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GC, GC/MS CHARACTERIZATION OF THE *ENICOSTEMA LITTORALE*

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ABSTRACT

The whole plant parts of *Enicostema littorale* collected around from the Tirunel veli District obtained good yield. The crude extract was examined by a combination of capillary GC and GC/MS. In some instances the structure elucidation based on GC and GC/MS data had to be corrected. More than thirty six constituents were found. This study clearly illustrates the advantage of complementary identification techniques.

KEY WORDS: Enicostema littorale, Chota chirayita, GC-MS.

INTRODUCTION

Enicostema axillare (Lam.).Raynal, syn.E.littorale Blume (Family) Gentianaceae is a perennial herb found throughout the greater part of India.Locally it is known as chota chirayita and used in indigenous medicines in the treatment of fevers and as bitter tonic and forms one ingredients of many hypoglycemic marketed formulations. *Enicostema littorale* belongs to family Gentianaceae. Locally it called as 'Vellaragu'. Gentianaceae is an erect annual herb growing to height of about a metre, and indigenous to the mountainous Districts of Northern India. *Enicostema littorale* is an annual or perennial herb. Stems often winged, rounded or angular leaves, sessile, often narrow. Inflorescence axillary dense clusters or cyme. A glabrous procumbent perennial herb up to 50 cm in height. From a thick root stock, stem & branches sub quadrangular; leaves simple opposite , sessile linear oblong or elliptic lanceolate glabrous 3 –nerved marginal nerves often obscure flowers white tubular in whorled axillary clusters. Calyx narrow campanulate divided down halfway to 2/3, thin with white thinner margins; corolla is small, white tabular and funnel shaped. Stamens inserted in corolla tube, with appendices at filament bases; filament

equal length anthers erect after anthers with sterile apex. Ovary without nectary disk stigmas capitates slightly bilobed. Fruit ellipsoid capsule narrow at the base & rounded not winged.

MATERIALS AND METHODS

Plant Material

The aerial plant parts of ***Enicostema littorale*** at flowering stage were collected from the Tirunelveli District, Alangulam, and March 2010. The plant species was identified (by Botanist Dr.P.Jayaraman at Plant Anatomy Research Centre (PARC). The collected material was dried under the dry shade and powdered. The powdered plant material was extracted using solvents of increasing polarity chloroform, ethyl acetate, methanol, petroleum ether, in a soxhlet extraction apparatus.

EXPERIMENTAL

GC-MS Profile of Methanol Fraction of Enicostemma littorale

Gas-chromatogram and Mass spectral studies were carried out for methanol fraction of Enicostemma littorale to analyse the compounds present in it. The chemical constituents along with their chemical name, molecular formula, molecular weight, and retention time and percentage area were tabulated in (**Table 1)** and the chromatogram was presented in Major chemical compounds(according to peak area percentage) present in Methanol fraction of Enicostemma littorale are 2-Methoxy-4-vinylphenol, 15.67%, 1,6-Anhydro-a-D-glucopyranose(levoglucose)(28.46%) 1,6 –An hydro a-d-galactofuranose(7.68%), 2H-Pyran-2-one 5,6-dihydro-4-(2-methyl-2-propen-3yl) (10.6%).

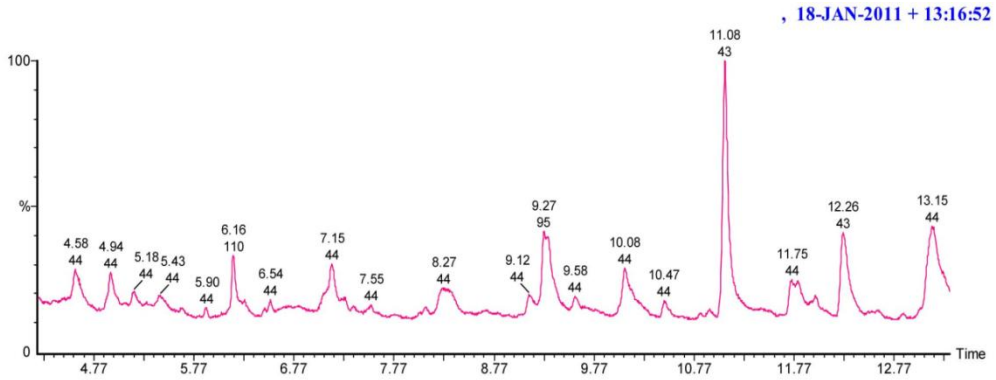
RESULTS AND DISCUSSION

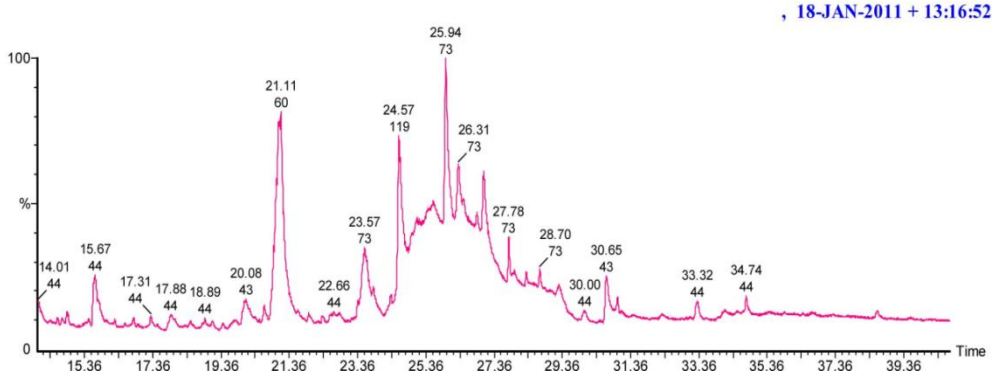
Table 1: GC-MS PROFILE OF METHANOL FRACTION OF ENICOSTEMMA LITTORALE

PEAK NAME	RETENTION TIME	PEAK AREA	% PEAK AREA
2-Cyclopenten-1-one, 2-hydroxy Formula:C_5H6O_2 M.W: 98	5.43	1289625	0.4847
4-Hydroxypyridine 1-oxide Formula:$C_5H_5NO_2$ M.W: 111	5.90	257203	0.0967
2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one Formula:$C_6H_8O_4$ MW: 144	6.54	695570	0.2614
2-Nitrohept-2-en-1-ol Formula:$C_7H_{13}NO_3$ MW: 159	8.27	4324287	1.6253
di-6-Methyl-5-hepten-2-ol Formula: $C_8H_{16}O$ MW: 128	9.27	7999597	3.0066

2-Cyclopenten-1-one,3-(1-methylethyl)- Formula: $C_8H_{12}O$ MW: 124	9.58	2039094	0.7664
3,6-Pyridazinedione, 1,2-dihydro-4-methyl- Formula: $C_5H_6N_2O_2$ MW: 126	10.08	2560169	0.9622
2-Methylbutanoic anhydride Formula : $C_{10}H_{18}O_3$ MW: 186	10.47	847698	0.3186
2,4-Dimethyl-3-pentanol acetate Formula:$C_9H_{18}O_2$ MW: 158	10.84	146389	0.0550
4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- Formula: $C_6H_8O_4$ MW: 144	11.08	12689290	4.7692
Cyclohexanone,2-(hydroxymethyl) Formula: $C_7H_{12}O_2$ MW: 128	13.15	10437345	3.9229
Cyclohexanone,(1,methylethylidene)Formula: C_9H_{16} MW: 124	14.57	399792	0.1503
5-(3-Ethoxy-4,5-dihydro-isoxazol-5-yl)-5-methyl-imidazolidine-2,4-dione Formula: $C_9H_{13}N_3O_4$ MW: 227	14.69	512379	0.1926
1H-Inden-1-one,2,3-dihydro- Formula: C_9H_8O MW: 132	14.85	1058038	0.3977
2-Methoxy-4-vinylphenol Formula: $C_9H_{10}O_2$ MW: 150	15.67	11613554	4.3649
3-Penten-2-one,3-(2-furanyl)- Formula: $C_9H_{10}O_2$ MW: 150	16.79	1175866	0.4419
Oxepine,2,7-dimethyl- Formula: $C_8H_{10}O$ MW: 122	17.31	1791316	0.6733
d-Mannose Formula: $C_6H_{12}O_6$ MW: 180	17.88	3821619	1.4363
1,4-Benzenedial, 2-methoxy- Formula: $C_7H_8O_3$ MW: 140	18.28	94900	0.0357
Bicyclo[2.2.1]heptan-2-ol,7,7- Dimethyl-,acetate Formula: $C_{11}H_{18}O_2$	18.89	721625	0.2712
Tetracyclo[3.3.1.0(3.9)]decan-10-One Formula: $C_{10}H_{12}O$ MW : 148	19.11	1078548	0.4533
d-Glycero-d-glucosem Formula: $C_7H_{14}O_7$ MW: 210	19.79	1206092	0.4533
3-O-Methyl-d-glucose Formula: $C_7H_{14}O_6$ MW: 194	20.08	6615847	2.4865
Benzene acetic acid, a-ethyl- Formula: $C_{10}H_{12}0_2$ MW: 164	20.62	1536464	0.5775
1,6-Anhydro-a-D-glucopyranose (laevoglucose) Formula: $C_{11}H_{18}O$ MW: 162	21.11	75744144	28.4683
Ethanol, 2-(3,3-dimethlybicyclo[2.2]hept-2-ylidene)- Formula: $C_{11}H_{18}O$ MW: 166	22.32	676129	0.2541
1,6-Anhydro-a-d-galactofuranase Formula: $C_6H_{10}O_5$ MW: 162	23.57	20459526	7.6897
Bicyclo[4.3.0]non-1(6)-ene-4,7- Dione-	24.35	767219	0.2884

8-carboxylic acid, methyl Ester Formula: $C_{11}H_{12}O_4$			
m-Toluic acid, allyl ester Formula: $C_{11}H_{12}O_2$ MW: 176	24.57	23578774	8.8620
1-Isobutyl-7,7-dimethyl-octahydro-isobezofuran-3a-ol Formula: C14H26O2 MW: 226	25.58	1338198	0.5030
Erythrocentaurin Formula: $C_{10}H_8O_3$ MW: 176(1H-2 Benzopyran-5-Carboxaldehyde,3,4-dihydro-1-oxo-)	25.94	21225548	7.9776
1H-Indole-2,3-dione, 1-methyl-3-hydrazone Formula: $C_9H_9N_3O$ MW: 175	27.05	8390185	3/1534
2H-Pyran-2-one,5,6-dihydro-4-(2-methyl-2-propen-3-yl)- Formula: $C_9H_{12}O_2$ MW: 152	29.26	28255405	10.6197
3-Methyl-5-nitrosotropone Formula: $C_8H_7NO_3$ MW: 165	30.00	1595546	0.5997
n-Hexadecanoic acid Formula: C16H32O2 MW: 256	30.65	7970946	2.0059
2H-1-Benzopyran-2-one, 6-(a-D-glucopyranosyloxy)-7-hydroxy Formula: C15H16O9 MW: 340	32.26	1151399	0.4328
			100.0000





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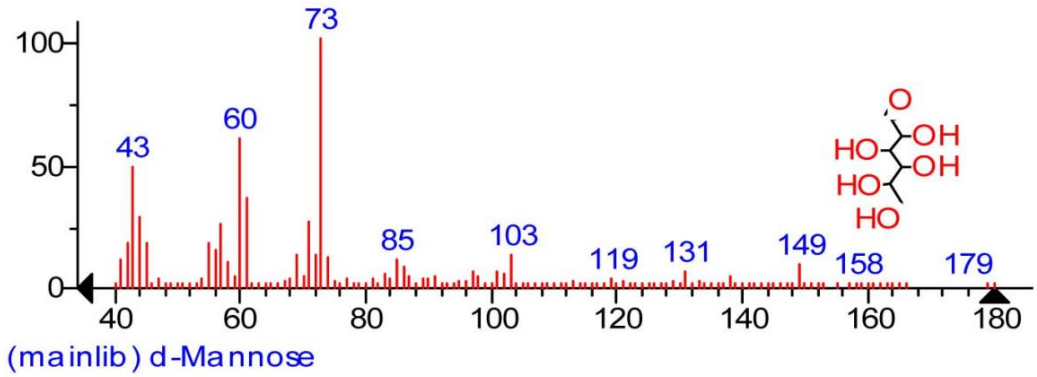
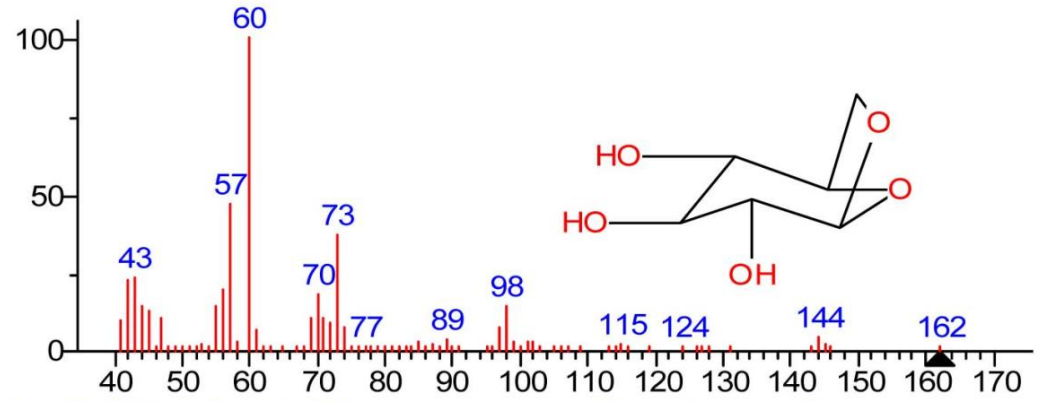


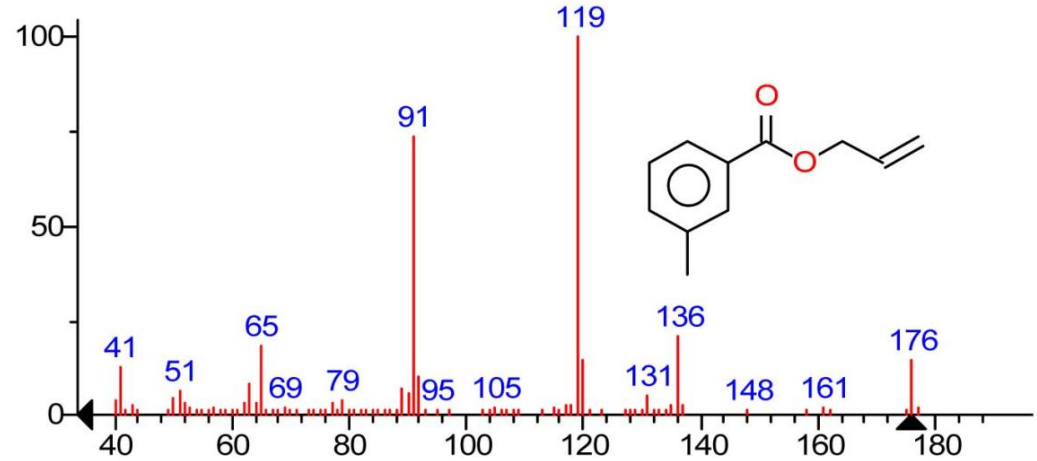
(mainlib) d-Mannose

21.11



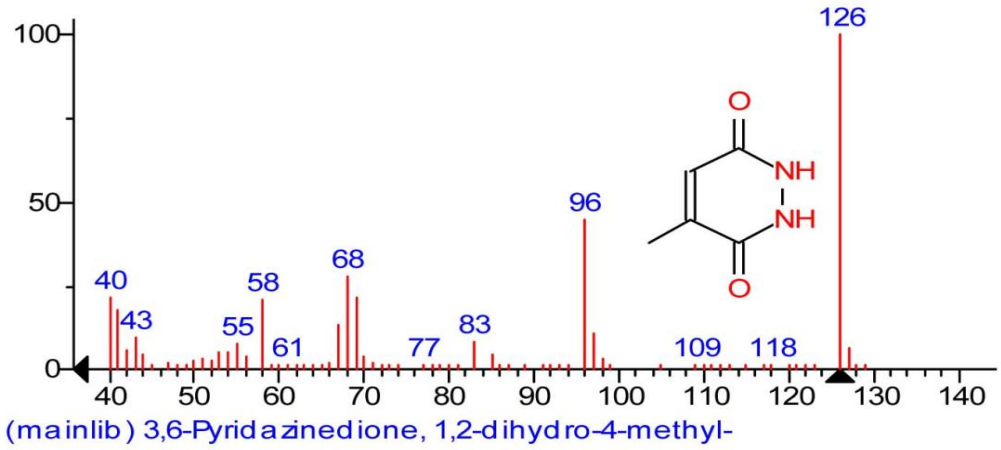
(replib) 1,6-Anhydro-á-D-glucopyranose (levoglucosan)

24.57



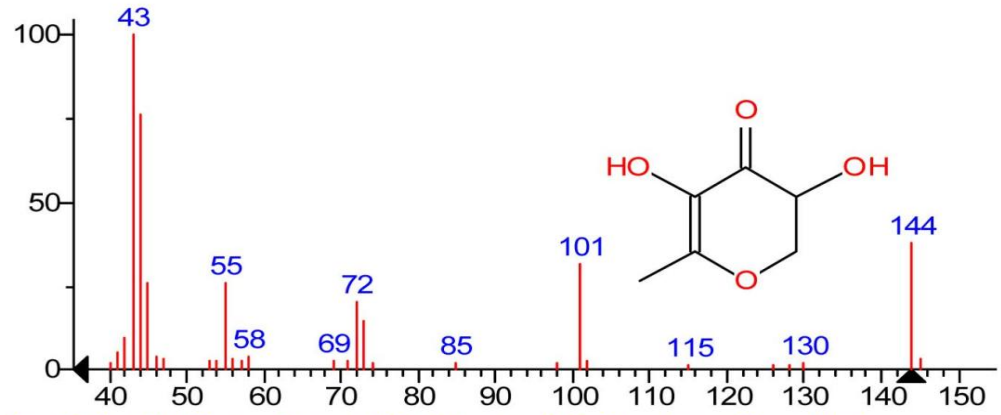
(mainlib) m-Toluic acid, allyl ester

RT 10.08



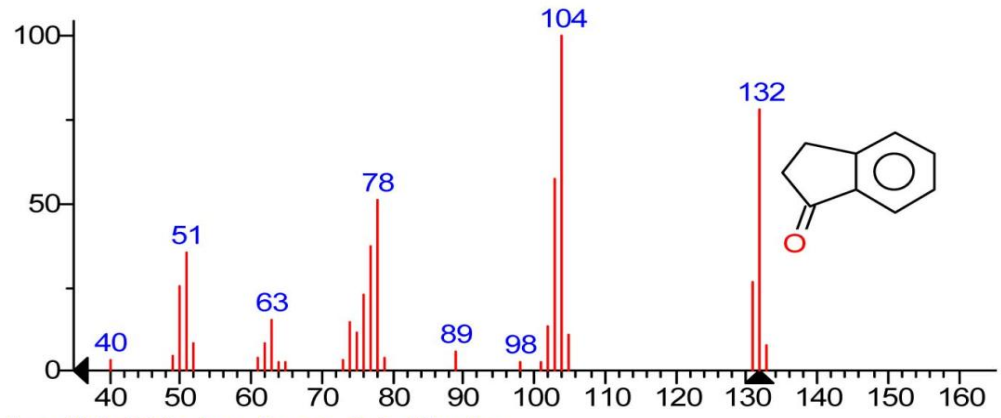
(mainlib) 3,6-Pyridazinedione, 1,2-dihydro-4-methyl-

11.08



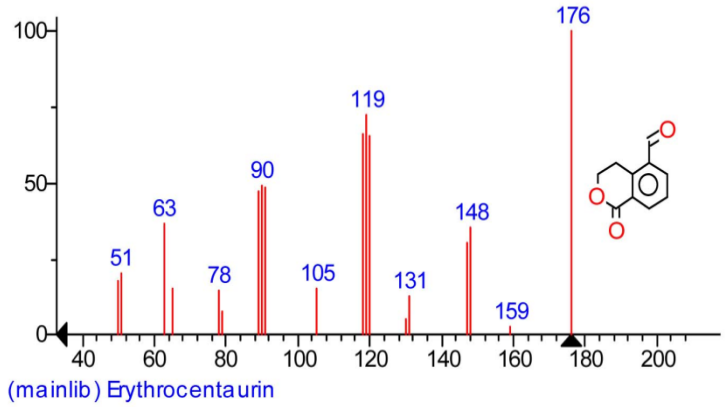
(mainlib) 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-

14.85



(replib) 1H-Inden-1-one, 2,3-dihydro-

25.94



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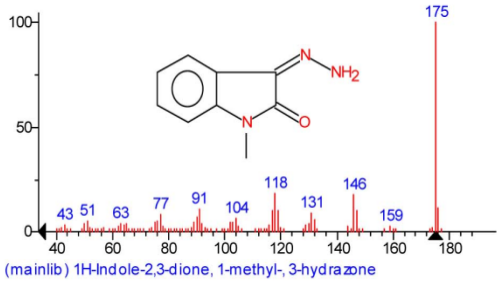

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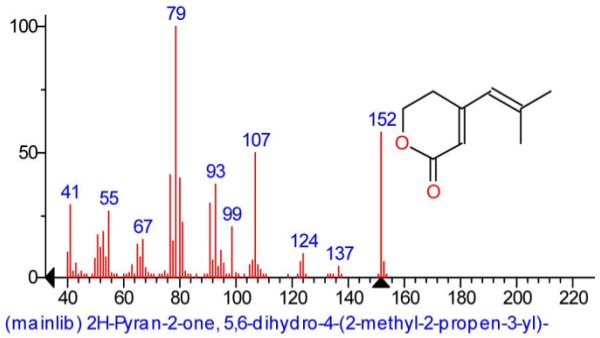

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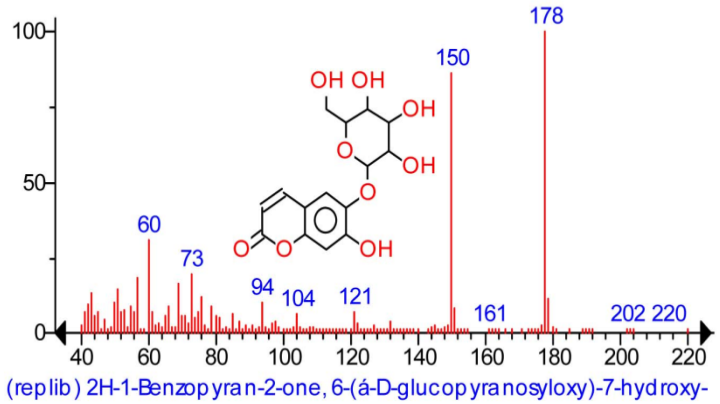

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Gas-chromatogram and mass spectral studies have been carried out for methanol fraction of *Enicostema littorale* to analyse the compounds present in it. The chemical constituents along with their chemical name, molecular formula, molecular weight, and retention time and percentage area have been recorded. GC-MS analysis of methanol extract residues revealed the presence of 2-methoxy vinylphenol(4.3649%), 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl(4.7692%),1,6-Anhydro-a-D-glucopyranose (laevoglucose) (28.4683%), m-Toluic acid, allyl ester(8.8620%), Erythrocentaurin(7.9776%),2H-Pyran-2-one, 5,6-dihydro-4-(2-methyl-2-propen-3yl)(10.6197%)**.**These above combination seen to have antiviral and anti-HIV activity. Erythrocentaurin is one of the swertiamarin intestinal metabolites Thus the GC-MS analysis and Bioinformatics Docking confirms the phytochemical of *Enicostema littorale,* **1-6-An hydro a-D-glucopyranose** as **anti-HIV agent.** The HIV/AIDS is also comes from the sexually transmitted disease, and this findings is matching with the references already available. There is no similar datas available for HIV/AIDS related to *Enicostema littorale.* These compounds are potent inhibitors of HIV-1 replication in cultured cell lines and catalytic activities in vitro. They are therefore promising compounds for developing new anti-AIDS drugs. Potential effective antiviral herbal preparations may stimulate the immune system and assist the body in fighting off infection before the virus has had a chance to invade living cells. Herbs that are thought to promote detoxification and elimination are often used in conjunction with antiviral herbs to further enhance action of the immune system. And the plant drugs which are having activity on virus, that is affecting Immune system must possess effective role on H1V/AIDS infection.

CONCLUSION

Gas-chromatogram and mass spectral studies have been carried out for methanol fraction of *Enicostema littorale* to analyse the compounds present in it. The chemical constituents along with their chemical name, molecular formula, molecular weight, and retention time and percentage area have been recorded, and significant. Major chemical compounds(according to peak area percentage) in Methanol fraction of *Enicostema littorale* are 2-methoxy vinyl phenol(4.3649%), 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl(4.7692%),1,6-Anhydro-a-D-glucopyranose(laevoglucose)(28.4683%), m-Toluic acid, allyl ester(8.8620%), Erythrocentaurin(7.9776%), 2H-Pyran-2-one, 5,6-dihydro-4- (2-methyl-2-propen-3yl) (10.6197%)**.** These above combination seen to have antiviral and anti-HIV activity.

REFERENCES

1. Gentinaceae, Systematic and Natural History, by Lena Struwe and Victor Anthony Albert (Eds), Cambridge University Press, UK, 2002, p.215.
2. The Wealth of India- Raw Materials, First supplement series , National Institute of Science Communication, CSIR, New Delhi, Vol.3 D-I, 2002, p.80.
3. Raghu Bir S Rawat, Plant based traditional knowledge for improved health care delivery system, Workshop: Approaches towards evaluation of medicinal plant prior to clinical trials, Nov.2006, Yashada, Pune, pp.18-23.
4. Garg SC Ethanomedicine for snake bite.J Med Arom Plant Sci, 2000-2001, 22(4A) & 23(1A), 546-553.
5. Rai BB, Enicostemma littorale Blume in malaria, Indian Med Gaz, 1946, 81,506-508.
6. Gite.V.N, R.D. Pokharkar1, V.V.Chopade2, S.B.Takate1, 2010: Evalution of Physicochemical Standardization Parameters of Enicostemma axillare. V.N.Gite et al., Journal of Biosci Tech, Vol 1 (4), 187-190 187
7. Gondal Rao, Y., 1968 Siddha Marunthugalin Seimurai (Tamil Edition), "IMCOPS" Publication, Madras pp.167-182.
8. Harvey A L 2008, Natural products in Drug Discovery Today, 13(19-20):894-901. Epub 2008 Aug 22.
9. K.M.Nadkarni the Indian Materia Medica with Ayurvedic, Unani & Home Remedies, Vol-I Bombay: popular prakashan private Ltd, pp.485.
10. Khanbabaee, K. and T. van Ree 2001, Tannins: classification and definition. Nat Prod Rep, 18(6): p. 641-9.
11. Kirtikar, K. R. and Basu, B. D. (Eds), Indian Medicinal Plants, Allahabad, 1984, vol. III, pp. 1664–1666.