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Research Article

MARINE NATURAL PRODUCTS RELATED COMPOUNDS AND THE POTENTIAL APPLICATIONS IN CLINICAL TRIALS

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A B S T R A C T

Marine macroalgae like ***Padina Gymnospora*** are used in traditional remedies in many parts of the world. In the present study, the extracts of P.g***ymnospora*** have been shown to have antibacterial activity in vitro against Gram-positive and Gram-negative bacteria. The pharmaceutical properties and anti-microbial activities was considered to be an indicator of the capacity of the macro algae to synthesize bioactive secondary metabolites. It have been identified that the macro algae P.g***ymnospora*** per 100g contain 5.0g protein, 0..30g fat, 4.2 g fiber, 3.4g Ash, 1.4 mg niacin, 190mg ascorbic acid, 0.7mg Ca, 4.1 mg P, 21mg Na, and 16 mg K . Apart from that the P.g***ymnospora*** shows the phyto pharmaceutical compounds such as alkaloids, flavanoids, tannis, terpanoids and phenolic compounds. They have known to show medicinal activity as well as exhibiting antibacterial activity.

INTRODUCTION

Each year infectious diseases cause 4 million deaths worldwide and such problem is worsened by antibiotic resistance. Infections caused by antibiotic resistant bacteria are a major cause of morbidity and mortality. Most of the common bacterial strains cause infectious diseases, and results in millions of deaths each year worldwide from pneumonia, bacteraemia and meningitis. Thus, there is an urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action for new and re-emerging infectious diseases. Scientists believe that from marine macro algae, a number of medications may be derived; such compounds from marine sources are now being tested as treatments for cancer, infectious disease and other pathogenic disorders. Marine macro algae or Seaweed is the most accessible marine resource of the coastal zone that occupies potential importance source of biochemical compound. Pharmaceutical importance of seaweed is well known all over the world and extensive efforts were given to bring out substances from algae. There are a number of reports regarding the medicinal importance of sea weeds belonging to Phaeophyceae, Rhodophyceae and Chlorophyceae from all over the world (Kolanjinathan *et al*., 2009; Padmini Sreenivasa Rao, 1998). Seaweeds are considered as source of bioactive compounds and produce a great variety of Secondary metabolites characterized by a broad spectrum of biological activities. Compounds with cytostatic, antiviral, antihelminthic, antifungal and antibacterial activities have been detected in green, brown and red algae (Lindequist and Schweder, 2001; Newman *et al*., 2003).

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MATERIALS AND METHODS

Sample collection

The seaweed (Macroalgae) **Padina *Gymnospora*** was collected by hand at lowtide in the Sea shores of Mandapam and Rameshwaram Coastal region, Southeast Coast of India. The seaweed sample were picked by hand and immediately washed with seawater to remove the foreign particles, sand particles and epiphytes. Then it was kept in an ice box containing slush ice and immediately transported to the laboratory and washed thoroughly using tap water to remove the salt on the surface of the sample. Then the seaweeds spread on blotting paper to remove excess water and shade dried at room temperature.

Sample identification

The collected sample of *Padina Gymnospora* was identified by Dr.C.Stella, Departmen of Marine Science, Alagappa University, Karaikudi, Dr.T.Ramanathan, Assistant Professor (Sr.Grade), Center of Advanced Study in Marine Biology, Annamalai University, Portonovo, Tamilnadu.

Preparation of crude extract

The extract of *Padina Gymnospora* was taken from whole plant using cold percolation method (Moreau *et al*. 1988). Fresh *Padina Gymnospora* sample were collected (1kg) and shade dried at room temperature at 37°C and ground well in a manual Mill shimdzu Blender. The power (250g) was soaked with 750ml (1:3W/V) of hexane in an aspirator bottle for 48h at room temperature with occasional shaking. The extract was filtered through a Buchner Funnel with Whatman number 1 Filter paper. The filtrate was evaporated to dryness under reduced pressure using rotary evaporator or hot air oven at 40°C. Finally crude extract was obtained in powder form. The crude extract was stored at 4°C until further use.

Preliminary phytochemical analysis

The preliminary phytochemicals from the algal sample extracts were determined. In the preliminary phytochemical analysis of crude extracts of *Padina Gymnospora* for screened the presence of glycosides, tannin, terpenoids, Anthroquinone, amino acid, Sterol, Protein and flavanoids were carried out by Hanaa *et al.,* (2008) method.

Test microorganisms

The test bacterial strains, ***Staphylococcus aureus,*** ATCC25923, ***Klebsiella Pneumonia,*** ATCC 15380, ***Salmonalla Typhi***, NCTC8394 and ***Shigella,*** ATCC 4698 were collected from Department of Microbiology, Bharathidasan University, Tiruchirappalli and used for the present study.

Antimicrobial Assays

The antimicrobial activity of the methanolic extract of *Padina Gymnospora were* determined by measuring the zone of inhibition in the Kirby Bauer well diffusion assay.The results were compared with standard antibiotic, Penicillin.

RESULTS AND DISCUSSION

Phytochemical analysis

The antimicrobial properties of macroalgae ***Padina Gymnospora*** are possibly due to the presence of various phytochemical constituents such as glycosides, tannin, terpenoids, anthroquinone, amino acid and phenolic compounds etc. Phytochemical analysis of algal extract revealed the presence of constituents which are known to show industrial and pharmaceutical activities.The results of preliminary phytochemical analysis of crude extracts of *Padina Gymnospora* contains glycosides, tannin, terpenoids, anthroquinone, amino acid, sterol, protein and flavonoids (Plate1).

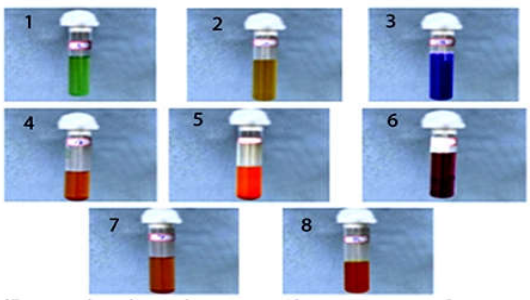

Plate 1 Phytochemical Screening of bioactive compounds
1. Tannin 2. Flavanoid 3. Steroids 4. Terapenoids
5. Protein 6. Amino Acids 7. Glycosides 8. Anthraquinone

Antimicrobial activity

The antimicrobial activities of crude extracts of Padina Gymnospora against pathogenic bacterial strains and their zone of inhibition were compared with standard antibiotic penicillin. The seaweed extracts were shown more active antimicrobial proficiency gainst, *Klebsiella Pneumonia, Staphylococcus aureus, Salmonalla Typhi* and *Shigella* when compared to the standard antibiotics.

The antibacterial effect of ***Padina Gymnospora*** shows positive result, when compared to regular standard antibiotics like penicillin.In solvent used as control there is no inhibition. The diameter of maximum inhibition of standard antibiotics penicillin shows 12 mm. (Table1) Fig 1.

Test Organisms	Zone of inhibition in(mm)		
	Negative control (solvent only)	Positive control	Experimental
		Penicillin	P. *Gymnospora* extract
S.aureus.	Nil	12	18
K.pnumoniae	Nil	6	11
S.typhi	Nil	8	14
Shigella	Nil	4	12

Negative control*:* It implies that the well contains only the solvent (acetone) devoid of Bioactive compounds and authentic antibiotics.

Positive control*:* It indicates that the well contains authentic antibiotic penicillin, in aquous medium.

Experimental*:* It implies that the well contains only the Bioactive compounds of the extract obtained from **P. *Gymnospora***

Statistical analysis: Mean value of 3 different assays.

Some studies concerning the effectiveness of Sea weed extraction shows antimicrobial activity (Rosell and Srivastava, 1987; Moreau *et al.,* 1988; Sastry and Rao, 1994).). The experimental study revealed that extracts caused bigger clear zones than antibiotic.Maeine plants, as sources of medicinal compounds continue to play dominant role in maintenance of human health since antiquities. Over 50% of all modern clinical drugs are of marine natural product origin (Stuffness and Douros, 1982). The marine macro algae play an important role in drug development programs of the pharmaceutical industry (Baker, *et al*., 1995; Cordell, 1995).

CONCLUSION

In the present study the phyto pharmaceutical compounds such as glycosides, tannin, terpenoids, anthroquinone, amino acid, sterol, and proteins are isolated from the seaweed *Padina Gymnospora. The* pharmaceutical compounds inhibited the growth of the pathogenic bacterial strains. The antimicrobial activity of *Padina Gymnospora* extract indicates the greater efficiency than penicillin. Further detailed study is required for isolating and establishing the antibacterial substances from P.*Gymnospora*.

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