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RESEARCH ARTICLE

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GC-MS Analysis of Bioactive Compounds of Ethanolic Seed Extract of *Elaeocarpus serratus*

DH Geetha*, Indhiramuthu Jayashree, M Rajeswari

PG and Research Department of Botany, Vellalar College for Women, (Autonomous), Erode- 638012, Tamil Nadu, India

ABSTRACT

The present investigation was carried out to determine the possible bioactive compounds of ethanolic extract of *Elaeocarpus serratus* (Elaeocarpaceae) has been subjected to GC-MS analysis. Thirty compounds were detected from the plant *E. serratus*. The highest peak area percentage of 19.12% was obtained by n-propanol (RT=3.04min.) and lowest peak area percentage of 2.34% was obtained by 1-propylthio-3,3,3-trifluoropropyl acetate (RT=11.57min.). The presence of various bioactive compounds confirms many aliments by traditional practitioners. However, isolation of individual phytochemical constituents may proceed to find a novel drug.

Keywords: *Elaeocarpus serratus*, GC-MS, bioactive compounds, propanol.

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***Corresponding author**: Dr. DH Geetha
Address: PG and Research Department of Botany, Vellalar College for Women, (Autonomous), Erode- 638012, Tamil Nadu, India
E-mail ✉: geethadhandapani2010@gmail.com
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INTRODUCTION

From ancient days to recent civilization, human beings depend on nature for running their life smoothly from day by day. Plants remain a vital source of drugs and now-a-days much emphasis has been given to nutraceuticals. [1] Natural remedies from medicinal plants are found to be safe and effective. Many plants species have been used in folkloric medicine to treat various ailments. Even today compounds from plants continue to play a major role in primary health care as therapeutic remedies in many developing countries. [2] Standardization of plant materials is the need of the day. Several pharmacopoeia containing monographs of the plant materials describe only the physicochemical parameters. Hence the modern methods describing the identification and quantification of active constituents in the plant material may be useful for proper standardization of herbals and its formulations. [3]

Medicinal plants as sources of bioactive compounds continue to play a dominant role in the maintenance of human health. Reports available on plants represent a reservoir of effective chemotherapeutants, non-phytotoxic, more systemic and easily biodegradable. [4-5] The genus *Elaeocarpus* species contain hard and highly ornamental stony endocarp of fruit commonly known as 'Rudraksh'. Rudraksha bead users have repeatedly confirmed the medicinal properties like antipyretic, anti-helminthic, reduce blood pressure, anti-paralysant and chemo preservative. [6] Several species have been known to possess cardiovascular stimulant, anti-viral, pesticide and anti-tumor activity, anti-asthmatic and anti-inflammatory, antiseptic,

ulcers, piles and leprosy. [7-8] *Elaeocarpus serratus* are used in the treatment of anti-arthritic [9-10], anti-microbial [11-12] and anti-diabetic activity [13-14], GC-MS analysis [15-16] of the plant extract. The literature search reveals that still no work has been done on this plant part. Hence this work was carried out to profile chemical compounds from ethanolic extract of *E. serratus*.

MATERIALS AND METHODS

Plant material

The seed 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 (T.N), India.

Preparation of Plant extract

Seeds were collected and air-dried at room temperature. The dried material was then homogenized to obtain coarse powder and stored in air-tight bottles for further analysis. The shade dried, powder seed were extracted [17] with ethanol solvent by hot extraction using soxhlet apparatus collected and stored in a vial for further analysis.

GC-MS Analysis

Ethanolic extract of seed of *E. serratus* were analyzed for the presence of different compounds by 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 (30 m length × outside diameter 0.25 mm × internal diameter 0.25µm) 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°C; Ion source temperature 200°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°C. Total GC run time was 46.16 min. The relative percentage of the each extract constituents 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 [18], WILEY [19] library sources were also used for matching the identified components from the plant material.

RESULTS AND DISCUSSION

The GC-MS analysis of ethanolic extract of seed of *Elaeocarpus serratus* revealed the presence of thirty bioactive compounds that could contribute the medicinal quality of the plant. The identification of the chemical compounds was confirmed based on the retention time, molecular formula, molecular weight and peak area in percentage were depicted in Figure 1 and Table 1.

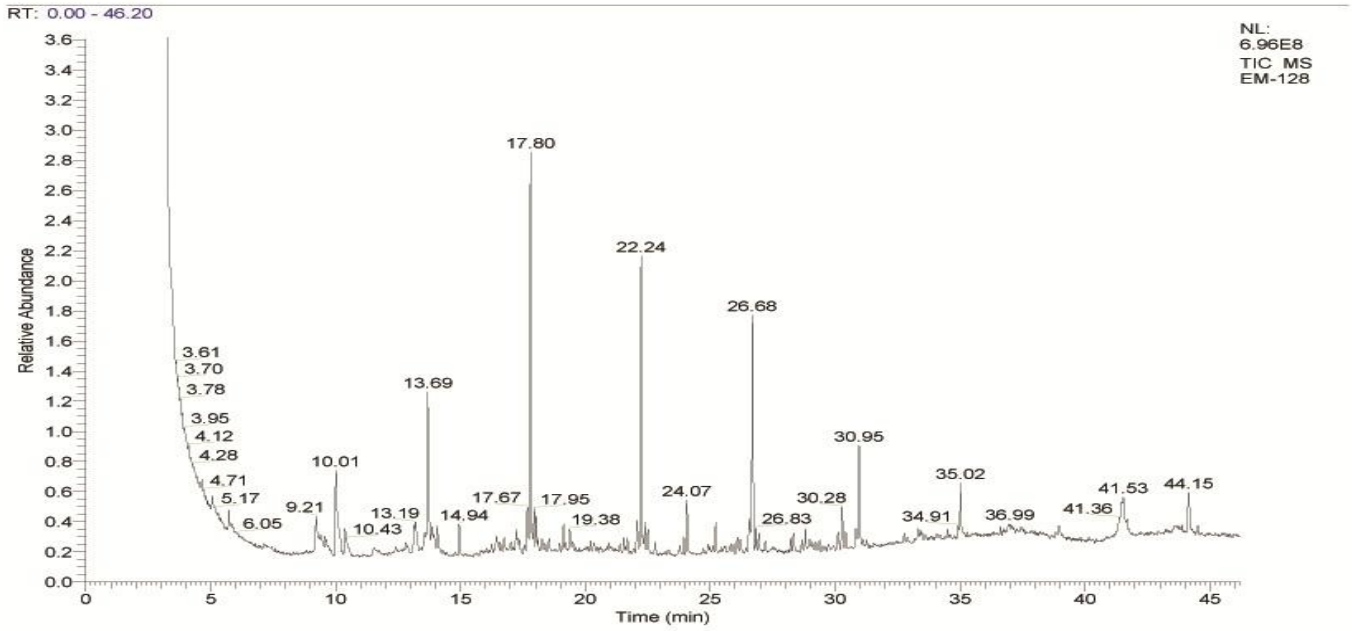

Fig. 1: GC-MS chromatogram of ethanolic extract of the seed of *Elaeocarpus serratus*

Table 1: GC-MS analysis of the ethanolic extract of seed of *Elaeocarpus serratus*

S. No.	RT	Name of the compound	Molecular formula	Molecular weight	Peak area %
1.	3.04	n-Propanol	C_3H_8O	60	19.12
2.	5.74	4-methyl-4-nitro-5-oxoheptanal	$C_8H_{13}NO_4$	187	0.86
3.	9.23	2-Bromomethyl-1-oxaspiro[2.4]heptane	$C_7H_{11}BrO$	190	1.65
4.	10.03	N-Allyloxymethylacrylamide	$C_7H_{11}NO_2$	141	4.21
5.	10.41	N-(2-Bromocyclopent-2-enyl)-N-(2-nitrophenyl) methanesulfonamide	$C_{12}H_{13}BrN_2O_4S$	360	1.38
6.	11.57	1-Propylthio-3,3,3-trifluoropropyl acetate	$C_8H_{13}F_3O_2S$	230	0.61
7.	13.19	(+-)-trans-2-(2,5-Octdiynyl)-3-undecyloxirane	$C_{21}H_{34}O$	302	2.47
8.	13.17	n-Undecanol	$C_{11}H_{24}O$	172	6.41
9.	14.96	cis-1-Bromo-2,2,3-trimethylcyclopropane	$C_6H_{11}Br$	162	1.40
10.	16.45	trans-1-(1-Chloro-1-methylethyl)-2,2,3,3,4-pentamethylcyclobutane	$C_{12}H_{23}Cl$	202	0.64
11.	17.25	heptyl pentadecafluorooctanoate	$C_{15}H_{15}F_{15}O_2$	512	1.17
12.	17.80	n-Hexadecene	$C_{16}H_{32}$	224	12.08
13.	19.12	Cis 3-Hexenyl Tiglate	$C_{11}H_{18}O_2$	182	1.01
14.	19.38	8-Pentadecanone	$C_{15}H_{30}O$	226	0.81
15.	22.24	n-Octadecanol	$C_{18}H_{38}O$	270	10.70
16.	24.07	Docosane	$C_{22}H_{46}$	310	2.19
17.	25.21	Heptanoic acid, methyl ester	$C_8H_{16}O_2$	144	0.97
18.	26.22	n-Tricosane	$C_{23}H_{48}$	324	0.82
19.	26.68	n-Decyl prop-2-ynoate	$C_{13}H_{22}O_2$	210	9.61
20.	28.32	2-methyl-3-tetrahydrofuran-2'-ylpropanoic acid	$C_8H_{14}O_3$	158	1.17
21.	28. 81	Pentadecanal	$C_{15}H_{30}O$	226	1.27
22.	30.28	1-Deutero-2-allyloctanol	$C_{11}H_{21}DO$	170	2.95
23.	30.95	Methyl (R)-3-Methyl-2-oxo[4,4,4-D3] butanoate	$C_6H_7D_3O_3$	130	4.91
24.	33.33	2-(2-Tetrafuryl) methyltetrahydropyran	$C_{10}H_{18}O_2$	170	0.70
25.	35.02	2-Propyldecan-1-ol	$C_{13}H_{28}O$	200	2.24
26.	36.97	(E)-3-Octen-2,5-dione	$C_8H_{12}O_2$	140	0.63
27.	38.97	Citronellyl isobutyrate	$C_{14}H_{26}O_2$	226	0.76
28.	41.54	Di(1-adamantyl) acetic acid	$C_{22}H_{32}O_2$	328	4.03
29.	43.65	Diethyl [2-(t-butyl)-4-oxopentyl]phosphonate	$C_{13}H_{27}O_4P$	278	0.91
30.	44.15	Methyl ethyl 2,2,4-trichlorotridecanoate	$C_{16}H_{27}C_{l3}O_4$	388	2.34

The presences of 30 compounds belong to the various groups like alcohol, alkane, esters, aldehyde, amide, acids and ketone. Higher value of alkane (n-tricosane and n-docosane) and alcohol groups (n-octanol, n-dodecanol) were common in the present study. Some of the identified major components were n-Propanol (19.12%), n-Hexadecene (12.08%), n-Octadecanol (10.70%), n-Decyl prop-2-ynoate (9.61%), n-Undecanol (6.41%) and minor compounds like Pentadecanal (1.27%), Docosane (2.19%), 4-methyl-4-nitro-5-oxoheptanal (0.86%), n-Tricosane (0.82%). The highest peak area percentage of 19.12% was obtained by 1-Propanol (RT=3.04 min.) and lowest peak area percentage of 2.34% was obtained by 1-Propylthio-3,3,3-trifluoropropyl acetate (RT=11.57 min.).

Among the identified phytochemicals, n-Propanol, n-Undecanol and n-Octadecanol is an alcohol group noted for its potent chemo preservative and anti-tumor agent [20], deodorant in cosmetic products [21], anti-fungal activity reported by Ramage *et al.* [22] The compound alkane (n-Hexadecene and Docosane) has been suggested to function as anti-microbial activity. Heptanoic acid, methyl ester and Citronellyl isobutyrate is an ester group, which is widely used as a flavoring agent and is known to possess insect repellent and anti-microbial properties. [23] The compounds citronellyl isobutyrate were reported by earlier worker. [15] Further in the present study, Aldehydes (4-methyl-4-nitro-5-oxoheptanal, pentadecanal) were known to possess powerful anti-microbial activity and 8-Pentadecanone, a ketone has compound has activity against acne treatment. [24] Thus GC-MS analysis is the first step towards understanding the nature of active principles in this medicinal plant. However, isolation of individual phytochemical constituents may proceed to find a novel drug.

Plant and plant products are being used as a source of medicine since long back. Plants are endowed with diverse range of secondary metabolites whose roles within plants are elusive. Taking into consideration the medicinal importance of *Elaeocarpus serratus*, the ethanolic seed extract were analysed for the first time using GC-MS. The presence of various bioactive compounds justifies the use of this plant for various ailments by traditional practitioners. From the present study, it was concluded that the plant *E. serratus* are highly valuable in medicinal usage for the treatment of various human ailments along with the chemical constituents present in it. The compounds needs further research on toxicological aspects to develop a safe drug.

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