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Research Article

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Preliminary phytochemical screening and GC-MS analysis of methanolic leaf extract of *Drypetes sepiaria* (Wight & Arn.) Pax. & Hoffim. from Silambur sacred grove, Tamilnadu

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ABSTRACT

A valuable Indian ethnomedicinal plant, Drypetes sepiaria (Wight & Arn.) Pax. & Hoffim was investigated to determine the phytochemical constituents present in various extracts of the leaves through GC-MS (Gas Chromatography-Mass Spectrometry) analysis. Powdered leaf plant materials were subjected to successive extraction with organic solvents such as methanol by Soxhlet extraction method. In the present study, a total of 23 different compounds identified by GC-MS analysis using methanol extract, 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 on toxicological aspects for the development of new lead of therapeutic interest.

Key words: *Drypetes sepiaria* preliminary screening, GC-MS analysis.

INTRODUCTION

Plants have been a rich source for drug discovery [1]. Plants and plant parts have been provide a good source of pharmaceutical active compounds, such as phenolic compounds, nitrogen compounds, vitamins, terpenoids, saponin and some other secondary metabolites, which are rich in valuable bioactivities of antioxidant, anti-inflammatory, antitumor, antimutagenic, anti-carcinogenic [2].

The genus *Drypetes* (Putranjivaceae (Euphorbiaceae) comprises nearly 160 species which has been used in the folk medicine of many cultures for many years [3]. Even though the species was different, they used to treat similar disorders. Among the members of the genus *Drypetes* earlier phytochemical studies on some species including *D. parrifolia, D. laciniata, D. inaequalis, D. armoracia, D. gossweileri, D. molunduana, D. roxburghii* have yielded flavonoids, chalcone glycosides, saponins, tripterpenoids, phenolics, alkaloids, etc.

Drypetes sepiaria (Wight & Arn.) Pax. & Hoffim. an ever green tree locally known as Kalvirai (Tamil) commonly grown in foothills and shrub jungles and some sacred groves of Tamil Nadu. *Drypetes sepiaria* is traditionally used to treat pain and inflammation and seeds are used as a wild edible food [4] and their root paste can be used as an antidote for scorpion bite. Decoction of leaves and seeds is also noted for reducing rheumatic inflammation [5]. As per earlier literature, there is no scientific investigations found in *D. sepiaria* on phytoconstituents present. In ethnomedicinal point of view as described above, the GC-MS analysis was carried out with methanolic leaf extract of *D. sepiaria* to investigate the chemical constituents present in it.

EXPERIMENTAL SECTION

Collection of plant materials and preparation of the extract

The fresh leaves of *D. sepiaria* were collected from the sacred grove of Silambur (Lat, 11.35 ºN; Long, 79.31ºE), Ariyalur District, Tamil Nadu, India. The specimen was botanically identified and confirmed by Rapinat Herbarium, St. Joseph's College, Tiruchirappalli. 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 leaves were then subjected to successive extraction with organic solvents such as hexane chloroform and ethanol by Soxhlet method [14]. The extracts were then collected and distilled off on a water bath at atmospheric pressure and the last trace of the solvents was removed and stored at 4˚C. They were used for GC-MS analysis.

Preparation of extract

The powdered leaf of *D. sepiaria* (500 g) was extracted with methanol (95%) and double distilled water separately in a soxhlet extractor. The extract was evaporated to dryness at 60ºC under reduced pressure in a rotary evaporator and kept in refrigerator at 4ºC till used. The extracts were dissolved in dimethylsulphoxide to make the final concentrations at the time study.

Preliminary phytochemical screening

A small portion of the dry extracts were subjected to preliminary phytochemical screening to detect the presence of various phytoconstituents present in the leaves of *D. sepiaria* (Trease and Evans, 1983, and Harbourne, 1973).

Gas chromatography- mass spectrometry (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% dimethylpolysiloxane) Oven temperature was programmed as follows: isothermal temperature at 60ºC then increased to 200ºC at the rate of 10ºC/min., then increased up to 280ºC at the rate of 5ºC/min. held for 9 min. Ionization of the sample components was performed in the Electron energy (70 eV). The helium was used as gas carrier (1ml/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 [22].

Identification of compounds

All the compounds were identified from methanol extracts based on direct comparison of the retention times and their mass spectra with the spectra of known compounds stored in the spectral database, NIST (Version year 2005).

RESULTS AND DISCUSSION

The chemical constituents identified by the GC-MS analysis on methanolic leaf extract of *D. sepiaria* were enumerated along with Molecular Formula (MF), Molecular Weight (MW), Retention Time (RT), and peak area and peak area (%) is presented in Table-1.

In the methanolic leaf extract of *D. sepiaria*, a total of 36 compounds were identified, of which n-Hexadecanoic acid (13.25%), was found as major compound followed by other compounds namely, Benzeneacetic acid, 3,4-dihydroxy-(12.92%), 2-Methoxy-4-vinylphenol (7.80%), 3,4-Dihydrocoumarin-7-ol (7.72%), and Cyclohexane, 1-methylene-4-(1-methylethenyl)- (5.38%).

Table -1. Compounds identified in methanolic leaf extract of *Drypetes sepiaria*

S.No.	Peak Name	Retention Time(min)	Peak Area	% Peak area
1.	Name: Propanoic acid, 2-oxo-, methyl ester Formula: $C_4H_6O_3$ MW: 102	2.83	352644	2.8966
2.	Name: 2-Furanmethanol Formula: $C_5H_6O_2$ MW: 98	3.69	526502	0.4325
3.	Name: 2-Cyclopenten-1-one, 2-hydroxy- Formula: $C_5H_6O_2$ MW: 98	4.82	251654	2.0671
4.	Name: Benzaldehyde Formula: C_7H_6O MW: 106	5.46	253243	2.0801
5.	Name: 2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one Formula: $C_6H_8O_4$ MW: 144	5.69	232379	1.9087
6.	Name: 2-Hydroxy-gamma-butyrolactone Formula: $C_4H_6O_3$ MW: 102	6.25	174726	1.4352
7.	Name: 3-Acetylthymine Formula: $C_7H_8N_2O_3$ MW: 168 CAS	8.20	341872	2.8081
8.	Name: Pyrimidine-4,6-diol, 5-methyl- Formula: $C_5H_6N_2O_2$ MW: 126	8.73	621868	0.5108
9.	Name: 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- Formula: $C_6H_8O_4$ MW: 144	9.53	284421	2.3362
10.	Name: 2-Propenal, 3-(2-furanyl)- Formula: $C_7H_6O_2$ MW: 122	10.04	247028	2.0291
11.	Name: 2(1H)-Pyrimidinethione, 4,6-diamino- Formula: $C_4H_6N_4S$ MW: 142	10.52	546851	0.4492
12.	Name: 1,6;3,4-Dianhydro-2-O-acetyl-á-d-allopyranose Formula: $C_8H_{10}O_5$ MW: 186	10.90	96626	0.0794
13.	Name: Dianhydromannitol Formula: $C_6H_{10}O_4$ MW: 146	11.01	318631	2.6172
14.	Name: 2-Furancarboxaldehyde, 5-(hydroxymethyl)- Formula: $C_6H_6O_3$ MW: 126	11.59	284490	2.3368
15.	Name: 2H-Pyran-5-carboxylic acid, 2-oxo-, methyl ester Formula: $C_7H_6O_4$ MW: 154	12.64	544630	0.4474
16.	Name: Ethyl N-hydroxyacetimidate Formula: $C_4H_9NO_2$ MW: 103	12.95	218384	0.1794
17.	Name: 2-Methoxy-4-vinylphenol Formula: $C_9H_{10}O_2$ MW: 150	13.32	950045	7.8036
18.	Name: 5-Formylsalicylaldehyde Formula: $C_8H_6O_3$ MW: 150	13.79	644626	0.5295
19.	Name: Phenol, 3,4-dimethoxy- Formula: $C_8H_{10}O_3$ MW: 154	14.15	505296	0.4150
20.	Name: Benzoic acid, 4-formyl-, methyl ester Formula: $C_9H_8O_3$ MW: 164	14.45	513228	4.2156
21.	Name: Benzeneethanol, 4-hydroxy- Formula: $C_8H_{10}O_2$ MW: 138	16.39	405797	3.3332
22.	Name: Phenol, 2-methoxy-4-(1-propenyl)- Formula: $C_{10}H_{12}O_2$	16.70	346247	2.8440

	MW: 164			
23.	Name: Cyclohexane, 1-methylene-4-(1-methylethenyl)- Formula: $C_{10}H_{16}$ MW: 136	18.18	655066	5.3806
24.	Name: 2-Propanone, 1-(4-hydroxy-3-methoxyphenyl)- Formula: $C_{10}H_{12}O_3$ MW: 180	18.68	689038	0.5660
25.	Name: 3',5'-Dimethoxyacetophenone Formula: $C_{10}H_{12}O_3$ MW: 180	19.60	116518	0.9571
26.	Name: Benzeneacetic acid, 3,4-dihydroxy- Formula: $C_8H_8O_4$ MW: 168	23.49	151320	12.4293
27.	Name: Benzeneacetic acid, 4-hydroxy-3-methoxy-, methyl ester Formula: $C_{10}H_{12}O_4$ MW: 196	24.19	120783	0.9921
28.	Name: (R)-(-)-4,4a,5,6,7,8-Hexahydro-4a-methyl-2(3H)-naphthalenone Formula: $C_{11}H_{16}O$ MW: 164	24.42	197221	1.6200
29.	Name: 4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol Formula: $C_{10}H_{12}O_3$ MW: 180	24.62	432379	3.5515
30.	Name: Benzoic acid, 3-formyl-4,6-dihydroxy-2,5-dimethyl-, methyl ester Formula: $C_{11}H_{12}O_5$ MW: 224	25.57	144845	1.1897
31.	Name: 3,4-Dihydrocoumarin-7-ol Formula: $C_9H_8O_3$ MW: 164	25.82	940934	7.7287
32.	Name: 3,7,11,15-Tetramethyl-2-hexadecen-1-ol Formula: $C_{20}H_{40}O$ MW: 296	26.53	531514	4.3658
33.	Name: Undecanoic acid, 2-methyl- Formula: $C_{12}H_{24}O_2$ MW: 200 CAS	28.79	111426	0.9152
34.	Name: n-Hexadecanoic acid Formula: $C_{16}H_{32}O_2$ MW: 256	30.13	161403	13.2575
35.	Name: 9,12-Octadecadienoic acid, methyl ester Formula: $C_{19}H_{34}O_2$ MW: 294	32.86	154532	1.2693
36.	Name: 10-Octadecenoic acid, methyl ester Formula: $C_{19}H_{36}O_2$ MW: 296	32.99	246271	2.0228

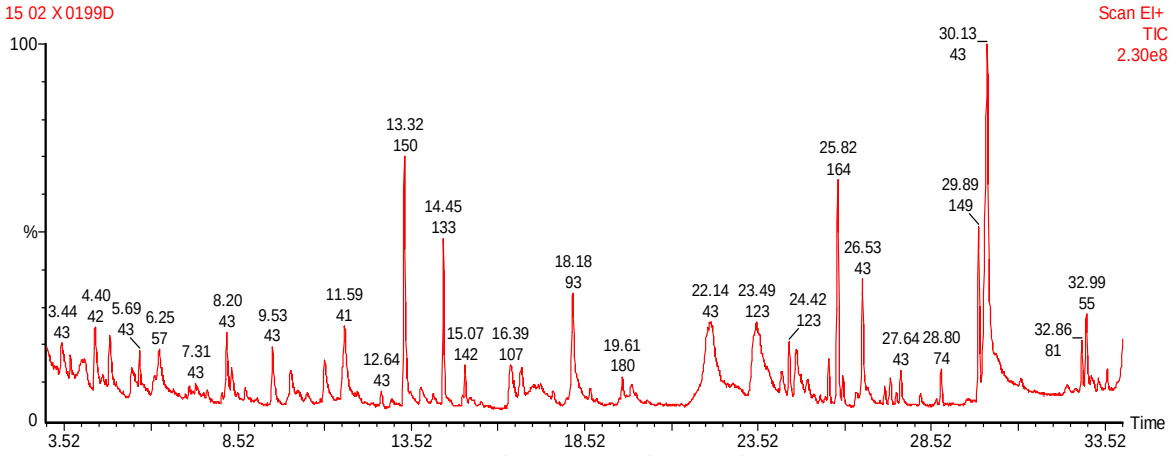

Fig 1. GC-MS analyses of methanolic leaf extract of *Drypetes sepiaria*

CONCLUSION

The present study it has been concluded that, the plant *Memcylon 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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