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'The GC MS Analysis of Ethyl Acetate Extract of One Herbal Plant, '*Cleome Viscosa*'

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Abstract

The present study deals with the GC MS analysis of one herbal medicinal plant, *Cleome viscosa*. Theplant was collected from paddy fields near Chengalpattu, Tamil Nadu, India and thewhole plant was subjected to ethyl acetate extraction. The extract was processed suitably to be used for GC MS analysis. The GC MS results indicated the presence of some important biomolecules such as n-Hexadecanoic acid, Oleic Acid, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, 1-Heptatriacotanol,Campesterol, Stigmasterol, .beta.-Sitosterol, Methyl 10, 13, 16-docosatrienoate which have various medicinal properties validating the medicinal role of this plant. Further work is on to isolate the compounds and studies them for their medicinal roles.

Key Words: GC MS, Ethyl acetate, n-Hexadecanoic acid, Oleic Acid, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, 1-Heptatriacotanol, Campesterol, Stigmasterol, .beta.-Sitosterol, Methyl 10, 13, 16-docosatrienoate

INTRODUCTION

Cleome viscosa, belonging to mustard family (Cleomaceae), is a common post rainy season plant available in plenty along road sides throughout India. Ethno-botanically this plant has various medicinal uses such as in rheumatic arthritis, hypertension, malaria, neurasthenia, and wound healing. Ethno-medicinally it is used for diarrhoea, fever, inflammation, liver diseases, bronchitis, skin diseases and the juice is useful in piles, lumbago, and earache. Some reports on the medicinal role of this plant are available. (Rajupt*et al,* 2012; Joshi *et al,* 2015). Pillai and Nair, 2013, have reported the antioxidant potential of methanol extract of *Cleome viscosa*. Wake *et al,* 2011 have studied the in-vitro antimicrobial activity of seed extracts of *Cleome viscosa*. Al-Humaidi*et al,* 2018, have shown the antioxidant role of related species of *Cleome* from Saudi Arabia. Uapadhyay, 2015

have elucidated the role of Cleome viscosa as natural source of pharmaceuticals and pesticides. Kavitha, 2017 has reported the GC MS and phytochemical constituents of *Cleome viscosa*. Kanimathi *et al*, 2019 have reported the GC MS profiles of seed extracts of three related species of genus *Cleome,* namely*, Cleome rutidosperma, Cleome gynandra*and *Cleome viscosa*.Deventhiran*et al*, 2017 have worked one comparative study of ethanol and chloroform extracts of the wild and micro-propagated*Cleome viscosa*. The present study is a continuation of our endeavour to scientifically validate the medicinal roles of herbal plants, Ayurvedic and Sidhha medicines.(Priyadarshini*et al,* 2017; Jayakumari*et al*, 2017; Rao*et al,* 2018; Vijayalakshmi and Rao, 2019; Yuvaraj*et al*, 2019; Mutteyi*et al,* 2019, Rao*et al*, 2019; Mutteyi*et al,* 2020; Vijayalakshmi and Rao, 2020; Janaki*et al*, 2021).

MATERIALS AND METHODS

The plant *Cleome viscosa*was collected from the nearby hills at Chengalpattu, Tamil Nadu. The plant was identified by a qualified botanist at Chennai. The ethyl acetate extract of the shade dried whole plant was collected after 48 h of soaking. The extract was evaporated and the dried powder was used for GC-MS analysis by standard procedures.

GC-MS Procedure

Instrument: GC (Agilent: GC: (G3440A) 7890A. MS/MS: 7000 Triple Quad GCMS) was equipped with MS detector.

Sample Preparation

About 100 ml sample was dissolved in 1 ml of suitable solvents. The solution was stirred vigorously using vortex stirrer for 10 s. The clear extract was determined using GC for analysis.

GC-MS Protocol

Column DB5 MS (30 mm × 0.25 mm ID ×0.25 µm, composed of 5% phenyl 95% methylpolysiloxane), electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1 ml/min injector temperature 280°C; auxilary temperature: 290°C ion-source temperature 280°C.

The oven temperature was programmed from 50°C (isothermal for 1.0 min), with an increase of 40°C/min, to 170°C C (isothermal for 4.0 min), then 10°C/min to 310°C (isothermal for 10 min) fragments from 45 to 450 Da. Total GC running time is 32.02 min. The compounds are identified by GC-MS Library (NIST and WILEY).

RESULTS AND DISCUSSION

The results of the GC-MS analysis of the whole plant ethyl acetate extract, along with the possible medicinal role of each molecule of*Cleome viscosa*extract are tabulated in Table 1. Figure 1

represents the GC-MS profile of ethyl acetate extract of the whole plant of *Cleome viscosa.* The identification of metabolites was accomplished by comparison of retention time and fragmentation pattern with mass spectra in the NIST spectral library stored in the computer software (version 1.10 beta, Shimadzu) of the GC-MS along with the possible pharmaceutical roles of each bio molecule as perDr. Duke's Phytochemical and ethno-botanical data base (National Agriculture Library, USA) and others as shown in Table 1.

The results indicated the presence of some important biomolecules such as n-Hexadecanoic acid, Oleic Acid, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, 1-Heptatriacotanol, Campesterol, Stigmasterol, .beta.-Sitosterol, Methyl 10,13,16-docosatrienoate which have various medicinal properties validating the medicinal role of this plant. Further work is on to isolate the compounds and studies them further for their medicinal roles.

CONCLUSION

From the above results it can be concluded that *Cleome viscosa* is a very important herb, which should be further exploited to be used as an effective medicine.

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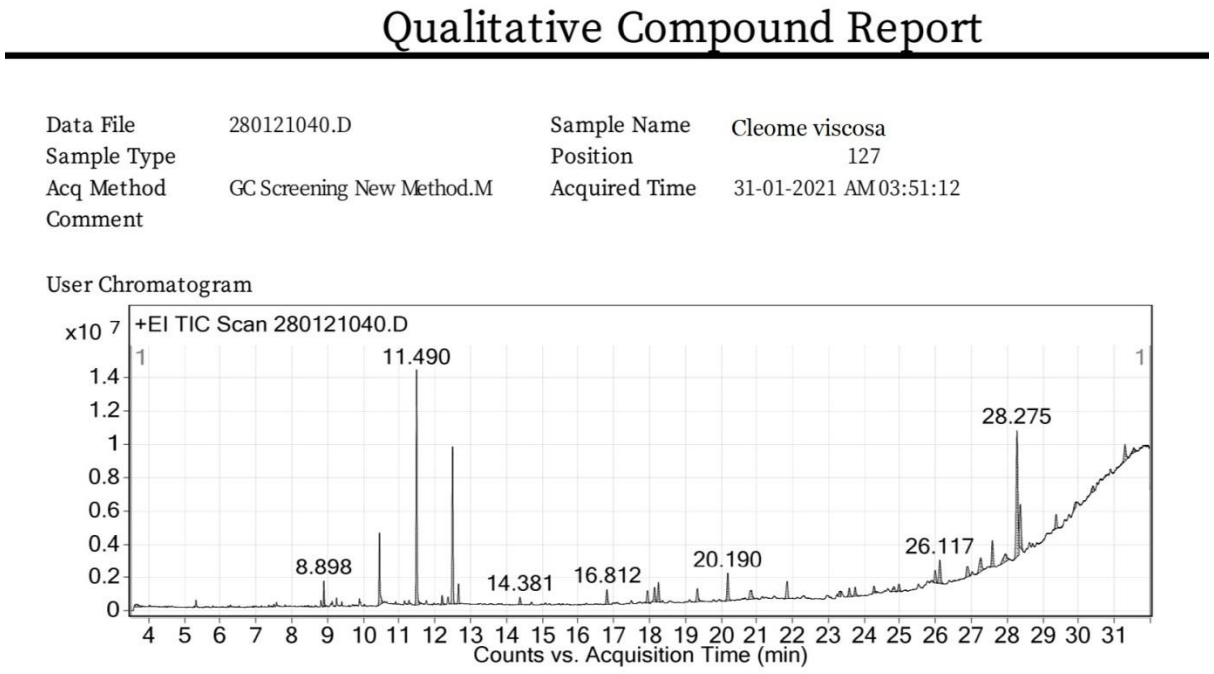

Figure 1. Shows the GC MS profile graph of ethyl acetate extract of*Cleome viscosa*

Table1. Indicates the retentions time, types of possible compound, molecular formula, molecular mass,

percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile of

Cleome viscosa

Ret. Time	Compound	Mol. Formula	Mol. Mass	% peak Area	Possible Medicinal Role
8.90	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-	C10H18	138.1	1.65	Not known
10.45	n-Hexadecanoic acid	C16H32O2	256.2	5.97	Anaphylactic, Antitumor, Arylamine-N-Acetyltransferase-Inhibitor, Decreases Norepinephrine Production, Down regulates nuclear and cytosol androgen reuptake, GABA-nergic, Increases natural killer cell activity, Inhibits Production of Tumor Necrosis Factor, Myo-neuro-stimulant
11.49	Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.)-(.+/-.)-	C10H20O	156.2	18.38	Not known
12.20	Oleic Acid	C18H34O2	282.3	0.97	Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity
12.50	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	C20H40O	296.3	19.45	Oligosaccharide Provider
12.66	Methyl 8,11,14-heptadecatrienoate	C18H30O2	278.2	1.65	Oligosaccharide Provider
16.81	Dodecane, 1-fluoro-	C12H25F	188.2	1.79	Not known
17.94	Androstan-17-one, 3-ethyl-3-hydroxy-, (5.alpha.)-	C21H34O2	318.3	1.47	Not known
18.25	2-((Octan-2-yloxy)carbonyl)benzoic acid	C16H22O4	278.2	2.22	Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity
19.34	Sulfurous acid, butyl heptadecyl ester	C21H44O3S	376.3	1.77	Acidifier, Arachidonic acid inhibitor, Increases Aromatic

					Amino acid Decarboxylase activity
20.19	Squalene	C30H50	410.4	3.46	Monooxygenase inhibitor, biochemical precursor in the preparation of steroids, natural moisturizer, used in cosmetics
20.85	1-Decanol, 2-hexyl-	C16H34O	242.3	2.02	Not known
24.98	Ethyl 5,8,11,14,17-icosapentaenoate	C22H34O2	330.3	1.00	Not known
25.99	4,7,10,13,16,19-Docosahexaenoic acid, methyl ester, (all-Z)-	C23H34O2	342.3	1.68	Not known
26.89	1-Heptatriacotanol	C37H76O	536.6	3.93	Antibacterial, anticancer, antiprotozoal, chemo-preventive, anti-inflammatory, antimalarial, anti-flu, antiviral, enzyme inhibitor, anti-hyper-cholesterolemic
27.26	Campesterol	C28H48O	400.4	3.17	Plant steroid use as food additive and has cholesterol lowering role
27.59	Stigmasterol	C29H48O	412.4	3.70	Precursor of progesterone , acts as intermediate in the biosynthesis of androgens and estrogens, anti-osteoarthritic, antihypercholesterolemic, cytotoxic, antitumor, hypoglycemic, antimutagenic, antioxidant, anti-inflammatory, analgesic
27.95	Neoisolongifolene, 8-bromo-	C15H23Br	282.1	2.49	Not known
28.28	.beta.-Sitosterol	C29H50O	414.4	18.23	17 beta dehydrogenase inhibitor, androgen blocker, anti-amyloid beta, anticancer, Anti TGF beta, Beta 2- receptor, beta blocker, beta-galactosidase inhibitor, beta-glucuronidase inhibitor
29.37	Ethyl 6,9,12,15,18-heneicosapentaenoate	C23H36O2	344.3	1.85	Not known
31.29	Methyl 10,13,16-docosatrienoate	C23H40O2	348.3	2.61	Catechol-O-methyl-Transferase Inhibitor, methyl Donar, Methyl Guanidine Inhibitor