

'The Gc Ms Analysis Of Ethyl Acetate Extract Of One Herbal Plant, 'Catunaregam Spinosa'

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ABSTRACT

The present study deals with the GC MS analysis of one medicinal plant, '*Catunaregam spinosa*'. Ethno-pharmacologically this plant is used to treat diarrhea, biliousness, fevers, wounds, snake bites and fish poisoning, ulcers, inflammations and skin diseases etc. This plant was collected from nearby hills 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, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, Campesterol, Stigmasterol, .beta.-Sitosterol, .alpha.-Amyrin, Lupeol were shown In the GC MS profile of this plant. These molecules have far reaching medicinal values which corroborate well with the ethno-medical use of this plant to cure various diseases.

Key Words GC MS, *Catunaregam spinosa*, n-Hexadecanoic acid, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, Campesterol, Stigmasterol, .beta.-Sitosterol, .alpha.-Amyrin, Lupeol

INTRODUCTION

Catunaregam spinosa (Thunb.)Tirveng.(Syn. *Randiadumetorum* (Retz.) Lam.), belonging to the Rubiaceae family. It is available in the wild areas with sharp woody spines and berry like fruits. In their review article Timalinaet al, 2021 have reported the various traditional uses, phytochemistry,

pharmacological roles and toxicological aspects of *Catunaregam spinosa*. In Ayurveda it is known as *Madanaphala* and used for treatment of diarrhea, biliousness, fevers, wounds, snake bites and fish poisoning, ulcers, inflammations and skin diseases. There are pharmacological reports of its antibacterial (Anand et al, 2017), antioxidant (Damle and Sharon, 2018), anti-inflammatory, analgesic and antipyretic (Saini et al, 2019), sedative (Madhavan et al, 2011), anticancer (Abdullah-Al-Ragib et al, 2017) and antifertility roles (Prakash, 2015). The present work deals with the GC MS analysis of the ethyl acetate extract of the aerial parts of this plant. This work is in continuation of our work to establish the efficacy of the herbal plants, Ayurvedic and Siddha medicines. (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, Perumalet al, 2021).

MATERIALS AND METHODS

The plant *Catunaregam spinosa* was 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 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; auxiliary 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 (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 aerial parts of the plant ethyl acetate extract, along with the possible medicinal role of each molecule of *Catunaregam spinosa* extract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of *Catunaregam spinosa*. 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 the results it was observed that this plant contained some very important biomolecules such as n-Hexadecanoic acid, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Sulfurous acid, butyl heptadecyl ester, Campesterol, Stigmasterol, .beta.-Sitosterol, .alpha.-Amyrin, Lupeoletc. with far reaching medicinal roles (Table 1) thus proving the ethno-medicinal role of this plant. Further work is warranted to isolate the compounds and study their individual roles to support the plants candidature for the medicinal value for which it is used.

CONCLUSION

Thus it can be concluded that due to the presence of these molecules, *Catunaregam spinosa* has 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 of *Catunaregam spinosa*

Qualitative Compound Report

Data File	280121037.D	Sample Name	Catunaregam spinosa
Sample Type		Position	124
Acq Method	GC Screening New Method.M	Acquired Time	31-01-2021 AM01:59:46
Comment			

User Chromatogram

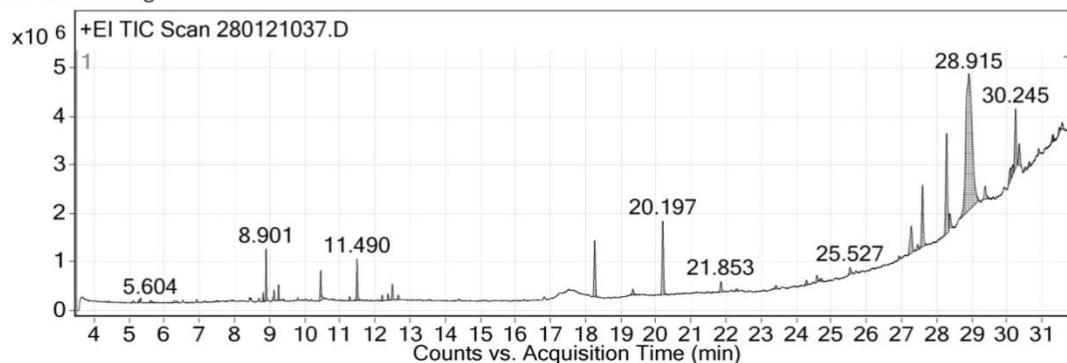


Table1. Indicates the retention time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile of Catunaregam spinosa.

Ret. Time	Molecule	Mol. Formula	Mol. Mass	% peak area	Possible Medicinal Roles
8.90	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-	C ₁₀ H ₁₈	138.1	2.08	Not Known
10.46	n-Hexadecanoic acid	C ₁₆ H ₃₂ O ₂	256.2	1.89	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
11.49	Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha., 2.beta., 5.alpha.)- (.+/-.)-	C10H20O	156.2	2.32	Not Known
18.26	2-((Octan-2-yloxy)carbonyl)benzoic acid	C16H22O4	278.2	4.66	Acidifier, Acidulant, Arachidonic acid-Inhibitor, Increase Aromatic Amino Acid Decarboxylase Activity, Inhibit Production of Uric Acid
21.85	Sulfurous acid, butyl heptadecyl ester	C21H44O3 S	376.3	0.94	Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier
25.53	7H-Pyrazolo[4,3-d]pyrimidin-7-one, 1,6-dihydro-3-ribofuranosyl-	C10H12N4 O5	268.1	0.57	Not known
27.28	Campesterol	C28H48O	400.4	3.50	Plant steroid use as food additive and has cholesterol lowering role
27.60	Stigmasterol	C29H48O	412.4	5.75	Precursor of progesterone , acts as intermediate in the biosynthesis of androgens and estrogens, anti-osteoarthritic, antihypercholesterolemic, cytotoxic, antitumor, hypoglycemic, antimutagenic, antioxidant, anti-inflammatory, analgesic

28.28	.beta.-Sitosterol	C29H50O	414.4	10.26	17 beta dehydrogenase inhibitor, androgen blocker, anti-amyloid beta, anticancer, Anti TGF beta, Beta 2-receptor, beta blocker, beta-galactosidase inhibitor, beta-glucuronidase inhibitor
28.37	7-Heptadecyne, 1-chloro-	C17H31Cl	270.2	1.48	Not Known
28.92	4,8,13-Cyclotetradecatriene-1,3-diol, 1,5,9-trimethyl-12-(1-methylethyl)-	C20H34O2	306.3	48.44	Not Known
29.38	Ethyl 5,8,11,14-eicosatetraenoate	C22H36O2	332.3	1.42	Not Known
30.10	2-[4-methyl-6-(2,6,6-trimethylcyclohex-1-enyl)hexa-1,3,5-trienyl]cyclohex-1-en-1-carboxaldehyde	C23H32O	324.2	1.19	Not Known
30.17	.alpha.-Amyrin	C30H50O	426.4	0.90	5 alpha reductase inhibitor, alpha amylase inhibitor, alpha glucosidase inhibitor, Antibacterial, Antioxidant, Potential antiplatelet component, Hypoglycemic, Hypolipidemic, Sedative, Hepatoprotective
30.25	Lupeol	C30H50O	426.4	5.28	anti-inflammatory, antioxidant, anti-diabetic, and anti-mutagenic effects
30.35	1-Naphthalenepropanol, .alpha.-ethyldecahydro-.alpha.,5,5,8a-tetramethyl-2-methylene-, [1S-[1.alpha.(S*),4a.beta.,8a.alpha.]]-	C20H36O	292.3	2.05	Not known