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# 'The Gc Ms Analysis Of Ethyl Acetate Extract Of One Herbal Plant, 'Ruellia Prostrata'

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**ABSTRACT**

The present study deals with the GC MS analysis of one medicinal plant, Ruellia prostrate. Ethno-pharmacologically this plant is used for treating rheumatism, eczema, cephalgia, hemiplegia etc. 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 n-Hexadecanoic acid, Oleic Acid, Methyl 9,10-octadecadienoate, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, i-Propyl 5,8,11,14,17-eicosapentaenoate, Campesterol, Stigmasterol, .beta.-Sitosterol, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, .beta.-Amyrin, Lupeol, (2,5-Dimethoxy-phenyl)-(2-hydroxy-1,1-dimethyl-decahydro- naphthalen-4a-yl)-methanone. These molecules with their various biological properties could serve as medicine for which this plant is used.

**Key words** GC MS, Ruellia prostrata, n-Hexadecanoic acid, Oleic Acid, Campesterol, Stigmasterol, .beta.-Sitosterol, .beta.-Amyrin, Lupeol

## INTRODUCTION

The present study deals with the GC MS analysis of one medicinal plant, Ruellia prostrata. Some reports are available on the medicinal role of this plant although scanty. Afzal et al, 2015 have detailed the ethno-pharmacology of Ruellia prostrata.Ruellia prostrata leaf is used in the treatment of chronic rheumatism, eczema, facial paralysis, cephalgia and hemiplegia. Leaf juice is an efficient remedy in colic of children (Rajan et al, 2012).In folk medicine and Ayurvedic medicine the genus Ruellia has been used as diuretic, anti-diabetic, antipyretic, analgesic, antioxidant, antihypertensive, gastroprotective agent and was also used to treat gonorrhea (Chen et al, 2006; Lans et al, 2006).Wangia et al, 2019 have reported the anticancer activity of Ruellia prostrata. It is known to be hypoglycemic, contraceptive, antidiuretic and anticancer, anti-inflammatory, antioxidant and antibacterial (Kalia et al, 2011; Jeyachandran et al, 2010).Chothani and Mishra have reported the antioxidant potential of another species, Ruellia tuberosa. This work deals with the GC MS analysis of the ethyl acetate extracts of the plant, Ruellia prostrata. This is in continuation of our endeavour to establish the medicinal efficacy of the herbal and traditional systems of Ayurveda, Sidhha and Unani systems of medicine (Priyadarshini et al, 2017; Jayakumari et al, 2017; Rao et al, 2018; Vijayalakshmi and Rao, 2019; Yuvaraj et al, 2019; Muttevi et al, 2019, Rao et al, 2019; Muttevi et al, 2020; Vijayalakshmi and Rao, 2020; Janaki et al, 2021, Perumal et al, 2021).

**MATERIALS AND METHODS**

The plant, Ruellia prostrata was 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 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 of Ruellia prostrataethyl acetate extract, along with the possible medicinal role of each molecule are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of Ruellia prostrata. 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. Some molecules as represented by the GC MS profile indicated the presence of some important biomolecules such as n-Hexadecanoic acid, Oleic Acid, Methyl 9,10-octadecadienoate, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, i-Propyl 5,8,11,14,17-eicosapentaenoate, Campesterol, Stigmasterol, .beta.-Sitosterol, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, .beta.-Amyrin, Lupeol, (2,5-Dimethoxy-phenyl)-(2-hydroxy-1,1-dimethyl-decahydro- naphthalen-4a-yl)-methanone. The medicinal roles ascribed to the molecules in Table 1 is as ample evidence that this plant's medicinal role is due to these molecules present their in.

**CONCLUSION**

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

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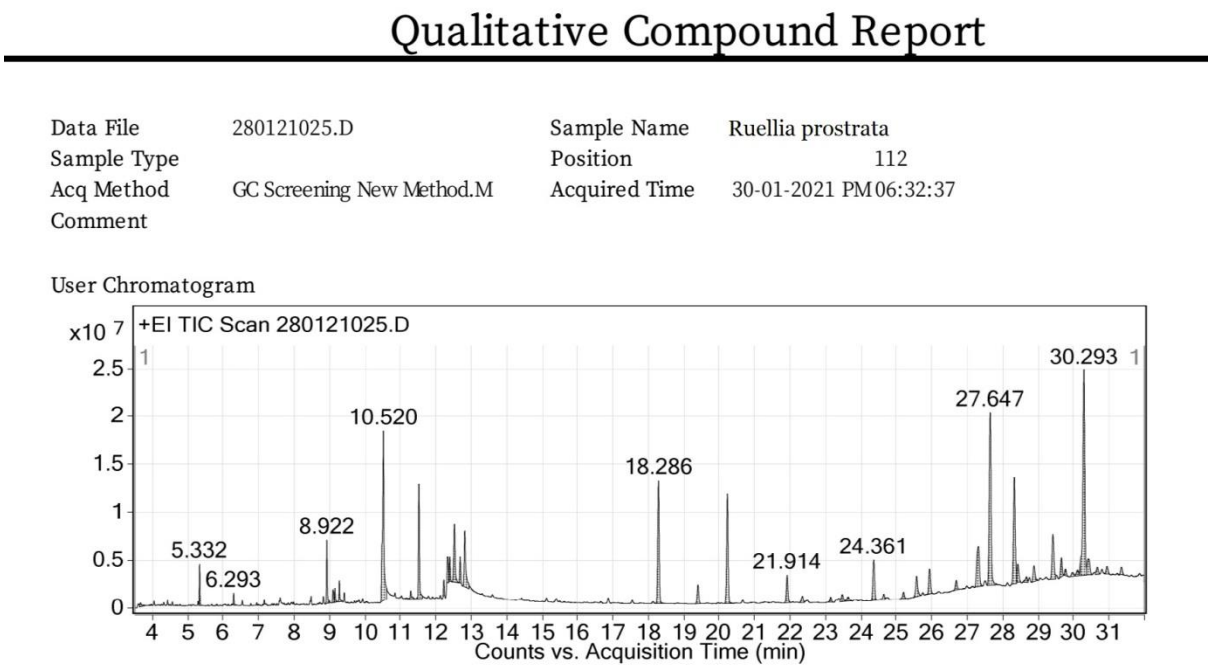


Figure 1. Represents the GC MS graph of ethyl acetate extractRuellia prostrata

Table 1. 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 ofRuellia prostrata

| Ret. Time | Compound | Mol. Formula | Mol. Mass | % Peak Area | Possible Medicinal Role |
|---|---|---|---|---|---|
| 5.33 | Naphthalene | C10H8 | 128.1 | 1.13 | Not Known |
| 8.92 | Bicyclo[3.1.1]heptane, 2,6,6-trimethyl- | C10H18 | 138.1 | 2.06 | Not Known |
| 10.52 | n-Hexadecanoic acid | C16H32O2 | 256.2 | 10.33 | Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier, |

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|---|---|---|---|---|---|
| | | | | | 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 |
| 11.52 | Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.)-(.+/-.)- | C10H20O | 156.2 | 4.71 | Not Known |
| 12.33 | Oleic Acid | C18H34O2 | 282.3 | 1.28 | Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity |
| 12.39 | Methyl 9,10-octadecadienoate | C19H34O2 | 294.3 | 1.06 | Catechol o methyl Transferase inhibitor, methyl donar, methyl guanidine inhibitor |
| 12.53 | (R)-(-)-14-Methyl-8-hexadecyn-1-ol | C17H32O | 252.2 | 3.23 | Not Known |
| 12.69 | 9,12,15-Octadecatrienoic acid, (Z,Z,Z)- | C18H30O2 | 278.2 | 1.02 | Not Known |
| 12.82 | 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)- | C19H32O2 | 292.2 | 3.61 | Not Known |
| 18.29 | 2-((Octan-2-yloxy)carbonyl)benzoic acid | C16H22O4 | 278.2 | 7.43 | Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity |

| | | | | | |
|---|---|---|---|---|---|
| 19.40 | Sulfurous acid, butyl heptadecyl ester | C21H44O3S | 376.3 | 1.20 | Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity |
| 25.57 | 7H-Pyrazolo[4,3-d]pyrimidin-7-one, 1,6-dihydro-3-ribofuranosyl- | C10H12N4O5 | 268.1 | 1.68 | Not Known |
| 25.94 | i-Propyl 5,8,11,14,17-eicosapentaenoate | C23H36O2 | 344.3 | 1.78 | Ionotrpoic, 11B-HSD inhibitor, 5 alpha reductase inhibitor, HIF1 alpha inhibitor, Alpha amylase inhibitor, IkappaB-alpha alpha phosphorylation inhibitor, Interlukine- 1 alpha inhibitor, Testosterone 5 alpha reductase inhibitor, 12 Lypoxygease inhibitor, 17 beta hydroxysteroid dehydrogenase inhibitor, 5 HETE inhibitor, 5 HT inhibitor, 8 HETE inhibitor, ACE inhibitor, Acetyl CoA carboxylase inhibitor |
| 27.31 | Campesterol | C28H48O | 400.4 | 4.34 | Plant steroid use as food additive and has cholesterol lowering role |
| 27.65 | Stigmasterol | C29H48O | 412.4 | 12.86 | Precursor of progesterone , acts as intermediate in the biosynthesis of androgens and estrogens, anti-osteoarthritic, antihypercholesterolemic, cytotoxic, antitumor, hypoglycemic, antimutagenic, antioxidant, anti-inflammatory, analgesic |
| 28.33 | .beta.-Sitosterol | C29H50O | 414.4 | 7.78 | 17 beta dehydrogenase inhibitor, androgen blocker, anti-amyloid |

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|---|---|---|---|---|---|
| | | | | | beta, anticancer, Anti TGF beta, Beta 2- receptor, beta blocker, beta-galactosidase inhibitor, beta-glucuronidase inhibitor |
| 28.43 | 3,7,11,15-Tetramethyl-2-hexadecen-1-ol | C20H40O | 296.3 | 1.31 | Oligosaccharide provider |
| 28.67 | Phytonadione | C31H46O2 | 450.4 | 0.48 | Not Known |
| 28.88 | Cholest-5-en-3-ol, 24-propylidene-, (3.beta.)- | C30H50O | 426.4 | 1.23 | Not Known |
| 29.42 | .beta.-Amyrin | C30H50O | 426.4 | 3.42 | 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 |
| 29.66 | 9,19-Cycloergost-24(28)-en-3-ol, 4,14-dimethyl-, acetate, (3.beta.,4.alpha.,5.alpha.)- | C32H52O2 | 468.4 | 1.25 | Not Known |
| 30.29 | Lupeol | C30H50O | 426.4 | 16.36 | Anti-inflammatory, anti-arthritic, anti-mutagenic and anti-malarial |
| 30.42 | (2,5-Dimethoxy-phenyl)-(2-hydroxy-1,1-dimethyl-decahydro- naphthalen-4a-yl)-methanone | C21H30O4 | 346.2 | 1.78 | Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity |