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

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Abstract

The present study deals with the GC MS analysis of ethyl acetate extract of one herbal medicinal plant, *Aervalanata*. There are quite a number of scientific reports on the medicinal role of this plant. This plant was collected from nearby paddy fields at Chengalpattu, Tamilnadu. 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 as 3.alpha.,5.alpha.-Cyclo-ergosta-7,9(11),22t-triene-6.beta.-ol, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Squalene, dl-.alpha.-Tocopherol were shown in the GC MS profile of this plant. These molecules have far reaching medicinal roles which suggest the efficacy of this plant. Further work in this regard is warranted.

Key Words: GC MS, *Aervalanata,* Ethyl acetate, Squalene, dl-.alpha.-Tocopherol

INTRODUCTION

The present deals with the GC MS analysis of the ethyl acetate extracts of the aerial parts of one medicinal plant, *Aervalanata*. The medicinal roles of this plant are well documented. Gorakhaganja or*Aerva*lanata has many ethnomedicial roles. The root decoction is used to treat renal calculi, retention of urine and for gonorrhoea. Cold infusion is sued for congestion and sore throat. The dried powder of leaves and stem are burnt and the smoke is inhaled to treat asthma and cough. The GC MS profile, antioxidant and nutritional roles of *Aervalanata* was reported by Yadav, *et al*, 2019. The paste of the whole plant is applied to treat headache (Goyal*et al*, 2011). This herb is used as a decoction or as an herbal tea with or without other herbs in Ayurveda. It is believed that long-term ingestion of *Aervalanata* is harmful, as it has adverse effects on the urinary tract. Vidhya and Rajangam, 2015 have reported the GC MS results of ethanolic extracts of *Aervalanata.* Gunatilaka and Lokuhetty, 2012 have reported the effects of *Aervalanata* on the structure and function of urinary tract.Adepu*et al*, 2013 have reviewed the medicinal roles of *Aervalanata*. The aerial parts were found to be anti-helmintic by Rajesh *et al*, 2010.Arthi*et al*, 2012 and Ragavendran*et al,* 2012 have shown the antioxidant activity of the aqueous extract of this plant. The hypoglycemic and anti-hyperlipidemic role of this plant was reported by Krishnan *et al,* 2009.Adulmuthalib*et al*, 2017 have reported the antioxidant and anti-proliferative activities of *Aervalanata* flower extracts. Gujjeti et al, 2017 have reported the Anti HIV role of phytosterol isolated from the roots of *Aervalanata.*Thangavel*et al*, 2014 have done phytochemical, GC MS and antibacterial studies of this plant. This study is a part of our work to establish the medicinal efficacy of herbal medicines in line with modern parameters (Priyadarshini*et al,* 2017; Jayakumari*et al*, 2017; Rao*et al,* 2018; Vijayalakshmi and Rao, 2019; Yuvaraj*et al*, 2019; Mutteve*et al,* 2019, Rao*et al*, 2019; Mutteve*et al,* 2020; Vijayalakshmi and Rao, 2020; Janaki*et al*, 2021)

MATERIALS AND METHODS

The plant *Aervalanata*was collected from the nearby paddy fields 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*Aervalanata*extract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of *Aervalanata.* 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 ethno-botanical data base (National Agriculture Library, USA) and others as shown in Table 1. From Table 1 it is clear that the presence of some important molecules such as 3.alpha.,5.alpha.-Cyclo-ergosta-7,9(11),22t-triene-6.beta.-ol, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Squalene, dl-.alpha.-Tocopherol, which have medicinal roles which support the herbal value of *Aervalanata.*

CONCLUSION

The above results clearly indicate the medicinal value of *Aervalanata* as herbal medicinal plant. It is also interesting to note that there are many molecules, as shown in the GC MS profile, whose medicinal roles are not reported yet and further work in this direction is warranted.

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REFERENCES

1. Yadav, V. P., Aswathanarayana. R., Padmasree, M. S. (2019). "Study on gas chromatography and mass spectroscopy analysis, antioxidant, and nutritive properties of *Aervalanata* (l.) juss. collected

from selected regions of Shimoga, Karnataka, India". *Asian Journal of Pharmaceutical and Clinical Research*, 12, (2), 185-189.

2. Goyal, M., Pareek, Nagori, B. .D, Samal, D. (2011) *Aervalanata*.: A review on phytochemiistry and pahrmacologcal aspects. *PharmacognosyReveiws, 5(10)*,195-198

3. Vidhya, R., Rajangam, Y.(2015) Gas Chromatography-Mass Spectrometry (GC-MS) Analysis of Ethanolic Extracts of *Aervalanata* (L.) *International Journal of Biochemistry Research & Review,7(4),*192-203

4. Gunatilaka, M., Lokuhetty, M. D.S., Bartholameuz, et al. (2012). *Aervalanata* (Polpala): Its effects on the structure and function of the urinary tract. *Pharmacognosy Res*, *4(4),* 181-188.

5. Adepu, A.,Narala, S., Ganji, A., Chilvalvar, S. (2013) A Review on Natural Plant: *Aervalanata. International Journal of Pharma Sciences, 3(6),* 398-402

6. Rajesh, R., Chitra, K., Padmaa, M.Paarakh. (2010) *In vitro* anthelmintic activity of aerial parts of *Aervalanata* Linn Juss. *Int J Pharm Sci Drug Res., 2,*269-271.

7. Arthi. I., Subburaju, T., Lakshmi narayanan,.B, PradeepRajkumar, L. A. (2012) *In Vitro* Evaluation of Antioxidant Activity of Aqueous Extract of *Aervalanata*(L). *Journal of Pharmacy Research 5(1),* 66-68.

8. Ragavendran, P., Sophia,. D, Arul Raj, C., Starlin, T., Gopalakrishnan, V. K. (2012) Phytochemical screening, antioxidant activity of *Aervalanata*(L) – an in vitro Study. *Asian J Pharm Clin Res, 5(2),* 77-81.

9. Appia Krishnan, G., Rai, V. K., Nandy, B. C., Meena, K. C., Dey, S., Tyagi, P. K., Tyagi, L. K. (2009) Hypoglycemic and Antihyperlipidaemic Effect of Ethanolic Extract of Aerial Parts of *Aervalanata*Linn. in Normal and Alloxan induced Diabetic Rats. *IJPSDR,1(3),* 191-194.

10. Abdulmuthalib, U., Manjur Shah, M. (2017) Phytochemical screening on the antioxidant properties of Aervalanata flower extracts and their in vitro anti proliferative effects on human liver cancer cell line running head phytochemical screening of flower extracts of *Aervalanata.J Biol Nat, 7,* 81-90.

11. Gujjeti, R. P., Mamidala, E. (2017). Anti HIV Activity of phytosterol isolated from *Aervalanata* Roots. *Rev J Field Pharm, 9,112-116*

12. Thangavel, A., Balakrishnan, S., Aarthy, A., et al. (2014) Phytochemical screening, gas chromatography-mass spectrometry (GC-MS) analysis of phytochemical constituents and anti-bacterial activity of *Aervalanata* (L.) leaves. *African journal of pharmacy and pharmacology, 8(5),* 126-135

13. 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

14. 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

15. 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

16. 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.

17. 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

18. 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

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

20. 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.

21. 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

22. 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

23. 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

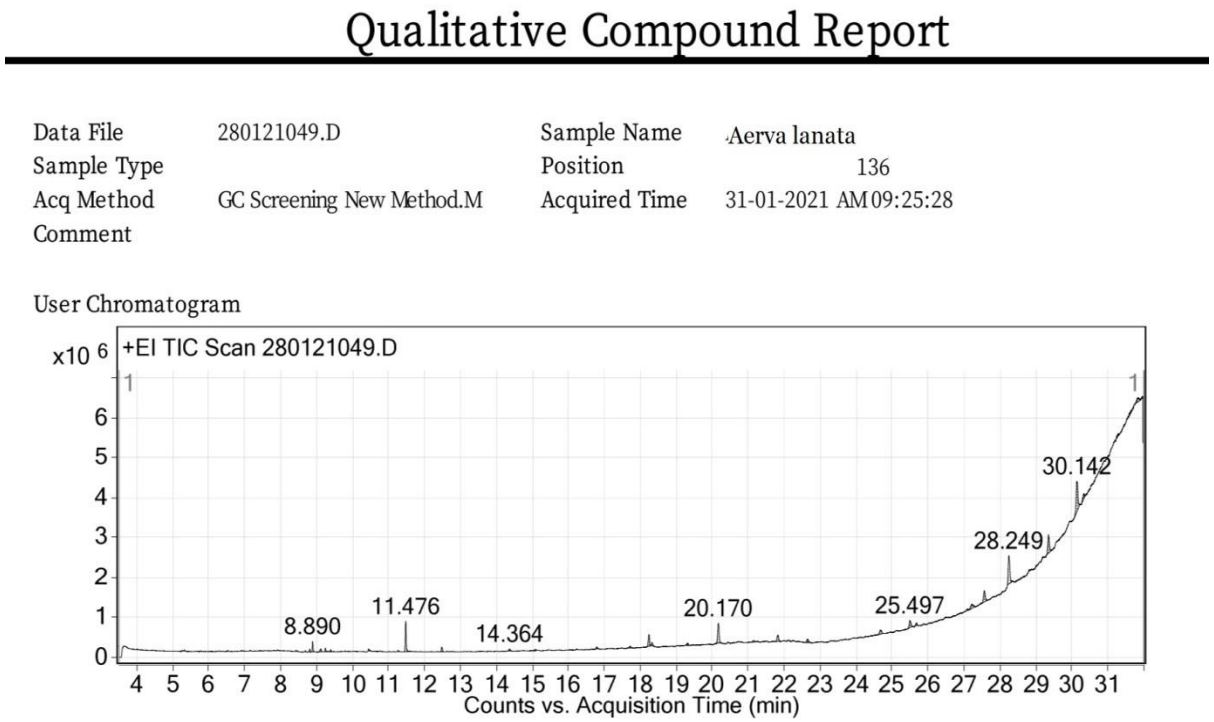

Figure 1. Shows the GC MS profile graph of ethyl acetate extract of *Aervalanata*

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 *Aervalanata.*

Ret. Time	Compound	Mol. Formula	Mol. mass	% Peak area	Possible Medicinalrole
8.89	3-Octadecyne	C18H34	250.3	2.85	Not Known
9.12	7-Heptadecyne, 17-chloro-	C17H31Cl	270.2	1.40	Not Known
11.48	Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.)-(.+/-.)-	C10H20O	156.2	11.30	Not Known
12.48	9-Eicosyne	C20H38	278.3	2.86	Not Known
17.71	3.alpha.,5.alpha.-Cyclo-ergosta-7,9(11),22t-triene-6.beta.-ol	C28H42O	394.3	1.20	Testosterone 5 alpha reductase inhibitor, TNF alpha inhibitor, 5 alpha reductase inhibitor, alpha amylase inhibitor, alpha glucosidase inhibitor, Alpha reducatse inhibitor, HIF 1 alpha inhibitor, IKappaka B alpha phosphorylation inhibitor, increases alpha mannosidase activity, Interlukin 1 alpha inhibitor, Cyclooxygease activator, oligosaccharide provider, 1t be hydroxysteroid dehydrogenase inhibitor, Antiamyloid beta, Anti TGF beta
18.24	2-((Octan-2-yloxy)carbonyl)benzoic acid	C16H22O4	278.2	6.03	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
18.32	5,6,6a,11-Tetraaza-benzo[a]fluorine	C13H8N4	220.1	1.52	Not known
19.31	Docosane, 1,22-dibromo-	C22H44Br2	466.2	1.39	Not known

20.17	Squalene	C30H50	410.4	10.90	Monooxygenase inhibitor, biochemical precursor of steroid synthesis, natural moisturizer, used in cosmetics
21.15	Methanone, (2,3-dihydro-5-bromo-1-indolyl)(3-methoxy-5-methylthiophenyl)-	C17H16BrNO2S	377	1.15	Not known
21.82	Tridecane, 2,2,4,10,12,12-hexamethyl-7-(3,5,5-trimethylhexyl)-	C28H58	394.5	3.85	Not known
22.65	Pyrazol-5-ol, 3-(3,4,5-trimethoxyphenyl)-	C12H14N2O4	250.1	2.51	Not known
24.68	6,7-Epoxypregn-4-ene-9,11,18-triol-3,20-dione, 11,18-diacetate	C25H32O8	460.2	3.16	Energizer
25.50	4,5,6,7-Tetrahydro-benzo[c]thiophene-1-carboxylic acid allylamide	C12H15NOS	221.1	4.84	Not known
25.68	dl-.alpha.-Tocopherol	C29H50O2	430.4	1.19	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