for analysis.

GC-MS Protocol

Column DB5 MS (30 mm × 0.25 mm ID ×0.25 µm, composed of 5% phenyl 95% methylpolysiloxane), electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1 ml/min injector temperature 280°C; auxilary temperature: 290°C ion-source temperature 280°C.

The oven temperature was programmed from 50°C (isothermal for 1.0 min), with an increase of 40°C/min, to 170°C C (isothermal for 4.0 min), then 10°C/min to 310°C (isothermal for 10 min) fragments from 45 to 450 Da. Total GC running time is 32.02 min. The compounds are identified by GC-MS Library (NIST and WILEY).

RESULTS AND DISCUSSION

The results of the GC-MS analysis of the whole plant ethyl acetate extract, along with the possible medicinal role of each molecule of'*Euphorbia hypericifolia'*extract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of '*Euphorbia hypericifolia'.* The identification of metabolites was accomplished by comparison of retention time and fragmentation pattern with mass spectra in the NIST spectral library stored in the computer software (version 1.10 beta, Shimadzu) of the GC-MS along with the possible pharmaceutical roles of each bio molecule as per Dr. Duke's Phytochemical and ethno-botanical data base (National Agriculture Library, USA) and others as shown in Table 1. The results as shown in Table 1 indicate the medicinal roles of some of the molecules such as 1-Amino-2,6-dimethylpiperidine, 4(1H)-Pyridone, 6-Methoxy-2-phenacyloxy-3(2H)-pyridazinone, Cyclopentanecarboxylic acid, 4-nitrophenyl ester, Dodecanoic acid, Tetradecanoic acid , n-Hexadecanoic acid, 17-Octadecynoic acid, Oleic Acid, Methyl 9,10-octadecadienoate, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Stigmasterol etc. The medicinal roles as described for these molecules could contribute to the ethno-medicinal roles of this plant. Further work, however is required to probe into the mechanism of each molecules as shown in the GC MS profile.

CONCLUSION

From the results it is clear that this plant does contain some important metabolites which have far reaching medicinal roles.

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REFERENCES

1. Saini,S., Intekhab, J. (2016) *Phytochemical studies on Euphorbiahypericifolia*. *International Education & Research Journal, 2(1),* 63-65

2. Mwine, J. T., Van Damme, P. (2011) Why do Euphorbiaceae tick as medicinal plants? A review of Euphorbiaceae family and its medicinal features.*Journal of Medicinal Plants Research, 5(5),* 652-662

3. GomathiPriyadarshini, Arul Amutha Elizabeth, Jacintha Anthony, Mudiganti Ram Krishna Rao, Prabhu. K., Aiswarya Ramesh, VaniKri,shna. (2017) The GC MS analysis of one medicinal plant, *Premnatomentosa. Journal of Pharmaceutical Sciences and Research,* ***9(9),*** 1595-1597

4. Jayakumari, S., Prabhu, K., Mudiganti Ram Krishna Rao, Bhupesh, G., Kumaran, D., Aishwariya Ramesh. (2017) The GC MS Analysis of a Rare Medicinal Plant *Aloe barbadensis. J. Pharm. Sci. & Res.9(7),* 1035-1037

5. Rao, M. R. K., Vijayalakshmi, N. (2018) Preliminary phytochemical and GC MS analysis of different extracts of *Sphaeranthusindicus* leaves*. Indo American J of Pharmaceuical Sciences, 5(3),* 1511-1520

6. Vijayalakshmi, N., Mudiganti Ram Krishna Rao. (2019) The antioxidant studies of two medicinal plants, *Sphaeranthusindicusand Psophocarpustetragonolobus*.*Asian J of pharmaceutical and Clinical Res, 12(1),* 321-327.

7. Yuvaraj, R., Mudiganti Ram Krishna Rao, Prabhu, K., Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N. (2019)The GC MS study of one medicinal plant, *Stachyterphetaindica*.*Drug Invention Today, 12(9),* 1665-1669

8. MutteviHyagreva Kumar, Prabhu, K., Mudiganti Ram Krishna Rao, Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N. (2019)The GC MS study of one medicinal plant, *Dodoneaangutifolia*. *Drug Invention Today, 12(9)*, 1661-1664

9. Mudiganti Ram Krishna Rao, Vijayalakshmi, N., Prabhu, K., Sathish Kumar, M. (2019)The gas chromatography–mass spectrometry study of *Moringaoleifera*seeds. *DIT, 12(10),* 2172-2175

10. MutteviHyagreva Kumar, Prabhu, K., Mudiganti Ram Krishna Rao, Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N.(2020)The GC MS study of one medicinal plant, *AristolochiaIndica .DIT, 12(12),* 2919-2923.

11. Vijayalakshmi, N., Mudiganti Ram Krishna Rao. (2020) 'Preliminary phytochemical and antioxidant studies of leaf extracts of one medicinal plant, *Vitexnegundo*".*RJPT, 13(5),* 2167-2173

12. Janaki C. S.', Prabhu K., Mudiganti Ram Krishna Rao,VenkatRamaiah, ShrutiDinkar, Vijayalakshmi, N., Kalaivannan. J. (2021) The GC MS analysis of Ethyl acetate extract of *Merremiaemerginata'.Ind J of Natural Sciences, 12(67),* 33638-33646

13. Dr.Duke's Phytochemcial and Ehnobotanical Databases.U.S. Department of Agriculture, Agricultural Research Service.1992-2016. Dr. Duke's Phytochemical and Ethnobotanical Databases. Home Page, http://phytochem.nal.usda.gov/ http://dx.doi.org/10.15482/USDA.ADC/1239279

Qualitative Compound Report

Data File	280121026.D	Sample Name	Euphorbia hypercifolia
Sample Type		Position	113
Acq Method	GC Screening New Method.M	Acquired Time	30-01-2021 PM 07:09:44
Comment			

User Chromatogram

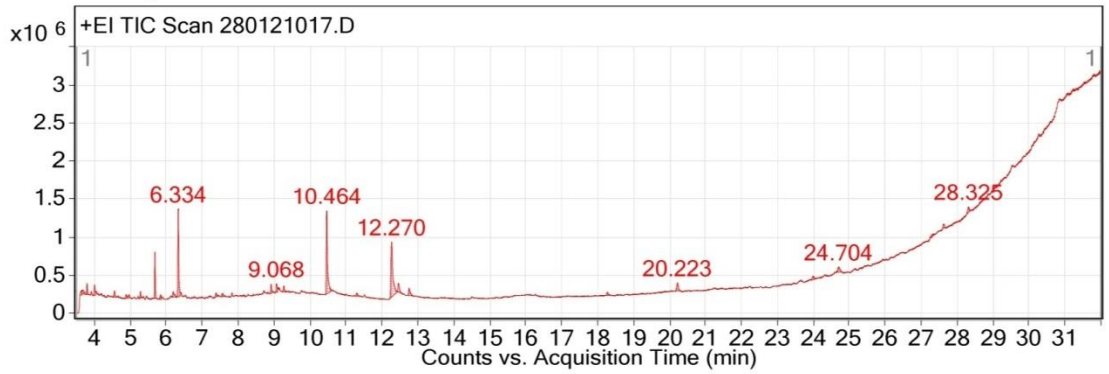

Figure 1. Shows the GC MS profile graph of ethyl acetate extract of *Euphorbia hypericifolia'*

Table1. Indicates the retentions time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile of *Euphorbia hypericifolia'*

Ret. Time	Compound	Mol. Formula	Mol. Mass	% Peak Area	Possible Medicinal Role
3.67	13-Heptadecyn-1-ol	C17H32O	252.2	1.80	Oligosaccharide provider
3.80	1,4-Butanediamine, 2,3-dimethoxy-N,N,N',N'-tetramethyl-, [S- (R*,R*)]-	C10H24N2O2	204.2	1.92	Not Known
4.00	1-Amino-2,6-dimethylpiperidine	C7H16N2	128.1	1.91	Increases Aromatic Amino acid decarboxylase activity
4.56	4(1H)-Pyridone	C5H5NO	95	1.34	11Beta HSD inhibitor, 17-beta-hydroxysteroid dehydrogenase inhibitor, 5 HETE inhibitor, 5 HT inhibitor, 8 HETE inhibitor, Anti 5-HT, Anti HIV integrase, Aryl hydrocarbon hydroxylase inhibitor, HDL genic, Hematopoietic
4.89	6-Methoxy-2-phenacyloxy-3(2H)-pyridazinone	C13H12N2O4	260.1	1.17	11Beta HSD inhibitor, 17-beta-hydroxysteroid dehydrogenase inhibitor, 5 HETE inhibitor, 5 HT inhibitor, 8 HETE inhibitor, Anti 5-HT, Anti HIV integrase, Aryl

					hydrocarbon hydroxylase inhibitor, HDL genic, Hematopoietic
5.28	3-Cyclobutene-1,2-dicarboxylic acid, dimethyl ester	C8H10O4	170.1	1.04	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
5.69	Furane-2-carboxaldehyde, 5-(4-nitrophenoxymethyl)-	C12H9NO5	247	6.54	Not Known
5.84	.beta.-d-Lyxofuranoside, O-nonyl-	C14H28O5	276.2	1.00	17-beta-hydroxysteroid dehydrogenase inhibitor, Antiamyloid-Beta, Anti TGF-Beta, Beta-2-Receptor-Agonist, Beta-Adrenergic receptor blocker, Beta Galactosidase inhibitor, Beta-Glucuronidase inhibitor, Aldehyde oxidase inhibitor
6.20	1-Penten-3-one	C5H8O	84.1	1.72	Not Known
6.33	Cyclopentanecarboxylic acid, 4-nitrophenyl ester	C12H13NO4	235.1	15.75	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
7.39	1,2,3-Benzenetriol	C6H6O3	126	0.94	Not Known
7.58	Dodecanoic acid	C12H24O2	200.2	1.15	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
8.92	3-Octadecyne	C18H34	250.3	1.68	Not Known
9.07	Tetradecanoic acid	C14H28O2	228.2	1.88	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
9.27	Phytol	C20H40O	296.3	1.34	Not Known
10.46	n-Hexadecanoic acid	C16H32O2	256.2	21.13	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier, Anaphylactic, Arylamine N acetyltransferase inhibitor, decreases norepinephrine production, Down regulates nuclear and cytosol androgen reuptake, GABA-nergic, Increase NK cell activity, inhibits production of tumor necrosis

					factor, Myo-neuro-stimulator
11.30	17-Octadecynoic acid	C18H32O2	280.2	0.98	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier,
12.27	Oleic Acid	C18H34O2	282.3	23.02	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier,
12.46	Methyl 9,10-octadecadienoate	C19H34O2	294.3	2.68	.Catechol-O-Methyl-Transfearse inhibitor, Methyl donar
12.76	9,12,15-Octadecatrienoic acid, (Z,Z,Z)-	C18H30O2	278.2	2.45	Not known
18.28	2-((Octan-2-yloxy)carbonyl)benzoic acid	C16H22O4	278.2	0.91	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier,
20.22	trans-Geranylgeraniol	C20H34O	290.3	2.81	Catechol-O-Methyl-Transfearse inhibitor, Increases Glutathione-s-Transferase Activity, Decrease Glutamate Oxaloacetate transaminase activity, Decreases Glutamate pyruvate transaminase, Glycosyltransferase inhibitor, Glutathione-S-Transfearse inhibitor, Increases glyoxalate transamination, Reverse transcriptase inhibitor,
24.00	Stigmasta-5,22-dien-3-ol, acetate, (3.beta.)-	C31H50O2	454.4	1.44	Not known
24.70	Androstan-17-one, 3-ethyl-3-hydroxy-, (5.alpha.)-	C21H34O2	318.3	2.40	Not known
27.63	Stigmasterol	C29H48O	412.4	0.97	Precursor of progesterone , acts as intermediate in the biosynthesis of androgens and estrogens, anti-osteoarthritic, antihypercholesterolemic, cytotoxic, antitumor, hypoglycemic, antimutagenic, antioxidant, anti-inflammatory, analgesic