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'The Gc Ms Analysis Of Ethyl Acetate Extract Of One Herbal Plant, 'Aristolochia Bracteolata'

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ABSTRACT

The present study deals with the GC MS analysis of one medicinal plant, 'Aristolochiabracteata. Ethno-pharmacologically this plant has medicinal roles such as stimulant, tonic, purgative and emmenagouge. This plant was collected from nearby fields 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 1,2,4-Cyclopentanetrione, 3-methyl-, 4(1H)-Pyridone, trans-3-Methyl-2-n-propylthiophane, 3-Hydroxydecanoic acid, Acetic acid, trifluoro-, anhydride, Lactose, 2-(N-Morpholinyl)ethylphosphine, Benzaldehyde, 2-hydroxy-6-methyl-, Trifluoromethyl t-butyl disulphide, .beta.-D-Glucopyranose, 1,6-anhydro-, 9-Decenoic acid, 1,6-Anhydro-.beta.-D-glucofuranose, Myo-Inositol, 4-C-methyl-, alpha.-D-Xylofuranoside, methyl 3-O-methyl-, 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.

Keywords GC MS, Aristolochiabracteolata, 1, 2, 4-Cyclopentanetrione, 3-methyl-, 4(1H)-Pyridone, trans-3-Methyl-2-n-propylthiophane, 3-Hydroxydecanoic acid

INTRODUCTION

A small plant belonging to Arisolochiaceae family, Aristolochiabracteolataor Aristolochiabracteata,

has many ethnopharmacological uses. Almost all parts of the plant are used as medicine. It is used to treat insect and spider bites, worm infestations and eczema. It has medicinal roles such as stimulant, tonic, purgative and emmenagouge. Some reports on pharmacological roles of this plant are available. Kavitha and Nirmaladevi, 2009, have reported the assessment of bio-therapeutic potential of Aristolochia bracteolate.Mohamed et al, 2014 have reported the antimicrobial activities of this plant. Abdelgadiret al, 2011 have isolated and characterized the Aristolochic acid of this plant. Krishnappa and Elumalai, 2012, have studied the toxicityof methanolic leaf extract on mosquitoes. Thirumalai, 2012 has overviewed on the pharmacognostical, phytochemical and pharmacological properties of this plant. Kanakavlliet al, 2015, have reported the antimicrobial activity of Aristolochiabracteolata. Mutteviet al, 2020 have reported the GC MS patterns of a related species, Aristolochiaindica. The present works deals with the GC MS analysis of the ethyl acetate extract of

the aerial parts of Aristolochia bracteolate. 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 Aristolochiabracteolatawas collected from the nearby fields 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 ofAristolochiabracteolataextract are tabulated in Table 1. Figure 1

represents the GC-MS profile of ethyl acetate extract of the whole plant of Aristolochiabracteolata. 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 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 as1,2,4-Cyclopentanetrione, 3-methyl-, 4(1H)-Pyridone, trans-3-Methyl-2-n-propylthiophane, 3-Hydroxydecanoic acid, Acetic acid, trifluoro-, anhydride, Lactose, 2-(N-Morpholinyl)ethylphosphine, Benzaldehyde, 2-hydroxy-6-methyl-, Trifluoromethyl t-butyl disulphide, .beta.-D-Glucopyranose, 1,6-anhydro-, 9-Decenoic acid, 1,6-Anhydro-.beta.-D-glucofuranose, Myo-Inositol, 4-C-methyl-, alpha.-D-Xylofuranoside, methyl 3-O-methyl-, 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 Aristolochia bracteolate.

CONCLUSION

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

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REFERENCES

1. Kavitha, D., Nirmaladevi, R. (2009) Assessment of Aristolochiabracteolata leaf extracts for its biotherapeutic potential. African Journal of Biotechnology, 8(17), 4242-4244

2. Mohamed, M. S., Idriss, M. T., Khedr, A. I. M., AlGadir, H. A., Takeshita, S., Shah, M. M., Ichinose, Y., Maki, T. (2014)Activity of Aristolochiabracteolate against Moraxella catarrhalis. Int J Bacteriol. 2014: 481686.

3. Abdelgadir,A. A., Ahmed, E. M., Eltohami,M. H. (2011)Isolation, Characterization and Quantity Determination of Aristolochic Acids, Toxic Compounds in Aristolochiabracteolata L. First Published February 27, 2011.https://doi.org/10.4137/EHI.S6292

4. Krishnappa, K., Elumalai, K. (2012) Toxicity of Aristolochiabracteata methanol leaf extract against selected medicallyimportant vector mosquitoes (Diptera: Culicidae). Asian Pacjific J of Trop Dis, 2(2), 5553-5557.

5.Thirumal, M. (2012) Aristolochiabraceolata: An Overview on Pharmacognostical, Phytochemical and Pharmacological Properties, Critical Review. Pharmaceutical Sciences**,** 1 (1), 70-85

6. Kanakavalli., Kaniyan.,Mohanapriya., Hemalatha., Parthiban., Samraj.,Thillaivanan. (2015) A review on anti-microbial herbs in siddha medicine. IJPPR, 7(1), 72-75

7. MutteviHyagreva Kumar, Prabhu, K, Mudiganti Ram Krishna Rao, Lakshmisundram, R., Sampad,Shil, Sathish Kumar, M., Vijayalakshmi, N.(2020)The GC MS study of one medicinal plant, Aristolochiaindica .DIT, 12(12), 2919-2923.

8. GomathiPriyadarshini, Arul Amutha Elizabeth, Jacintha Anthony, Mudiganti Ram Krishna Rao, Prabhu. K., Aiswarya Ramesh, Vani Krishna. (2017) The GC MS analysis of one medicinal plant, Premnatomentosa. Journal of Pharmaceutical Sciences and Research, 9(9), 1595-1597

9. Jayakumari, S., Prabhu, K., Mudiganti Ram Krishna Rao, Bhupesh, G., Kumaran, D., Aishwariya Ramesh. (2017) The GC MS Analysis of a Rare Medicinal Plant Aloe barbadensis. J. Pharm. Sci. & Res.9(7), 1035-1037

10. Rao, M. R. K., Vijayalakshmi, N. (2018) Preliminary phytochemical and GC MS analysis of different extracts of Sphaeranthusindicus leaves. Indo American J of Pharmaceuical Sciences, 5(3), 1511-1520

11. Vijayalakshmi, N., Mudiganti Ram Krishna Rao. (2019) The antioxidant studies of two medicinal plants, Sphaeranthusindicusand Psophocarpustetragonolobus.Asian J of pharmaceutical and Clinical Res, 12(1), 321-327.

12. Yuvaraj, R., Mudiganti Ram Krishna Rao, Prabhu, K., Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N. (2019)The GC MS study of one medicinal plant, Stachyterphetaindica.Drug Invention Today, 12(9), 1665-1669

13. MutteviHyagreva Kumar, Prabhu, K., Mudiganti Ram Krishna Rao, Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N. (2019)The GC MS study of one medicinal plant, Dodoneaangutifolia. Drug Invention Today, 12(9), 1661-1664

14. Mudiganti Ram Krishna Rao, Vijayalakshmi, N., Prabhu, K., Sathish Kumar, M. (2019)The gas chromatography–mass spectrometry study of Moringaoleiferaseeds. DIT, 12(10), 2172-2175

15. MutteviHyagreva Kumar, Prabhu, K., Mudiganti Ram Krishna Rao, Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N.(2020)The GC MS study of one medicinal plant, AristolochiaIndica .DIT, 12(12), 2919-2923.

16. Vijayalakshmi, N., Mudiganti Ram Krishna Rao. (2020) 'Preliminary phytochemical and antioxidant studies of leaf extracts of one medicinal plant, Vitexnegundo".RJPT, 13(5), 2167-2173

17. Janaki C. S.', Prabhu K., Mudiganti Ram Krishna Rao,VenkatRamaiah, ShrutiDinkar, Vijayalakshmi, N., Kalaivannan. J. (2021) The GC MS analysis of Ethyl acetate extract of Merremiaemerginata'.Ind J of Natural Sciences, 12(67), 33638-33646

18. Perumal, G. M., Prabhu, K., Rao, M. R. K.,Janaki, C. S., Kalaivannan, J., Kavimani, M. (2021) The GC MS analysis of Ethyl acetate extract of 'Flueggealeucopyrus. Nat. Volatiles & Essential Oils, 8(5), 4035-4040

18. Dr.Duke's Phytochemcial and Ehnobotanical Databases.U.S. Department of Agriculture, Agricultural Research Service.1992-2016. Dr. Duke's Phytochemical and Ethnobotanical Databases. Home Page, http://phytochem.nal.usda.gov/ http://dx.doi.org/10.15482/USDA.ADC/1239279

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

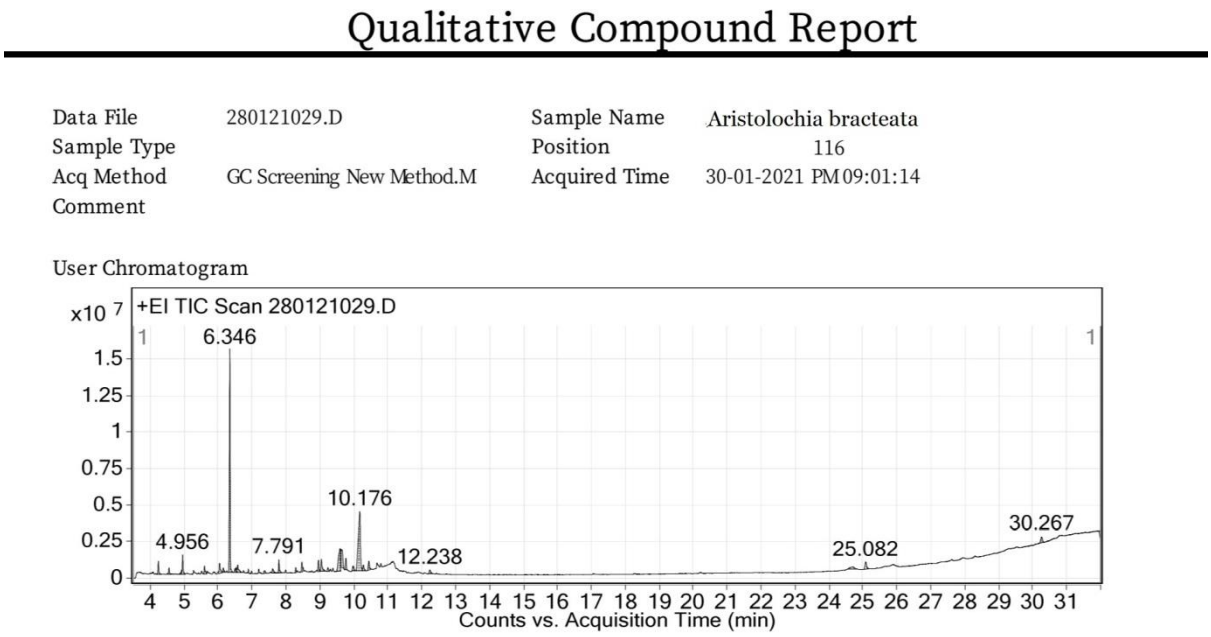

Table1. Indicates the retention time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile of Aristolochiabracteolata

Ret. Time	Molecule	Mol. Formula	Mol. mass	% Peak area	Possible medicinal role
4.24	1,2,4-Cyclopentanetrione, 3-methyl-	C6H6O3	126	2.06	Catechol-O-Methyl-Transfearse inhibitor, Methyl donar
4.55	4(1H)-Pyridone	C5H5NO	95	1.09	11Beta HSD inhibitor, 17-beta-hydroxysteroid dehydrogenase inhibitor, 5 HETE inhibitor, 5 HT inhibitor, 8 HETE inhibitor, Anti 5-HT, Anti HIV integrase, Aryl hydrocarbon hydroxylase inhibitor, HDL genic, Hematopoietic
4.92	2,5-Furandicarboxaldehyde	C6H4O3	124	0.82	Not known
4.96	trans-3-Methyl-2-n-	C8H16S	144.1	2.96	Catechol-O-Methyl-Transfearse

	propylthiophane				inhibitor, Increases Glutathione-s-Transferase Activity, Decrease Glutamate Oxaloacetate transaminase activity, Decreases Glutamate pyruvate transaminase, Glycosyltransferase inhibitor, Glutathione-S-Transfearse inhibitor, Increases glyoxalate transamination, Reverse transcriptase inhibitor, 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
5.60	Benzofuran, 2,3-dihydro-	C8H8O	120.1	1.70	Not known
6.04	3-Hydroxydecanoic acid	C10H20O3	188.1	2.50	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
6.15	3,4-Methylpropylsuccinimide	C8H13NO2	155.1	0.87	Not known
6.35	Acetic acid, trifluoro-, anhydride	C4F6O3	210	34.30	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
6.53	2-Methoxy-4-vinylphenol	C9H10	150.1	0.85	Not known

		O2			
6.58	Lactose	C12H22O11	342.1	2.15	It is milk protein
7.37	1,3,5-Benzenetriol	C6H6O3	126	0.85	Not known
7.61	2-(N-Morpholinyl)ethylphosphine	C6H14NOP	147.1	1.31	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, N-Cholinolytic, NADH-Oxidase-Inhibitor, NADH-Ubiquinone-Oxidoreductase-Inhibitor
7.79	Benzaldehyde, 2-hydroxy-6-methyl-	C8H8O2	136.1	2.32	17 beta hydroxysteroid dehydrogenase inhibitor, Arylamine-N-Acetyltransferase-Inhibitor, Testosteron hydroxylase inducer, Catechol o methyl Transferase inhibitor, methyl donar, methyl guanidine inhibitor
8.29	Ethyl pipecolinate	C8H15NO2	157.1	0.78	Not known
8.47	Trifluoromethyl t-butyl disulfide	C5H9F3S2	190	1.58	Blood thinner, C telopeptide inhibitor, Catechol o methyl Transferase inhibitor, Decrease Glutamate Oxaloacetate transaminase activity, Decreases Glutamate pyruvate transaminase, Glycosyltransferase inhibitor,

					Glutathione-S-Transfearse inhibitor, DNA topoisomerase inhibitor, decreae thromboxane activity
8.95	.beta.-D-Glucopyranose, 1,6-anhydro-	C6H10 O5	162.1	2.09	17-beta-hydroxysteroid dehydrogenase inhibitor, Antiamyloid-Beta, Anti TGF-Beta, Beta-2-Receptor-Agonist, Beta-Adrenergic receptor blocker, Beta Galactosidase inhibitor, Beta-Glucuronidase inhibitor, Aldehyde oxidase inhibitor
9.04	9-Decenoic acid	C10H18 O2	170.1	3.15	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
9.23	Methyl 6-O-[1-methylpropyl]-.beta.-d-galactopyranoside	C11H22 O6	250.1	0.82	Not known
9.76	1,6-Anhydro-.beta.-D-glucofuranose	C6H10 O5	162.1	1.81	17-beta-hydroxysteroid dehydrogenase inhibitor, Antiamyloid-Beta, Anti TGF-Beta, Beta-2-Receptor-Agonist, Beta-Adrenergic receptor blocker, Beta Galactosidase inhibitor, Beta-Glucuronidase inhibitor, Aldehyde oxidase inhibitor, anti-leukotrine D4, ER beta binder
9.98	1-Penten-3-one	C5H8O	84.1	1.38	Not known
10.18	Myo-Inositol, 4-C-methyl-	C7H14 O6	194.1	25.29	Myo-neuro stimulant, myocardiotonic,myolytic, myo relaxant, Catechol-O-Methyl-

					Transfearse inhibitor, Methyl donor, Methyl guanidine inhibitor
10.28	.alpha.-D-Xylofuranoside, methyl 3-O-methyl-	C7H14O5	178.1	1.38	Catechol-O-Methyl-Transferase-Inhibitor, Methyl-Donor, Methyl-Guanidine-Inhibitor, Decrease Glutamate Oxaloacetate Transaminase, Decrease Oxalate Excretion, Down regulation of nuclear and cytosol androgen reuptake, Inhibit Destruction of Glycosaminoglycans, Ornithine-Decarboxylase-Inhibitor, 5-Alpha-Reductase-Inhibitor, Alpha-Agonist, Alpha-Amylase-Inhibitor, Alpha-Glucosidase-Inhibitor, Alpha-Reductase-Inhibitor, HIF-1alpha-Inhibitor, IkappaB-alpha-Phosphorylation-Inhibitor, Increase Alpha-Mannosidase Activity, Interleukin-1-alpha-Inhibitor, Testosterone-5-Alpha-Reductase-Inhibitor, TNF-alpha-Inhibitor
10.45	n-Hexadecanoic acid	C16H32O2	256.2	2.26	Acidifier, Acidulant, Arachidonic acid-Inhibitor, Increase Aromatic Amino Acid Decarboxylase Activity, Inhibit Production of Uric Acid, Anaphylactic, Antitumor, Arylamine-N-Acetyltransferase-Inhibitor, Decrease Norepinephrine Production, Down regulation of nuclear and cytosol androgen reuptake, GABA-nergic, Increase

					Natural Killer (NK) Cell Activity, Inhibit Production of Tumor Necrosis Factor, Myo-neuro-stimulant
12.24	Octadecanoic acid	C18H36O2	284.3	1.13	Acidifier, Acidulant, Arachidonic acid-Inhibitor, Increase Aromatic Amino Acid Decarboxylase Activity, Inhibit Production of Uric Acid
25.08	Isomethadone	C21H27NO	309.2	2.46	Not known
30.27	Betulin	C30H50O2	442.4	2.08	It has a role as a metabolite, an antiviral agent, an analgesic, an anti-inflammatory agent and an antineoplastic agent