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# 'The Gc Ms Analysis Of Ethyl Acetate Extract Of One Herbal Plant, 'Crotalaria Pallida'

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**ABSTRACT**

The present study deals with the GC MS analysis of one medicinal plant, 'Crotalaria pallida'.Crotalaria pallidaAiton, (Family: Fabaceae) is a plant found on the road side and in the wild, is traditional medicine, used to treat urinary problems, swelling of joints and the juice of the leaves are used to eliminate intestinal worms. Known as "rattle or rattlesnake" is known for its anti-inflammatory, antimicrobial and antifungal roles. 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 trans-2-methyl-4-n-pentylthiane, S,S-dioxide, 7-Octadecyne, 2-methyl-, n-Hexadecanoic acid, 4-(2,4-Dimethylcyclohex-3-enyl)but-3-en-2-one, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Squalene, Sulfurous acid, butyl heptadecyl ester, 5-Nonadecen-1-ol, dl-.alpha.-Tocopherol, Campesterol, Stigmasterol, Lupeol etc. These molecules do represent the medicinal roles of this plant as anti-iflamamtory, antimicrobial and other ethno-medicinal uses.

**KeyWord** GC MS, Crotalaria pallida, Squalene, Sulfurous acid,butyl heptadecyl ester, dl-.alpha.-Tocopherol, Campesterol, Stigmasterol, Lupeol

**INTRODUCTION**

Crotalaria pallidaAiton. (Fabaceae).I is a plant found on the road side and in the wild is traditional medicine, used to treat urinary problems, swelling of joints and the juice of the leaves are used to eliminate intestinal worms. (Kiruthigaet al, 2014). Known as “rattle or rattlesnake” is known for its anti-inflammatory, antimicrobial and antifungal roles. Lasker and Roy, 2016, have reported the phytochemical characterization of antimicrobial role of this plant. Paul, 2019 gave a comprehensive review on the various aspects of this plant in which he has indicated the this plants role as antioxidant, anti-iflammatory, anthelmintic, anti-diabetic, anti-proliferative, cytotoxic, apoptotic and analgesic. Physicochemical characterization and antibacterial activity of the leaf oil of Crotalaria pallida Aiton. Roy, 2016 has reported this plant’s antimicrobial activity. Boldrinet al, 2013 have reported the estrogenic and mutagenic activities of this plant measured by recombinant yeast assay and Ames test. The present works deals with the GC MS analysis of the ethyl acetate extract of the aerial parts of Crotalaria pallida. 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 Crotalaria pallidawas 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 ofCrotalaria pallidaextract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of Crotalaria pallida. 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 ethno-botanical 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 trans-2-methyl-4-n-pentylthiane, S,S-dioxide, 7-Octadecyne, 2-methyl-, n-Hexadecanoic acid, 4-(2,4-Dimethylcyclohex-3-enyl)but-3-en-2-one, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Squalene, Sulfurous acid, butyl heptadecyl ester, 5-Nonadecen-1-ol, dl-.alpha.-Tocopherol, Campesterol, Stigmasterol, Lupeol etc. These molecules do represent the medicinal roles of this plant as antiiflamamtory, antimicrobial and other ethno-medicinal uses.

**CONCLUSION**

Thus it can be concluded that due to the presence of these molecules, Crotalaria pallidahas 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 ofCrotalaria pallida

# Qualitative Compound Report

| | | | |
|---|---|---|---|
| Data File | 280121042.D | Sample Name | Crotalaria pallida |
| Sample Type | | Position | 129 |
| Acq Method | GC Screening New Method.M | Acquired Time | 31-01-2021 AM 05:05:24 |
| Comment | | | |

User Chromatogram

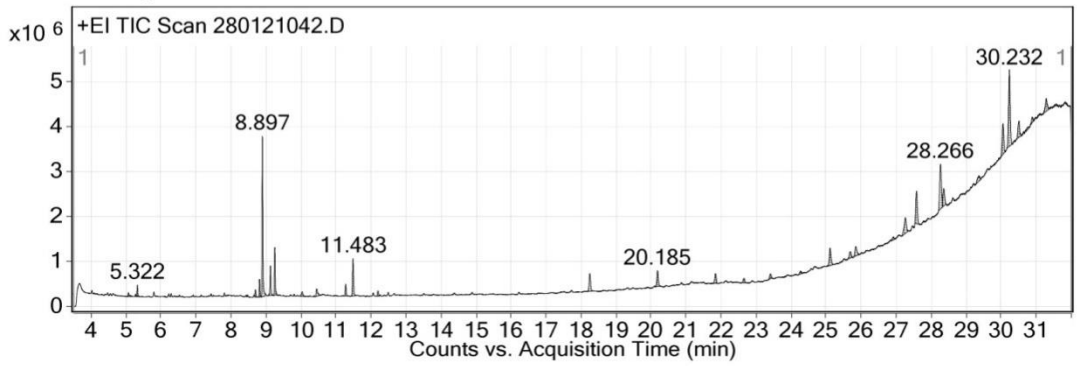


Table1. Indicates the retention time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile of Crotalaria pallida

| Ret. Time | Molecule | Mol. Formula | Mol. Mass | % Peak Value | Possible Medicinal Role |
|---|---|---|---|---|---|
| 5.32 | Naphthalene | C10H8 | 128.1 | 0.99 | Not Known |
| 8.81 | trans-2-methyl-4-n-pentylthiane, S,S-dioxide | C11H22O2S | 218.1 | 1.67 | Glutathione-S-Transferase-Inhibitor,Catechol-O-Methyl-Transfearse inhibitor,Myo-neuro-stimulator, NitricOxideSynthatase inhibitor, NO savaenger, Stimulates Morepinephrine production, Stimulates Sympathetic nervous system, decrease |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | glutamate oxaloacetate transaminase, decrease glutame pyruvate transaminase, Glycosyltrabsferase inhibitor, inceresesglyoxalate transamination, reverse transcriptase inhibitor, smart drug, adrenal supporter |
| 8.90 | Bicyclo[3.1.1]heptane, 2,6,6-trimethyl- | C10H18 | 138.1 | 14.96 | Not known |
| 9.25 | 7-Octadecyne, 2-methyl- | C19H36 | 264.3 | 4.45 | Catechol o methyl Transferase inhibitor, methyl donar, methyl guanidine inhibitor |
| 10.45 | n-Hexadecanoic acid | C16H32O2 | 256.2 | 1.38 | 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 |
| 11.27 | 4-(2,4-Dimethylcyclohex-3-enyl)but-3-en-2-one | C12H18O | 178.1 | 1.30 | Decrease Endothilial Leukocyte Adhesion, Decrease Endothilial Platelet Adhesion, Encephalopathic, Endoanesthetic, Endocrinactive, Endorphinogenic, Endothelium-Dependent, Endothelium-Derived Relaxing Factor Promoter, Endrocrin-Tonic, Energizer |
| 11.48 | Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.)-(.+/-.)- | C10H20O | 156.2 | 4.42 | Not Known |
| 18.25 | 2-((Octan-2-yloxy)carbonyl)benzoic acid | C16H22O4 | 278.2 | 3.07 | Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | decarboxylase activity, Inhibits production of uric acid, Urine acidifier |
| 20.19 | Squalene | C30H50 | 410.4 | 2.87 | Plant steroid use as food additive and has cholesterol lowering role |
| 21.84 | Sulfurous acid, butyl heptadecyl ester | C21H44O3S | 376.3 | 1.83 | Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity |
| 25.12 | 5-Nonadecen-1-ol | C19H38O | 282.3 | 3.74 | Oligosaccharide provider |
| 25.69 | dl-.alpha.-Tocopherol | C29H50O2 | 430.4 | 1.27 | 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 |

| | | | | | |
|---|---|---|---|---|---|
| 25.85 | cis-1-Chloro-9-octadecene | C18H35Cl | 286.2 | 2.12 | Not known |
| 27.26 | Campesterol | C28H48O | 400.4 | 4.25 | Plant steroid use as food additive and has cholesterol lowering role |
| 27.58 | Stigmasterol | C29H48O | 412.4 | 6.32 | Precursor of progesterone , acts as intermediate in the biosynthesis of androgens and estrogens, anti-osteoarthritic, antihypercholesterolemic, cytotoxic, antitumor, hypoglycemic, antimutagenic, antioxidant, anti-inflammatory, analgesic |
| 28.27 | .beta.-Sitosterol | C29H50O | 414.4 | 9.22 | 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 | 7-Heptadecyne, 17-chloro- | C17H31Cl | 270.2 | 3.63 | Not known |
| 29.36 | Gitoxigenin | C23H34O5 | 390.2 | 1.54 | Not known |

| | | | | | |
|---|---|---|---|---|---|
| 30.05 | 1,1,6-trimethyl-3-methylene-2-(3,6,9,13-tetramethyl-6-ethenye-10,14-dimethylene-pentadec-4-enyl)cyclohexane | C33H56 | 452.4 | 5.96 | Not known |
| 30.23 | Lupeol | C30H50O | 426.4 | 15.42 | anti-inflammatory, antioxidant, anti-diabetic, and anti-mutagenic effects |