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Research Article

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Phytochemical analysis of red alga *Acanthophora spicifera* (Vahl) collected from Mumbai, India

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ABSTRACT

Natural products from marine algae have attracted the attention of biologists and chemists the world over for the last five decades. Many of these compounds are used to treat diseases like cancer, acquired immune-deficiency syndrome, inflammation, pain, arthritis, as well as viral, bacterial, and fungal infections. The marine red alga showed the phytochemical constituents like phenols, alkaloids, saponins, flavonoids and steroids. The presence of a variety of chemical constituents, such as saponins, phenols, flavonoids, alkaloids and steroids were analyzed in Acanthophora spicifera by qualitative tests, TLC and antioxidant activities by DPPH assay .The aim of the present study is to evaluate the phytochemical constituents of the marine red alga Acanthophora spicifera.

Key words: Phenols, alkaloids, saponins, flavonoids and steroids, *Acanthophora spicifera*

INTRODUCTION

Red algae and their extracts have been studied as novel sources of variety of compounds and reported for their biological activity for potential medicinal use. Red algae are the source of amino acids, terpenoids, phlorotannins, steroids, phenolic compounds, halogenated ketones and alkanes, cyclic polysulphides, fatty acids, acrylic acid (4 ,13) .These compounds probably have diverse simultaneous functions for the seaweeds and can act as allelopathic, antimicrobial, antifouling, and herbivore deterrents, or as ultraviolet-screening agents. They are also used by the pharmaceutical industry in drug development to treat diseases like cancer, acquired immune-deficiency syndrome (AIDS), inflammation, pain, arthritis, infection for virus, bacteria and fungus (3). Compounds with cytostatic, antiviral, antihelmintic, antifungal and antibacterial activities have been detected in green, brown and red algae(6) . Marine macroalgae are considered as an excellent source of bioactive compounds which has a broad range of biological activities including antibacterial (14) antiviral (6) , antifungal (8) anticoagulant (4) antitumor (9) and anti-inflammatory activities (19). Phenolic compounds are commonly found in brown green red seaweeds , whose antioxidant properties have been correlated to their phenolic contents . Flavonoids are largest group of polyphenolic compounds and are known to contain a broad spectrum of chemicals and biological activities including antioxidant and free radical scavenging properties. They are remarkable group of plant metabolites. Flavonoids are perhaps best known to enhance the effects of ascorbic acid (2) There are several reports on the antioxidant activities of steroids , terpenoids and sapnonins. The presence of these secondary metabolites in seaweeds is highly evident of their pharmaceutical potential. Thus, the present investigation was carried to evaluate the phytochemical constituents of marine red alga *Anthocarpa specifera.*

EXPERIMENTAL SECTION

Collection of algae: The marine red alga *Acanthophora spicifera* collected from the intertidal region of the Mumbai coastal water and immediately brought to the laboratory in plastic bags containing water to prevent evaporation. Then the sample was washed thoroughly with sea water to remove extraneous materials. Samples were dried at 37°C and ground in an electric mixer. The extract was then concentrated and dried by a rotary evaporator.

Preliminary Tests for detection of components: Preparation of algal extract for preliminary tests , 200mg of dried algal powder was crushed in 10ml of methanol using a mortar and pestle and it was filtered through muslin cloth. The filtrate was collected in a clean test tube. This served as the sample for detection of various components in algae. (Extracts of alga prepared using the above mentioned procedure.)

Separation of components by Thin layer chromatography: Thin layer chromatography technique was used for the separation of active components flavonoids , alkaloids, steroids , sapnonins and phenols from various solvents combinations gave separated phytoconstituents which were observed under U.V. light by (5 , 16)

Antioxidant Assay DPPH Radical Scavenging Assay: 2-picryl-hydrazyl (DPPH) following the method of (18) 0.1 mM solution of DPPH in methanol was prepared and 1ml of this solution was added to 1 ml of seaweed extracts at different concentrations (1 , 5 ,10 ,15 , 25 , 50, 75, 100, 150 and 200 µg/mL). After 10 min, absorbance was measured at 517 nm. The percentage scavenging activity values were calculated as below:

% of scavenging = ((Ao-A1) /Ao) x 100

RESULTS AND DISCUSSION

There are many studies were reported on the presence of different phytochemical compounds of marine red algae collected from the coastal area (14) . Preliminary qualitative tests clearly revealed the presence of flavonoids , alkaloids, steroids , saponinins and phenols compounds. The test algae were proved to be a good source of bioactive components i.e. flavonoids , alkaloids, steroids , saponinins and phenols compounds (Table no 1) . The red algae *Champia parvula* extract contained sterols, glycosides, anthroquinones, phenols, alkaloids, triterpenoids, tannins, saponins, flavonoids, (17) **.** In TLC profile fig (1) specific solvents were used to separate the bioactive compounds. The Flavonoids were separated as spots at the Rf value 0.88 ± 0.01 , 0.78 ± 0.04 , 0.65 ± 0.02 for, alkaloids Rf value 0.54 ± 0.01 , 0.45 ± 0.01 , 0.33± 0.02, for phenols Rf value 0.62±0.02. , 0.46±0.03 , 0.42±0.01, for saponin Rf value 0.65±0.01 and steroid 0.72 ± 0.01(Table No.2) . There are reports that marine algae were also a rich source of phytochemical compounds screening from *Gracilaria corticata* and *Spirulina platensis* exposed the presence of alkaloids, phenolics, flavonoids and steroids (1). Several previous studies have revealed the bioactivity of active compounds isolated from *Acanthophora* sp. such as antibacterial antiviral and antioxidant activity (1, 7). The scavenging activity of *A. spicifera* was measured by DPPH free radical scavenging method. The scavenging activity increases with the increasing of the sample. The higher scavenging activity exhibited by the extract was found to be (53.2) % (Table No. 3) DPPH also showed a decrease in the absorption value with the increase in marine algae extract concentration from 50 to 200µl compared with the test control 1.70 this indicated that marine red alga extract showed better antioxidant activity. The scavenging activity of *A. spicifera* was measured by DPPH free radical scavenging method, the higher scavenging activity exhibited by the extract was found to be (55.03 ± 0.5) % by (7).

Table No 1: Phytochemical constituents of *Acanthophora spicifera*

Content	Extract
Flavonoids	+++
Alkaloids	++
Phenols	++
Saponin	++
Steroid	++

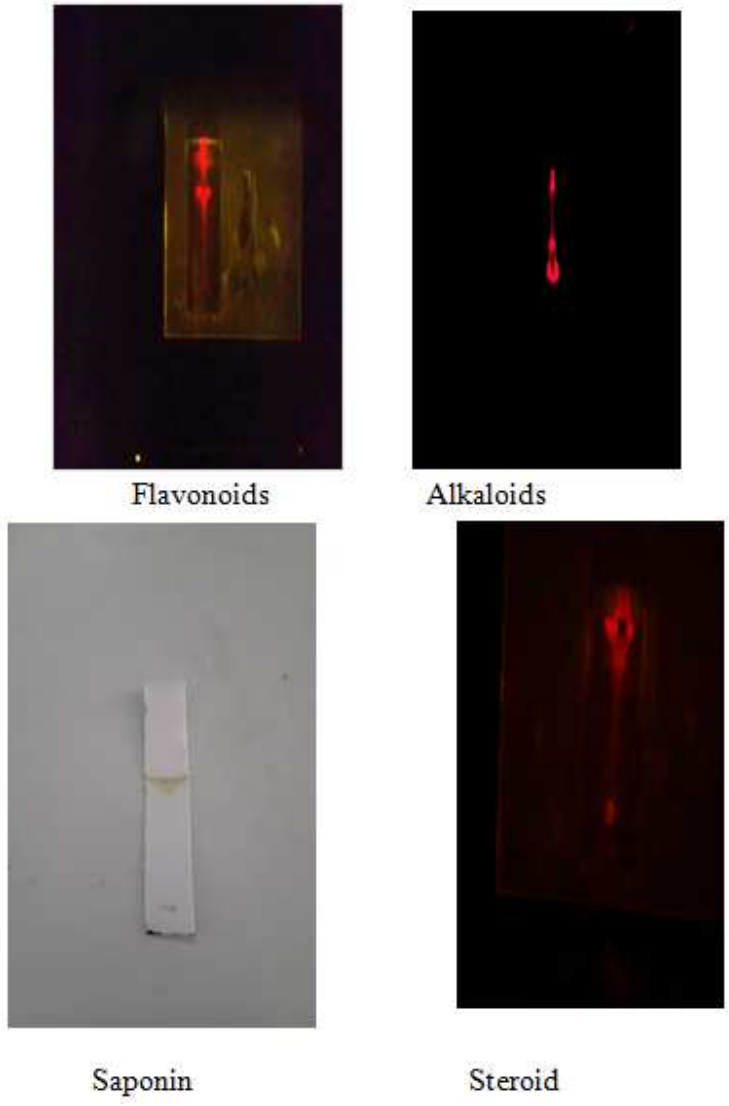
Table No 2 : TLC profile of *Acanthophora spicifera*

TLC profile of *Acanthophora spicifera*	
Flavonoids	0.88 ± 0.01 , 0.78 ± 0.04 , 0.65 ± 0.02
Alkaloids	0.54 ± 0.01 , 0.45 ± 0.01 , 0.33± 0.02
Phenols	0.62±0.02. , 0.46±0.03 , 0.42±0.01,
Saponin	0.65±0.01
Steroid	0.72 ± 0.01

Table No 3: Antioxidant Activity of *Acanthophora spicifera* Marine algae extracts of various concentrations (µl)

Red Alga	50	75	100	125	150	175	200
Acanthophora spicifera	0.42 (74.%)	0.54 (69.2 %)	0.65 (62.3%)	0.71 (60.0%)	0.81 (54.2%)	0.86 (53.2%)	0.94 (42.1%)

Fig No 1 TLC Profile of *Acanthophora spicifera*



Phenols

CONCLUSION

Results revealed that the marine red alga have several chemical constituents of high therapeutic efficacy. Further studies are required to investigate the extracts of for potential pharmacological properties.

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