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Research Article

GC-MS Analysis of Methanolic Extract of *Colpomenia Sinuosa* (Mertens Ex Roth) Derb. Et Sol. From Manapad in the South East Coast of Tamil Nadu, India

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A B S T R A C T

Objectives: The present study was carried out to explore the various secondary metabolites and bioactive compounds present in the methanolic extract of brown marine macro alga *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol.

Design: The plant materials were collected from Hare Island, located in Thoothukudi, Tamil Nadu, India. The characterization of biochemicals was carried out using GC-MS analysis.

Intervention: Among the different solvent extracts, methanolic extract was intervened in the present study

Main outcome measure: The main measurement results in the study were to predict the presence of various phytochemicals in the methanolic extract of *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol.

Results: The analysis revealed seventeen bioactive compounds such as z,z-6,28-Heptatriactontadien-2-one (25.88%), 2-Hexadecanol (2.18%), L-(+)-Ascorbic acid (25.13%), N-propyl 11-octadecenoate (9.41%), 3-Methyl-2-(2-oxopropyl)furan (2.02%), Hexadecane (1.01%), Hentriacontane (9.00%), Palmitaldehyde (4.22%), Tritetracontane (2.42%), Squalene (1.03%), Trans-5-Hexyl-1,4-dioxane-2-carboxylic acid (4.12%), Methyl 2-hydroxy-eicosanoate (3.25%), Cyclopentane,1,1,3-trimethyl- (2.15%), Palmitoleic acid (1.64%), Vitamin E (0.18%), 2-Pentacosanone (0.22%) and 3-Methylene-1-oxa-spiro[3,6]decane (0.14%).

Conclusion: The bioactive compounds from methanolic extract of *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol. may have the potential effect against various diseases.

Keywords: *Colpomenia sinuosa*, Macro algae, Bioactive, GC-MS, Secondary metabolites.

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INTRODUCTION

Marine ecosystem has the richest biodiversity than the terrestrial. The marine organisms produce different primary and secondary metabolites for the survival, defense and signals to protect themselves from environmental stress. The chemical substances produced by marine organisms were the sources of medicine for human health care. The main sources for marine natural products are marine macro and micro algae, sea grass, fishes, sponges, corals, mollusks, ascidians, microorganisms and others[1]. Marine macro algae serve as an important source of bioactive natural substances[2, 3]. They have some of the valuable medicinal value components such as antibiotics, antioxidant[4] anticoagulants, anti-ulcer products and suspending agents in radiological preparations[5]. Fresh and dry marine macro algae are extensively consumed by people especially living in the coastal areas. From the literature, it is observed that the edible macro algae contain significant amount of the protein, vitamins and minerals essential for the human nutrition[6]. Most of the compounds of macro algae show anti-bacterial activities[7]. Many

metabolites isolated from algae have been shown to possess bioactive efforts[8, 9, 10]. Marine macro algae serve as important resources for bioactive natural products.

Colpomenia sinuosa (Mertens Ex Roth) Derb. Et Sol.is a representative of brown macro algae (Phaeophyceae), usually attached on rocky substrates, various shell bottoms and coral fragments in shallow waters and show a wider distribution in unpolluted environments. The chemical compounds already isolated from algae were providing valuable ideas for the development of new drugs against different diseases. In this contextual, the present study was carried out to evaluate phytochemical constituents present in the methanolic extract of *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol. collected from Thoothukudi, the south east coast of Tamil Nadu, India.

MATERIALS AND METHODS

Collection of Plant Sample

Colpomenia sinuosa (Mertens Ex Roth) Derb. Et Sol., one of the important brown marine macro algae shows much attention in the present study as it has potential to supplement native vegetation. *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol. was collected from Thoothukudi in the south east coast of Tamil Nadu, India. Samples were rinsed with marine water to remove debris and epiphytes. The entire epiphytes were removed using soft brush. In the laboratory, the collected plants were again washed in freshwater and stored in refrigerator for further analysis[11].

Preparation of extracts

For the preparation of methanol extract, the plant specimens were washed thoroughly and placed on blotting paper and spread out at room temperature in the shade condition for drying. The shade dried samples were grounded to fine powder using a tissue blender. The powdered samples were then stored in the refrigerator for further use. 30g powdered samples were packed in Soxhlet apparatus and extracted with methanol for 8h separately[12].

Gas Chromatography-Mass spectrometry (GC-MS)

The GC-MS analysis was carried out using GC model Clarus 680, Mass Spectrometer Clarus 600 (EI) Perkin Elmer, Gas Chromatography was equipped and coupled to a mass detector TurboMass 5.4.2 spectrometer with an Elite-5MS, (100% Dimethyl ply siloxane), 30.0m × 250µm df capillary column. The instrument was set to an initial temperature of 60°C and maintained at this temperature for 2min. At the end of this period, the oven temperature was raised upto 300°C, at the rate of an increase of 10°C/min and maintained for 6min. Injection port temperature was ensured as 250°C and Helium flow rate as 1ml/min. The ionization voltage was 70eV. The samples were injected in split mode as 10:1. Mass Spectral condition solvent delay 2min, transfer temperature 240°C, source temperature 240°C and scanning range was set at 50-600Da. The chemical constituents were identified by GC-MS[13].

Interpretation of mass spectrum of GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The retention time, compound name, molecular formula and molecular weight and area percentage of the test materials were ascertained.

RESULT & DISCUSSION

GC-MS spectrum of methanolic extract of *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol. indicated 17 major peaks which showed the presence of 17 compounds. The expecting compounds in methanolic extract were Z,z-6,28-Heptatriactontadien-2-one (25.88%), 2-Hexadecanol (2.18%), L-(+)-Ascorbic acid (25.13%), N-propyl 11-octadecenoate (9.41%), 3-Methyl-2-(2-oxopropyl)furan (2.02%), Hexadecane (1.01%), Hentriacontane (9.00%), Palmitaldehyde (4.22%), Tritetracontane (2.42%), Squalene (1.03%), Trans-5-Hexyl-1,4-dioxane-2-carboxylic acid (4.12%), Methyl 2-hydroxy-eicosanoate (3.25%), Cyclopentane,1,1,3-trimethyl- (2.15%), Palmitoleic acid (1.64%), Vitamin E (0.18%), 2-Pentacosanone (0.22%) and 3-Methylene-1-oxa-spiro[3,6]decane (0.14%). The spectrum profile of GC-MS confirmed the presence of seventeen major components with retention time of 16.41min, 16.85min, 17.86min, 19.64min, 19.84min, 21.51min, 22.31min, 22.66min, 23.08min, 23.81min, 24.53min, 25.22min, 25.89min, 27.33min, 28.21min, 29.56min and 30.00min respectively (Figure 1 and Table 1).

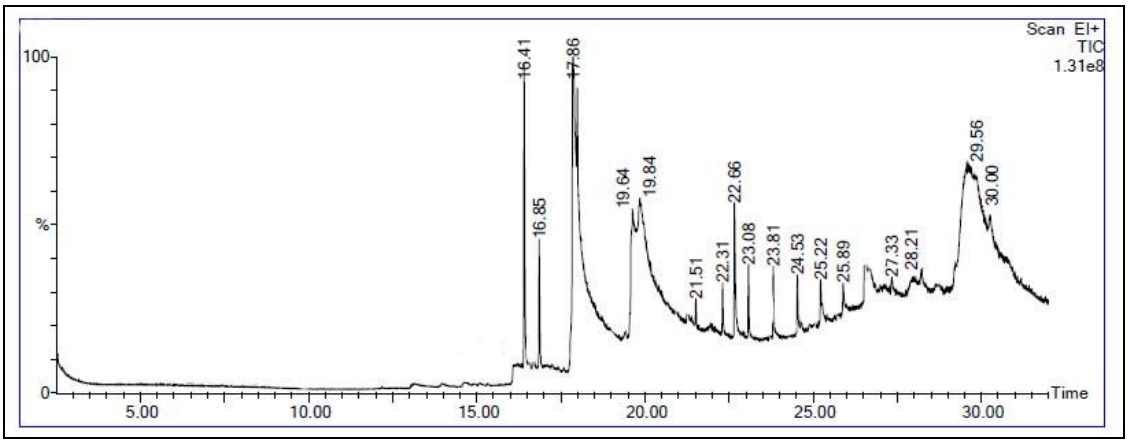

Figure: 1 GC-MS profile of methanolic extract of *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol.

Table: 1 *GC-MS profile of methanolic extract of Colpomenia sinuosa (Mertens Ex Roth) Derb. Et Sol.*

SN	RT	Name of compound	MF	MW	PA
1.	16.41	Z,z-6,28-Heptatriactontadien-2-one	$C_{37}H_{70}O$	530	25.88
2.	16.85	2-Hexadecanol	$C_{16}H_{34}O$	242	2.18
3.	17.86	L-(+)-Ascorbic acid	$C_{38}H_{68}O_8$	652	25.13
4.	19.64	N-propyl 11-octadecenoate	$C_{21}H_{40}O_2$	326	9.41
5.	19.84	3-Methyl-2-(2-oxopropyl)furan	$C_8H_{10}O2$	138	2.02
6.	21.51	Hexadecane	$C_{16}H_{34}$	226	1.01
7.	22.31	Hentriacontane	$C_{31}H_{64}$	436	9.00
8.	22.66	Palmitaldehyde	$C_{16}H_{32}O$	240	4.22
9.	23.08	Tritetracontane	$C_{43}H_{88}$	605	2.42
10.	23.81	Squalene	$C_{30}H_{50}$	410	1.03
11.	24.53	Trans-5-Hexyl-1,4-dioxane-2-carboxylic acid	$C_{11}H_{20}O_4$	216	4.12
12.	25.22	Methyl 2-hydroxy-eicosanoate	$C_{21}H_{42}O_3$	342	3.25
13.	25.89	Cyclopentane,1,1,3-trimethyl-	C_8H_{16}	112	2.15
14.	27.33	Palmitoleic acid	$C_{16}H_{30}O_2$	254	1.64
15.	28.21	Vitamin E	$C_{29}H_{50}O_2$	430	0.18
16.	29.56	2-Pentacosanone	$C_{25}H_{50}O$	366	0.22
17.	30.00	3-Methylene-1-oxa-spiro[3,6]decane	$C_{10}H_{16}O$	152	0.14

SN: Serial Number; RT: Retention Time; MF: Molecular Formula; MW: Molecular Weight; PA: Peak Area.

CONCLUSION

GC-MS analysis of the methanolic extract of *Colpomenia sinuosa* (Mertens Ex Roth) Derb. Et Sol. showed the presence of bioactive components. Retention time, molecular formula, molecular weight and peak area were used for the confirmation of phytochemical compounds. Totally there were 17 bioactive principles were reported in the present study. Among them, the major constituents were z,z-6,28-Heptatriactontadien-2-one, 2-Hexadecanol, L-(+)-Ascorbic acid, N-propyl 11-octadecenoate, 3-Methyl-2-(2-oxopropyl)furan, Hexadecane, Hentriacontane, Palmitaldehyde, Tritetracontane, Squalene, Trans-5-Hexyl-1,4-dioxane-2-carboxylic acid, Methyl 2-hydroxy-eicosanoate, Cyclopentane,1,1,3-trimethyl-, Palmitoleic acid, Vitamin-E, 2-Pentacosanone and 3-Methylene-1-oxa-spiro[3,6]decane. The research work is in progress to ascertain the medicinal quality of the brown macro algae and brighten the phytochemical profile of it in the field of medicinal value.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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