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GC-MS Analysis of bioactive components on aerial parts of *Cissus quadrangularis* L.

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ABSTRACT

Medicinal plants are the backbone of traditional medicine. The present study of phytochemical analysis of aerial parts of Cissus quadrangularis L. Var-I with 50% alcoholic extract, the phytochemical compounds were investigated using Perkin-Elmer Gas Chromatography-Mass Spectroscopy. In these GC-MS analysis 30 phytochemical compounds predominantly Acid derivatives are present included Fatty Acid, Fatty Acid Ester, Alcoholic Compounds and Hydrocarbon. This analysis revealed that the existence of n-hexadecanoic acid. These different active phytochemicals have been found to possess a wide range of biological activities.

Key Words: (GC-MS, Phytochemicals, *Cissus quadrangularis* L, Hexadecanoic acid and Alcoholic extract)

INTRODUCTION

Biologically active compounds from natural sources have always been of great interest to scientists working on infectious diseases. Plant kingdom represents a vast emporium of untapped medicinal potential. Medicinal plants are used in large proportion by the Indian population, the reasons for the use includes their effectiveness with no harmful side effects, low cost, easy access and ancestral experience [1]. *Cissus quadrangularis* L. Var-I (Quadrangular Stemmed) (Synonym: *Vitis quadrangularis* L.) is perennial plant of the grape family (Vitaceae). It is found mostly in the hotter parts of the world, such as India, Srilanka, South Africa, Thailand, Malaya and Philippines [2-6]. *Cissus quadrangularis* is commonly used in the alterative, diaphoretic, stomachic, emmenagouge, antireumatic [7-9], bone fracture, intestine worm control, whooping cough, scurvy [10-12], urinary tract infection, eczema, asthma, obesity, menstrual problems and anti-ulcer [13-18].

MATERIALS AND METHODS

The aerial parts of *Cissus quadrangularis* were collected during flowering period at reddish clay loam soil from Arumbavur, Perambalur Dist., Tamil Nadu in India. The botanical identity was authenticated by Dr. M. Jegadeesan, Professor and Head, Dept. of Environmental and Herbals Sciences, Tamil University, Thanjavur, Tamilnadu. Specimens were further confirmed with reference to Herbarium sheet available in the Botanical Survey of India, Southern Circle, Coimbatore.

PREPARATION OF EXTRACT

The samples were collected and dried under shade. The dried materials were powdered mechanically. Required quantity of the powder was treated with aqueous alcohol (50%). The extract contains both polar and non-polar components of the material and 1µL of extract was employed in GC-MS for analysis of different compounds.

GC-MS ANALYSIS

The aqueous alcohol extract was examined in GC-MS for its chemical composition by GC-MS engine model GC-Clarus 500 Perkin Elmer and Computer Mass Library with a GC column Elite -1 (100% Methyl Poly Siloxane). The other conditions were as follows: Injector: GC-Clarus -500; Perkin Elmer; Carrier gas flow Helium 1ml/min; Split ratio – 1:25; Sample injected 1µL; Oven temperature- 110 ^{o}C; upto 270 ^{o}C at the ratio of 5 ^{o}C/min – 4min hold; Injector temperature 250 ^{o}C; Total GC- time 38min; MS inlet line temperature 200 ^{o}C; Source temperature 200 ^{o}C; Electron energy 70eV; Mass Scan 25-400; MS Time 39min.

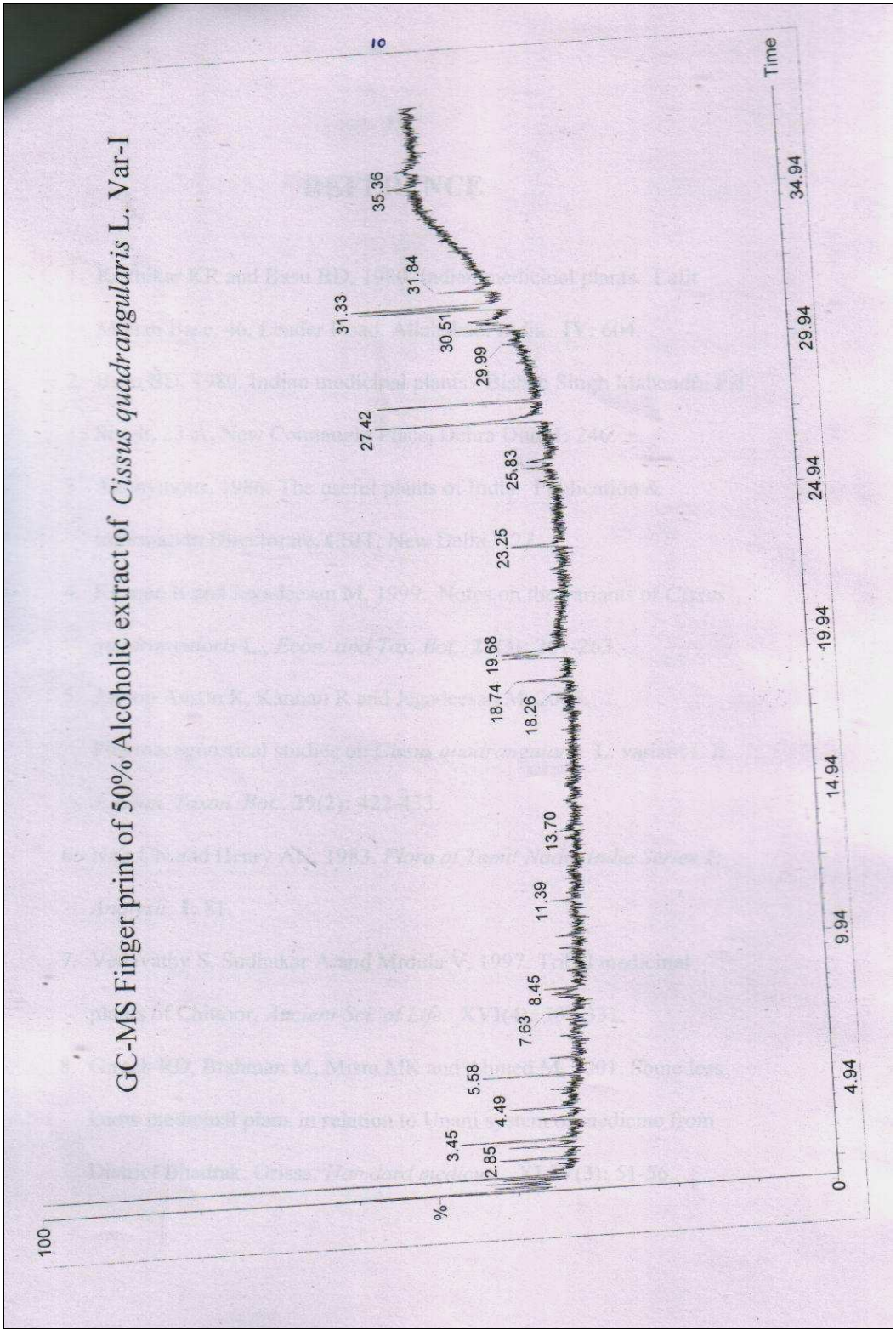
IDENTIFICATION OF PHYTOCHEMICAL COMPOUNDS

Interpretation of mass spectrum of GC-MS was done using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The mass spectrum of unknown components was compared with the spectrum of the known components stored in the NIST Library. The name, retention time, molecular weight and molecular formula of the components of the test materials were ascertained [19-21].

TABLE – 1 Identified phytochemical bio active compounds present in the aqueous alcoholic extract of aerial parts of *Cissus quadrangularis* L. using GC-MS

Sl. No.	Name of the Compounds	Retention Time	Molecular Formula	Molecular Weight	% Peak Area
1.	Ethan -1,1- diethoxy	2.27	$C_6H_{14}O_2$	118	11.62
2.	Glycerin	2.85	$C_3H_8O_3$	92	3.01
3.	2- Formylhistamine	3.25	$C_6H_9N_3O$	139	3.33
4.	Butanedioic acid - 2, 3 – bis (acetyloxy), (R, R*, R*)	3.455	$C_8H_{10}O_8$	234	4.43
5.	2 – Cyclopenten – 1 – one, 2 – hydroxyl	4.14	$C_5H_6O_2$	98	2.98
6.	Glycerin	4.49	$C_3H_8O_3$	92	3.47
7.	Benzene – 1, 2, 4 – trimethyl	5.58	C_9H_{12}	120	3.36
8.	Benzene – 1 – ethyl – 3 – methyl	6.15	C_9H_{12}	120	1.02
9.	DL – 3, 4 – Dimethyl – 3, 4 – hexanediol	7.63	$C_8H_{18}O_2$	146	2.02
10.	1, 3, 8 – P – Menthatrien	8.16	$C_{10}H_{14}$	134	0.62
11.	4H – Pyran – 4 – one, 2, 3 – dihydro – 3, 5 – dihydroxy – 6- methyl	8.44	$C_6H_8O_4$	144	1.58
12	2 – Furancarboxaladehyde, 5–(hydroxylmethyl)	9.81	$C_6H_6O_3$	126	0.89
13.	1, 2, 3– Propanetriol, monoacetate	10.19	$C_5H_{10}O_4$	134	0.82
14.	DL – 3, 4 – Dimethyl – 3, 4 – hexanediol	11.39	$C_8H_{18}O_2$	146	1.30
15.	Asarone	18.267	$C_{12}H_{16}O_3$	208	0.76
16.	Undecanoic acid	18.736	$C_{11}H_{22}O_2$	186	2.63
17.	Ethyl – d – glycopyranoside	19.54	$C_8H_{16}O_6$	208	4.01
18.	Phenol, 4 – (3 – hydroxyl – 1 – Propenyl) – 2 - methoxy	22.45	$C_{10}H_{12}O_3$	180	Trace
19.	Tetradecanoic acid	23.25	$C_{14}H_{28}O_2$	228	3.43
20.	n - Decanoic acid	25.37	$C_{10}H_{20}O_2$	172	0.79
21.	n – Hexadecanoic acid	27.42	$C_{16}H_{32}O_2$	256	11.65
22.	Tetradecanoic acid, ethyl ester	28.08	$C_{16}H_{32}O_2$	256	7.77
23.	Nonanoic acid, 5 – methyl, ethyl ester	29.99	$C_{12}H_{24}O_2$	200	Trace
24.	Phytol	30.51	$C_{20}H_{40}O$	296	3.06
25.	1, E – 11, Z – 13 – Octadecatriene	30.70	$C_{18}H_{32}$	248	1.19
26.	13 - Tetradece – 11 – yn – 1 – ol	30.795	$C_{14}H_{24}O$	208	3.51
27.	9, 12, Octadecadienoic acid, methyl ester (E, E)	31.23	$C_{19}H_{34}O_2$	294	7.12
28.	9, 12, 15 – Octadecatrienoic acid methyl ester (Z, Z, Z)	31.32	$C_{19}H_{32}O_2$	292	9.48
29.	Octadecanoic acid, ethyl ester	31.83	$C_{20}H_{40}O_2$	312	2.23
30.	Hexanedioic acid, mono (2- ethylhexyl) ester	35.36	$C_{14}H_{26}O_4$	258	1.90

Fig-1 GC-MS Profile of aqueous alcoholic extract of *Cissus quadrangularis* L.



RESULTS AND DISCUSSION

GC-MS chromatogram of the alcoholic extract of aerial parts of *Cissus quadrangularis* showed 30 peaks (Fig-1) indicating the presence of thirty bio-active compounds. Chemical compounds indentified with their molecular formula, molecular weight, retention time and % of peak area were presented in the Table -1. The result revealed that the presence of n-hexadecanoic acid(11.65%); ethan-1,1-diethoxy (11.62%); 9,12,15-octadecatrienoic acid – methyl ester (Z, Z, Z) (9.48%); tetradecanoic acid-ethyl ester (7.77%) and 9,12-octadecadienoic acid-methyl ester (E, E) (7.12%). The GC-MS analysis revealed that the 50% alcoholic extract is mainly composed of fatty acid, ester, phenolic compound and alcohol. These phytochemical compounds are responsible for various pharmacological actions like anti-ulcer [22-24], bone fracture [25, 26], anti-inflammatory [27-29] and antimicrobial activities [30-33]

CONCLUSION

In the present study thirty chemical constituents have been identified from alcoholic extract of aerial parts of *Cissus quadrangularis* by GC-MS analysis. The existence of various bioactive chemical compounds proves the use of this plant various ailment by traditional medical practitioners.

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