

GC-MS Analysis of *Tribulus terrestris*. I

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ABSTRACT

In this study, the bioactive compounds of *Tribulus terrestris* have been evaluated using GC-MS. The chemical compositions of the whole plant methanol extract of *Tribulus terrestris* were investigated using Perkin-Elmer Gas Chromatography - Mass Spectroscopy. GC-MS analysis of *Tribulus terrestris* whole plant methanol extract revealed the existence of the major compound α -Amyrin(65.73).

Keywords : GC-MS analysis Bioactive compounds *Tribulus terrestris*, Methanol extract.

INTRODUCTION

Tribulus terrestris is a flowering plant in the family Zygophyllaceae. Natural products perform various functions and many of them have interesting and useful biological activities. There are more than 35,000 plants species being used in various human cultures around the world for medicinal purpose. Biologically active compounds present in medicinal plants have always been of great interest to scientist working in this field (Koshy Philip *et al* 2011).

Tribulus terrestris extract is commonly used in the folk medicine also for control of blood pressure and cholesterol. There are reports showing that this extract decreases blood cholesterol level in humans, rats and mice (Chu *et al.*, 2003).

In Irag *Tribulus terrestris* is used in folk medicine as tonic, aphrodisiac, analgesic, astringent, stomachic, anti-hypertensive, diuretic lithon-triptic and urinary anti- infectives (Majeed and mahmood, 1988; Saad Aldein, 1986).

The fruits are regarded as cooling diuretic, tonic and aphorodisiac and are used in painful micturition, calculous affections, urinary disorders and importance. An infusion made from the fruit has been as a diuretic, in gout, kidney disease and gravel also used largely in two Punjab as aphrodisiac.

In south of France and in the southern countries of Europe the roots and the leaves are considered tonic and aperients.

In traditional Chinese medicine, the plant *Tribulus terrestris* L. has long been used for the treatment of catenous pruritus, edema and inflammation, but no detailed studies concerning the related active components have been reported (Jiangsu New Medical Collges, 1977)

MATERIALS AND METHODS

Plant material

Tribulus terrestris was collected from Tamil university, Campus ,Thanjavur District,Tamil Nadu in India and Identified by Prof.Dr.A.Rajendran ,Research Gaide,Dept of Botany, Bharathiar University, Coimbatore.

Preparation of extract

The Sample were dried and Pulverized to powder in a mechanical grinder.Required quantity of the whole plant powder of *Tribulus terrestris* was weighted ,transferred to flaske, treated with the Methanol until the powder was fully immersed,incubated over night and filtered through a Whatmann No.41 filterpaper along with Sodium sulphate was wetted with absolute alcohol.The filtrate is then concentrated to 1ml by bubbling nitrogen gas in to the solution. The extract contains both polar and non-polar components of the material and 2ul sample of the solution was employed in GC-MS for analysis of different compounds.

GC – MS analysis

The GC – MS analysis was carried out using a Clarus 500 Perkin – elmer (Auto system XL) Gas Chromatograph equipped and coupled to a mass detector Turbo mass gold – Perkin Elmer Turbomass 5.1 spectrometer with an Elite – 1 (100% Dimethyl poly siloxane), 30m x 0.25 mm ID x 1µm of capillary column. The instrument was set to an initial temperature of 110°C, and maintained at this temperature for 2 min. At the end of this period the oven temperature was rose up to 280°C, at the rate of an increase of 5°C/min, and maintained for 9 min. Injection port temperature was ensured as 250°C and Helium flow rate as one ml/min. The ionization voltage was 70eV. The samples were injected in split mode as 10:1. Mass spectral scan range was set at 45-450 (m/z).

Using computer searches on a NIST Ver.2.1 MS data library and comparing the spectrum obtained through GC – MS compounds present in the plants sample were identified.

Identification of phytochemicals

Interpretation on mass-spectrum GC-MS was conducted using the database of National institute Standard and Tecnology (NIST)having more 62,000 patterns. The spectrum of the unknown components was compared with the The spectrum of known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials were ascertained.

RESULTS AND DISCUSSION

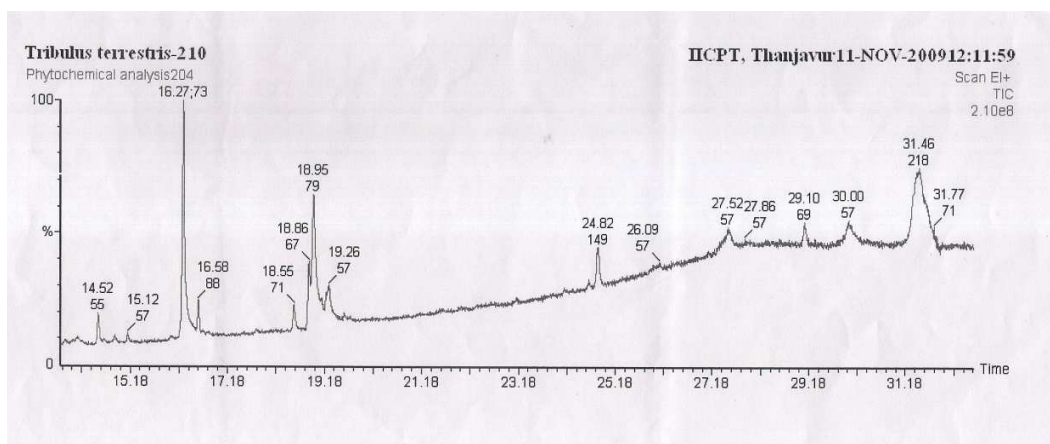
The studies on the active principles in the *Tribulus terrestris* whole plant Methanolic extract by GC-MS analysis clearly showed the presence of nine compounds (Tab-1). The active principles with their retention time (RT), molecular formula, molecular weight (MW), and concentration (peak area%) are presented in Table-1. The GC-MS chromatogram of the seven peak of the compounds detected was shown in Figure-1. Chromatogram GC-MS analysis of the methanol extract of *Tribulus terrestris*. Showed the presence of major peaks and the components corresponding to the peaks were determined as follows, Nine compounds were detected in methanolic extracts of *Tribulus terrestris*. The results revealed that α -Amyrin (65.73%) was found as the one major component in the methanol extract and the eight minor components such as 3,7,11,15-tetramethyl-2-hexadecen-1-ol (1.04%), n-hexadecadienoic acid (8.83%), Hexadecadienoic acid, ethyl ester (0.74%), Phytol (0.99%), 9,12-Octadecadienoic acid (z,z) (1.86%), 9,12,15-Octadecatrienoic acid (z,z,z) (8.58%), Octadecanoic acid (2.95%), 1,2-Benzenedicarboxylic acid, diisooctyl ester (9.27%), and α -Amyrin (65.73%).

The GC-MS spectrum shows the presence of more long chain hydrocarbons. When the number of carbon atoms increases in the molecule, hydrophilicity is reduced and the lipophilicity is increased. Increased lipophilicity of a drug decreases its transport across intestinal epithelial cells (Wils *et al* 1994).

Mussaenda frondosa is one of the medicinally important plants belonging to the family Rubiaceae, commonly known as "Vellai ilai" in Tamil. Traditionally leaves are used in the treatment of jaundice, asthma, hyperacidity, ulcers, leprosy, diuretic, wound, swells, antimicrobial, diuretic activity, hypolipidemic effect, hepatoprotective activity, fever and cough. In the present study the ethanolic extract of *Mussaenda frondosa* has been subjected to GC-MS analysis. Twenty chemical constituents have been identified, The major chemical constituents are (-)-Quinic acid (32.87%), 4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol (8.30%), Naphthalene, decahydro-2-methoxy- (7.20%), 1, 2, 3-Benzenetriol (7.70%), (Gopalakrishnan and Vadivel., 2011). (Table 1 & Fig 1)

Table 1. GC – MS analysis of *Tribulus terrestris*

S. No.	RT	Name of the compound	Molecular Formula	MW	Peak Area%
1	14.52	3,7,11,15-tetramethyl-2-hexadecen-1-ol	C ₂₀ H ₄₀ O	296	1.04
2	16.27	n-Hexadecadienoic acid	C ₁₆ H ₃₂ O ₂	256	8.83
3	16.58	Hexadecadienoic acid, ethyl ester	C ₁₈ H ₃₆ O ₂	284	0.74
4	18.55	phytol	C ₂₀ H ₄₀ O	296	0.99
5	18.86	9,12-Octadecadienoic acid (z,z)-	C ₁₈ H ₃₂ O ₂	280	1.86
6	18.95	9,12,15-Octadecatrienoic acid, (z,z,z)-	C ₁₈ H ₃₆ O ₂	278	8.58
7	19.26	Octadecanoic acid	C ₁₈ H ₃₄ O ₂	284	2.95
8	24.82	1,2-Benzenedicarboxylic acid, diisooctyl ester	C ₂₄ H ₃₈ O ₄	390	9.27
9	31.46	α -Amyrin	C ₃₀ H ₅₀ O	426	65.73

Fig 1. GC – MS analysis of *Tribulus terrestris*

CONCLUSION

In the present study twenty chemical constituents have been identified from Methanolic extract of the whole plant of *Tribulus terrestris* by Gas Chromatogram Mass spectrometry (GC-MS) analysis. The presence of various bioactive compounds justifies the use of whole plant various ailments by traditional practitioners.

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