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'The GC MS Analysis Of Ethyl Acetate Extract Of One Herbal Plant, '*Canthiumparviflorum* '

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Abstract

The present study deals with the GC MS analysis of one medicinal plant, **'***Canthiumparviflorum***'.** Ethno-pharmacologically this plant is used to treatdiarrhoea, fever, worm infestation, respiratory disorders, obesity and also as a diuretic. 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 Butanedioic acid, dimethyl ester, Butanedioic acid, hydroxy-, dimethyl ester, Benzoic acid, 1-Methyl-1-ethoxycyclobutane, Cyclopentanecarboxylic acid, 4-nitrophenyl ester, 1,5-Pentanediol, O,O'-divaleryl-, 3-Pyridinecarboxylic acid, 6-amino-, .beta.-D-Glucopyranose, 1,6-anhydro-, Methyl .beta.-d-galactopyranoside, Hexadecanoic acid, methyl ester, n-Hexadecanoic acid etc. were found in the GC MS profile of this plant which have far reaching medicinal roles, thereby supporting the medicinal value of this plant.

Key words: GC MS, *Cathiumparviflorum***,** Butanedioic acid, dimethyl ester, Butanedioic acid, hydroxy-, dimethyl ester, Benzoic acid, Hexadecanoic acid, methyl ester, n-Hexadecanoic acid

INTRODUCTION

Canthiumparviflorum is a wild bush having various ethno-medicinal uses. In Ayurveda it is known as Gangeruki, Chayatinisha. The roots and leaves of this plant are used to control diarrhoea, fever, worm infestation etc. In sidhha system of medicine this plant is used to treat respiratory disorders, obesity and as diuretic. Some reports on the medicinal role of this plant are available. Pulate*et al*, 2015 have studied the phytochemical, ethnomedicinal and anatomical aspects of *Canthiumparviflorum.* Palvai*et al*, 2014 and Kotebagilu*et al*, 2015 have discussed about the antioxidant parameters with reference to leavesof*Canthiumparviflorum***.** Radhakrishnan*et al*, 2016 reported the GC MS analysis of methanol, ethanol and hexane extracts of the leaves of *Canthiumparviflorum.*Prabhu*et al,* 2013, have also studied the GC MS patterns of ethanolic leaf extracts of this plant. The present works deals with the GC MS analysis of the ethyl acetate extract of the aerial parts of this plant. This work is in continuation of our work to establish the efficacy of the 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; Mutteviet *al,* 2019, Rao*et al*, 2019; Mutteviet *al,* 2020; Vijayalakshmi and Rao, 2020; Janaki*et al*, 2021).

MATERIALS AND METHODS

The plant *Canthiumparviflorum* 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

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 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*Canthiumparviflorum* extract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of *Canthiumparviflorum.* 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 per Dr. Duke's Phytochemical and ethnobotanical 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 Butanedioic acid, dimethyl ester, Butanedioic acid, hydroxy-, dimethyl ester, Benzoic acid, 1-Methyl-1-ethoxycyclobutane, Cyclopentanecarboxylic acid, 4-nitrophenyl ester, 1,5-Pentanediol, O,O'-divaleryl-, 3-Pyridinecarboxylic acid, 6-amino-, .beta.-D-Glucopyranose, 1,6-anhydro-, Methyl .beta.-d-galactopyranoside, Hexadecanoic acid, methyl ester, n-Hexadecanoic acid etc. with far reaching medicinal roles (Table 1) thus proving the ethno-medicinal role of this plant. Further work is warranted to isolate the compounds and study their individual roles to support the plants candidature for the medicinal value for which it is used.

CONCLUSION

Thus it can be concluded that due to the presence of these molecules, *Canthiumparviflorum*has 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 of *Cathiumparvifolium*

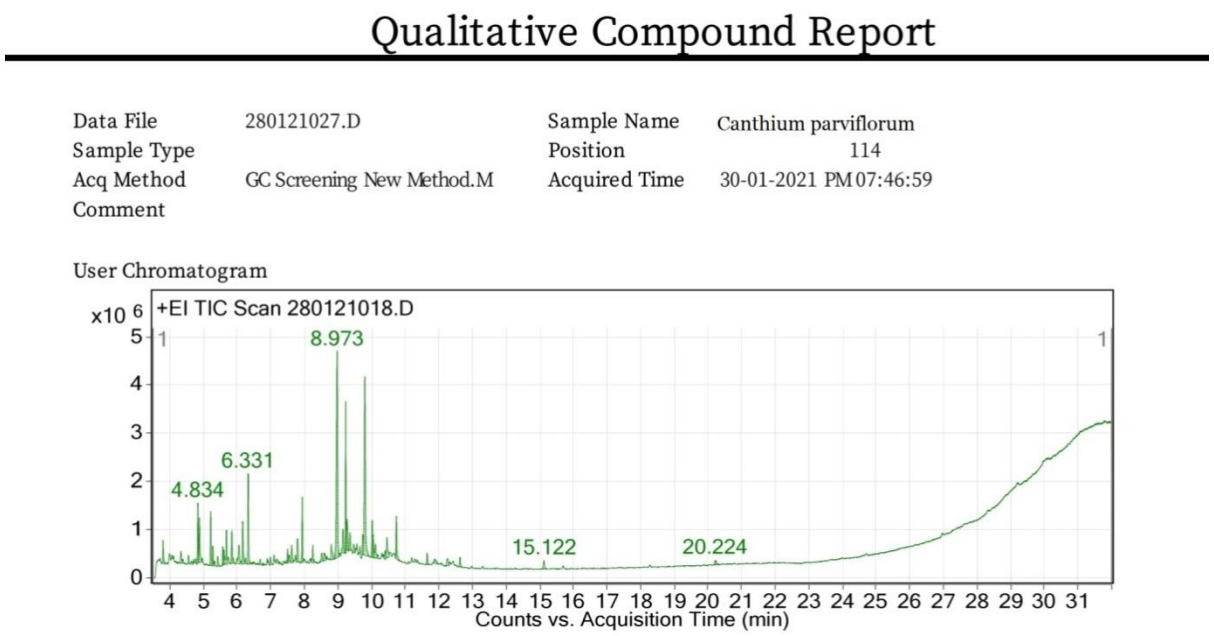

Table1.Indicates the retention time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile of*Canthiumparviflorum*.

Ret. Time	Compound	Mol. Formula	Mol. mass	% Peak Area	Possible medicinal role
3.80	Butanedioic acid, dimethyl ester	C6H10O4	146.1	1.25	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
4.83	Butanedioic acid, hydroxy-, dimethyl ester	C6H10O5	162.1	2.75	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier, 17 beta hydroxysteroid dehydrogenase inhibitor, Aryl

					hydrocarbon hydroxylase inhibitor, testosterone hydroxylase inducer
4.88	Benzoic acid	C7H6O2	122	3.15	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
5.21	Levoglucosenone	C6H6O3	126	2.90	Not known
5.28	2,4-Hexadienedioic acid, dimethyl ester, (E,Z)-	C8H10O4	170.1	1.10	Not known
5.58	3-Hydroxydecanoic acid	C10H20O3	188.1	1.06	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
5.61	Benzofuran, 2,3-dihydro-	C8H8O	120.1	1.41	Not known
5.69	Furane-2-carboxaldehyde, 5-(4-nitrophenoxymethyl)-	C12H9NO5	247	1.87	Not known
5.84	Valeric anhydride	C10H18O3	186.1	2.18	Not known
6.06	1-Methyl-1-ethoxycyclobutane	C7H14O	114.1	1.52	Catechol o methyl Transferase inhibitor, methyl donar, methyl guanidine inhibitor
6.17	1,4:3,6-Dianhydro-.alpha.-d-glucopyranose	C6H8O4	144	2.78	Not known
6.33	Cyclopentanecarboxylic acid, 4-nitrophenyl ester	C12H13NO4	235.1	4.87	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
7.62	Heptane, 1,1'-oxybis-	C14H30O	214.2	1.33	Not known
7.94	1,5-Pentanediol, O,O'-divaleryl-	C15H28O4	272.2	3.46	Aldehyde oxidase inhibitor, Catechol o methyl Transferase inhibitor, methyl donar, methyl guanidine inhibitor, anticancer, 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, N-Cholinolytic, NADH-Oxidase-Inhibitor, NADH-Ubiquinone-Oxidoreductase-Inhibitor
8.25	Methyl 4-oxo-2-heptenedioate	C9H12O5	200.1	1.08	Catechol o methyl Transferase

					inhibitor, methyl donar, methyl guanidine inhibitor
8.59	3-Pyridinecarboxylic acid, 6-amino-	C6H6N2O2	138	0.99	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
8.97	.beta.-D-Glucopyranose, 1,6-anhydro-	C6H10O5	162.1	20.09	17 beta hydroxysteroid dehydrogenase inhibitor, Antiamyloid beta, Anti TGF beta, Beta 2-receptor agonist, ER beta binder, alcoholdehydrogenase inhibitor, Beta-adrenergic receptor blocker, beta blocker, beta galactosidase inhibitor, anti-cancer, CNS depresssent, anti-leukotriene D4, Smart drug, beta glucuronidase inhibitor, ER beta binder, coronary dilator
9.15	1,5-Anhydro-d-mannitol	C6H12O5	164.1	1.97	Anhydrotic, smart drug, 17-beta hydoxysteroid dehydrogenase inhibitor, Alcohol dehydrogenase inhibitor, anticancer, anti-leukotriene D4, CNS depressant, coronary dilator, decalcifier, decrease C telopeptide excretion, decresesdeoxypyridinoline excretion, decreases endothelial leukocyte adhesion
9.23	1,6-Dioxaspiro[4.4]nonane, 2-ethyl-	C9H16O2	156.1	7.26	Not known
9.27	Methyl .beta.-d-galactopyranoside	C7H14O6	194.1	2.48	17 beta hydroxysteroid dehydrogenase inhibitor, Antiamyloid beta, Anti TGF beta, Beta 2-receptor agonist, ER beta binder, alcoholdehydrogenase inhibitor, Beta-adrenergic receptor blocker, beta blocker, beta galactosidase inhibitor, anti-cancer, CNS depressant, anti- leukotriene D4, Smart drug, beta glucuronidase inhibitor, ER beta binder, coronary dilator
9.36	.beta.-l-Arabinopyranoside, methyl	C6H12O5	164.1	1.25	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, 12-Lypoxygenase inhibitor, Anti-LDL
9.80	1,6-Anhydro-.alpha.-d-galactofuranose	C6H10O5	162.1	17.69	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
10.04	Hexadecanoic acid, methyl ester	C17H34O2	270.3	1.41	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
10.11	1,3-Propanediol, 2-butyl-2-ethyl-	C9H20O2	160.1	1.31	Not known
10.46	n-Hexadecanoic acid	C16H32O2	256.2	1.86	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier, Anaphylactic, 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, Myo-neuro-stimulator