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Phytochemical Studies on Turbinaria Ornata (Turner) J.AG.

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ABSTRACT

The present study was aimed to explore the phytochemical constituents present in *Turbinaria ornata* (Turner) J.Ag. collected from the south east coast of Tamil Nadu, India. The phytochemical screening of different extracts was estimated using the standard procedure for UV-Vis spectroscopic and HPLC. The UV-Vis phytochemical profile of various extracts of *Turbinaria ornata* (Turner) J.Ag. was analyzed. The qualitative HPLC fingerprint profile of methanol extract of *Turbinaria ornata* (Turner) J.Ag. was selected at a wavelength of 254 nm due to sharpness of the peaks and proper baseline. The profile displayed one prominent peak at a retention time of 1.953 min and some moderate peaks were observed at a retention time of 3.000, 2.570 and 2.467 min respectively. The present study on *Turbinaria ornata* (Turner) J.Ag. produced novel phytochemical markers in standardization as useful analytical tools to check not only the quality of the powder but also the presence of adulterants in ayurvedic drugs.

Keywords: Phytochemistry, Seaweeds, *Turbinaria ornata,* UV-Vis, HPLC.

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INTRODUCTION

For the past few decades compounds from natural sources have been gaining importance due to the vast chemical diversity. These natural sources had led to a phenomenal increase in the demand for medicines in the last few decades and the need for ensuring the quality, safety and efficacy of drugs. The medicinal value of the plants lies in some chemical substances that produce a definite physiological action on the human body. The phytochemical screening reveals the presence of primary and secondary metabolites that suggest the plant might be of medicinal or industrial importance. The screening of phytochemicals is relevant in various areas for different purposes and some of these include alkaloids, steroids, tannins, saponins, flavonoids and phenolics.

Figure 1:Turbinaria ornata

Marine macro algae are referred to as seaweeds and can be classified as red algae (Rhodophyta), brown algae (Phaeophyta) and green algae (Chlorophyta) depending on their chemical composition. Seaweeds serve as an important source of bioactive natural substances. They have some of the valuable medicinal value components such as antibiotics, antioxidant, anticoagulants, anti-ulcer products and suspending agents in radiological preparations [1,2]. From the literature, it is observed that the seaweeds contain a significant amount of the protein, vitamins and minerals essential for the human nutrition [3]. Most of the compounds of marine algae show antibacterial activities [4,5]. Many metabolites isolated from marine algae have been shown to possess bioactive efforts [6,7]. Among the different compounds with functional properties, antioxidants are the most widely studied. Moreover the important role of antioxidants in human health has been demonstrated thus increasing the interest in such products and their demand by consumers. Marine algae serve as important resources for bioactive natural products [8,9]. Marine organisms are a rich source of structurally novel and biologically active metabolites. Secondary or primary metabolites produced by these organisms may be potential bioactive compounds of interest in the pharmaceutical industry. To date, many chemically unique

compounds of marine origin with various biological activities have been isolated and some of them are under investigation and are being used to develop new pharmaceuticals. Thus the present study was aimed to explore the phytochemical constituents present in *Turbinaria ornata* medicinally important brown algae.

MATERIALS AND METHODS

Collection of samples

The samples of *Turbinaria ornata* J.Ag. were collected from Rasthacaud (Lat N $08^0$08'308'' E$77^0$32'80") located in the Kanyakumari district, Tamil Nadu, India. The collections were 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. For drying, washed specimens were placed on blotting paper and spread out at room temperature in the shade. 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.

Preparation of extracts

10 g of air dried powder was extracted with 60 mL of solvents viz., aqueous, methanol, acetone, chloroform and benzene,. The sample was kept in dark for 72 h with intermittent shaking. After incubation, the solution was filtered through filter paper and the filtrate was collected (crude extracts).

UV-Vis spectroscopic analysis

The different extracts of *Turbinaria ornata* (Turner) J.Ag. were centrifuged at 3000 rpm for 10 min and then filtered through Whatmann No.1 filter paper using high pressure vacuum pump. The sample is diluted to 1:10 with the same solvents. The crude extracts containing the bioactive compound was analyzed spectroscopically for further confirmation. They were scanned in the wavelength ranging from 200-1100 nm using Shimazdu spectrophotometer and characteristic peaks were detected [10].

HPLC analysis

HPLC method was performed on a Shimadzu LC-10AT VP HPLC system, equipped with a model LC-10AT pump, UV-Vis detector SPD- 10AT, Rheodyne injector fitted with a 20 µL loop and auto injector SIL-10AT. A Hypersil BDS C-18 column (4.6 × 250 mm, 5 µm size) with a C-

18 guard column was used. The elution was carried out with gradient solvent systems with a flow rate of 1 mL min-1 at ambient temperature (25-28°C). The mobile phase was consisted of 0.1% v/v methanol (Solvent A) and water (Solvent B). The mobile phase was prepared daily, filtered through a 0.45 µm and sonicated before use. Total running time was 15 min. The sample injection volume was 20 µL while the wavelength of the UV-Vis detector was set at 254 nm [11,12].

RESULTS AND DISCUSSION

UV-VIS Spectroscopic analysis

The qualitative UV-VIS fingerprint profile of the aqueous extract of *Turbinaria ornata* (Turner) J.Ag. was selected at the wavelength of 310nm to 900nm due to the sharpness of the peaks and proper baseline. The profile showed the compounds separated at 310nm, 380nm, 410nm and 520nm with the absorption 4.000, 2.181, 1.435 and 0.521 respectively (Table-1 and Figure-2A). The UV-VIS fingerprint profile of the methanol extract of *Turbinaria ornata* (Turner) J.Ag. was selected at the wavelength of 310nm to 900nm due to the sharpness of the peaks and proper baseline. The profile showed the compounds separated at the nm of 310, 380, 410 and 460 with the absorption 3.024, 3.068, 3.612 and 2.185 respectively (Table-1 and Figure-2B).

Table 1 UV-VIS peak values of different extracts of *Turbinaria ornata* (Turner) J.Ag.

Solvents	Aqueous		Methanol		Acetone		Chloroform		Benzene	
Peak No.	nm	Abs	nm	Abs	nm	Abs	nm	Abs	nm	Abs
1	310	4.000	310	3.024	310	1.796	310	1.593	310	1.582
2	380	2.181	380	3.068	380	2.960	380	2.364	380	2.542
3	410	1.435	410	3.612	410	3.462	410	3.263	410	3.325
4	460	0.820	460	2.185	460	1.514	460	1.134	460	1.187
5	520	0.521	520	0.539	520	0.501	520	0.444	520	0.429
6	570	0.382	570	0.228	570	0.268	570	0.242	570	0.213
7	610	0.314	610	0.323	610	0.550	610	0.441	610	0.459
8	670	0.246	670	0.801	670	2.160	670	1.260	670	1.820
9	710	0.204	710	0.036	710	0.045	710	0.018	710	0.037
10	780	0.157	780	0.011	780	0.006	780	-0.006	780	0.013
11	830	0.133	830	0.008	830	0.003	830	-0.010	830	0.010
12	900	0.110	900	0.004	900	0.001	900	-0.013	900	0.006

The UV-VIS fingerprint profile of the acetone extract of *Turbinaria ornata* (Turner) J.Ag. was selected at a wavelength of 310nm to 900nm due to the sharpness of the peaks and proper baseline. The profile showed the compounds separated at 310nm, 380nm, 410nm, 460nm and 670nm with the absorption, 1.796, 2.960, 3.462, 1.514 and 2.160 respectively (Table-1 and Figure-2C). And profile of the chloroform extract of *Turbinaria ornata* (Turner) J.Ag. was selected at a wavelength of 310nm to 900nm due to sharpness of the peaks and proper baseline. The profile showed the compounds separated at 310nm, 380nm, 410nm, 460nm and 670nm with

the absorption, 1.593, 2.364, 3.263, 1.134 and 1.260 respectively (Table-1 and Figure2D). The UV-VIS fingerprint profile of the benzene extract of *Turbinaria ornata* (Turner) J.Ag. was selected at a wavelength of 310nm to 900nm due to sharpness of the peaks and proper baseline. The profile showed the compounds separated at 310nm, 380nm, 410nm, 460nm and 670nm with the absorption 1.582, 2.542, 3.325, 1.187, and 1.820 respectively (Table-1 and Figure-2E).

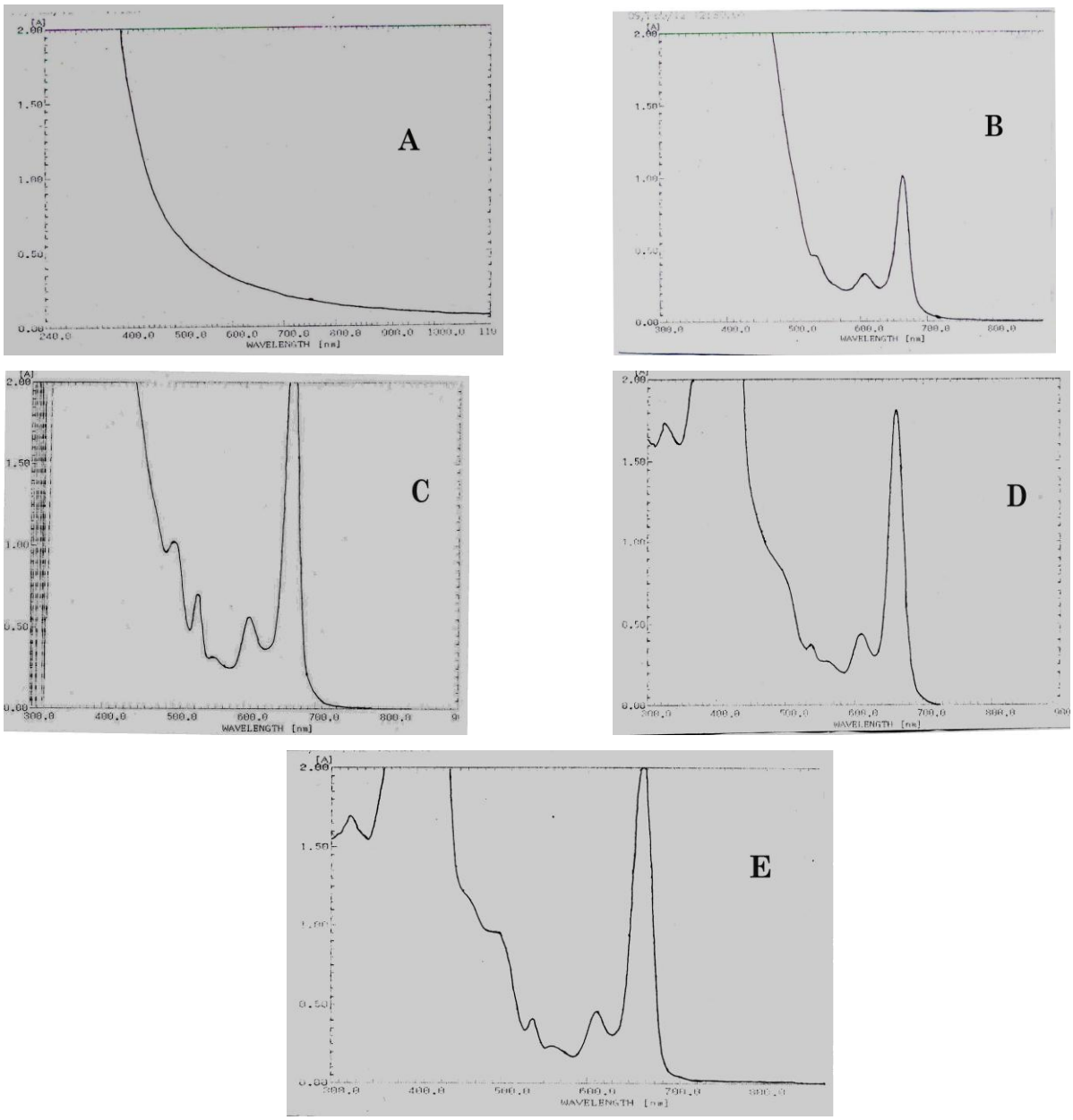

Figure 1 UV-VIS Peak Values of Different Extracts of Turbinaria ornata (Turner) J.Ag.

A. Aqueous Ether cold extract; B. Methanol cold extract;

C. Acetone cold extract; D. Chloroform cold extract; E. Benzene cold extrac

HPLC Analysis

The qualitative HPLC fingerprint profile of the methanol extract of *Turbinaria ornata* (Turner)

J.Ag. was selected at a wavelength of 660nm due to the sharpness of the peaks and proper baseline. The methanol extract prepared by cold extraction was subjected to HPLC for the separation and identification of constituents present in the *Turbinaria ornata* (Turner) J.Ag. Six compounds were separated at different retention times of 1.957min, 2.113min, 2.573min, 3.013min, 3.377min and 3.047min respectively. The profile displayed three prominent peaks at the retention times of 1.957min, 2.113min and 2.573min and some moderate peaks were also observed at the retention times of 3.013min, 3.377min and 8.047min (Figure-3).

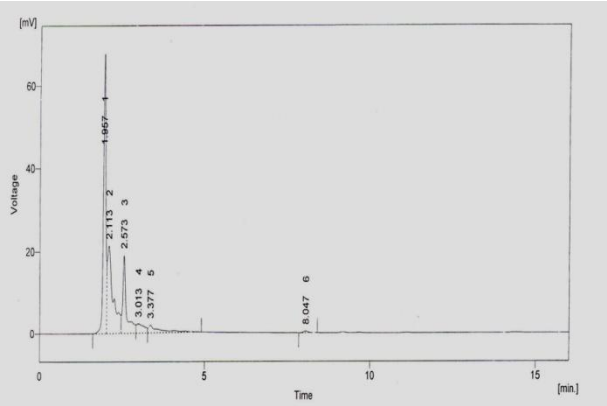

Figure 2 HPLC Profile of *Turbinaria ornata* (Turner) J.Ag. – Methanolic cold extract

Seaweeds have the great potential for the production of secondary novel bioactive compounds which are not found in terrestrial environment [13,14]. Seaweeds are considered as the richest source of bioactive compounds as they are able to produce a great variety of secondary metabolites characterized by a broad spectrum of biological activities. Compounds with cytostatic, antiviral, anthelmintic, antifungal and antibacterial activities have been detected in brown algae [15,16]. It is a real fact that the importance of marine organisms as a source of new substances is growing. With marine species comprising approximately a half of the total global biodiversity, the sea offers an enormous resource for novel compounds, and it has been classified as the largest remaining reservoir of natural molecules to be evaluated for drug activity. A very different kind of substances have been obtained from marine organisms among other reasons because they are living in a very exigent, competitive and aggressive surrounding very different in many aspects from the terrestrial environment, a situation that demands the production of quite specific and potent active molecules [17]. Seaweeds known as medicinal are rich in secondary metabolites which include alkaloids, glycosides, phenols, flavonoids, tannins, saponins, steroids, related active metabolites are of great medicinal value and have been extensively used in the drug and pharmaceutical industry. Recently, a number of studies have been reported on the phytochemistry of seaweeds across the world [18,19,20]. In the present investigation also, *Turbinaria*

ornata (Turner) J.Ag. have been selected from Tamil Nadu, India for phytochemical screening on the basis of traditional and pharmaceutical uses.

CONCLUSION

The present study *Turbinaria ornata* (Turner) J. Ag. produced novel phytochemical markers in standardization as useful analytical tools to check not only the quality of the powder but also the presence of adulterants in ayurvedic drugs. UV-VIS and HPLC analysis can be used as effective markers in identifying authentic from its adulterants. It also suggested that *Turbinaria ornata* (Turner) J.Ag. may be rich sources of phytochemicals which can be isolated and further screened for different kinds of biological activities depending on their reported therapeutic uses. Further work will emphasize the isolation and characterization of active principles responsible for bioactivity.

REFERENCES

1. Lekameera R, Vijayabaskar P, Somasundaram ST. Potential antioxidant activity of brown alga *Loboohora variegate*. Seaweed Res. Utiln 2007; 29 (1&2): 55-61.
2. Lekameera R, Vijayabaskar P, Somasundaram ST. Evaluating antioxidant property of brown alga *Colpomenia sinuosa* (Derb. Et sol). African J. Food Sci 2008; 2: 126-130.
3. Fayaz K, Namitha KN, Chidambara MM, Mahadeva SR, Sarada SK, Ravishankar S. Chemical composition Iron bioavailability and antioxidant activity of *Kappaphycus alvarezi* (Doty). J. Agric. Food Chem 2005; 53: 792-797.
4. Thirumaran G, Vijayabaskar P, Anantharaman P. Antibacterial and antifungal activies of brown Marine macro alaga (*Dictyota dichotoma*) from the Gulf of mannar biosphere reserve. Environ. Ecol., 2006; 24(1): 37-40.
5. Kim, Lee. Antimicrobial activities of the bromophenols from the red alga *Odonthalia corymbifera* and some synthetic derivatives. Bioorganic and Medicinal Chem. Lett 2008; 18: 104-108.
6. Venkateswarlu G, Panchagnula K, Aditya L, Gottumukkala VS. Synthesis, structural revision and biological activities of 4-chloroaurone, metabolite of marine brown alga *Spatoglossum variabile*. Tetrahedron 2007; 63: 6909-6914.
7. Yang L, Peng LS, Zhou S. Lactones from a brown alga endophytic fungus (No. ZZF36) from the South China Sea and their antimicrobial activities. Bioorganic and Med. Chem Lett 2006; 16: 4205-4208.
8. Iliopoulere D, Agias C, Harvala C, Roussis V. C_{15} acetogenins from the red alga

Laurencia obtuse. Phytochemistry 2002; 59: 111-116.

9. Metzger P, Roger MN, Largean C. Botryolins A and B, two tetramethyl sequalene triethers from the green microalga *Botryoccus braunic*. Phytochemistry 2002; 59: 839-843.
10. Johnson M, Babu A, Janakiraman N, Renisheya Joy Jeba Malar T. Phytochemical studies on *Laurencia obtusa* (Hudson) Lamourux. International Journal of Biomedical and Advance Research 2012; 3(4): 225-232.
11. Sharanabasappa GK, Santosh MK, Shaila, Seetharam YN, Sanjeevarao I. Phytochemical Studies on *Bauhinia racemosa* Lam., *Bauhinia purpurea* Linn. and *Hardwickia binata* Roxb. E-Journal of Chemistry 2007; 4(1): 21-31.
12. Mallikharjuna PB, Rajanna LN, Seetharam YN, Sharanabasappa GK. Phytochemical Studies of *Strychnos potatorum* L.f. – A Medicinal Plant. E-Journal of Chemistry 2007; 4(4): 510-518.
13. Fayaz KKM, Namitha, Chidambara MKN, Mahadeva Swamy M, Sarada R, Salma Khanam, Subbarao PV, Ravishankar GA. Chemical composition, Iron bioavailability and antioxidant activity of *Kappsphycus alvarezi* (Doty). J. Agric. Food Chem 2005; 53: 792-797.
14. Faulkner DJ. Marine natural products. Nat. Products Rep 2002; 19: 1-48.
15. Lindequist U, Schweder T. Marine biotechnology, In: H.J. Rehm, G. Reed (Eds.), Biotechnology Vol.10, Wiley-VCH, Weinheim, 2001:441-484.
16. Newman DJ, Cragg GM, Snader KM. Natural products as source of new drugs over the period 1981-2002. J. Nat. Prod 2003; 66: 1022-1037.
17. Blunt JW, Copp BR, Munro MHG, Northcote PT, Prinsep MR. Marine natural products. Natur. Prod. Report 2006; 23: 26-78.
18. AL-Haj NA, Mashan NI, Mariana N Shamsudin, MN, Mohamad H, Vairappan CS and Sekawi Z. Antibacterial Activity of Marine Source Extracts Against Multidrug Resistance Organisms. Am. J. Pharmacol. Toxicol 2010; 5(2): 95-102.
19. Salem WM, Galal H, Nasr El-deen F. Screening for antibacterial activities in some marine algae from the red sea (Hurghada, Egypt). African Journal of Microbiology Research 2011; 5(15): 2160- 2167.
20. Manivannan K, Karthikaidevi G, Anantharaman P, Balasubaramanian T. Antmicrobial potential of selected brown seaweeds from Vedalai coastal waters, Gulf of Mannar. Asian Pacific Journal of Tropical Biomedicine 2011; 117-123.