Nat. Volatiles & Essent. Oils, 2021; 8(4): 6338-6346

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

Ganesan Muruga Perumal[1], Prabhu K[2], Rao MRK[3*], Janaki C. S.[4], Kalaivannan J[5], Kavimani M[1]

[1]Professor, Department of Anatomy, SreeBalaji Medical College and Hospital, Chennai, Tamil Nadu, India.

[2] Associate Professor, Department of Anatomy, SreeBalaji Medical College and Hospital, Chennai, Tamil Nadu, India.

[3*]Consultant Scientist, M/s. Noahs Laboratories, No, 8/1, Old Mahabalipuram Road, Thiruporur, Tamil Nadu 603110, India.

[4] Associate Professor, Department of Anatomy, Bhaarath Medical College and Hospital, Chennai, Tamil nadu, India.

[5]Associate Professor, Department of Anatomy, Vinayaka Mission’s Medical College and Hospital, Karikal, Vinayaka Mission’s Research foundation, Salem, Tamil nadu, India.

ABSTRACT

The present study deals with the GC MS analysis of one medicinal plant, ‘Muntingiacalabura’. The plant ‘Muntingiacalabura’ was collected from the nearby fields at Chengalpattu, Tamil Nadu. The ethyl acetate extract of the aerial parts of the plant was subjected to GC MS study following standard protocols. I was observed that some very important molecules such asn-Hexadecanoic acid, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, 1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) ester, Tridecanol, 2-ethyl-2-methyl-, Squalene, dl-.alpha.-Tocopherol, Campesterol, Stigmasterol, .beta.-Sitosterol, Betulin, Lupeol were shown in the GC MS profile of this plant. The medicinal roles of these molecules clearly indicate the curative properties of Muntingiacalabura, which is used to treat various diseases.

Keywords ; GC MS, Muntingiacalabura, n-Hexadecanoic acid, Squalene, dl-.alpha.-Tocopherol, Campesterol, Stigmasterol, .beta.-Sitosterol, Betulin, Lupeol

INTRODUCTION

Muntingiacalbura is used to treat various aliments ethno-medicinally. The flowersand bark of this plant is used as antiseptic and to reduce swelling of the legs. The decoction of leaves is used to treat gastric ulcers and swelling of prostate gland. The infusion of flowers is used as tonic and tranquilizer. The plant is also used to treat measles, mouth pimples and stomach ache. There a few reports on the medicinal roles of this plant.

Krishnaveniet al, 2015 have reported the GC MS and antibacterial studied of ethanolic extract of the leaf of Muntingiacalabura. Wong et al, 1996 have reported the volatile constituents of the fruits of Muntinigiacalabura. Triswaningsihet al. 2017a, b have worked on the estimation of chemical compounds present and antioxidant role of the Muntingiacalabura extracts. Zakariaet al, 2019 have studied the hepatoprotective role of Muntingiacalaburamethanolic leaf extracts. Saniet al, 2012 have reportedtheantinociceptive role of methanolic extracts of Muntingiacalabura. Krishnaveni and Dhanalakshmi, 2014 have worked on the qualitative and quantitative phytochemical studies of Muntingiacalabura leaf and fruits.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).

MATERIALS AND METHODS

The plant Muntingiacalaburawas 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 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 leaves of Muntingiacalaburaethyl acetate extract, along with the possible medicinal role of each molecule ofMuntingiacalaburaextract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of Muntingiacalabura. 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 database (National Agriculture Library, USA) and others as shown in Table 1. The results as mentioned in Table 1 indicated the presence of some important metabolites such as n-Hexadecanoic acid, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, 1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) ester, Tridecanol, 2-ethyl-2-methyl-, Squalene, dl-.alpha.-Tocopherol, Campesterol, Stigmasterol, .beta.-Sitosterol, Betulin, Lupeol. These molecules have some very important medicinal values which support the medicinal value of Muntingiacalabura.

CONCLUSION

The GC MS profile indicated the presence of some important biomolecules which could contribute to the medicinal role ofMuntingiacalabura

ACKNOWLEDGMENTS

The authors express their sincere thanks to all who have helped in this project.

REFERENCES

1. Krishnaveni, M., Banu, C. R., Kalaivani, M., Krishnakumari, G. (2015) GC MS/MS analysis of phytochemicals in Muntingiacalabura, antimicrobial assay.WJPR, 4(4), 1855-1859.

2. Wong, K. C., Chee,S. G., Er, C. C.(1996) Volatile Constituents of the Fruits of Muntingiacalabura L., Journal of Essential Oil Research, 8(4),423-426,

3. Triswaningsih, D., Kumalaningsih, S., Pratikto W. (2017) Estimation of Chemical Compounds and Antioxidant Activity of MuntingiaCalabura Extract. International Journal of ChemTech Research, 10(3), 17-23

4. Triswaningsih, D., Kumalaningsih,Wignyanto,Pratikto, S. (2017) Identification of chemical compounds cherry leaves (Muntingiacalabura) powder as a natural antioxidant.Int. J. Agron. Agri. Res.,10(5),84-91,

5. Zakaria, Z. A., Mahmood, N. D., Omar, M. H., et al. (2019) Methanol extract of Muntingiacalaburaleaves attenuates CCl_4-induced liver injury: possible synergistic action of flavonoids and volatile bioactive compounds on endogenous defence system. Pharm Biol., 57(1), 335–344.

6. Sani, M.H.M.,Zakaria. Z. A. et al. (2012)Antinociceptive Activity of Methanol Extract of Muntingiacalabura Leaves and the Mechanisms of Action Involved. Evid Based Compl Alt Med, 2012;doi: 10.1155/2012/890361

7. Krishnaveni, M., Dhanalakshmi, R. (2014) Qualitative and quantitative study of phytochemicals in Muntingiacalabura L. leaf and fruit. World Journal of Pharmaceutical Research, 3(6), 1687-1696.

8. GomathiPriyadarshini, Arul Amutha Elizabeth, Jacintha Anthony, Mudiganti Ram Krishna Rao, Prabhu. K., Aiswarya Ramesh, VaniKri,shna. (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. 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 ofMutingiacalabura

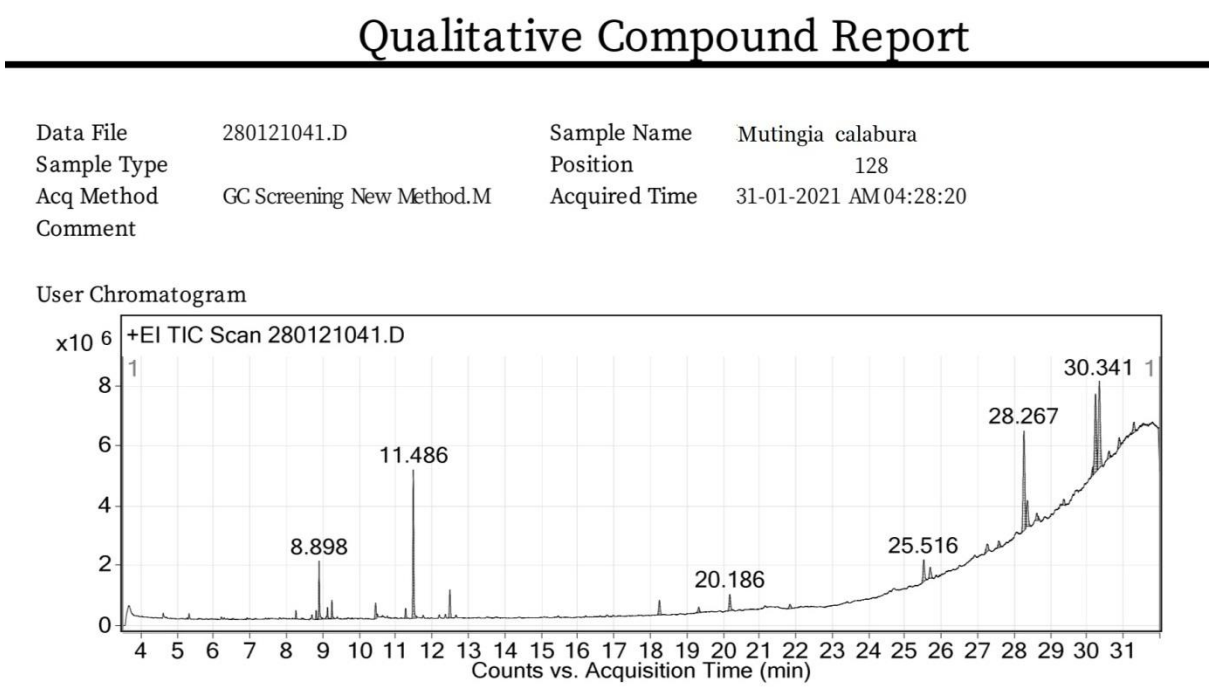

Table1. Indicates the retentions time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile ofMutingiacalabura.

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	4.54	Not Known
9.13	9-Octadecyne	C18H34	250.3	1.10	Not Known
10.45	n-Hexadecanoic acid	C16H32O2	256.2	1.63	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
11.49	Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.) -(.+/-.)-	C10H20O	156.2	13.83	Not known
12.49	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	C20H40O	296.3	2.87	Catechol-O-Methyl-Transfearse inhibitor, Methyl donar
18.25	1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) ester	C16H22O4	278.2	2.07	Monoamine precursor, Monooxygenase inhibitor, Squalenemonooxygenase inhibitor, acidifier,

					Arachidonic acid inhibitor, increases aromatic amino acid decarboxylase activity
19.33	Tridecanol, 2-ethyl-2-methyl-	C16H34O	242.3	0.82	Catechol-O-Methyl-Transfearse inhibitor, Methyl donor
20.19	Squalene	C30H50	410.4	2.45	Monooxygenase inhibitor, biochemical precursor in the preparation of steroids, natural moisturizer, used in cosmetics
25.52	4,5,6,7-Tetrahydro-benzo[c]thiophene-1-carboxylic acid allylamide	C12H15NOS	221.1	3.40	Not known
25.69	dl-.alpha.-Tocopherol	C29H50O2	430.4	1.74	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
27.26	Campesterol	C28H48O	400.4	1.55	Plant steroid use as food additive and has cholesterol lowering role
27.57	Stigmasterol	C29H48O	412.4	1.22	Precursor of progesterone act as intermediate in the biosynthesis of androgens

					and estrogens Antiosteoarthritic, antihypercholestrolemic, cytotoxic, antitumor, hypoglycaemic, antimutagenic, antioxidant, anti-inflammatory, Analgesic
28.27	.beta.-Sitosterol	C29H50O	414.4	17.75	17 beta dehydrogenase inhibitor, androgen blocker, anti-amyloid beta, anticancer, Anti TGF beta, Beta 2- receptor, beta blocker, beta-galactosidase inhibitor, beta-glucuronidase inhibitor
28.36	9-Eicosyne	C20H38	278.3	4.52	Not Known
28.62	Phytonadione	C31H46O2	450.4	1.15	Not Known
30.16	Betulin	C30H50O2	442.4	0.99	It has a role as a metabolite, an antiviral agent, an analgesic, an anti-inflammatory agent and an antineoplastic agent
30.24	Lupeol	C30H50O	426.4	14.17	Anti-inflammatory, anti-arthritic, anti-mutagenic and anti-malarial
30.34	1-Naphthalenepropanol, .alpha.-ethyldecahydro-.alpha.,5,5,8a- tetramethyl-2-methylene-, [1S-[1.alpha.(S*),4a.beta.,8a.alpha.]]-	C20H36O	292.3	15.84	Not known
30.61	9-Hexadecenoic acid, 9-octadecenyl ester, (Z,Z)-	C34H64O2	504.5	1.11	Not known

30.88	Isopropyl linoleate	C21H38O2	322.3	1.63	Not known
31.29	Butyl 9,12,15-octadecatrienoate	C22H38O2	334.3	1.84	Not known