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Research Article

### Preliminary phytochemical profile of *Dictyota dichotoma* (Huds.) Lamouroux collected from Koothankuzhi Coast, Tirunelveli district, Tamil Nadu, India

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#### ABSTRACT

The present study was intended to discover the preliminary phytochemicals of *Dictyota dichotoma* (Huds.) Lamouroux from Koothankuzhi coast, Tirunelveli district, the south east coast of Tamil Nadu, India. The preliminary phytochemical analysis was conducted in seven extracts namely methanol, acetone, chloroform, ethyl acetate, petroleum ether, hexane and benzene by Harborne method. The preliminary phytochemical analysis showed the presence of alkaloids, anthocyanin, anthraquinones, cardiac glycosides, catechin, coumarins, diterpenes, emodins, flavonoids, glycosides, leucoanthocyanin, lignins, phenols, phlobatannins, quinones, saponins, steroids, tannins, terpenoids and triterpenoids. Among the various phytochemicals studied, tannin showed the maximum presence, being found in seven different extracts and anthraquinones was observed in only one extract. From the results, it was noted that the extracts of *Dictyota dichotoma* (Huds.) Lamouroux was found to be the presence of a number of active secondary metabolites. This report will lead to the isolation and characterization of these active secondary metabolites for bioefficacy and bioactivity.

**Keywords:** Phytochemical, Bioactive compounds, Seaweed extracts, *Dictyota*, Tamil Nadu.

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#### INTRODUCTION

Marine life is attractive and is considered to have great probable for the inherent value as well as for the development of new drugs. In current years, significant importance is attached to the detection of new biodynamic agents from marine sources to unearth the new sources of drugs from the marine ecosystem<sup>1,2</sup>. Marine organisms including plants and animals are reported to have a wide spectrum of bioactive metabolites which are structurally novel and biologically active substances. Many researchers have concentrated on the research in the areas of marine products which has grown geometrically in the recent and past<sup>3,4</sup>. The marine natural products have proved to be the prospective source of pharmaceuticals, nutritional supplements, cosmetics, agrochemicals, molecular probes, enzymes and fine chemicals and each of these classes has a potential multibillion dollar market value. New trends in drug discovery from natural sources stress on investigation of the marine ecosystem to see the sights plentiful complex and novel chemical entities. These entities are the source of new way for treatment of various diseases such as cancer, AIDS, inflammatory condition,

arthritis, malaria and large variety of viral, bacterial, fungal diseases<sup>6,7</sup>.

Seaweeds are the marine macro algae and primitive type of plants, growing plentifully in the shallow waters of sea, estuaries and backwaters. Seaweeds thrive wherever rocky, coral or suitable substrata are existing for the attachment<sup>7</sup>. Usually the marine ecosystem is the rich place for much natural products. Among them, seaweeds are one of the important marine living resources with unbelievable profitable products<sup>8</sup>. It was estimated that, there are about 9,000 species of seaweeds broadly grouped into three main groups namely green (Chlorophyceae), brown (Phaeophyceae) and red (Rhodophyceae) based on their pigments such as chlorophylls, carotenoids and phycobiliproteins<sup>9</sup>. Among the three categories, brown algae showed much attention with the valuable secondary metabolites. Hence the present study was undertaken to explore the presence of secondary metabolites in *Dictyota dichotoma* (Huds.) Lamouroux from Koothankuzhi coast, Tirunelveli district, the south east coast of Tamil Nadu, India in order to use it as a possible source for new biomedical substances to human.

## MATERIALS AND METHODS

### Collection of Plant sample

The plant materials used in the present study was *Dictyota dichotoma* (Huds.) Lamouroux, belonging to Phaeophyceae (brown algae) was made during the low tidal and subtidal regions (up to 1m depth) by hand picking. The collected materials were washed thoroughly with marine water in the field itself to remove the epiphytes and sediment particles. Then the samples were packed separately in polythene bags in wet conditions and brought to the laboratory, then thoroughly washed in tap water followed by distilled water to remove the salt on the surface of the thalli. They were stored in 5% formalin solution <sup>10</sup>.

### Preparation of extracts

For the preparation of different extracts, 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, acetone, chloroform, ethyl acetate, petroleum ether, hexane and benzene for 8h separately <sup>11</sup>.

### Preliminary phytochemical analysis

The different extracts (methanol, acetone, chloroform, ethyl acetate, petroleum ether, hexane and benzene) of *Dictyota dichotoma* (Huds.) Lamouroux were tested for alkaloids, anthocyanin, anthraquinones, cardiac glycosides, catechin, coumarins, diterpenes, emodins, flavonoids, glycosides, leucoanthocyanin, lignins, phenols, phlobatannins, quinones, saponins, steroids, tannins, terpenoids and triterpenoids. Phytochemical screening of the extracts was carried out according to the standard methods <sup>12</sup>.

### Test for alkaloids

1ml of 1% HCl was added with 2ml of extract and was treated with few drops of Mayer's reagent. A creamy white precipitate indicates the presence of alkaloids.

### Test for anthocyanin

1ml of 2N HCl was added to the 1ml of extract and was treated with NH<sub>3</sub>. Pink red colour turns blue violet.

### Test for anthraquinone

2ml of extract was mixed with 1ml of benzene and 1ml of 10% ammonia solution was added. The presence of red or violet color indicates the anthraquinones.

### Test for cardiac glycosides

0.4ml of glacial acetic acid was added with 1ml extract and trace amount of FeCl<sub>3</sub>. Blue colour indicates the presence of cardiac glycosides.

### Test for catechin

1ml of plant extract was mixed with few drops of Ehrlich's reagent was treated with few drops of conc. HCl. Pink color indicates catechin.

### Test for Coumarins

1ml of seaweed extract was added with 1ml of 10% NaOH. Formation of yellow colour indicates the presence of coumarins.

### Test for diterpenes

1ml extract was added with 1ml dis. H<sub>2</sub>O and 10 drops of copper acetate solution. Emerald green colour indicates the presence of diterpenes.

### Test for emodins

1ml of plant extract was mixed with 2ml of NH<sub>4</sub>OH and treated with 3ml of benzene. Red color indicates emodins.

### Test for flavonoids

A few drops of 1% NH<sub>3</sub> solution was added to 2 ml of extract in a test tube. Yellow coloration indicates the presence of flavonoids.

### Test for glycosides

2ml of 50% H<sub>2</sub>SO<sub>4</sub> was added to 2ml of extract in a boiling tube. The mixture was heated in boiling water bath for 5 min. 10ml of Fehling's solution was added and boiled. A brick red precipitate indicates the presence of glycosides.

### Test for leucoanthocyanin

1ml of plant extract was mixed with 1ml of isoamyl alcohol. Upper layer appear red in color indicates leucoanthocyanin.

### Test for lignins

1ml of plant extract treated with gallic acid. Formation of olive green color indicates lignins.

### Test for phenols

To 1ml extract, add 2ml distilled water followed by few drops of 10% ferric chloride. The formation of blue or black colour indicates the presence of phenolic groups.

### Test for phlobatannins

1ml extract was added with 1% aqueous HCl and then boiled. Red precipitate indicates the presence of phlobatannins.

### Test for quinones

1ml seaweed extract added with 1ml of alcoholic KOH. Red to blue colour indicates the presence of quinones.

### Test for saponins

2ml of extract was shaken vigorously with 5ml distilled water to obtain stable persistent foam. The formation of emulsion indicates the presence of saponins.

### Test for steroids

1ml of extract added to 1ml CHCl<sub>3</sub> and few drops of Conc. H<sub>2</sub>SO<sub>4</sub>. Golden red colour or Brown colour indicates the presence of phytosteroids.

### Test for tannins

To 2ml extract, 1ml of distilled water and 1-2 drops of ferric chloride solution was added and observed for brownish green or a blue black coloration indicates the presence of tannins.

### Test for terpenoids

2ml extract was mixed with 2ml of CHCl<sub>3</sub> in a test tube. 3ml Conc. H<sub>2</sub>SO<sub>4</sub> was added carefully along the wall of the test tube to form a layer. An interface with a reddish brown coloration confirms the presence of terpenoids.

### Test for triterpenoids

1ml of plant extract was added with 1ml of CHCl<sub>3</sub> and treated with few drops of Conc. H<sub>2</sub>SO<sub>4</sub>. Yellow color lower layer indicates triterpenoids.

### RESULTS AND DISCUSSION

In the preliminary phytochemical analysis of *Dictyota dichotoma* (Huds.) Lamouroux, twenty secondary metabolites (alkaloids, anthocyanin, anthraquinones,

cardiac glycosides, catechin, coumarins, diterpenes, emodins, flavonoids, glycosides, leucoanthocyanin, lignins, phenols, phlobatannins, quinones, saponins, steroids, tannins, terpenoids and triterpenoids) were tested in seven different extracts. Thus, out of 1x7x20=140 tests were conducted, 76 tests gave positive results and the remaining gave negative results.

**Table-1: Preliminary phytochemical analysis of *Dictyota dichotoma* (Huds.) Lamouroux.**

Tests	Solvents						
	Met.	Ace.	Chl.	EA	PE	Ben.	Hex.
Alkaloids	+	+	-	-	+	-	+
Anthocyanin	+	+	+	-	-	-	-
Anthraquinones	-	-	-	+	-	-	-
Cardiac glycosides	+	-	+	+	+	+	+
Catechin	+	-	-	-	+	-	-
Coumarins	+	+	+	+	-	+	+
Diterpenes	+	+	-	-	-	-	+
Emodins	+	-	-	-	-	+	-
Flavonoids	+	+	+	+	-	+	+
Glycosides	+	+	+	+	-	-	-
Leucoanthocyanin	+	+	-	-	-	-	-
Lignins	+	+	+	+	+	-	-
Phenols	+	+	-	-	-	+	+
Phlobatannins	+	-	+	-	-	-	-
Quinones	+	-	+	-	-	-	-
Saponins	+	+	-	+	+	+	+
Steroids	-	+	+	+	-	+	+
Tannins	+	+	+	+	+	+	+
Terpenoids	+	+	+	-	-	-	-
Triterpenoids	-	-	+	-	+	-	+

Met: Methanol  
EA: Ethyl acetate

Ace: Acetone  
PE : Petroleum ether

Chl: Chloroform  
Ben: Benzene

Hex: Hexane

The 76 positive results showed the presence of alkaloids, anthocyanin, anthraquinones, cardiac glycosides, catechin, coumarins, diterpenes, emodins, flavonoids, glycosides, leucoanthocyanin, lignins, phenols, phlobatannins, quinones, saponins, steroids, tannins, terpenoids and triterpenoids. Tannins showed the maximum presence, being found in seven different extracts, followed by cardiac glycosides, coumarins, flavonoids and saponins were found in six extracts, lignins and steroids found in five extracts. Alkaloids, glycosides and phenols were present in four different extracts, followed by anthocyanin, diterpenes, terpenoids and triterpenoids were present in three different extracts. Catechin, emodins, leucoanthocyanin, phlobatannins, quinones and terpenoids were found in two extracts followed by anthraquinones found in only one extract.

Among the seven various extracts, the methanol extract showed the presence of the maximum number (17) of compounds and followed by, the chloroform extract showed thirteen compounds. Next to chloroform extract, acetone extract with the presence of twelve compounds, hexane extract with ten compounds, ethyl acetate with nine compounds and benzene extract with eight compounds each. The petroleum ether extract showed seven compounds (Table-1).

### CONCLUSION

From the present study, it was concluded that *Dictyota dichotoma* (Huds.) Lamouroux showed the presence of a number of active secondary metabolites such as alkaloids, anthocyanins, anthraquinones, cardiac glycosides, coumarins, diterpenes, flavanoids, glycosides, phenols, phlobatannins, phytosteroids, quinones, saponins, tannins and terpenoids. From the results, it can be observed that the different extracts of *Dictyota dichotoma* (Huds.) Lamouroux were found to be the presence of a number of active secondary metabolites. This report will direct to the isolation and characterization of these active secondary metabolites for bioefficacy and bioactivity.

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### CONFLICT OF INTEREST

The author declares that he has no conflict of interest.

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