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Exploring Antimicrobial Activity of *Sargassam wightii* Extracts against Microbial Pathogens

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A B S T R A C T

Seaweeds are considered as a source of bioactive compounds as they are able to produce a great variety of secondary metabolites characterized by a broad wightiiectrum of biological activities. Compounds with antioxidant, antiviral, antifungal and antimicrobial activities have been detected in brown, red and green algae. Algae are the source of amino acids, terpenoids, phlorotannins, steroids, phenolic compounds, halogenated ketones and alkanes and cyclic polysulphides.In this study, antimicrobial activity of sea weed, *Sargassam wightii* was checked against the diabetic survival bacteria. There are three algal extracts evaluated for antibacterial activity was studied by well diffusion assay and the antifungal activity was studied by poison

Introduction

Seaweeds belong to a group of plants known as algae. Seaweeds are classified as Rhodophyta (red algae), Phaeophyta (brown algae) and Chlorophyta (green algae) depending on their nutrient and chemical composition[1,2]. Like other plants, seaweeds contain various inorganic and organic substances which can benefit human health[3,4]. The inhibitory substances biosynthesized by the seaweeds were noted as early as in 1917[5,6,7]. The first observation regarding antibiotic activities of seaweeds was reported by Pratt et al., 1944.

Recent findings evidenced that seaweeds contained antibacterial, antiviral, antifungal, cytotoxic and larvicidal potentials.[8,9,10.]

Materials and Methods

The samples of *Sargassam wightii* were collected from the Kanyakumari coastal region during low tides. Then the seaweeds were washed thoroughly with seawater to remove extraneous materials and brought to the laboratory in plastic bags containing water to prevent evaporation. Then the

samples were washed with distlled water twice to remove salts. Samples were then shadow dried until constant weight obtained and ground in pulverization to get coarse powder. The powdered samples subsequently stored in refrigerator.

Preparation of the Extracts

Extraction of algal material was prepared according to the methodology of Indian Pharmacopoeia. The fresh materials were dried in shade conditions and the dried materials were subjected to pulverization to get coarse powder. About 100 gm of dry sample powder was weighed and macerated with 1000 ml of each solvent (Acetone, Aqueous and Ethanol) in a Soxhlet extractor for 6 hours. The extraction was repeated twice. The total extracts were filtered and the obtained filtrates (crude extracts) were concentrated under rotary evaporator. The extracts were stored in a refrigerator in air tight containers.

Collection of Microorganisms

Test organisms used were MTCC cultures. The pathogenic bacteria were cultured on Nutrient broth at 37°C for 18 hours before inoculation for assay. The bacterial stock cultures were maintained at 4°C

Antibacterial Assay

The antibacterial activity of Aqueous, Acetone and ethanol extracts of *sargassam wightii* were performed by using well diffusion method.

About 20 ml of sterile molten Mueller Hinton agar (Hi Media Laboratories Pvt. Limited, Mumbai, India) was poured into the sterile petriplates. Plates were swabbed with the overnight broth culture (108 cells/ml).

The solid medium was gently punctured with the help of cork borer to make a well. Finally the crude extracts at different concentrations (500ppm,750ppm and 1000ppm) were added into each well and incubated for 24 h at 37 ± 2°C. After 24 h of incubation, the zone of inhibition was measured and expressed as millimeter in diameter.

Antifungal Assay

The culture of 48 hours old grown on potato dextrose agar was used as a inoculum in this study .

1000ppm of algal extract (aqueous, acetone and ethanol) was taken, mixed with presterilized, cooled potato dextrose agar and poured in the sterilized Petri plate.

After solidification, the fungal inoculum was taken and inoculated at the center of the solidified plate. A control plate is maintained without mixing of the algal extract in the Potato dextrose agar.

Incubation period of 10 days was maintained for observation of antifungal activity of the crude plant extracts.

The complete fungal analysis was carried out in aseptic conditions.

Results and Discussion

The antibacterial activity of the crude extracts (aqueous, acetone and ethanol) was evaluated by disc diffusion assay and are listed in the table no : 01.

The antifungal activity of the crude extracts (aqueous, acetone and ethanol) was evaluated by Poison food technique and are listed in table no : 02.

Table.1

Dilutions	Extracts	Microorganisms				
		E.coli	*P. aeruginosa*	*K. pneumoniae*	*S. aureus*	*P.vulgaris*
500ppm	Aqueous	No activity	6mm	5mm	No activity	No activity
	Acetone	10mm	10mm	8 mm	10mm	10 mm
	Ethanol	10mm	10mm	9 mm	10mm	8 mm
750ppm	Aqueous	8mm	10mm	6 mm	10mm	8mm
	Acetone	12mm	14mm	10 mm	12mm	11mm
	Ethanol	11mm	12mm	11 mm	12mm	12mm
1000ppm	Aqueous	10mm	10mm	9 mm	10mm	10mm
	Acetone	14mm	14mm	12 mm	14mm	13mm
	Ethanol	14mm	15mm	12 mm	13 mm	12 mm

Table.2

Fungi and Dilusions	Percentage of inhibition		
Fusarium sp	Ethanol extract	Acetone extract	Aquous extract
1000ppm	85%	60%	No activity
750ppm	70%	40%	No activity
Candida albicans			
1000ppm	80%	70%	20%
750ppm	70%	60%	No activity
Penicillium sp			
1000ppm	70%	60%	No activity
750ppm	50%	50 %	No activity

The percentage of Inhibition is Calculated as Follows

$$MI\ (\%) = \frac{MG_{control} - MG_{treatment}}{MG_{control}} \times 100$$

where MI = mycelial inhibition,

$MG_{control}$ = mycelial growth of control and

$MG_{treatment}$ = mycelial growth of treated sample.

The present study was carried out to analyze the antimicrobial activity of the seaweed *Sargassam wightii*. From this study, we can conclude that the ethanolic extract of *Sargassam wightii* has a very good antimicrobial activity.

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