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PRELIMINARY PHYTOCHEMICAL SCREENING AND GC-MS ANALYSIS OF METHANOLIC LEAF EXTRACT OF *Memecylon umbellatum* BURM.F. FROM SENTHIRANKILLAI SACRED GROVE, CUDDALORE DISTRICT, TAMILNADU, INDIA

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Abstract

The investigation was carried out to determine the possible bioactive components of leaf of *Memecylon umbellatum* using GC-MS. The chemical compositions of the ethanol extract of leaf of *Memecylon umbellatum* was investigated using Perkin-Elmer Gas Chromatography-Mass spectrometry (GC-MS), while the mass spectra of the compounds found in the extract was matched with the National Institute of Standards and Technology (NIST) library. Nearly. 24 compounds from leaves were identified of which D-Allose (26.74 %), 1,2,3-Benzenetriol (15.87 %), 2-Furancarboxaldehyde, 5-(hydroxymethyl) - (14.66 %), 1,6-Anhydro-à-d-alactofuranose (10.29 %), E-9-Tetradecenoic acid (6.92 %) were found to be predominant compounds found to be major compounds identified. All the identified compounds were medicinally valuable for the treatment of various human ailments. In addition, all the phytochemical compounds were needed for further investigations for the development of new lead of therapeutic interest.

Key words: *Memecylon umbellatum*, Preliminary screening, GC-MS analysis and Bioactive compounds.

1. Introduction

Plants are natural source of producing wide number of phytoconstituents in a most efficient way and with precise selectivity. Since the middle of the century, different bioactive phytoconstituents have been isolated and characterized. Many of these are used as the major active ingredients of the modern medicine or as the lead compounds for new drug discovery (Uddin *et al*., 2011). Medicinal plants would be the best source to obtain a variety of drugs and therefore such plants should be investigated to understand better about their properties, safety and efficacy (Nascimento *et al*., 2000).

The genus *Memecylon* L., (family: Melastomataceae) comprises of about 300 species in the world, of which 30 species has been reported from India (Santapu and Henry, 1973; Henry *et al*., 1989) and 16 species from Tamilnadu (Nair *et al*., 1983). *M. umbellatum*, a robust shrub used ethnomedicinally for treating various ailments. In traditional medicines, leaves of *M. umbellatum* has been used as a cooling astringent, in conjunctivitis as a lotion and given internally in leucorrhoea and gonorrhea (Chopra *et al*., 1956).

Leaves mainly used to treat eye troubles, gonorrhea, leucorrhea and wounds (Dhar *et al*., 1968), treatment of bone fracture, herpes, diabetes, skin diseases, snake bite. The leaves and barks are applied to bruises (Rajakumar *et al*., 2009). Biological activity such as anti-diabetic, anti-viral and wound healing activity were reported. Taking

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into consideration of the medicinal importance of the plant, the methanolic leaf extract of *Memecylon umbellatum* was analyzed for the GC-MS. This work will help to identify the compounds of therapeutic value. GC-MS is one of the technique to identify the bioactive constituents of long chain branched chain hydrocarbons, alcohols, acids, esters, etc (Amalraj *et al*., 1998).

2. Materials and methods

Collection of plant materials and preparation of the extract

The fresh leaves of *M. umbellatum* were collected from the sacred grove of Senthirankillai (11°44'24" N, 79°47'24" E), Cuddalore District, Tamil Nadu, India. The specimen was botanically identified and confirmed by Rapinat Herbarium, St. Joseph's College, Tiruchirappalli, Tamil Nadu, India. The preserved plant specimens were submitted to the Department of Botany, Annamalai University, Annamalainagar, Tamilnadu for further reference. The leaves were chopped into small pieces, shade-dried and coarsely powdered by using a pulverizor. The powdered leaf was then subjected to successive extraction with organic solvents such as hexane chloroform and ethanol by Soxhlet method (Catherine *et al*., 1997). The extracts were then collected and distilled off on a water bath at atmospheric pressure and the last trace of the solvents was removed in vacuum and stored at 4 ˚C and used for GC-MS analysis.

Phytochemical Screening

All the dried extracts were dissolved in small quantity of respective solvents and tested for phytoconstituents (Catherine *et al*., 1997).

GC-MS analysis

GC-MS analysis was performed with GC-MS Clarus 500 Perkin Elmer Equipment. Compounds were separated on Elite-5 capillary column (Crossbond 5 % Phenyl 95 % dimethyl polysiloxane) Oven temperature was programmed as follows: isothermal temperature at 60 ºC then increased to 200 ºC at the rate of 10 ºC/min., then increased upto 280 ºC at the rate of 5 ºC/min for 9 min. Ionization of the sample components was performed in the Electron energy (70 eV). The helium was used as gas carrier (1 ml/min.), and 1.0 µL of sample was injected. The detector was Mass detector Turbomass gold Perkin Elmer. The total running time for GC was 36 min and software Turbomass 5.2.0 was used in this GC-MS study (Manjamalai *et al*., 2010).

Identification of compounds

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The Name, Molecular weight and structure of the components of the test materials were ascertained.

Table – 1: Preliminary phytochemical screening of methanolic leaf extract of *Memecylon umbellatum*

S.No.	Phytochemicals	Petroleum ether	Chloroform	Ethyl acetate	Methanol
1.	Alkaloids	-	-	-	-
2.	Steroids	+	+	+	+
3.	Terpenoids	-	-	-	+
4.	Flavonoids	-	+	-	+
5.	Anthraquinones	-	-	-	+
6.	Tannins	-	-	+	+
7.	Saponins	-	-	+	+
8.	Glycosides	-	-	-	+
9.	Reducing sugars	-	+	+	+

Steroids were present in all the extracts. Carbohydrates were present in petroleum ether extract. Alkaloids were absent all the four extracts. Steroids only present in Petroleum ether extract (Table – 1).

Table - 2: List of compounds identified by GC-MS analysis of methanolic leaf extract of *Memecylon umbellatum*

S.No.	Peak Name	Retention time	Peak area	%Peak area
1.	Name: Furfural Formula: $C_5H_4O_2$ MW: 96	3.48	132486	3.5693
2.	Name: Oxazolidine, 2,2-diethyl-3-methyl- Formula: $C_8H_{17}NO$ MW: 143	6.54	379738	0.1023
3.	Name: 1,2-Butanediol, 1-phenyl- Formula: $C_{10}H_{14}O_2$ MW: 166	7.42	110255	0.2970
4.	Name: 2,5-Furandicarboxaldehyde Formula: $C_6H_4O_3$ MW: 124	8.33	110956	2.9893
5.	Name: 3-Acetylthymine Formula: $C_7H_8N_2O_3$ MW: 168	8.72	479207	1.2910
6.	Name: Levoglucosenone Formula: $C_6H_6O_3$ MW: 126	9.01	469505	1.2649
7.	Name: 3-Hexanone, 2,5-dimethyl- Formula: $C_8H_{16}O$ MW: 128	9.37	202018	0.5443
8.	Name: 1H-Imidazo[1,2-b]pyrazole, 2,3-dihydro- Formula: $C_5H_7N_3$ MW: 109	10.03	722071	1.9453
9.	Name: 1,2,4-Triazol-5-acetic acid, 3-amino- Formula: $C_4H_6N_4O_2$ MW: 142	11.11	647717	1.7450
10.	Name: 1,4:3,6-Dianhydro-à-d-glucopyranose Formula: $C_6H_8O_4$ MW: 144	11.70	353201	0.9516
11.	Name: 2-Furancarboxaldehyde, 5-hydroxymethyl Formula: $C_6H_6O_3$ MW: 126	12.32	544377	14.666
12.	Name: Valeric acid, 2,3-epoxy-3,4-dimethyl-, tert-butyl ester, cis- Formula: $C_{11}H_{20}O_3$	14.09	479179	1.2909

S.No.	Peak Name	Retention time	Peak area	%Peak area
	MW: 200			
13.	Name: 1,2,3-Benzenetriol Formula: $C_6H_6O_3$ MW: 126	17.40	589318	15.876
14.	Name: D-Allose Formula: $C_6H_{12}O_6$ MW: 180	20.11	992562	26.740
15.	Name: 1,6-Anhydro-à-d-galactofuranose Formula: $C_6H_{10}O_5$ MW: 162	23.41	382037	10.292
16.	Name: Benzeneacetic acid, 4-hydroxy-3-methoxy-, methyl ester Formula: $C_{10}H_{12}O_4$ MW: 196	25.21	882804	0.2378
17.	Name: 3,7,11,15-Tetramethyl-2-hexadecen-1-ol Formula: $C_{20}H_{40}O$ MW: 296	27.02	443850	1.1958
18.	Name: 3,7,11,15-Tetramethyl-2-hexadecen-1-ol Formula: $C_{20}H_{40}O$ MW: 296	28.16	199149	0.5365
19.	Name: Tetradecanoic acid, 12-methyl-, methyl ester Formula: $C_{16}H_{32}O_2$ MW: 256	29.36	405157	0.1092
20.	Name: n-Hexadecanoic acid Formula: $C_{16}H_{32}O_2$ MW: 256	30.98	142297	3.8336
21.	Name: 2H,8H-Benzo[1,2-b:3,4-b']dipyran-2-one, 8,8-dimethyl- Formula: $C_{14}H_{12}O_3$ MW: 228	31.92	109370	0.2947
22.	Name: Phytol Formula: $C_{20}H_{40}O$ MW: 296	34.03	801960	0.2161
23.	Name: E-9-Tetradecenoic acid Formula: $C_{14}H_{26}O_2$ MW: 226	35.31	257021	6.9244
24.	Name: 2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)- Formula: $C_{30}H_{50}$ MW: 410	49.30	114539	3.0858

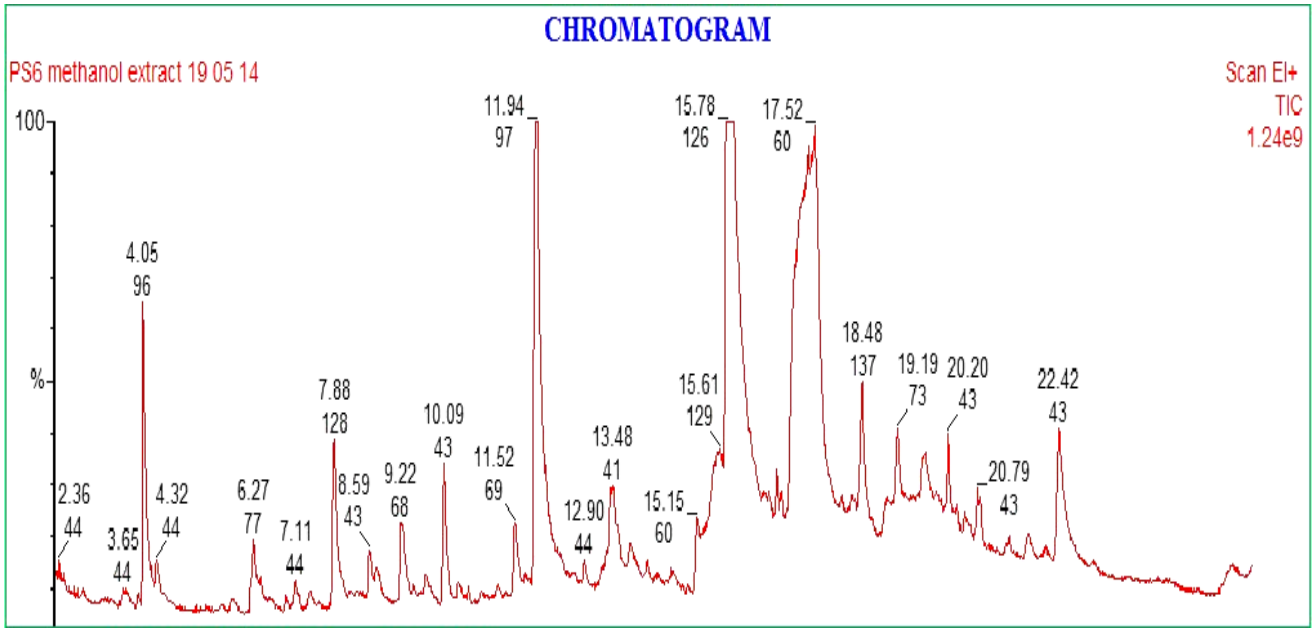

Fig -1: GC-MS Chromatogram of methanolic leaf extract of *Memecylon umbellatum*

3. Results and Discussion

Twenty four compounds were identified in *Memecylon umbellatum* leaf extract by GC-MS analysis. The active principles with their retention time (RT), molecular formula (MF), molecular weight (MW) and peak area and peak area (%) are presented in Table - 2 and Fig. 1. The prevailing compounds were D-Allose (26.74 %), 1,2,3-Benzenetriol (15.87 %), 2-Furancarboxaldehyde, 5-(hydroxymethyl) - (14.66 %), 1,6-Anhydro-à-d-alactofuranose (10.29 %), E-9-Tetradecenoic acid (6.92 %), n-Hexadecanoic acid (3.83 %), Furfural (3.56 %), 2, 6, 10, 14, 18, 22 Tetracosahexaene, 2, 6, 10, 15, 19, 23 (3.08 %), 2, 5 Furandicarboxaldehyde (2.98 %), 1 H-Imidazo[1,2-b] pyrazole, 2, 3-dihydro - (1.94 %), 1,2,4-Triazol-5-acetic acid, 3-amino- (1.74 %), Valeric acid, 2,3-epoxy-3,4-dimethyl-, tert-butyl ester, cis- (1.29 %), 3-Acetylthymine (1.29 %), Levoglucosenone (1.26 %), 3, 7, 11, 15 - Tetramethyl-2-hexadecen-1-ol (1.19 %), 1, 4, 3, 6 - Dianhydro-à-d-glucopyranose (0.95 %), 3-Hexanone, 2, 5- dimethyl-(0.54 %), 3,7,11,15-Tetramethyl-2-hexadecen-1-ol (0.53 %), 1,2-Butanediol, 1-phenyl - (0.29 %), 2H, 8H-Benzo [1,2-b:3,4-b']dipyran-2-one, 8,8-dimethyl-(0.29 %), Benzeneacetic acid, 4-hydroxy-3-methoxy-, methyl ester (0.23 %), Phytol (0.21 %), Tetradecanoic acid, 12 - methyl-, methyl ester (0.10 %) and Oxazolidine, 2,2-diethyl-3-methyl- (0.10 %).

Secondary metabolites in plant products are responsible for several biological activities in man and animals (Nair *et al*., 1983). The compounds identified by GC-MS in methanolic leaf extract were medicinally valuable and possess various pharmaceutical applications. Among the identified phytochemicals, phytol was detected in *Memecylon umbellatum* whole plant which was also found to be effective at different stages of the arthritis. It was found to give good as well as preventive and therapeutic results against arthritis. The results show that reactive oxygen species promoting substances such as phytol constitute a promising novel class of pharmaceuticals for the treatment of rheumatory diseases and possibly other chronic inflammatory diseases (Jegadeeswari *et al*., 2012; Rao *et al*., 1998). Thus, the present and previous studies have been identified and reported the biological activities of the plant (Sivu *et al*., 2013).

4. Conclusion

The present study it has been concluded that, the plant *Memecylon umbellatum* is a potential source of biologically active compounds with pharmaceutical value. Further, the compounds identified were needed further study on the toxicological aspects including clinical trials to develop safe drug for the treatment of various human ailments.

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