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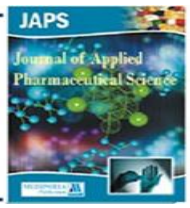

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GC-MS determination of bioactive components of *Erythropalum scandens* Bl., Bijdr.

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ABSTRACT

Erythropalum scandens Bl., Bijdr (Erythropalaceae) known to the *Kanikkar* as "Vaathavallikodi" is an important medicinal plant. The *Kanikkar* tribe, inhabitants of KMTR, Western Ghats, Tamil Nadu use this plant to relief from rheumatic pain. The present investigation deals with GC-MS analysis of ethanol extract of the above said plant. Forty one compounds were identified.

Keywords: GC-MS analysis, *Erythropalum scandens*, phytol.

INTRODUCTION

Erythropalum scandens Bl., Bijdr belongs to the family Erythropalaceae. It is commonly known as "Vaathavallikodi" in Kanikkar tribals of KMTR, Western Ghats, Tamil Nadu. The chopped tender shoots of *Erythropalum scandens* are boiled with water, bath is taken with warm water until relieve from the rheumatic complaints. Fresh leaf paste prepared from the leaf of *Erythropalum scandens* is mixed with one teaspoon of honey is given orally twice a day for treating rheumatism by the Kanikkar tribals (Sutha *et al.*, 2010). The ethanol extract of *Erythropalum scandens* leaf was evaluated for their anti-inflammatory activity in rat using a carrageenan induced paw edema (Sutha *et al.*, 2011). Perusal of literature reveals that information on the chemical analysis of *Erythropalum scandens* is totally lacking. The present communication deals with the GC-MS analysis of ethanol extract of *Erythropalum scandens* leaf.

MATERIALS AND METHODS

The plant materials of *Erythropalum scandens* Bl., Bijdr were collected from the Agasthiarmalai Biosphere Reserve, Western Ghats, Tamil Nadu. The leaves were cleaned, shaded dried and pulverized to powder in a mechanical grinder. Required quantity of powder was weighed and transferred to stoppard 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 thus obtained was then subjected to GC-MS analysis.

GC-MS Analysis

GC-MS analysis of these extracts were performed using a Perkin-Elmer GC Clarus 500 system and Gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with a

Elite-I, fused silica capillary column (30mmX0.25mm 1D X 1 µMdf, composed of 100% Dimethyl poly siloxane). For GC-MS detection, an electron ionization system with ionizing energy of 70 eV was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/min and an injection volume of 2µl was employed (split ratio of 10:1); Injector temperature 250°C; Ion-source temperature 280°C. The oven temperature was programmed from 110°C (isothermal for 2 min.), with an increase of 10°C/min, to 200°C, then 5°C/min to 280°C, ending with a 9min isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5seconds and fragments from 45 to 450 Da. Total GC running time was 36 minutes. The relative % amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms was a Turbomass.

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

RESULTS

The compounds present in the ethanol extract of leaf of *Erythropalum scandens* were identified by GC-MS analysis (Figure 1). The active principles with their retention time (RT) molecular formula, molecular weight (MW) and concentration (%) in the ethanol extract of leaf of *Erythropalum scandens* are presented in Table 1. Forty one compounds were detected in ethanol extract of *Erythropalum scandens* leaf. The results revealed that 2-pentanoe, 4-amino-4-methyl (23.46%) ,Methyl 2, 6 – anhydro – alpha – d – altroside (18.60%), Glycerine (7.39%), 9,12, 15- Octa decatrienoic acid, methyl ester (z, z, z) (5%) , n-Hexadecanoic acid (4.03%), Tetradecanoic acid, 10,13-dimethyl-methyl ester (3.45%), cyclobutanecarboxylic acid, phenyl ester (3.31%) and phytol (2.62%) were found as the major compounds in the ethanol extract of *Erythropalum scandens* leaf.

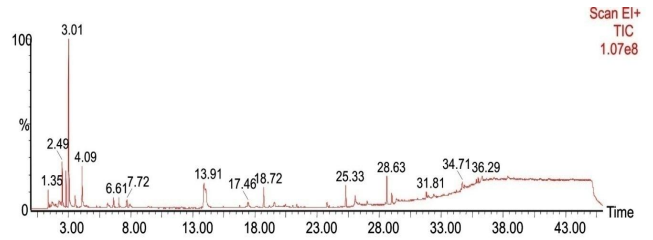

Fig: 1. GC-MS Chromatogram of the ethanol extract of *Erythropalum scandens* leaf.

Figure, 2, 3, 4 and 5 shows mass spectrum and structure of Tetradecanoic acid, 10, 13-dimethyl- methyl ester, n-Hexadecanoic acid, 9, 12, 15- Octa decatrienoic acid, methyl ester and Phytol respectively.

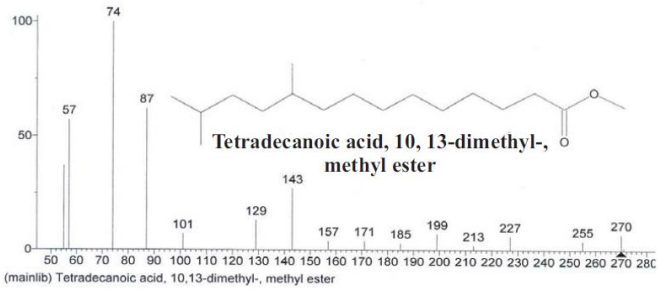

Fig: 2. Mass spectrum of Tetradecanoic acid, 10, 13-dimethyl- methyl ester.

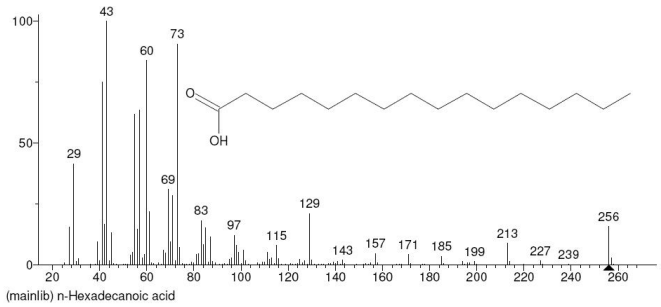

Fig: 3. Mass spectrum of n-Hexadecanoic acid.

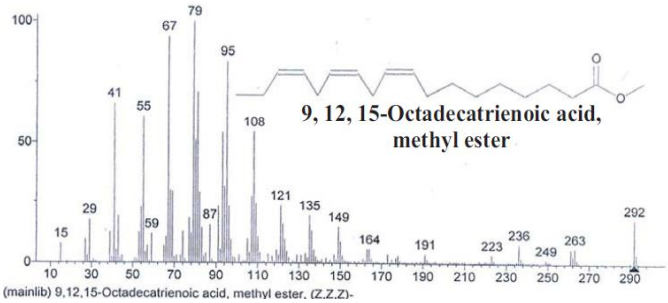

Fig: 4. Mass spectrum of 9, 12, 15- Octadecatrienoic acid, methyl ester.

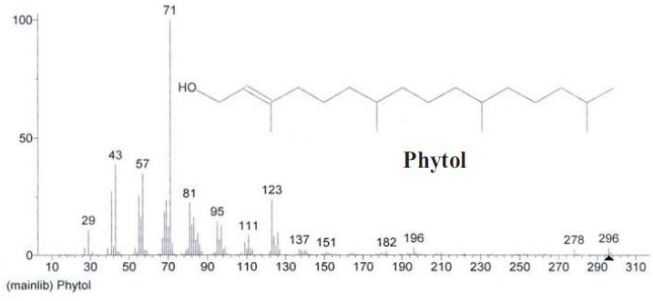

Fig: 5. Mass spectrum of Phytol.

DISCUSSION

In the present study, 41 compounds have been identified from ethanol extract of the leaf of *Erythropalum scandens* by Gas Chromatography- Mass spectrometry (GC-MS) analysis. Among the identified phytochemicals Tetradecanoic acid and n-Hexadecanoic acid have the property of antioxidant activity and

Table 1: Components detected in *Erythropalum scandens* leaf extract.

Sl No.	R.T	Name	Formula	Peak area %	M.W
1.	3.01	2-Pentanone, 4-amino-4-methyl	$C_6H_{13}NO$	23.46	115
2.	3.53	1,2-Ethanediol, 1,2-di-4-pyridinyl-	$C_{12}H_{12}N_2O_2$	2.46	216
3.	4.09	Glycerin	$C_3H_8O_3$	7.33	92
4.	4.43	Phenol, 4-(ethylamino)-	$C_8H_{11}NO$	Trace	137
5.	5.26	2(3H)-Furanone, dihydro-3-hydroxy-4,4-dimethyl-	$C_6H_{10}O_3$	0.29	130
6.	5.51	1H-Pyrrole, 2,3-dimethyl-	C_6H_9N	0.19	95
7.	6.16	Thymine	$C_5H_6N_2O_2$	1.69	126
8.	6.61	1H-Pyrrole, 2,5-dimethyl-	C_6H_9N	2.03	95
9.	7.06	4-Piperidinone, 2,2,6,6-tetramethyl- (Vincubina)	$C_9H_{17}NO$	1.71	155
10.	7.20	2-Hexen-1-ol, (E)-	$C_6H_{12}O$	0.50	100
11.	7.72	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	$C_6H_8O_4$	2.67	144
12.	7.95	L-Pipecolinic acid	$C_6H_{11}NO_2$	1.82	129
13.	8.89	2-Hexene	C_6H_{12}	0.09	84
14.	9.32	N-Benzyl-2-phenethylamine	$C_{15}H_{17}N$	0.14	211
15.	9.39	(S)-(-)-2-Amino-3-phenyl-1-propanol	$C_9H_{13}NO$	0.64	151
16.	10.57	Bis(2-furfuryl)disulfide	$C_{10}H_{10}O_2S_2$	0.20	226
17.	11.51	2,5-Dimethylpyrimidine	$C_6H_8N_2$	0.23	108
18.	12.10	1-Propanamine, 3-dibenzo[b,e]thiepin-11(6H)-ylidene-N,N-dimethyl-, S-oxide	$C_{19}H_{21}NOS$	0.40	311
19.	13.91	Methyl 2,6-anhydro-à-d-altroside	$C_7H_{12}O_5$	18.60	176
20.	16.78	Phenyl-β-D-glucoside	$C_{12}H_{16}O_6$	0.43	256
21.	17.46	à-L-Galactopyranoside, methyl 6-deoxy-	$C_7H_{14}O_5$	2.44	178
22.	18.73	Cyclobutanecarboxylic acid, phenyl ester	$C_{11}H_{12}O_2$	3.31	176
23.	19.16	8-Azabicyclo[3.2.1]oct-6-en-3-ol, 8-methyl-	$C_8H_{13}NO$	0.49	139
24.	19.57	Myo-Inositol, 4-C-methyl-	$C_7H_{14}O_6$	1.93	194
25.	20.46	1,2,3,4,5-Cyclopentanepentol	$C_5H_{10}O_5$	0.99	150
26.	21.05	Pyrrole-2-carboxamide	$C_5H_6N_2O$	0.45	110
27.	21.38	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol	$C_{10}H_{12}O_3$	0.65	180
28.	21.71	2-Cyclohexen-1-one, 4-ethynyl-4-hydroxy-3,5,5-trimethyl-	$C_{11}H_{14}O_2$	0.18	178
29.	21.91	1,10-Hexadecanediol	$C_{16}H_{34}O_2$	0.13	258
30.	23.79	4H-1,2,4-Triazole, 3,4,5-trimethyl-	$C_5H_9N_3$	1.51	111
31.	23.99	1,2-Benzenedicarboxylic acid, diheptyl ester	$C_{22}H_{34}O_4$	0.27	362
32.	25.32	Tetradecanoic acid, 10,13-dimethyl-, methyl ester	$C_{17}H_{34}O_2$	3.45	270
33.	26.05	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	4.03	256
34.	27.05	4-Methyloctanoic acid	$C_9H_{18}O_2$	0.81	158
35.	28.63	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-	$C_{19}H_{32}O_2$	5.00	292
36.	29.01	Phytol	$C_{20}H_{40}O$	2.62	296
37.	31.81	2-Propenoic acid, 2-(dimethylamino) ethyl ester	$C_7H_{13}NO_2$	1.68	143
38.	31.96	1,2-Cyclopentanediol, 3-methyl-	$C_6H_{12}O_2$	1.26	116
39.	35.84	Pentadecanal-	$C_{15}H_{30}O$	0.81	226
40.	35.98	1,2-Benzenedicarboxylic acid, diisooctyl ester	$C_{24}H_{38}O_4$	0.96	390
41.	36.29	1-Methylene-2b-hydroxymethyl-3,3-dimethyl-4b-(3-methybut-2-enyl)-Cyclohexane	$C_{15}H_{26}O$	2.10	222

9,12, 15- Octa decatrienoic acid, methyl ester (z, z, z) have the property of anti-inflammatory and anti arthritic as reported by earlier workers (Lalitharani *et al*., 2009; Maruthupandian and Mohan, 2011). Omega-3-fatty acid have been found to be essential for normal growth and development and may play an important role in the prevention and treatment of coronary artery disease, hypertension, diabetes and arthritis, other inflammatory and autoimmune disorders and cancer (Simopoulos, 1991; 1997; 2004). Phytol is detected in *Erythropalum scandens* leaf 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 rheumatoid arthritis and possibly other chronic inflammatory diseases (Ogunlesi *et al.*, 2009).

Thus, this type of GC-MS analysis is the first step towards understanding the nature of active principles in this medicinal plant and this type of study will be helpful for further detailed study. Further investigations into the pharmacological importance of

Erythropalum scandens and their diversity and detailed phytochemistry may add new knowledge to the information in the traditional medical systems.

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