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GC-MS ANALYSIS OF ETHANOLIC EXTRACT OF *ELAEOCARPUS SERRATUS* L.

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ABSTRACT

The investigation was carried out to determine the potential bioactive components the ethanol extract of fruit of *Elaeocarpus serratus* was scrutinized using GC-MS analysis. Thirty components were identified; the following were major components were n-octanol (25.91%), n-hexadecene (9.73%), n-dodecanol (9.24%), n-pentadecanol (8.04%), 3-pentyl-1-cyclohexanone (7.78%), n-hexadecanol (6.11%). n-octanol was the first to come out from the column (RT=3.04 min.), n-pentadecanol was retained in the column for the longest time (RT=40.22min.). Some pharmacologically active compounds were also noticed in the fruit extract.

KEYWORDS: Bioactive components, *Elaeocarpus serratus*, n-octanol, n-hexadecene, Tricosane.

INTRODUCTION

Medicinal plants are of great importance to the health of individuals and communities. The medicinal values of plants lies in some chemical substances are due to the presence of such as the secondary metabolites which possess interesting biological activities that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids, and phenolic compounds.[1] In general, these secondary metabolites are an important source with a variety of structural arrangements and properties. Thus Natural products play a dominant role in the development of novel drug leads for the treatment and prevention of diseases.[2-4]

Elaeocarpus serratus (Elaeocarpaceae) is a medium to big sized tree with simple leaves, inflorescence racemes in axillary, small white flowers, fruit drupe, oblong, ellipsoid or ovoid about 2.5 cm long; containing a much tubercled, 1-seeded stone. Commonly called Ceylon-olive and the plant are also found in East Africa as well as the subtropical and tropical Asia and tropical Australia. Fruits contain tannin and large amount of plant acids. [5] The fruit juice is given for stimulating secretions from taste buds thus increasing appetite in patients [6] while the fruits are locally prescribed for the treatment of diarrhea and dysentery. Biological activities such as GC-MS analysis [7], antimicrobial activity,[8] cardiovascular stimulant, anti-viral, pesticide and anti-tumor activity, anti-asthmatic and anti-inflammatory , rheumatism, antiseptic, ulcers, piles and leprosy [9,10] of the plant extract. To our knowledge, no chemical study has been previously reported on this plant part. The present study deals with the GC-MS analysis of ethanolic extracts of said plant of the fruit.

MATERIALS AND METHODS

Plant Material and its Extraction

The fruits of *Elaeocarpus serratus* L. were collected from Upper Palani Hills of Western Ghats (Kodaikanal Forest Division), India and were authenticated at Botanical Survey of India (BSI), Southern Circle, Coimbatore, India and the herbarium of Voucher specimen number BSI/SRC/5/23/2011-12/Tech.454 has been deposited at the PG and Research Department of Botany, Vellalar College for Women, Erode (Tamil Nadu), India.

Preparation of Plant extract

Fresh fruits were collected and air-dried at room temperature. The dried material was then homogenized to obtain coarse powder. The fruit powder was extracted [11] with ethanol by hot extraction using soxhlet apparatus. The ethanolic extract was collected and stored in a vial for further analysis.

GC-MS ANALYSIS

Ethanolic extract of fruit of *E. serratus* were analyzed for the presence of different compounds by Gas chromatography-Mass spectroscopy (GC-MS) technique. GC/MS analysis of some of the potent volatile constituents present in the extracts was performed at The South India Textile Research Association (SITRA), Coimbatore (Tamil Nadu), India. GC analysis of the extracts was performed using a GC-MS (Model; Thermo Trace GC Ultra) equipped with a DB-5MS fused silica capillary column (30m length X outside diameter 0.25 mm X internal diameter 0.25 μm) and gas chromatograph interfaced to a Mass Selective

Detector (MS-DSQ-II) with XCALIBUR software. For GC-MS detection, an electron ionization system with ionization energy of -70eV was used. Helium gas was used as a carrier gas at a constant flow rate of 1ml/min and the sample injected was 2µl; Injector temperature 250^{o}C; Ion source temperature 200^{o}C. The oven temperature was programmed from 80° to 200°C at the rate of 10°C/min, held isothermal for 1min and finally raised to 260°C at 10°C/min. Interface temperature was kept at 250^{o}C. Total GC run time was 46.16 min. The relative percentage of the each extract constituent was expressed as percentage with peak area normalization.

Identification of components

The identity of the components in the extract was assigned by the comparison of their retention indices and mass spectra fragmentation patterns with those stored on the computer library and also with published literatures. NIST [12] , WILEY [13] library sources were also used for matching the identified components from the plant material.

RESULTS AND DISCUSSION

The bioactive compounds present in the ethanolic extract of fruit of *Elaeocarpus serratus* were identified by GC-MS analysis (Figure 1). Thirty compounds were detected in the test plant. The active principles with their retention time (RT), molecular formula, molecular weight (MW) and peak area (%) are presented in Table 1. and the total running time was 44.85 minutes. The prevailing compounds were n-octanol (25.91%), n-hexadecene (9.73%), n-dodecanol (9.24%), n-pentadecanol (8.04%), 3-pentyl-1-cyclohexanone (7.78%), n-hexadecanol (6.11%), n-adecanol (4.06%), benzene, chloro- (4.04%). While n-octanol was the first to come out from the column (RT= 3.04 min.), n-pentadecanol was retained for the longest time in the column (RT= 40.22 min.). Minor components like 1,3-dicyano-2-selenabicyclo[3,1,0] hex-3-ene (0.48%), N-(2-deuterioallyl)-2-fluoro-N-methylaniline (0.52%), 2-butoxy-7,8-dimethoxy-chroman-6-ol(0.53%), (+-)-trans-2-(2,5-Octdiynyl)-3-undecyloxirane (0.57%) were also detected. Tricosane (1.75%) a pharmacologically active compound was noticed in the fruit extract.

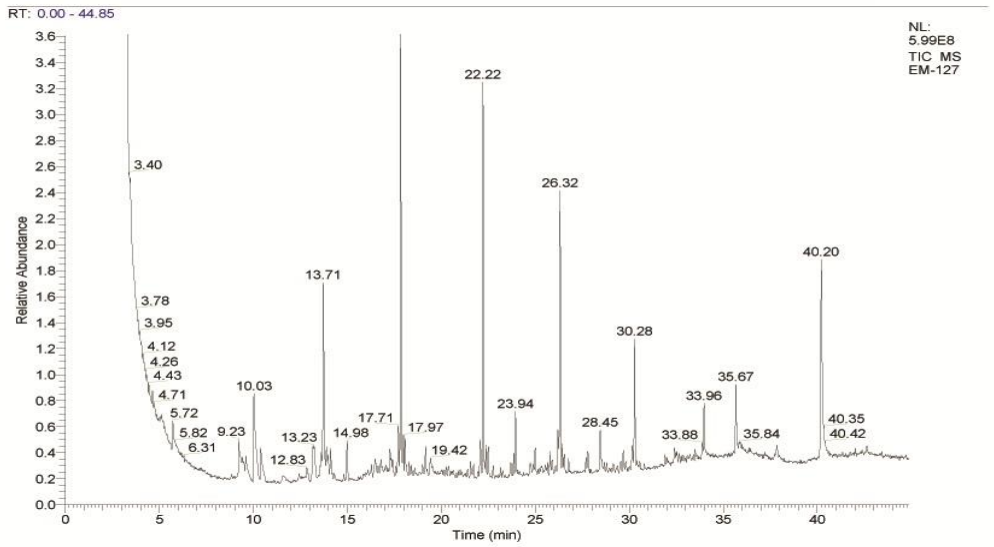

Figure -1.GC-MS Chromatogram of ethanolic extract of the fruit of Elaeocarpus serratus

Table 1. Bioactive compounds in the ethanolic extract of the fruit of *Elaeocarpus serratus* by GC-MS.

S. No.	RT	Name of the compound	Molecular formula	Molecular weight	Peak area %
1.	3.04	n-octanol	$C_8H_{18}O$	130	25.91
2.	5.13	2-methylhexahydropyrrolo[1,2-a]pyrazine-1,4-dione	$C_8H_{12}N_2O_2$	168	0.65
3.	5.74	4-methyl-4-nitro-5-oxoheptana	$C_8H_{13}NO_4$	187	0.74
4.	9.25	5-acetoxy-3-(8-decenyl)-2-isoxazoline	$C_{15}H_{25}NO_3$	267	1.50
5.	10.05	Benzene, chloro-	C_6H_5Cl	112	4.04
6.	10.43	2-[2',6'-bis(2",2"-Dimethylpropanoyloxy)phenyl]-1,10-phenanthroline	$C_{44}H_{48}N_2O_8$	732	1.19
7.	11.61	8,10-Dibenzyl-8,10-diaza-5-methylene-6-hydroxy-2-oxabicyclo[4.2.2]-decane-7,9-dione	$C_{22}H_{22}N_2O_4$	378	0.58
8.	12.85	(+-)-trans-2-(2,5-Octdiynyl)-3-undecyloxirane	$C_{21}H_{28}O_2$	228	0.57
9.	13.21	trans-2,3-Dibromo-1,3-phenyl-1-propanone	$C_{15}H_{12}Br_2O$	366	2.36
10.	13.74	n-hexadecanol	$C_{16}H_{34}O$	242	6.11
11.	14.98	(E)-6-methyl-4-heptenoic acid	$C_8H_{14}O_2$	142	1.37
12.	16.26	N-(2-deuterioallyl)-2-fluoro-N-methylaniline	$C_{10}H_{11}DFN$	165	0.52
13.	16.47	1,3-dicyano-2-selenabicyclo[3.1.0]hex-3-ene	$C_7H_4N_2Se$	196	0.48
14.	17.29	12-azabicyclo(9.2.1)Tetradeca-1(14)-Ene-13-One	$C_{13}H_{21}NO$	207	1.12
15.	17.84	n-hexadecene	$C_{16}H_{32}$	224	9.73
16.	19.17	2,2'-dicyclopropyl-2,2'-azopropane	$C_{20}H_{42}O$	194	0.94
17.	19.44	4,5,6,7-tetrahydro-1-N-(phenylsulphonyl)amino-6-(tert-butyl)-1H-benzotriazole	$C_{16}H_{22}N_4O_2S$	334	0.66
18.	22.22	n-dodecanol	$C_{12}H_{26}O$	186	9.24
19.	23.94	Tricosane	$C_{23}H_{48}$	324	1.75
20.	24.98	Methyl hexadecanoate	$C_{17}H_{34}O_2$	270	1.52

21.	26.30	3-pentyl-1-cyclohexanone	$C_{11}H_{20}O$	168	7.78
22.	27.78	2-cyanocyclohexanol	$C_7H_{11}NO$	170	0.97
23.	28.45	(E)-8-methyl-6-decen-1-ol	$C_{11}H_{22}O$	170	1.28
24.	29.67	Octyl chloroacetate	$C_{10}H_{19}ClO_2$	206	0.93
25.	30.28	n-hexadecanol	$C_{16}H_{34}O$	242	4.06
26.	32.41	2-butoxy-7,8-dimethoxy-chroman-6-ol	$C_{15}H_{22}O_5$	282	0.53
27.	33.96	2-fluorohexadecanal	$C_{16}H_{31}FO$	258	1.98
28.	35.67	(trans)-1-butyl-2-undecylcyclopropane	$C_{18}H_{36}$	252	2.66
29.	37.84	Cyclopentanodec-5-ene	$C_{15}H_{28}$	208	0.75
30.	40.22	n-pentadecanol	$C_{15}H_{32}O$	228	8.04

Among the identified bioactive compounds, the fatty alcohols like n-octanol, n-hexadecanol, n-dodecanol, n-nonadecanol and n-pentadecanol, are predominantly present in the fruit extract. Alcohols are known to possess antioxidant [14] and bactericidal rather than bacteriostatic activity.[15] Fatty alcohols are emulsifiers and emollients [16] to make skin smoother and prevent moisture loss. They are used to control viscosity and dispersion characteristics in cosmetics, personal care products and pharmaceutical ingredients such as medications for the treatment of eczema. [17] Corresponding to the present study, [18] observed n-dodecanol (2.94%) in the petroleum ether extract of bark of *Albizia lebbeck* and [19] detected the presence of n-dodecanol in the methanolic extract of roots of *Hibiscus micranthus*.

The compound n-tricosane is a saturated aliphatic hydrocarbon and has known to anti-microbial property. [20,21] The major aliphatic hydrocarbons like n-hexane, 2-methylheptane, 2-methylnonane, n-non-2-ene and n-heptane, n-tricosane and n-docosane. n-octanol, n-decanol, n-heptadecanol, n-nonanol, n-dodecanol, n-tridecanol and n-tetradecanol which occurred as the main aliphatic alcohols. Similar to the present study,[22] detected the presence of pentadecanol in the ethanol extract of *Cyperus rotundus* leaves. The higher alkane (n-tricosane and n-docosane) and alcohol groups (n-octanol, n-dodecanol) are common from the present study.

In the current investigation the following aldehydes 2-fluoro hexadecanal, pentadecanal, 4-methyl-4-nitro-5 oxoheptanal were present in the plant sample. Aldehydes are known to possess powerful anti-microbial activity [15] and preservative. The biological activities listed are based on Dr. Duke's phytochemical and ethanobotanical databases by Dr. Jim Duke of the Agricultural Research Service/ USDA. Plants are natural sources of bioactive compounds to treat life threating diseases. So it is recommended as a plant of phyto pharmaceutical

importance, however, further studies will need to be undertaken to ascertain fully its pharmacological activity.

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