



**Full Length Research Article**

**PHYTOCHEMICAL ANALYSIS IN DIFFERENT SOLVENT EXTRACTS OF PADINA  
TETRASTROMATICA**

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**ABSTRACT**

The phytochemical constituents of the aqueous, acetone and methanol extracts of *Padina tetrastromatica* were studied. The qualitative analysis revealed the presence of alkaloids, steroids, tannin, phenols, saponins, terpenoids and flavonoids. The methanol extract of *Padina tetrastromatica*, was used for quantitative estimation of alkaloid, tannin, flavanoid, phenol, Chlorophyll, Protein and Carbohydrate. The alkaloid content was  $5.97 \pm 0.10$ , Tannin ( $5.39 \pm 0.16$ ), Flavanoid ( $1.48 \pm 0.69$ ), Phenol ( $4.5 \pm 0.02$ ), Chlorophyll ( $0.39 \pm 1.29$ ), Protein ( $28 \pm 0.16$ ) and Carbohydrate ( $15.75 \pm 0.14$ ) in *Padina tetrastromatica*.

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**INTRODUCTION**

Macroalgae are potential source of bioactive metabolites for the pharmaceutical industry in drug development. It is a rich source of all essential nutrients which is promising as a source of pharmacognosical value which include alkaloids, phenols, flavonoids, saponins, steroids and the related active metabolites are of great medicinal values which have been extensively used in the drug and pharmaceutical industry. Macroalgae are considered as a source of bioactive compounds as they are able to produce a great variety of secondary metabolites characterized by a broad spectrum of biological activities, Newman *et al.* (2003). Compounds with antioxidant, antiviral, antifungal and antimicrobial activities have been detected in brown, red and green algae, (Yuan *et al.*, 2005). Although thousands of bioactive compounds have been discovered, the need for novel therapeutic compounds is still urgent in concern of number of new diseases and resistant strains of microorganisms (Chakraborty *et al.*, 2009). The present study revealed that screening of *Padina tetrastromatica* for the phytochemicals both quantitatively and qualitatively.

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**MATERIALS AND METHODS**

**Collection and extraction of macroalgae**

The brown algae *Padina tetrastromatica*, was collected from the Rasthacaud coast near Kanyakumari. Then they were washed thoroughly with seawater to remove extraneous materials and brought to the laboratory in plastic bags containing water to prevent evaporation. The fresh materials were dried in shade conditions and were subjected to pulverization to get coarse powder. The coarse powdered material was subjected to Soxhlet apparatus separately and successively extracted with methanol, acetone and distilled water. These extracts were collected and concentrated in a rotary evaporator. The concentrated extracts were stored in air tight containers and kept inside the refrigerator for subsequent use.

**Phytochemical analysis in different solvent extract**

The phytochemical analysis of methanol, acetone and aqueous extract from selected algae were screened for the presence or absence of active secondary metabolites such as Saponin, Terpenoids, Tannins, Steroids, Alkaloids, Flavanoids, Phlobatannins, Anthraquinones and Phenol. General reaction in these analysis revealed the presence or absence of the compounds in the algal extracts in

following procedures. The phytochemicals of the extracts were determined qualitatively as reported by Aiyelaagbe and Osamudiamen (2009), Egwaikhide *et al.* (2007) and Mariita *et al.* (2010). The phytochemical constituents of *Padina tetrastromatica* was quantitatively analyzed by following methods. Alkaloid (Harborne, 1973), Phenol (Sadasivam and Manickam, 1992), Tannin (Van-Burden and Robinson, 1981), Flavonoid (Bohm and Kocipai-Abyazan, 1994), Chlorophyll (Arnon, 1949). Carbohydrate (Dubois *et al.*, 1956).

## RESULTS

The important phytochemicals tannin, steroid, alkaloid, saponin, phenol, flavonoid, terpenoid, phlobatannin, anthraquinone, and glycoside in acetone, methanol and aqueous extracts of *Padina tetrastromatica* were screened. The compound phenol present in all the three solvent extracts. The positive results were observed for tannin, phenol and the compounds steroid, saponin, phlobatannin, anthraquinone, flavonoid, alkaloid, glycoside, terpenoid were not observed in acetone extract. In the methanol extract, the compounds steroid, saponin, alkaloid, phenol, flavonoid, terpenoid were observed and tannin, phlobatannin, anthraquinone, glycoside were given negative results. The aqueous extract shows the presence of glycoside and phenol. The compounds like steroid, saponin, phlobatannin, tannin, anthraquinone flavonoid, alkaloid and terpenoid were showed negative result (Table 1).

**Table 1. Phytochemical screening of different solvent extract of *Padina tetrastromatica*.**

Sl. No	Name of the compound	Aqueous	Acetone	Methanol
1	Tannin	-	+	-
2	Steroid	-	-	+
3	Phlobatannin	-	-	-
4	Saponin	-	-	+
5	Alkaloid	-	-	+
6	Anthraquinone	-	-	-
7	Glycoside	+	-	-
8	Phenol	+	+	+
9	Flavanoid	-	-	+
10	Terpenoid	-	-	+

Note: + present - absent

Among the three solvent extract taken from *Padina tetrastromatica*, the methanol dissolved the maximum antibiotic material. Thus the methanol extract of selected algae was taken for quantitative analysis. The alkaloid content was  $5.97 \pm 0.10$  mg/g, Tannin ( $5.39 \pm 0.16$  mg/g), Flavanoid ( $1.48 \pm 0.69$  mg/g), Phenol ( $4.5 \pm 0.02$  mg/g), Chlorophyll ( $0.39 \pm 1.29$  mg/g), Protein ( $28 \pm 0.16$  mg/g) and Carbohydrate ( $15.75 \pm 0.14$  mg/g) in *Padina tetrastromatica* (Table 2).

**Table 2. Quantitative estimation of different compounds in *Padina tetrastromatica***

S.No	Compound	Content (mg/g)
1	Tannin	$5.39 \pm 0.16$
2	Alkaloid	$5.97 \pm 0.10$
3	Flavanoid	$1.48 \pm 0.69$
4	Phenol	$4.5 \pm 0.02$
5	Chlorophyll	$0.39 \pm 1.29$
6	Protein	$28 \pm 0.16$
7	Carbohydrate	$15.75 \pm 0.14$

## DISCUSSION

Marine algae are a rich source of structurally novel and biologically active metabolites. Secondary metabolites produced by these algae may be potential bioactive compounds of interest in the pharmaceutical industry. It has been reported that the presence of phytoconstituents such as flavonoids, tannins and phenols help in preventing a number of diseases through free radical scavenging activity (Vasanthi *et al.*, 2006). The methanol extract was found to be the most prominent extract in extracting the major phytoconstituents of the species compared to other organic extracts. Preliminary phytochemical screening of various organic extracts revealed the presence of phytoconstituents including Alkaloids, Anthraquinones, Cardiac glycosides, flavonoids, reducing sugars, saponins and terpenoids, (Dhanalakshmi, *et al.*, 2013). In the present study, observed the presence of steroids, phenolic groups, saponin, tannin, flavonoid, alkaloid in *Padina tetrastromatica*. Melpha *et al.* (2014) reported that the proteins and tannins were absent in both *Padina tetrastromatica* and *P. boergesnii*, Carbohydrate is one of the important components for metabolism and it supplies the energy needed for respiration and other most important processes. The typical carbohydrates in brown seaweeds are fucoidan, laminarian, cellulose and alginates (Dawczynski *et al.*, 2007). The carbohydrate content was high when compared to other species Kokilam *et al.* (2013). Similarly the present study revealed high carbohydrate content in *Padina tetrastromatica*.

Mary and Vimalabai (2003) reported highest phenol content in *Padina tetrastromatica*. Phenolic compounds are widely distributed in the plant kingdom and have been reported to have several biological activities including antioxidant properties. The phenolic compounds may affect the growth and metabolism of bacteria. They could have an activating or inhibiting effect on microbial growth according to their constitution and concentration (Reguant *et al.*, 2000). Flavonoids are known as nature's tender drug which possesses numerous biological and pharmacological activities. The presence of various secondary metabolites in *Padina tetrastromatica* algae is the clear indication of their pharmaceutical potential. Thus this seaweed could be collected and utilized effectively in product preparation for the beneficial of mankind.

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