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GC-MS analysis of bioactive compounds in methanolic stem extract of *Equisetum debile* Roxb. ex Vaucher: An endangered medicinal plant

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Abstract

The present study, the bioactive compounds of *Equisetum debile* stem powder extracted with methanol was analyzed by using Gas Chromatography-Mass Spectroscopy. GC-MS analysis of *E. debile* stem extract revealed the existence of major peaks presented in methanol were Sym-Tetra methyl dimethoxy disiloxane (R.T:2.59); 1-(4-Hydroxy-3-methoxy phenyl)-1-ethoxyacetic acid ethyl ester (R.T:7.16); 2- Pentadecanone (R.T: 18.11); Hexadecanoic acid (R.T:18.94); 9-Octadecenal (R.T: 21.22); Stigmast-5-en-3-ol (R.T:28.61).

Keywords: GC-MS analysis, bioactive compounds, *E. debile*, methanol extract

1. Introduction

India has one of the oldest, richest and most diverse cultural traditions associated with the use of medicinal and aromatic plants. The country has a great heritage of medicinal plant use from early Vedic period. Like in many other indigenous countries (or) civilizations across the World, Indian indigenous communities have possessed (or) accumulated vast Knowledge on multifarious uses of plants and other natural resources found around them. Living close to nature and by trail, error, empirical reasoning and experimentation, the indigenous societies have developed their own unique wealth of knowledge pertaining to conservation and sustainable use of plants, animals and other natural resources. Medicinal plants constituted one of the major groups of plant resources used by Indians science four millennia. The tribal peoples of many countries are still using the medicinal plants to cure various ailments ^[1]. Plants based natural constituents can be derived from any part of the plant like bark, leaves, roots, flowers, fruits, seeds ^[2]. Plants are the traditional sources for many chemicals used as a pharmaceutical biochemical, fragrances, food colors and flavors ^[3]. Medicinal plants are at great interest to the researcher in the field of biotechnology, as most of the drug industries depends in part on plants to produce pharmaceutical compounds.

2. Materials and Methods

2.1 Plant material: The fresh plant of *Equisetum debile* of Equisetaceae family were from Paderu forest division in Visakhapatnam district of Andhra Pradesh, India, and deposited in Herbarium Dept. of Botany, Osmania University, Hyderabad.

2.2 Preparation of extract: Five hundred grams of course powder shade dried of whole plant of *E. debile* was extracted successively with methanol in soxhlet extractor for 72 hours. Dark green residues were obtained after concentrating the extract under reduced pressure. The obtained extract was stored in desicator for GC-MS for analysis of different compounds.

2.3 Gas Chromatographic Mass Spectroscopy (GC-MS) analysis

GC-MS analyses of methanol extract were performed using a Shimadzu QP2010 Gas-Chromatography–Mass spectroscopy. It employed a fused silica column packed with Elite -5 ms [5% Diphenyl 95% Dimethyl poly siloxane, 30 mm × 0.25 mm × 0.25 μm df] and the components were separated using helium as carrier gas at a constant flow of 1ml / min. The 2 μl sample extract injected in to the instrument. It was detected by the turbo gold mass detector with aid of Turbo mass 5.2 software. During the GC Process the oven was maintained at temperature of 110 °C with 2 min holding. The injector temperature was set at 250 °C. The inlet line temperature was 200 °C and source temperature was 200 °C. Mass spectra were taken at 70 eV, a scan period of 0.5 S and fragment from 45 - 450 Da. The MS detection was completed in 35 min.

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Interpretation on mass spectrum GC-MS was conducted using the database of National Institute standard and technology (NIST and WILEY) having more than 62,000 patterns. The spectrum of unknown components stored in the NIST and WILEY library [4].

3. Results

The bioactive compounds in methanol extracts of *E.debile* stem by GC-MS report (Figure 1). The GC-MS analysis revealed the major constituents were Sym-Tetra methyl dimethoxy disiloxane (R.T:2.59); 1-(4-Hydroxy-3-methoxy phenyl)-1-ethoxyacetic acid ethyl ester (R.T:7.16); 2-Pentadecanone (R.T: 18.11); Hexadecanoic acid (R.T:18.94); 9-Octadecenal (R.T: 21.22); Stigmast-5-en-3-ol (R.T:28.61) presented (Table 1). Earlier studies on phytochemical

investigation of leaf extracts of *Jisticia adhatoda* by GC-MS analyzed the presence of Hexadecanoic acid [5], similar work was reported for phytochemical constituents in leaf extract of *Clerodendrum phlomidism* [6], leaf extract of *Melia azedarach* [7], methanol extract of *Vernonia cinerea* [8], leaf extracts of *Stylosanthes fruticosa* [9] and GC-MS analysis of bioactive compounds of *Leucas lavandulaefolia* [10].

The GC-MS chromatogram shows the peak area separation of the compounds. The above methanol isolated compounds from the methanol extract of stem of *E.debile* new scientific strategies for the evaluation of natural products with specific biological activities require the implementation of large scale screening process. Further study of these phytoconstituents may prove the medicinal importance in future.

Table 1: Phytoconstituents identified in the methanol extract of *E. debile*

S. No	Compound Name	Formulation	Molecular weight(g/mol)	Peak area %	R.T.
1.	Sym-Tetra methyl dimethoxy disiloxane	C ₆ H ₁₈ O ₃ Si ₂	194.376	8.20%	2.59
2.	1-(4-hydroxy-3-methoxy phenyl)-1-ethoxyacetic acid ethyl ester	C ₁₈ H ₂₈ O ₅ Si	326.464	1.43%	7.16
3.	2-Pentadecanone	C ₁₅ H ₃₀ O	226.404	1.52%	18.11
4.	Hexadecanoic acid	C ₁₆ H ₃₂ O ₂	256.43	2.92%	18.94
5.	9-Octadecenal	C ₁₈ H ₃₄ O	266.469	10.47%	21.22
6.	Stigmast 5-en-3-ol	C ₂₉ H ₅₀ O	414.718	2.64%	28.61

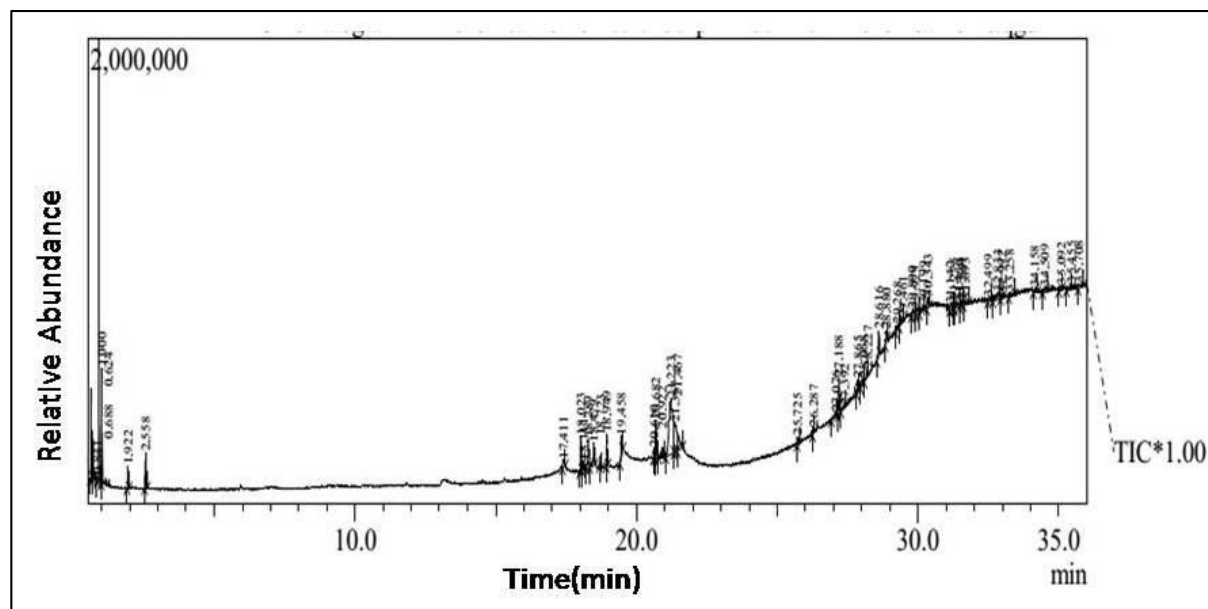


Fig 1: GC-MS Profile of Methanol extract of *E. debile*

4. Conclusion

Equisetum debile is a plant, traditionally used for the treatment of hepatoprotective, hypoglycemic, antipyretic, antidiarrheal and wound healing etc. But till date, there are few reports on chromatographic analysis of methanol extract of the whole plant. Here we report the presence of some important compounds in this plant isolated by GC-MS analysis. Thus, this type of study may give information on nature of active principles present in the medicinal plants. These identified phytoconstituents presumed to be responsible for electing the traditional activity of this plant *E. debile*.

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6. References

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