Share Your Innovations through JACS Directory

Journal of Natural Products and Resources

Visit Journal at http://www.jacsdirectory.com/jnpr

ISSN: 2455-0299

Phytochemical Analysis of *Elaeocarpus blascoi* Weibel using Gas Chromatography – Mass Spectroscopy

A. Vijayan*

PG and Research Department of Botany, Bishop Heber College (Autonomous), Tiruchirappalli – 620 017, Tamil Nadu, India.

ARTICLE DETAILS

Article history:
Received 14 February 2017
Accepted 04 April 2017
Available online 08 August 2017

Keywords:
Elaeocarpus blascoi
Western Ghats
Palni Hills

ABSTRACT

A preliminary phytochemical study of leaves of *Elaeocarpus blascoi* Weibel moist evergreen tree commonly Known as "Kodai Rudraksha" (Elaeocarpaceae), was done using Gas chromatography-Mass spectrometry for the determination of the constituents. Chromatogram of the GCMS analysis carried out for the identification of the phytochemicals present in the metabolic leave ethanolic extract of indicated the presence of sixty three compounds. The most available compounds are 1,6-Anhydro-á-D-glucopyranose(levoglucosan), 1,2,3-Benzenetriol, levoglucosenone, phenol, etc.,. The present results concluded that the phytochemicals was observed in methanol extract which revealed that the plant extract is potential use in different fields namely medical and pharmaceuticals and highly valuable in medicinal usage for the treatment of various human aliments.

1. Introduction

Plants are a valuable source of new natural products [1]. Despite the availability of different approaches for discovery of therapeuticals, natural products still remain as one of the best reservoirs of new structural types [2]. Researches have shown that about 25% of prescription drugs sold in the United States are of natural products, while another 25% are for structural modifications of a natural product. Furthermore, 74% of the 119 most important drugs currently contain ingredients from plants used in traditional medicine [3]. Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. Plants are part of life. Without them nobody can live. Mostly people believe in Ayurveda or Unani medicines because they do not show any side effects compared to allopathic medicines. When a plant has antibiotic properties it is called medicinal plants. About 80% of the world population use traditional medicines, which are predominantly based on plant materials [4]. Gas chromatography mass spectroscopy is a very compatible and one of the best methods to identify the pure compounds present at less than 1 ng biological specimen and quantification purpose. The unknown organic compounds in a complex mixture can be determined by interpretation and also by matching the spectra with reference spectra [5].

Genus *Elaeocarpus,* with about 360 species (Elaeocarpaceae family), contains hard and highly ornamental stony endocarp commonly known as 'Rudraksha'. The stony endocarp is used as religious malai in the form of beads throughout India and Southeast Asia. Out of about 120 species of *Elaeocarpus* reported from different parts of Asia, foothills of the Himalayas and various parts of India, 25 are found in India. The species generally prefer a warm humid climate and usually occur between 500–2000 m. Though widely distributed, they are never found in abundance in any particular locality. The fruits of *Elaeocarpus* are edible and the fruits of *Elaeocarpus sphaericus* are used as beads for rosaries, bracelets and necklaces and also for their purported magico-religious properties [6, 7]. Most of the members of the family Elaeocarpaceae have indolizidine alkaloid compounds, which have attracted a great deal of interest on account of their ability to inhibit the enzymatic activity of glucosidases. Hence, there is some potential to explore it further in the treatment of AIDS, diabetes and cancer [8]. The fruits of *Elaeocarpus* species are endowed with a hard and highly ornamental stony endocarp. In nature, the germination of nuts in most of the *Elaeocarpus* species is very low and erratic, since nuts are unable to imbibe water. Poor or no germination coupled with prolonged dormancy owing to the hardness of the endocarp cause a significant reduction in the regeneration of several *Elaeocarpus* species [9, 10].

Western Ghats of India is recognized as one of the 34 global biodiversity hotspots of the world with over one-third of its angiosperms being endemic. The United Nations Educational, Scientific and Cultural Organization have recognised the Western Ghats as one of the Natural World Heritage sites due to its importance of rich endemism. The Palni hills are a part of Western Ghats which are one of the internationally recognized hotspots of the planet and is also known as an environmental marker zones. There is an alarming threat for extinction of species which often increases in the wild [11]. *Elaeocarpus blascoi* is a woody, evergreen tree, first discovered in Kodaikanal, Palni hills, Western Ghats, India [12-14] (Fig. 1).

Fig. 1 *Elaeocarpus blascoi* Weibel-Habit

Elaeocarpus blascoi is an endemic and also red listed as endangered species by IUCN [16]. Mathew, who could not collect any specimens, then presumed the plant to be extinct in the wild; however the single tree was rediscovered in Kodaikanal forest area during the year 2000 by local conservation trust team. Besides, a couple of individuals were relocated around the Vattakanal forests of Kodaikanal, Southern Western Ghats. *Elaeocarpus blascoi* also fruits are endowed with a hard and highly ornamental stony endocarp and germination of the seeds is very low and

*Corresponding Author
Email Address: vijayan.arumuga@gmail.com (A. Vijayan)

erratic since the nuts are unable to absorb water [15]. Hence the present investigation was aimed to identify the functional groups present in crude powder and phyto components present in Hydro-methanol extract of *Elaeocarpus blascoi* plants with the aid of GC-MS analytical techniques, which may provide an insight in its use of traditional medicine.

2. Experimental Methods

2.1 Plant Materials and Preparation of Plant Extract

The whole plant specimens of *Elaeocarpus blascoi* Weibel was collected from Vattakanal forest (10°12.59.6'' N and 77°29.06.9''E) at an altitude of 2030 m, Kodaikanal, Palni hills India. The plants were shade dried for about one week and pulverized to powder in an electrical grinder. The required quantity of the plant powdered was weighed and transferred to a stoppered flask, and treated with ethanol until the powder is fully immersed. The flask was shaken every hour for the first 6 hours and then it was kept aside and again shaken after 24 hours. This process was repeated for 3 days and then the extract was filtered. The extract was collected and evaporated to dryness by using a vacuum distillation unit. The final residue obtained was then subjected to GC-MS analysis. The voucher specimens (4 June, 2010) were processed, mounted and identified with the help of Flora of Palni Hills and were also authenticated by Dr. K. Ravikumar, Deputy Director, FRLHT, Bangalore. A voucher specimen was deposited with the Botanical Survey of India (BSI), Coimbatore, TN, South India under the accession number BSI/SC/5/23/2009-10/Tech. 1405 (21/Jan/2010).

2.2 GC-MS Analysis

The plant powdered sample 10 g is soaked with 30 mL ethanol overnight and filtered through ash less filter paper with sodium sulphate (2 g). The extract is concentrated to 1 mL by bubbling nitrogen into the solution. The extract contained both polar and non-polar phyto components. 2 µL of the ethanolic extract of *Elaeocarpus blascoi* was employed for GC-MS analysis. The Clarus 500 GC used in the analysis employed a fused silica column packed with Elite-1 [100% dimethyl poly siloxane, 30 nm × 0.25 nm ID × 1 µm and the components were separated using Helium as carrier gas at a constant flow of 1 mL/min. The 2 µL sample extract injected into the instrument was detected by the Turbo gold mass detector (Perkin Elmer) with the aid of the Turbo mass 5.1 software. During the 36th minute GC extraction process, the oven was maintained at a temperature of 110 °C with 2 minutes holding. The injector temperature was set at 250 °C (mass analyzer). The different parameters involved in the operation of the Clarus 500 MS, were also standardized (Inlet line temperature: 200 °C; Source temperature: 200 °C). Mass spectra were taken at 70 eV; a scan interval of 0.5 s and fragments from 45 to 450 Da. The MS detection was completed in 36 minutes. Identification of components, the relative percentage amount of each component was calculated by comparing its average peak area to the total areas. The detection employed the NIST (National Institute of Standards and Technology) Ver.2.0-Year 2005 library. The compound prediction is based on Dr. Duke's Phytochemical and Ethnobotanical Databases by Dr. Jim Duke of the Agricultural Research Service/USDA. Interpretation of GC-MS was conducted using the database of 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 [16].

3. Results and Discussion

The compounds present in the ethanol extract of whole plant of *Elaeocarpus blascoi* were identified by GC-MS analysis (Fig. 2). The active principle with their retention time (RT), molecular formula, molecular weight (MW) and peak area percentage of the leaves explant plant of *Elaeocarpus blascoi* are presented in Table 1. The most abundant components in Hydro-methanol extract of whole plant study was carried out by GC-MS analysis of *Elaeocarpus blascoi* and the chromatogram identified Sixty three (63) phytochemicals as constituents. Of these compounds, 1,2,3-Benzenetriol (61.7068%); 1,6-Anhydro-á-D-glucopyranose(levoglucosan) (8.6330%); Levoglucosenone (3.1946%); à-D-Glucopyranoside, methyl (2.6206%); 3,7,11,15-Tetramethyl-2-hexadecen-1-ol (2.1823%); 1,6-Anhydro-à-d-galactofuranose (1.6749 %); Phenol, 3-[(trimethylsilyl)oxy]- (1.4820%); Phenol (1.3040%); 1,2,3,5-Cyclohexanetetrol, (1à,2á,3à,5á)- (1.0259%); 1,2-Benzenediol (1.0129). Remaining constituent chemical compounds were less than 0.9322%. The components, their retention times and their activities are summarized in Table 2. Of the 63 compounds identified, compounds were already reported with different activities in various other plants by several studies.

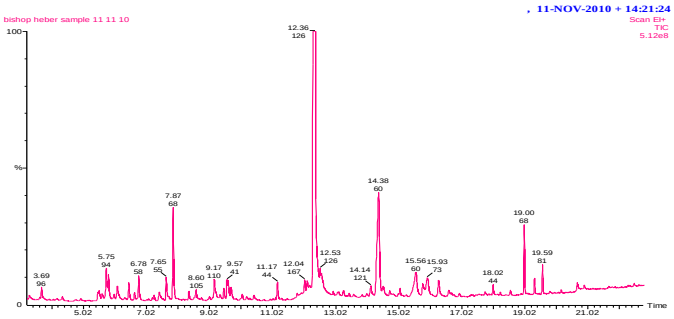

Fig. 2 GC-MS chromatogram of the ethanol plant extract of *Elaeocarpus blascoi* Weibel

Table 1 Components detected in the ethanol extract of *Elaeocarpus blascoi* Weibel

Sl. No	Name of the Compounds	Mol. Formula	Mol. Wt	RT
1	Vinylfuran	C_6H_6O	94	4.35
2	Phenol	C_6H_6O	94	5.75
3	Cis-1,2-Dihydrocatechol	$C_6H_8O_2$	112	5.82
4	2-Cyclopenten-1-one, 2-hydroxy-3-methyl-	$C_6H_8O_2$	112	5.99
5	Oxazolidine, 2,2-diethyl-3-methyl-	$C_8H_{17}NO$	143	6.09
6	Tetrahydrocyclopenta [1,3] dioxin-4-one	$C_7H_{10}O_3$	142	6.46
7	N-Cbz-glycylglycine p-nitrophenyl ester	$C_{18}H_{17}N_3O_7$	387	6.64
8	5H-1,4-Dioxepin, 2,3-dihydro-2,5-dimethyl-	$C_7H_{12}O_2$	128	6.78
9	2H-Pyran-2-carboxaldehyde,5,6-dihydro-	$C_6H_8O_2$	112	7.09
10	Pyridazine	$C_4H_4N_2$	80	7.21
11	3-Amino-2-oxazolidinone	$C_3H_6N_2O_2$	102	7.26
12	Cyclohexanol,2,2-dimethyl-	$C_8H_{16}O$	128	7.42
13	2,3-Dimethylfumaric acid	$C_6H_8O_4$	144	7.65
14	Levoglucosenone	$C_6H_6O_3$	126	7.87
15	4H-Pyran-4-one, 5-hydroxy-2-methyl-	$C_6H_6O_3$	126	8.19
16	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy- 6-methyl-	$C_6H_8O_4$	144	8.37
17	Benzenecarboxylic acid	$C_7H_6O_2$	122	8.60
18	Xylose	$C_5H_{10}O_5$	150	8.76
19	Methyl-a-d-ribofuranoside	$C_6H_{12}O_5$	164	9.02
20	1,2-Benzenediol	$C_6H_6O_2$	110	9.18
21	2-Azaquinuclidone-3	$C_6H_{10}N_2O$	126	9.35
22	Benzene, (ethenyloxy)-	C_8H_8O	120	9.48
23	2-Butene-1,4-diol, (Z)-	$C_4H_8O_2$	88	10.20
24	2(R),3(S)-1,2,3,4-Butanetetrol	$C_4H_{10}O_4$	122	10.30
25	2-Deoxy-D-galactose	$C_6H_{12}O_5$	164	10.43
26	1,6-Anhydro-2,4-dideoxy-a-D-ribo-hexopyranose	$C_6H_{10}O_3$	130	10.93
27	Valeric acid,2,3-epoxy-3,4-dimethyl-,tert-Butyl ester, cis-	$C_{11}H_{20}O_3$	200	11.03
28	2-Methoxy-4-vinylphenol	$C_9H_{10}O_2$	150	11.11
29	Methyl-a-d-ribofuranoside	$C_6H_{12}O_5$	164	11.32
30	Valeric acid, 2,3-epoxy-3,4-dimethyl-,tert-Butyl ester, cis-	$C_{11}H_{20}O_3$	200	11.17
31	d-Mannose	$C_6H_{12}O_6$	180	11.49
32	Phenol,3-[(trimethylsilyl)oxy]-	$C_9H_{14}O_3$	182	12.04
33	1,2,3-Benzenetriol	$C_{11}H_{20}O_3Si$	126	12.36
34	4-Decynoic acid, methyl ester	$C_6H_6O_3$	182	12.94
35	2-Chloro-3-cyano-6-methylpyridine	$C_{11}H_{18}O_2$	152	13.26
36	Phenol, 2-methoxy-4-(1-propenyl)-,(E)-	$C_7H_5C_1N_2$	164	13.45
37	Phenol, 2-methoxy-4-propyl-	$C_{10}H_{12}O_2$	166	13.58
38	3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-Dioxo-	$C_{10}H_{14}O_2$	240	13.86
39	Benzoic acid, 3-hydroxy-	$C_{12}H_{16}O_5$	138	14.14
40	1,6-Anhydro-a-D-glucopyranose (Levoglucosan)	$C_7H_6O_3$	126	14.38
41	Benzoic acid, 3-hydroxy-	$C_7H_6O_3$	138	14.53
42	2-Propanone, 1-(4-hydroxy-3-Methoxyphenyl)-	$C_{10}H_{12}O_3$	180	14.73
43	á-D-Glucopyranoside, methyl	$C_7H_{14}O_6$	194	15.56
44	1,6-Anhydro- á -d-galactofuranose	$C_6H_{10}O_5$	162	15.93
45	1,2,3,5-Cyclohexanetetrol, (1á,2á,3á,5á)-	$C_6H_{12}O_4$	148	16.28
46	Phenol,4-(ethoxymethyl)2-methoxy-	$C_{10}H_{18}S$	182	16.61
47	Cis,cis-2-Methyl-1-thiadecalin	$C_6H_{12}O_4$	170	16.70

48	3-O-Methyl-d-glucose	$C_7H_{14}O_6$	194	16.95
49	Benzeneacetic acid, 4-hydroxy-3-methoxy-,Methyl ester	$C_{10}H_{12}O_4$	196	17.76
50	4-Hydroxy-2-methoxycinnamaldehyde	$C_{10}H_{10}O_3$	178	17.95
51	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	18.02
52	Desaspidinol	$C_{11}H_{14}O_4$	210	18.24
53	Androstan-7-one, 3-(acetyloxy)-, (3.beta. 5. alpha.)-	$C_{12}H_{32}O_3$	332	18.56
54	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	$C_{20}H_{40}O$	296	19.00
55	6,10-Dimethoxy-3,3-dimethyl-1-Methylsulfanyl-2-aza-spiro[4.5]deca-1,6,9-Trien-8-one	$C_{14}H_{19}NO_3S$	281	19.81
56	Pentadecanoic acid, 14-methyl-, methyl ester	$C_{17}H_{34}O_2$	270	20.18
57	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	20.69
58	2,4-hexadienedioic acid, 3,4-diethyl-,Dimethyl ester, (Z,Z)-	$C_{12}H_{18}O_4$	226	20.91
59	Nonanoic acid, 5-methyl-,ethyl ester	$C_{12}H_{24}O_2$	200	21.02
60	Phytol	$C_{20}H_{40}O$	296	22.49
61	3`,8`,8`-Trimethoxy-3-piperidyl-2,2`-binaphthalene-1,1`,4,4`-tetrone	$C_{28}H_{25}NO_7$	487	26.87
62	10,11-Dihydro-10-hydroxy-2,3-Dimethoxydibenz(b,f)oxepin	$C_{16}H_{16}O_4$	272	27.99
63	2,2,4-Trimethyl-3-(3,8,12,16-tetramethyl-Heptadeca-3,7,11,15-tetraenyl)-cyclohexanol	$C_{30}H_{52}O$	428	28.85

Table 2 Activity of Components identified in the *Elaeocarpus blascoi* Weibel plant extract

Sl. No	Name of the Compounds	Mol. Formula	Activity
1	Vinylfuran	C_6H_6O	Antimicrobial activity
2	Phenol	C_6H_6O	Oral anesthetic and analgesic combination. Cosmetic industry sunscreens, skin lightening creams and hair coloring solutions
3	Cis-1,2-Dihydrocatechol	$C_6H_8O_2$	Antimicrobial activity
4	2-Cyclopenten-1-one, 2-hydroxy-3-methyl-	$C_6H_8O_2$	Bacteriostatic Activity
5	Oxazolidine, 2,2-diethyl-3-methyl-	$C_8H_{17}NO$	Biological activities, anti-petitmalactivity, anti-grandmal activity
6	Tetrahydrocyclopenta [1,3] dioxin-4-one	$C_7H_{10}O_3$	Antimicrobial, CNS, Antinflammatory activity
7	N-Cbz-glycylglycine p-nitrophenyl ester	$C_{18}H_{17}N_3O_7$	Antimicrobial activity
8	5H-1,4-Dioxepin, 2,3-dihydro-2,5-dimethyl-	$C_7H_{12}O_2$	Antibacterial and Antifungal activity
9	2H-Pyran-2-carboxaldehyde,5,6-dihydro-	$C_6H_8O_2$	Heterocyclic, activities including human antitumor, antifungal, antimicrobial activity
10	Pyridazine	$C_4H_4N_2$	Antimicrobial ,biological activity, CNS
11	3-Amino-2-oxazolidinone	$C_3H_6N_2O_2$	Antibacterial activity, Antifungal Activity of microbial secondary metabolites
12	Cyclohexanol,2,2-dimethyl-	$C_8H_{16}O$	Antimicrobial assay in vitro with nine pathogenic MDR bacteria
13	2,3-Dimethylfumaric acid	$C_6H_8O_4$	antimicrobial, antitumor, antiseptic, preservative, and insecticidal and activities
14	Levoglucosenone	$C_6H_6O_3$	Fungal and bacterial activity and soil texture correlate with soil organic matter
15	4H-Pyran-4-one, 5-hydroxy-2-methyl-	$C_6H_6O_3$	Antituberculostatic and antimicrobial activities
16	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy- 6-methyl-	$C_6H_8O_4$	Antituberculostatic, antimicrobial activities
17	Benzenecarboxylic acid	$C_7H_6O_2$	Antimicrobial activity
18	Xylose	$C_5H_{10}O_5$	Antibacterial Activity
19	Methyl-a-d-ribofuranoside	$C_6H_{12}O_5$	Antimicrobial Anti-inflammatory
20	1,2-Benzenediol	$C_6H_6O_2$	Antimicrobial activity
21	2-Azaquinuclidone-3	$C_6H_{10}N_2O$	Anti-bacterial activity
22	Benzene, (ethenyloxy)-	C_8H_8O	Anti-bacterial activity
23	2-Butene-1,4-diol, (Z)-	$C_4H_8O_2$	Insecticidal, antimicrobial, antioxidant, antitumor activity
24	2(R),3(S)-1,2,3,4-Butanetetrol	$C_4H_{10}O_4$	Anti-bacterial activity antimicrobial activity, anthelmintic activity
25	2-Deoxy-D-galactose	$C_6H_{12}O_5$	Uridylyltransferase activity
26	1,6-Anhydro-2,4-dideoxy-a-D-ribo-hexopyranose	$C_6H_{10}O_3$	Cytotoxic activity, antimicrobial and/or antinflammatory activity
27	Valeric acid,2,3-epoxy-3,4-dimethyl-,tert-Butyl ester, cis-	$C_{11}H_{20}O_3$	Biological activity such as anti-diabetic, anti-viral and wound healing
28	2-Methoxy-4-vinylphenol	$C_9H_{10}O_2$	Antioxidant, antimicrobial and anti-inflammatory. Pharmacological activities and therapeutics.
29	Methyl-a-d-ribofuranoside	$C_6H_{12}O_5$	anti-inflammatory, antioxidant and antimicrobial activity
30	Valeric acid, 2,3-epoxy-3,4-dimethyl-,tert-Butyl ester, cis-	$C_{11}H_{20}O_3$	Antimicrobial activity
31	d-Mannose	$C_6H_{12}O_6$	Antimicrobial agents and Chemotherapy
32	Phenol,3-[(trimethylsilyl)oxy]-	$C_9H_{14}O_3$	anti-diabetic activity and antimicrobial
33	1,2,3-Benzenetriol	$C_{11}H_{20}O_3Si$	Antimicrobial agents and Chemotherapy
34	4-Decynoic acid, methyl ester	$C_6H_6O_3$	Antioxidant activity
35	2-Chloro-3-cyano-6-methylpyridine	$C_{11}H_{18}O_2$	Pharmacological activities, pharmacokinetics
36	Phenol, 2-methoxy-4-(1-propenyl)-,(E)-	$C_7H_5C_1N_2$	Antimicrobial, Antioxidant, Anti-inflammatory, Analgesic activity
37	Phenol, 2-methoxy-4-propyl-	$C_{10}H_{12}O_2$	Antimicrobial Ant-iinflammatory Antioxidant activity
38	3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-Dioxo-	$C_{10}H_{14}O_2$	Antimicrobial activity
39	Benzoic acid, 3-hydroxy-	$C_{12}H_{16}O_5$	Anti-inflammatory activity
40	1,6-Anhydro-a-D-glucopyranose (Levoglucosan)	$C_7H_6O_3$	Antimicrobial activity, anthropogenic activity
41	Benzoic acid, 3-hydroxy-	$C_7H_6O_3$	Antimicrobial activities
42	2-Propanone, 1-(4-hydroxy-3-Methoxyphenyl)-	$C_{10}H_{12}O_3$	Antimicrobial activity
43	á-D-Glucopyranoside, methyl	$C_7H_{14}O_6$	Antimicrobial activity
44	1,6-Anhydro- á -d-galactofuranose	$C_6H_{10}O_5$	Antimicrobial activity
45	1,2,3,5-Cyclohexanetetrol, (1á,2á,3á,5á)-	$C_6H_{12}O_4$	
46	Phenol,4-(ethoxymethyl)2-methoxy-	$C_{10}H_{18}S$	Antimicrobial Antioxidant, Anti-inflammatory, Diuretic
47	Cis,cis-2-Methyl-1-thiadecalin	$C_6H_{12}O_4$	Antimicrobial activity
48	3-O-Methyl-d-glucose	$C_7H_{14}O_6$	Antimicrobial, Anti inflammatory
49	Benzeneacetic acid, 4-hydroxy-3-methoxy-,Methyl ester	$C_{10}H_{12}O_4$	Antioxidant activity

50	4-Hydroxy-2-methoxycinnamaldehyde	$C_{10}H_{10}O_3$	Antimicrobial activity
51	Tetradecanoic acid	$C_{14}H_{28}O_2$	Antioxidant, Cancer preventive Nematicide, Hypocholesterolemic, Lubricant
52	Desaspidinol	$C_{11}H_{14}O_4$	anti-bacteria effect, Antioxidant activity
53	Androstan-7-one, 3-(acetyloxy)-, (3.beta. 5. alpha.)-	$C_{12}H_{32}O_3$	Antagonistic activity
54	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	$C_{20}H_{40}O$	Anticancer, anti-inflammatory, antimicrobial activities
55	6,10-Dimethoxy-3,3-dimethyl-1-Methylsulfanyl-2-aza-spiro[4.5]deca-1,6,9-Trien-8-one	$C_{14}H_{19}NO_3S$	Anti-microbial activity
56	Pentadecanoic acid, 14-methyl-, methyl ester	$C_{17}H_{34}O_2$	Anti-microbial activity, Antioxidant
57	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	Antioxidant, Hypocholesterolemic Antiandrogenic, Antioxidant.
58	2,4-hexadienedioic acid, 3,4-diethyl-,Dimethyl ester, (Z,Z)-	$C_{12}H_{18}O_4$	Antagonist activity
59	Nonanoic acid, 5-methyl-,ethyl ester	$C_{12}H_{24}O_2$	Antidiabetic activity
60	Phytol	$C_{20}H_{40}O$	Antimicrobial, Anticancer, Anti-inflammatory Hypocholesterolemic, Anticoronary, Antiarthritic, Hepatoprotective, Anti -androgenic,
61	3`,8`,8`-Trimethoxy-3-piperidyl-2,2`-binaphthalene-1,1`,4,4`-tetrone	$C_{28}H_{25}NO_7$	Fungicidal activity
62	10,11-Dihydro-10-hydroxy-2,3-Dimethoxydibenz(b,f)oxepin	$C_{16}H_{16}O_4$	Antioxidant activity
63	2,2,4-Trimethyl-3-(3,8,12,16-tetramethyl-Heptadeca-3,7,11,15-tetraenyl)-cyclohexanol	$C_{30}H_{52}O$	Antimicrobial activity

These phytochemicals have been shown to possess analgesic, anesthetic, allergenic, antibacterial, anti-inflammatory, antioxidant and hepatoprotective activities. The therapeutic benefits of secondary metabolites of plant origin have been researched in several recent studies. Most of identified compounds have antimicrobial and antioxidant activities. Phenols, aromatic compounds, lauric acid, myristic acid, palmitic acid, fatty acid and terpenes are reported to have antioxidant properties. The compounds possessing antimicrobial activity are phenols, terpenes, lauric acid, alkaloids and plasticizer. GC-MS is a valuable tool for reliable identification of bioactive compounds and also can identify pure compounds present at less than 1ng in biological specimens [17, 18]. In the last few years, GC-MS has become confidently established as a key technological platform for secondary metabolites profiling in plant species [19, 20]. This study demonstrated the usefulness of GC-MS, not only for the determination of drugs of abuse in biological samples, for their clinical or forensic purposes, but also for physiological evaluations and development of toxicological models [21, 22]. In the present work, sixty three compounds were isolated from the ethanolic extract of *Elaeocarpus blascoi* leaf. According to Duke's ethnobotanical and phytochemistry database. Duke's, 1998 the identified compounds possess many biological properties.

They are used as chemical intermediate to synthesis target molecules of pharmaceuticals, pesticides and other organic compounds and antioxidant activity. The gallic acid used in the preparation of 1,2,3-benzenetriol can be obtained by microbial degradation of tannins, which are complex combinations of glucose obtained from oak bark and gallnuts. An important step in the degradation of pyrogallol is its initial conversion to phloroglucinol. Levoglucosan is a pyrolysis product of cellulose and is one of the major organic components of ambient from biomass combustion. It is frequently used as a tracer for biomass burning because it is produced at relatively high levels and is stable in the atmosphere.

Phytol an unsaturated alcohol is component of the chlorophyll molecule. The *Elaeocarpus* species plant contains some components that have been reported to exhibit various activities. Phytol is one part of chlorophyll which is important for plant biosynthesis. Phenols studies on the antioxidant activity, phenol and flavonoid contents of some selected medicinal plants used for wound healing and polyphenolic compounds, such as flavonoids, are widely found in food products derived from plant sources, and they have been shown to possess significant antioxidant activities. Phenol is a carbolic acid, antiseptic, tropical, antipruritic, pharmaceutical aid and antimicrobial preservative and its vapors are corrosive to the eyes, the skin, and the respiratory tract. 1,2-Benzenediol Pyrocatechol; o-Benzenediol; o-Dihydroxybenzene; 1,2-Benzenediol has been identified in cigarette smoke and wood smoke. Hypotensive activity and enzymatic activity. Cis-1,2-Dihydrocatechol Cis-3,5- Cyclohexadiene-1,2-Diol; Biological activity. Palmitic acid constitutes between 20 and 30 percent of most animal fats and is also an important constituent of most vegetable fats (35 - 45 percent of palm oil). Stearic acid is nature's most common long-chain fatty acids, derived from animal and vegetable fats. Oleic acid is the most abundant of the unsaturated fatty acids in nature.

Tetradecanoic acid, Myristic acid. d-Mannose, Mannose, Carubinose; d(+)-Mannose; d-Mannopyranose; Mannose; D-Mannose, which appears in some fruits including cranberry, may prevent adhesion of bacteria to tissues of the urinary tract and bladder. D-Mannose is a natural occurring simple sugar that appears to be a safe, practical alternative for the treatment of urinary tract infections (UTI's). D-Mannose is absorbed eight times slower than glucose, and when ingested, is not converted to glycogen. Phytol, antimicrobial, anticancer, anti-inflammatory, diuretic activity. Likewise, hexadecane, dodecanoic acid, nonadecane, eicosane, tetradecanoic acid, oleic acid, heptacosane, 9,12- octadecenoic acid, ethyl ester; n-hexadecanoic acid; 1,2-benzenedicarboxylic acid and 9-octadecenoic acid (Z)-ethyl ester were reported in *Clerodendrum inerme* and *C. phlomidis* leaves [23]. The investigation concluded that the stronger extraction capacity of ethanol could have produced a number of active constituents healthy environment [24, 25].

4. Conclusion

This type of GC-MS analysis is the first step towards understanding nature of active compounds in this medicinal plant and helpful for the further detailed study. The information on the biological activities of the above compounds have taken from the Dr. Dukes phytochemical and ethno botanical databases. Therefore, the results obtained in this work were satisfactory according to the initial objectives, various bioactive compounds including such with strong antimicrobial activity and could be recommended as a plant of phyto-pharmaceutical importance. Phytochemical characterization and active chemical screening studies on plant-based compounds could lead to a discovery of new natural bioactive compound. The present study is the first report on chemical characterization of the leaves of *Elaeocarpus blascoi* Weibel.

Acknowledgement

The authors are grateful to Principal and Vice-Principal (F. Samuel Christopher), Dr. C. Sebastian Rajasekaran (Rtd) and Dr. V. Anand Gideon, Bishop Heber College (Autonomous), Tiruchirappalli and the Indian Institute of Crop Processing Technology (IICPT), Thanjavur for providing the instrumentation facilities.

References

[1] A.J. Uraku, Gas Chromatography-Mass Spectrometry (GC-MS) analysis of essential oil from hyptis spicigera leaves, Amer. J. Bio. Chem. 3(3) (2015) 45-56.
[2] K. Manju, A Review of medicinal plants used as source of anticancer agents, Intern. J. Drug Res. Technol. 2(2) (2012) 177-183.
[3] A.E. Omotoso, Phytochemical analysis of *Cnidoscolus aconitifolius* (Euphorbiaceae) leaf with spectrometric techniques, Nigerian J. Pharm. Appl. Sci. Res. 3(1) (2014) 38-49.
[4] D. Saranya, J. Sekar, GC-MS and FT-IR analyses of ethylacetate leaf extract of *Abutilon indicum (L.)* Sweet, Int. J. Adv. Res. Biol. Sci. 3(2) (2016) 193-197.
[5] A.R. Hites, Gas chromatography mass spectroscopy: handbook of instrumental techniques for analytical chemistry, Prentice Hall, New Jersey, Bergen, USA, 1997, pp. 609-611.
[6] R. Weibel, Morphology of the embryo and seed of *Elaeocarpus*, Condollea 27 (1) (1972) 1-16.

[7] B.D. Sharma, M. Sanjappa, Flora of India: Portulacaceae - Ixonanthaceae, Botanical Survey of India, Calcutta, 1993, pp. -529.
[8] C. Wiart, Medicinal plants of Asia and The Pacific, CRC/Taylor and Francis, Boca Raton, 2006, pp.1-87.
[9] M.L. Khan, P. Bhuyan, R.S. Tripathi, Regeneration of Rudraksh (*Elaeocarpus ganitrus* Roxb.)-a threatened tree species: germination strategies, Int. J. Ecology Environ. Sci. 29 (2003) 255-260.
[10] A. Vijayan, Investigations and invitro conservation of *Elaeocarpus blascoi* Weibel-an endangered tree at Palni hills (Western ghats), India, Ph.D., Thesis, Bharathidasan University, Tiruchirappalli, TN, India, 2011, pp. 1-96.
[11] S.M. Siva, T.A. Priya, P. Balasubramanian, V. Manimekalai, P. Ravichandran, In vitro regeneration of an endangered tree-*Elaeocarpus blascoi* Weibel from Southern Western Ghats, Tamil Nadu, India, European J. Biotechnol. Biosci. 3(11) (2015) 62-66.
[12] F. Blasco, *Elaeocarpus blascoi* vascular plant type collection, New York Botanical garden, Institute Francais, Pondicherry, 1968, pp. 2-20.
[13] K.M. Matthew, The Flora of the Palni Hills, South India, The Rapinat Herbarium, India, 1999, pp. 1199-1880.
[14] Robert Stewart, Tanya Balcar, Rare flora of upper Palnis: in Envis: special habitats and threatened plants of India, Envis bulletin. 11(1) (2008) 135-138.
[15] P. Bhuyan, M.L. Khan, R.S. Tripathi, Regeneration status and population structure of Rudraksha (*Elaeocarpus ganitrus* Roxb.)- In relation to cultural disturbances in tropical wet evergreen forest of Arunachal Pradesh, Cur. Sci. 83 (2002) 1391-1394.
[16] J. Duke, Duke's Phytochemicals and Ethnobotanical databases, Department of Agriculture, Agriculture Research Service, USA, 1998. www.ars-grin.gov/duke/ (Accessed On: 12.10.2016)
[17] D.C. Liebler, J.A. Burr, L. Philips, A.J. Ham, Gas chromatography-mass spectrometry analysis of vitamin E and its oxidation products, Analytical Biochem. 236(1) (1996) 27-34.
[18] F. Johnson, S. Westra, A. Sharma, A.J. Pitman, An assessment of GCM Skill in stimulating persistence across multiple time scales, J. Climate 24(14) (2011) 3609-3623.
[19] N.J. Merlin, V. Parthasarathy, R. Manavalan, S. Kumaravel, Chemical investigation of aerial parts of *Gmelina asiatica* Linn by GC-MS, Pharmacognosy Res. 1(3) (2009) 152-156.
[20] N. Janakiraman, M. Johnson, S.S. Sathish, GC-MS analysis of bioactive constituents of *Peristrophe bicalyculata* (Retz) Nees. (Acanthaceae), Asian Pacific J. Tropical Biomedicine 2(1) (2012) 46-49.
[21] P.S. Cardano, A.K. Chaturvedi, J.W. Soper, D.V. Canfield, Simultaneous analyses of cocaine, cocaeethylene, and their possible metabolic and pyrolytic products, Forensic Sci. Int. 157(1) (2006) 46-56.
[22] M.J. Valente, R. Henrique, V. Vilas-Boas, R. Silva, M.L. Bastos, et al, Cocaine-induced kidney toxicity: an in vitro study using primary cultured human proximal tubular epithelial cells, Arch. Toxicol. 86(2) (2012) 249-261.
[23] K. Anandhi, T. Ushadevi, Analysis of phytochemical constituents and antibacterial activities of *Clerodendrum inerme L.* against some selected pathogens, Int. J. Biotechnol. Allied Fields 1(7) (2013) 387-393.
[24] K. Balaji, D. Kilimozhi, GC-MS analysis of various extracts of *Clerodendrum phlomidis* leaf, Int. J. Pharm. Pharm. Sci. 6(1) (2014) 226-232.
[25] E. Daffodil, F. Uthayakumari, V. Mohan, GC-MS determination of bioactive compounds of *Curculigo orchioides* Gaertn, Sci. Res. Reporter 2 (2012) 198-201.