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‘The Gc Ms Analysis Of Ethyl Acetate Extract Of One Herbal Plant, ‘Gmelina Asiatica’

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ABSTRACT

The present study deals with the GC MS analysis of one medicinal plant, **‘**Gmelinaasiatica.**’**Gmelinaasiaticais a wild shrub belonging to family Lamiaceae. Roots, leaves, young shoots of Gmelinaasiatica are considered to be medicinal in traditional medicine. This plant was collected from nearby hills of Chengalpattu, Tamilnadu. The ethyl acetate extract of the aerial parts of the plant was subjected to GC MS study following standard protocols. It was observed that some very important molecules such as 7-Octadecyne, 2-methyl-, Ethyl 13-methyl-tetradecanoate, Oleic Acid, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, Methyl 8,11,14,17-eicosatetraenoate, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, trans-Geranylgeraniol, dl-.alpha.-Tocopherol, Oleyl alcohol, trifluoroacetate, Ursodeoxycholic acid, Stigmasterol, .alpha.-N-Normethadol, .beta.-Amyrin, betulin,etc. These molecules have far reaching medicinal roles which correspond to the reports of its medicinal values of Gmelinaasiatica.

Keywords GC MS, Gmelinaasiatica, Sulfurous acid, butyl heptadecyl ester, trans-Geranylgeraniol, dl-.alpha.-Tocopherol, Oleyl alcohol, trifluoroacetate, Ursodeoxycholic acid, Stigmasterol, .alpha.-N-Normethadol, .beta.-Amyrin

INTRODUCTION

Gmelinaasiaticais a wild shrub belonging to family Lamiaceae. Roots, leaves, young shoots of Gmelinaasiatica are considered to be medicinal in traditional medicine. Use of leaves and aerial parts in treatment of jaundice and other hepatic diseases by some tribes in Tamil Nadu (Apparanthamet al, 1982) and another tribe for body heat (Vikneshwaranet al, 2008). Roots, bark, fruit, leaves, and young shoots are used in various medicines in Sri Lanka (Jayaweera, 1982). Florence and Jeeva, 2016 have reported the anticancer property of this plant. Girija and Ravindhran have demonstrated the antioxidant potential of this plant. Shibuet al, 2012 have reported the antibacterial role of different parts of this plant. Ismail et al, 1997 have reported the mechanism of action of this plant's extract on inflammation. Merlin and Parthasarathy, 2011 have reported the antioxidant and hepato-protective role of extracts of this plant.The present works deals with the GC MS analysis of the ethyl acetate extract of the aerial parts of Gmelinaasiatica. This work is in continuation of our work to establish the efficacy of the herbal plants, Ayurvedic and Sidhha medicines. (Priyadarshiniet al, 2017; Jayakumariet al, 2017; Raoet al, 2018; Vijayalakshmi and Rao, 2019; Yuvarajet al, 2019; Mutteviet al, 2019, Raoet al, 2019; Mutteviet al, 2020; Vijayalakshmi and Rao, 2020; Janakiet al, 2021, Perumalet al, 2021).

MATERIALS AND METHODS

The plant Gmelinaasiaticawas collected from the nearby fills at Chengalpattu, Tamil Nadu. The plant was identified by a qualified botanist at Chennai. The ethyl acetate extract of the shade dried leaves were 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

sing 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 ofGmelinaasiaticaextract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of Gmelinaasiatica**.** The identification of metabolites as 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 per Dr. Duke's Phytochemical and ethno-botanical data base (National Agriculture Library, USA) and others as shown in Table 1. From the results it was observed that this plant contained some very important biomolecules such as 7-Octadecyne, 2-methyl-, Ethyl 13-methyl-tetradecanoate, Oleic Acid, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, Methyl 8,11,14,17-eicosatetraenoate, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, trans-Geranylgeraniol, dl-.alpha.-Tocopherol, Oleyl alcohol, trifluoroacetate, Ursodeoxycholic acid, Stigmasterol, .alpha.-N-Normethadol, .beta.-Amyrin, betulin, which have potential medicinal roles that correspond to the claim that Gmelinaasiaticais a potent shrub with many medicinal roles.

CONCLUSION

Thus it can be concluded that due to the presence of these molecules, Gmelinaasiaticahas the medicinal roles for which it is used. Further work to isolate and understand the molecular mechanism is warranted.

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Figure 1. Shows the GC MS profile graph of ethyl acetate extract ofGmelinaasiatica

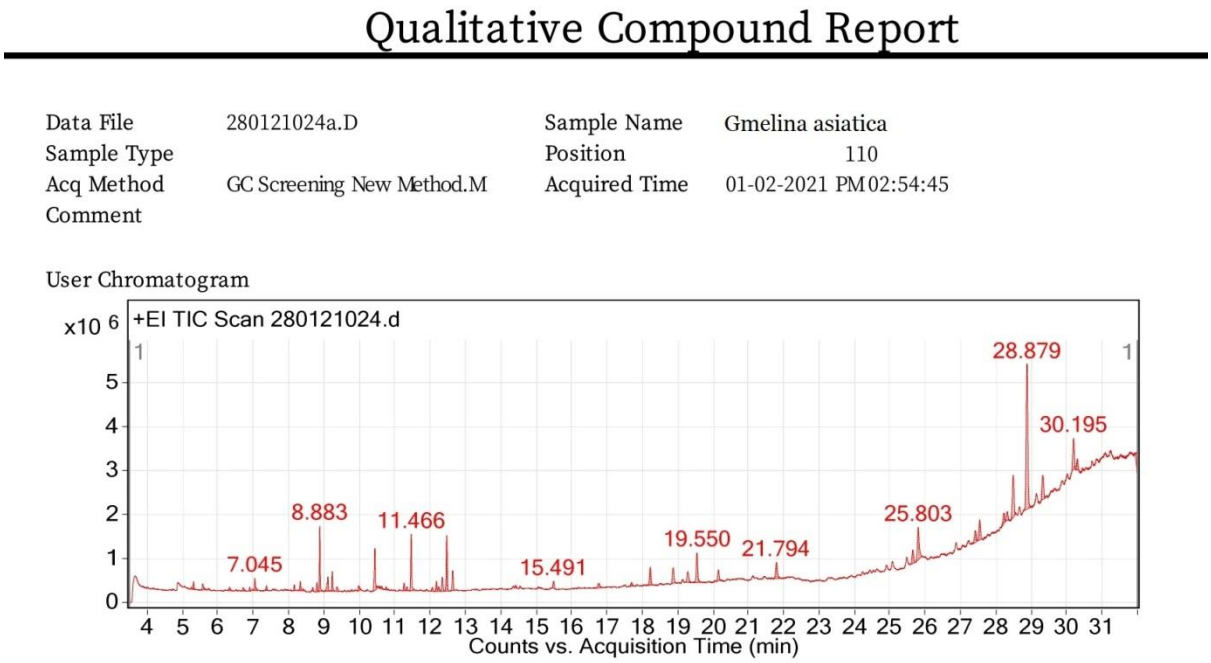

Table1. Indicates the retention time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile ofGmelinaasiatica

Ret. Time	Molecule	Mol. Formula	Mol. mass	% Peak Area	Possible Medicinal Role
7.05	(-)-Aristolene	C15H24	204.2	1.13	Not Known
8.88	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-	C10H18	138.1	4.41	Not Known
9.11	9,12-Octadecadienoic acid (Z,Z)-	C18H32O2	280.2	1.72	Not Known
9.24	7-Octadecyne, 2-methyl-	C19H36	264.3	1.41	Catechol-O-methyl-Transferase Inhibitor, methyl Donar, Methyl Guanidine Inhibitor
10.44	Ethyl 13-methyl-tetradecanoate	C17H34O2	270.3	3.68	Catechol-O-methyl-

					Transferase Inhibitor, methyl Donar, Methyl Guanidine Inhibitor
11.47	Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.)-(.+/-.)-	C10H20O	156.2	5.08	Not Known
12.18	Oleic Acid	C18H34O2	282.3	0.94	Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity
12.35	9,12-Octadecadienoyl chloride, (Z,Z)-	C18H31ClO	298.2	1.37	Not Known
12.47	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	C20H40O	296.3	5.50	Oligosaccharide provider
12.64	Methyl 8,11,14,17-eicosatetraenoate	C21H34O2	318.3	1.98	Catechol-O-methyl-Transferase Inhibitor, methyl Donar, Methyl Guanidine Inhibitor
18.23	2-((Octan-2-yloxy)carbonyl)benzoic acid	C16H22O4	278.2	2.47	Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity
19.29	Sulfurous acid, butyl heptadecyl ester	C21H44O3S	376.3	1.60	Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity
19.55	Butyl 4,7,10,13,16,19-docosahexaenoate	C26H40O2	384.3	4.31	Not Known
20.15	trans-Geranylgeraniol	C20H34O	290.3	1.44	Catechol-O-Methyl-Transferase-Inhibitor,

					Increases Glutathione-S-Transferase (GST) Activity, Decreases Glutamate Oxaloacetate Transaminase, Decreases Glutamate Pyruvate Transaminase, Glucosyl-Transferase-Inhibitor, Glutathione-S-Transferase-Inhibitor, Increases Glyoxalate Transamination, Reverse-Transcriptase-Inhibitor, Transdermal
21.79	1-Decanol, 2-hexyl-	C16H34O	242.3	2.61	Not Known
25.65	dl-.alpha.-Tocopherol	C29H50O2	430.4	2.06	Tocopherol synergist, 5 alpha reductase inhibitor, Alpha agonist, Alpha amylase inhibitor, Alpha glucosidase inhibitor, HIF-1 alpha inhibitor, Ikappa B-alpha phosphorylation inhibitor, Increase alpha mannosidase activity, Interleukin 1-alpha inhibitor, Testosterone-5-Alpha-Reductase-Inhibitor, TNF- alpha inhibitor
25.80	Oleyl alcohol, trifluoroacetate	C20H35F3O2	364.3	5.68	Alchol dehydrogenase inhibitor, Detoxifying
27.42	Ethanol, 2-(9-octadecenyloxy)-, (Z)-	C20H40O2	312.3	1.87	Not known

28.23	Ursodeoxycholic acid	C24H40O4	392.3	1.50	Acidifier, acidulant, Arachidonic acid inhibitor, Increase aromatic amino acid decarboxylase activity, inhibits production of Uric acid
28.32	1-Oxacyclopentadecan-2-one, 15-isopropenyl	C17H30O2	266.2	1.21	Not known
28.49	Stigmasterol	C29H48O	412.4	6.51	Precursor of progesterone , acts as intermediate in the biosynthesis of androgens and estrogens, anti-osteoarthritic, antihypercholesterolemic, cytotoxic, antitumor, hypoglycemic, antimutagenic, antioxidant, anti-inflammatory, analgesic
28.88	.alpha.-N-Normethadol	C20H27NO	297.2	22.88	5, alpha-reductase inhibitor, alpha-amylase inhibitor, alpha-glucosidase inhibitor, alpha-reductase inhibitor, HIF 1 alpha inhibitor, increases alpha-N-mannosidase activity, interleukin-1 alpha inhibitor, testosterone 5-alpha reductase inhibitor TNF-alpha inhibitor,

					Arylamine N acetyltransferase inhibitor, decreases norepinephrine production, Down regulates nuclear and cytosol androgen reuptake, GABA-nergic, Increase NK cell activity, inhibits production of tumor necrosis factor
29.33	.beta.-Amyrin	C30H50O	426.4	3.91	17 beta hydroxysteroid dehydrogenase inhibitor, Antiamyloid beta, Anti TGF beta, Beta receptor agonist, Beta adrenergic receptor blocker, beta blocker, beta galactosidase inhibitor, beta glucuronidase inhibitor, ER beta binder
30.20	Betulin	C30H50O2	442.4	4.10	It has a role as a metabolite, an antiviral agent, an analgesic, an anti-inflammatory agent and an antineoplastic agent