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EVALUATION OF PHYTO-COMPOUNDS FROM *Dictyota dichotoma* EXTRACT USING GAS CHROMATOGRAPHIC AND MASS SPECTROSCOPIC TECHNIQUE

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ABSTRACT
The phytocomponents of *Dictyota dichotoma* were evaluated using Gas Chromatography–Mass Spectrometry (Perkin-Elmer). The compounds are present within the *Dictyota dichotoma* ethanoic extract was compared with the NIST (National Institute of Standards and Technology) library. The GC-MS analysis shown that thirty compounds via Nonadecane, Phenol, 3,5-bis(1,1-dimethylethyl), n-Hexadecanoic acid, Hexadecanoic acid tri-methylsilyl ester, Eicosane, cis-Vaccenic acid, cis-13,16-Docasadienoic acid, Octadecanoic acid, 9,12-Octadecadienoic acid in the ethanolic extract of *Dictyota dichotoma*. These findings support the traditional use of *Dictyota dichotoma* for various disorders.

Keyword: Gas chromatography Mass spectroscopy, *Dictyota dichotoma* , Phyto-compounds, Biological activity

Introduction

Plants are a rich source of secondary metabolites with interesting biological activities. In general, these secondary metabolites are an important source with a variety of structural arrangements and properties (De-Fátima *et al*., 2006). Different medicinal plants are commonly used for different ailments throughout the planet. Different phyto-compounds separated and characterized from plant species are described. The major phyto-compounds include phenols, flavonoids, saponins and cyanogenic glycosides (Shahidi, 2000: Shahidi *et al*., 2008). Natural products from microbial origin was the early source of antibiotics, but with the recent recognition of medicinal plants as an support sort of health care, the investigation of medicinal plants for phytol-compounds has become important function as sources of book antibiotic (Meurer-Grimes *et al*., 1996: Koduru *et al*., 2006). The *in vitro* study needed to preliminary phytochemical analysis is necessary to pick crude plant extracts with potentially useful medicinal property for further biological activity and chemical investigations (Mathekaga *et al*., 1998).

In recent years, the variety of analytically advanced instruments including UV, NMR, FTIR and GC-MS that were important tools for identification, separation and structural analysis of bioactive compounds. GCMS may be a very companionable technique and therefore the most typically used method for the quantification and identification purpose. The unidentified organic compounds during a multifaceted mixture are often analysed by interpretation and also by matching with reference standard spectra (Ronald Hites *et al*., 1997). The chosen medicinal plant namely as *Dictyota dichotoma* belongs to Dictyotaceae Family. *Dictyota dichotoma* is widely distributed in south east cost of India and Sri Lanka. The purpose of the study is to determine the organic chemicals present in the *Dictyota dichotoma* extract with the aid of GC-MS Technique.

Materials and methods

Plant Materials

Whole plant of *Dictyota dichotoma* were collected from Mandapam, Ramanathapuram District, Tamil Nadu. The plant authenticated by Ministry of Environment, forest, and Climate Change, Botanical survey of India, Southern Reginal Centre, TNAU campus, Lawley Road, Coimbatore. The identified specimen (Ref No.: BSI/SRC/5/23/2019/Tech./2934) was preserved in our department. Whole plant was washed several times

with purified water to eliminate dust particles and then dried in shade for two weeks to remove the residual moisture.

Preparation of alcoholic extract

The whole plant of *Dictyota dichotoma* was dried at room temperature and coarsely powered. The powder extracted with ethanol extract for 24 hours a semi solid extract was obtained after complete elimination of alcohol under reduced pressure. The extract was then concentrated in vacuum until the solvent was completely removed.

GC MS Analysis

GC MS investigation was done by Shimadzu 2010 plus contain a AOC-20i auto sampler and GC (Gas chromatograph) interfaced to a mass spectrometer instrument. Software adopted to handle mass spectra and chromatograms was a Turbo Mass Ver 5.2.0 (Srinivasan *et al*., 2013).

Identification of components

Interpretation on GCMS was conducted using the database of National Institute Standard and Technology (NIST) having more than sixty two thousand patterns. The unknown component was identified with known components kept in the NIST library (Dr. Dukes, (2013).

Results and discussion

GC-MS (Gas chromatography mass spectrometry) is a method that associations the features of gas-liquid chromatography and mass spectrometry to detect different materials within a test sample (Kell *et al*., 2005: Fernie et al., 2001). Plants have an nearly boundless ability to synthesize aromatic materials, most of which are their oxygen substituted derivatives or phenols. Most are phytochemicals of which a minimum of 12,000 are isolated. These substances function plant defence mechanisms against herbivores and insects. Flavonoids demonstration of several biological activities such as anti-fungal, anti-inflammatory, anti-ulcer and anti-hepatotoxic actions.

National Institute Standard and Technology (NIST) having quite 62,000 patterns which interpretation on spectrum of GC-MS. The spectrum of the unidentified components were corresponding with the spectrum of the documented components stored within the NIST library. The relative molecular mass, name and structure of the compounds of the analysed samples were ascertained. The results pertaining to GC-MS analysis of *Dictyota dichotoma* ethanolic extract lead to the identification of a number of compounds. These compounds were identified through mass spectrometry attached with GC.

The thirty components were present in the whole *Dictyota dichotoma* detected by the GC-MS are repreent in Table 1. In the GC-MS analysis, Hexadecanoic acid tri-methylsilyl ester, Phenol, 3,5-bis(1,1-dimethylethyl), Nonadecane, n-Hexadecanoic acid, Eicosane, cis-13,16-Docasadienoic acid, cis-Vaccenic acid, Octadecanoic acid, 9,12-Octadecadienoic acid were identified and highly in *Dictyota dichotoma* ethanolic extract and were stated in table above. The identification of bioactive compounds is based on the peak area, molecular formula and molecular weight. These compounds are responsible for pharmacological activities. Out of 30 compounds, 03 compounds have highest peak area are n-Hexadecanoic acid (26%), cis-13,16-Docasadienoic acid (53%) and Octadecanoic acid (20%). Table 2 represent the bological activity of phytocomponents identified in *Dictyota dichotoma* ethanol extract.

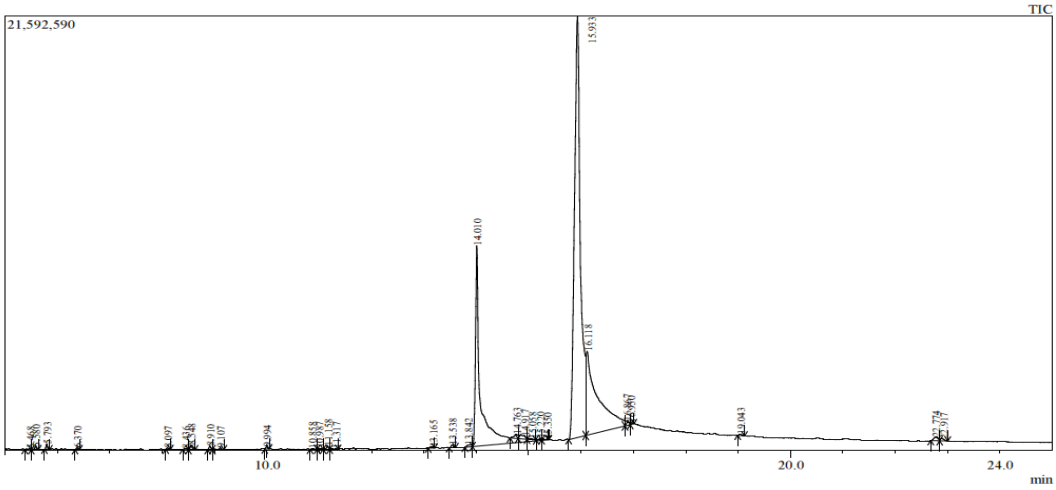

Figure 1 GC MS Chromatogram of *Dictyota dichotoma* extra

Table 1 Identification of phytochemical components in ethanolic extract of *Dictyota dichotoma* extract using GC MS

Peak#	R.Time	Area	Area%	Height	Height%	A/H	Name
1	5.468	223847	0.07	56230	0.15	3.98	Oxalic acid, 2-ethylhexyl hexyl ester
2	5.580	395449	0.13	152948	0.40	2.59	Hexane, 3,3-dimethyl-
3	5.793	526099	0.17	277626	0.73	1.89	Decane, 3,7-dimethyl-
4	6.370	192324	0.06	93688	0.25	2.05	Heptane, 3,3-dimethyl-
5	8.097	185272	0.06	74152	0.19	2.50	Dodecane, 4,6-dimethyl-
6	8.436	245080	0.08	63339	0.17	3.87	Hexane, 2,2,3,3-tetramethyl-
7	8.548	626067	0.20	225323	0.59	2.78	Nonadecane
8	8.910	500584	0.16	175856	0.46	2.85	Phenol, 3,5-bis(1,1-dimethylethyl)-
9	9.107	447452	0.14	100330	0.26	4.46	Sulfurous acid, hexyl octyl ester
10	9.994	265988	0.09	106825	0.28	2.49	Phthalic acid, di-(1-hexen-5-yl) ester
11	10.858	166430	0.05	40032	0.10	4.16	Decane, 3,7-dimethyl-
12	10.987	230876	0.07	51256	0.13	4.50	Nonadecane
13	11.158	461778	0.15	177760	0.47	2.60	Dodecane, 2,6,11-trimethyl-
14	11.317	181556	0.06	29825	0.08	6.09	Decane, 2,3,5,8-tetramethyl-
15	13.165	219622	0.07	49666	0.13	4.42	Sulfurous acid, 2-ethylhexyl isohexyl ester
16	13.538	394531	0.13	141128	0.37	2.80	Eicosane
17	13.842	591013	0.19	107208	0.28	5.51	cis-Vaccenic acid
18	14.010	66905813	21.50	9971194	26.10	6.71	n-Hexadecanoic acid
19	14.763	1007405	0.32	200333	0.52	5.03	Hexadecanoic acid, trimethylsilyl ester
20	14.917	1357999	0.44	150507	0.39	9.02	1-Octanol, 2-butyl-
21	15.058	331815	0.11	48580	0.13	6.83	Tetracontane, 3,5,24-trimethyl-
22	15.220	210020	0.07	71195	0.19	2.95	1-Heneicosanol
23	15.350	196288	0.06	31465	0.08	6.24	7-Hexadecenal, (Z)-
24	15.933	167602882	53.85	20953712	54.85	8.00	cis-13,16-Docasadienoic acid
25	16.118	64560607	20.74	4171144	10.92	15.48	Octadecanoic acid
26	16.867	1070932	0.34	231946	0.61	4.62	trans-4,5-Epoxydecane
27	16.950	209085	0.07	103287	0.27	2.02	5-Methyl-5-octen-1-ol
28	19.043	242502	0.08	72844	0.19	3.33	1-Hexanol, 5-methyl-2-(1-methylethyl)-, aceta
29	22.774	1111830	0.36	173816	0.46	6.40	9,12-Octadecadienoic acid (Z,Z)-
30	22.917	577148	0.19	96293	0.25	5.99	Di-n-octyl phthalate
		311238294	100.00	38199508	100.00		

Among the identified phytochemicals hexadecanoic acid is suggested to be a fatty acid ester and it may employ as flavor, antioxidant, hypocholesterolemic agent, antimicrobial and larvicidal activities (Bodoprost *et al*., 2007: Falodun *et al*., 2009). 1, 2- bnzenedicarboxylic acid, diisooctyl ester is a plasticizer compound and performances as antifouling and antimicrobial agent (Heinonen *et al*., 1998). Compounds like 12-octadecanoic acid, n-hexadecanoic acid, dodecanoic acid, t,2-Benzenedicarboxylic acid, dibutyl ester, etradecanoic acid, 9,12-octadecadienoic acid (Z,Z) and 1hexadecanoic acid, ethyl ester were found in *Vitex altissima* ethanolic leaf extract (Sathish *et al*., 2012). Likewise, tetradecanoic acid, 9-octadecenoic acid (Z)-

ethyl ester, hexadecane, nonadecane, oleic acid, eicosane, heptacosane, 9n-hexadecanoic acid, 12-octadecenoic acid, ethyl ester; dodecanoic acid and 1,2-benzenedicarboxylic acid were reported in *Clerodendrum inerme* and *C. phlomidis* leaves (Anandhi and Ushadevi, 2013; Balaji *et al*., 2013).

Table 2 Biological activity of phytocomponents identified in *Dictyota dichotoma* ethanol extract

S. No	Compound Name	Biological activity
1.	Decane, 3,7-dimethyl	Antihelmintic, Antiparasitic, Antihelmintic, Membrane permeability inhibitor, Antimicrobial
2.	Dodecane, 4,6-dimethyl-	Antineoplastic, General pump inhibitor, Antifungal
3.	Nonadecane	Antioxidant, Anti-fungal activity
4.	Phenol, 3,5-bis(1,1-dimethylethyl)	Antioxidants, Anticancer, Antifungal, Antibacteria
5.	n-Hexadecanoic acid	Hypercholesterolemic, Lubricant, Antimicrobial, Flavor, Cosmetic and Perfumery
6.	Hexadecanoic acid trimethylsilyl ester	Antimicrobial activity
7.	Eicosane	Antifungal activity, Acrocylindropepsin inhibitor, Acetylesterase inhibitor
8.	cis-Vaccenic acid	Potential fetal hemoglobin therapeutic inducer
9.	Octadecanoic acid	Cosmetic, Flavor, Hypocholesterolemic, Lubricant, Perfumery, Propecic, Suppository, Antimicrobial activity,
10.	9,12-Octadecadienoic acid	Antiinflammatory, hypocholesterolemic cancer preventive, hepatoprotective, nematicide, insectifuge, antihistaminic antieczemic, antiacne, 5-Alpha reductase inhibitor, antiandrogenic, antiarthritic, anticoronary, insectifuge

Duke's. Phytochemical and Ethnobotanical Databases,www.ars-gov/cgi-bin/duke/, 2013.**

Conclusion

The investigation established that the strong extraction ability of ethanol could are extracted number of bioactive components for various biological properties. In order that those could be applied for earlier medicines and further study must elute different active compounds from the plants which can be created a replacement to treat many incurable diseases.

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