GC-MS ANALYSIS OF ETHANOL EXTRACT OF *RIVINA HUMILIS* L. (ROOT)

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Abstract

The present study was focused to scrutinize the presence of phytoconstituents in the ethanolic extract of *Rivina humilis* root using Perklin Elmer Gas Chromatography – Mass Spectrometry, our results of GCMS compounds in the extract was relavant to the National Institute of standards and Technology (NIST) library. GCMS analysis of ethanolic extract of *Rivinahumilis*root confes the presence of 30 compounds such as d-Glycero-d-ido-heptose, Boldione1-Hexadecanol, sucrose, dimethyl phthalate, 3,7,11,15,19-pentaoxa -2,20-disilaheneicosane, 2,2,20,20-tetramethyl,melexitose, tetradecanoic acid, caffeine etc. This plant sample contains various bioactive compounds and therefore has various medicinal properties which can be used for the treatment of various diseases.

Keywords:

Rivina humilis, phytoconstituents, ethanol, boldione, caffeine, medicinal properties.

Introduction

For centuries, herbal medicine has been the basis for medical treatments and such traditional medicine is still widely practiced today. The World Health Organization (WHO) estimated that upto 80% of people over the world still rely on traditional remedies such as herbs for their medicine (Tripathi and Tripathi, 2003; Odesanmi *et al*., 2009). Higher plants as source of bioactive compounds continue to play a dominant role in the maintenance of human health. Reports available on green plants a reservoir of effective chemotherapeutants, these are non-phytotoxic, more systematic and easily biodegradable (Vyas, 1999; Kaushik et al., 2002; ChamanLal and Verma, 2006).

*Rivina humilis*is a species of flowering plant in the family phytolaccaceae. It can be found in the Southern United States, the Caribbean, and Central America. Common names include pigeon berry, rouge plant, baby peppers, blood berry with its colourful, bright red and shiny berries, it is more attractive in fruit than in flower. In India the plant is commonly available in wastelands of gardens and plains. In the past several years gas chromatography mass spectrometry has been firmly established as a key technological platform for metabolites profiling in both plant and non-plant species (Robertson, 2005). The objective of the study was to identify the phytocomponents from *Rivina humilis* L., root extract by GC-MS analysis.

Materials and Methods

Collection and preparation of plant material

The fresh roots of *Rivina humilis* were collected from the experiment garden. The samples were washed thoroughly in running tap water to remove soil particles and adhered debris are finally washed with sterile distilled water. The roots were shade dried and ground into find powder, and kept in containers and stored in refrigerator for GC-MS (Ambethkar and Ananthalakshmi, 2014).

Plant sample extraction

Required quantity of powder was weighted and transferred to stoppered flask and treated with ethanol until the powder is fully immersed (Shanmugavel *et al*., 2015). Residues were obtained after concentrating the extract under reduced pressure. The obtained extracts were stored in desiccators for further GC-MS analysis.

GC-MS analysis

Gas chromatography (GC) analysis was carried out using Perkin Elmer Clarus SQ8C gas chromatography equipped with capillary PTV Injector. The chromatograph was fitted with DB 5 MS capillary standard nonpolar column (30 m × 0.25 mm i.d. film thickness 0.25 μm). The mass spectra were obtained by centroid scan of the mass range from 40 to 650 amu. The extract was identified based on the comparison of Retention time. The injector temperature was set at 250°C and the oven temperature was initially set at 70°C.

Helium was used as a carrier gas with the flow rate of 1 ml/min. One microliter of the sample (diluted with 1:4) was injected in the split mode in the ratio of 1 : 12.

The mass spectrometer was operated in the electron impact mode at +VE. Ion source and transfer line temperature were kept at 220 & 250°C. The mass spectra were obtained by centroid scan of the mass range from 40 to 650 amu.

Identification of bioactive components

The extract was identified based on the comparison of Retention time (RT) & their mass spectra to NTST library data of the GC-MS system and literature data.

Result and discussion

The GC-MS chromatogram of ethanolic extracts of root of *Rivinahumilis*revealed the presence of various 30 compounds with corresponding peaks at different retention time (Govindaraj and Rajangam, 2017). The chromatogram of the ethanolic extract at *Rivinahumilis* is shown in the following figure 1.

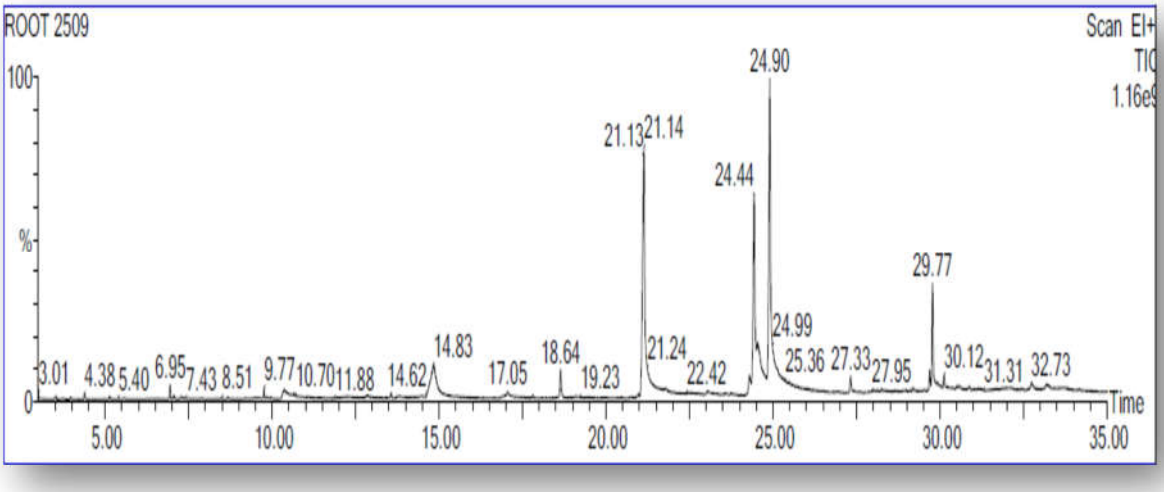


Fig. 1: GC-MS chromatogram of the ethanolic extract of *Rivinahumilis*L.

The active principles with their name, retention time (RT), peak area percentage and biological activity of the bioactive compounds those present in the ethanolic extract of *R. humilis* are showed in Table 1.

Table 1: Names and their RT value, peak area %, Activity of the compounds in ethanolic extract of *R. humilis*.

SI. No.	Compound name	RT	Peak area %	Activity
1	d-Glycero-d-ido-heptose	3.013	0.449	Antiinflammatory and anti-septic activities.
2	Boldione	6.955	0.334	Antineoplastic, anti-eczematic, anti-hypertensive
3	1-Hexadecanol	9.766	0.224	Human metabolite, and an algal metabolite, skin protect against skin irritations caused by bites, rashes, stings, inhibit growth of mycoplasma, cosmetics.
4	Sucrose	10.361	1.477	Antimicrobial agents, cell culture, emulsifier solubilisator in cosmetics
5	Dimethyl phthalate	10.646	1.80	Insect repellent, ectoparasiticide.
6	3,7,11,15,19-Pentaoxa-2,20-disilaheneicosane, 2,2,20,20-tetramethyl	13.803	0.409	No activity
7	Melezitose	14.453	0.293	Animal metabolite it reduces the stress of osmosis by reducing their water potential
8	Myo-Inositol,4-c-methyl	14.838	6.965	Antimicrobial activity
9	Tetradecanoic acid	17.054	1.023	Antifungal, antioxidant, cancer preventive, nematicide, hypocholesterolemic, lubricant
10	Caffeine	18.645	1.225	Act as a central nervous system stimulant, manage drowsiness, headache
11	1,2-Benzendicarboxylic acid, butylochyl ester	20.971	0.213	Antimicrobial activity
12	n-Hexadecanoic acid	21.136	22.166	Antioxidant, pesticide, flavor, 5-alpha-reductase inhibitor, antifibrinolytic, Lubricant, Nematicide, Hypocholesterolemic, Antiinflammatory, antibacterial
13	Hexadecanoic acid, ethyl ester	21.806	1.219	Antioxidant, hyphocholesterolemic, Nematicide, Antiandrogenic, Pesticide, Flavor, Hemolytic, Pesticide, 5-Alpha-Reductase-inhibitor, Lubricant.
14	Dasycarpidan-1-methanol, acetate (ester)	21.991	0.214	Antibacterial, antifungal, inflammatory, anti-diabetic anticancer

SI. No.	Compound name	RT	Peak area %	Activity
15	1H-Indene,2-butyl-3-hexyl-	22.046	0.344	Antioxidant activity
16	Dasycarpidan-methanol, acetate (ester)	22.176	0.204	Antimicrobial activity
17	Heptadecanoic acid	23.046	0.422	Carminative
18	9,12-Octadecadienoic acid (z,z)	24.292	0.860	Antimicrobial
19	9-Octadecenoic acid, (E)	24.437	14.022	Antibacterial, cosmetic formulations
20	Octadecanoic acid	24.902	18.519	Antimicrobial
21	Octadecanoic acid	25.307	0.221	Antimicrobial
22	Hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester	27.328	0.666	Anti-inflammatory, anticancer effects, antioxidant properties
23	Isopropyl linoleate	29.694	0.617	Antioxidant, antidiabetic, anti-inflammatory
24	9,12,15,octadecatrienoic acid, 2,3-dihydroxypropyl ester, (z, z, z)	29.774	4.057	Antimicrobial, anticancer, hepatoprotective, anti arthiritic, antiasthma, diuretic, nematicide, anticoronary
25	2,2-Dimethyl-6-methylene-1-[3,5-dihydroxy-1-pentenyl]cyclohexan-1-perhydrol	29.929	0.413	Antibacterial
26	Glycidyloleate	30.124	0.471	Antimicrobial
27	3,9-methano-10H-furo[3,2-d]azonine-10, 11-dione,9-[2-(dimethylamino)-3-methoxyphenyl] decahydro-2,6-dimethyl-[2R – (2R*, 3R*, 3aS*, 9R*, 10aR*)]			No activity
28	5,8,11 – Eicosatrienoic acid, (z) – TMS derivative	32,750	0.635	Antimicrobial activity
29	2,6,10,14-Hexadecatetraen-1-ol,3,7,11,15-tetramethyl-, acetate, (E, E, E)	33.180	0.996	Anti-inflammatory, antimicrobial, cytotoxic, antidiabetic, antioxidant
30	Cyclohane, 1-4-dimethyl-2-octadecyl	33.706	0.434	Antibacterial activity

This study showed that the ethanolic extract of *R. humilis* root was subjected to GC-MS analysis and 30 phytocompounds were identified namely; d-Glycero-d-ido-heptose, Boldione, 1-Hexadecanol, sucrose, Dimethyl phthalate, 3,7,11,15.19-pentaoxa-2, 20-disilaheneicosane, 2,2,20,20-tetramethyl, melezitose, Myo-Inositol, 4-c-methyl,

Tetradecanoic acid, caffeine, 1,2-Benzendicarboxylic acid, ethyl ester, dasycarpidan-1-methanol, acetate(ester), 1H-Indene, 2-butyl-3-hexyl, Dasycarpidan-methanol, acetate (ester), Heptadecanoic acid, 9.12 –Octadecadienoic acid (z,z)-g-octadecenoic acid, (E), octadecanoic acid, Hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester, Isopropyl linoleate, 9,12,15-octadecatrienoic acid, 2,3-dihydroxypropyl ester, (z,z,z)-2,2-Dimethyl-6-methylene-1-[3,5-dihydroxy-1-pentenyl]cyclohexan-1-perhydrol, Glycidyloleate, 3,9 – Methano-10H – Furo [3, 2 – d] azonine-10,11-dione, 9-[2-(dimethylamino)-3-methoxyphenyl]decahydro-2,6-dimethyl-,[2R-(2R*, 3R*, 3aS*, 9R*, 10aR*)]-, 5,8,11-Eicosatrienoic acid, (z)-, TMS derivative, cyclohexane.

d-Glycere-d-ido-heptose have anti-inflamatory and anti-septic activities. N-Hexadecanoic acid, ethyl ester, and Dasycarpidan-1-methanol, have anti inflammatory property. Caffeine act as a central nervous system stimulant, manage drowsiness, headache. Sucrose have antimicrobial agents against fungi, cell culture, emulsifier, solubilisator in cosmetics. Dimethyl phthalate has Insect repellent, ectoparasiticide activities. N-Hexadecanoicacid have anti-inflammatory activities, anticancer effects, anti oxidant properties, nematicide activities. Tetradecanoic acid act as antifungal, antioxidant, cancer preventive, nematicide, hypercholesterolemic, lubricant.

Among the identified compound 9,12,15-octadecatrienoic acid (z,z,z)-which is linoleic acid compound and reported to have an anti-inflammatory, anti-arthritic, hypocholesterolemic, hepatoprotective, anti-cancer, anti-histaminic, anti-acne, nematicide, insectifuge and anti-eczemic properties (Sharmila *et al*., 2016). Similarly, the presence of 9-octadecenoic acid was observed in the ethanolic root of plumbagozeylanica by Ajayi *et al*., 2011). Hexadecanoic ethyl ester has anticancer, anti inflammatory, antimicrobial, diuretic, hepatoprotective, antiarthritic, anti oxidant flavor activities. Present investigation reported hexadecanoic ethyl ester in the methanolic extract of entire plant of kylling triceps (Siddabathuni *et al*., 2014). N – Hexadecanoic acid has antioxidant, hypocholesterolemic, nematicide, pesticide, lubricant, antiandrogenic, flavor, hemolytic 5-alpha reductaseinhibitor activities (Harada *et al*, 2002; Graikou *et al.,* 2011, Parveen *et al*, 2010).

Conclusion

In this present study about 30 compounds are identified from ethanol extract of *R. humilis* by GC-MS method. This study helps to predict the biomolecules which can be

used as drugs. It enhances the traditional usage of *R. humilis* which posses some known and unknown bioactive compounds. However, isolation of individual phytochemical constituents and subjecting it to pharmacological activity will definitely give valuable results (Sharmila *et al*, 2016).

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