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Research Article

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Effect of the extract of *Ulva sp* on pathogenic microorganisms

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ABSTRACT

Seaweed extracts in different solvents exhibited different antimicrobial activities.Solvents like methanol, ethanol, chloroform or a mixture of these are widely used to extract active princples from living organisms. No specific solvent exhibited activity against all the test organisms effectively. In the present study the marine algae Ulva sp was tested for its antimicrobial properties against six pathogenic bacteria. There was activity in all the three solvent systems used. All the algal extracts investigated, showed activity against Pseudomonas fluorescens.

Keywords: seaweeds, antibacterial activity, solvent extract, plate assay *Ulva sp*.

INTRODUCTION

Seaweeds are used in many countries as a source food. They have wide applications in the pharmaceutical, food as well as cosmetic industry. They posses a rich source of nutrients and various active principles and has been targetted widely for extensive research. The protein, carbohydrate content of seaweeds has been screened for various species of seaweeds [1,2]. Several studies have focused on the antioxidant principles of these extracts and it has been attributed to be associated with the carotenoid fraction of the plant [3]. It has also been used as a fertilizer. Much work has been carried out to find out the active principles responsible for imparting certain antimicrobial properties in various organisms. Different types of solvents are used for this purpose to find out the most effective solvent which can extract the maximum amount of active principles. The antimicrobial activity of *Sargassum ilicifolium* and *Kappaphycus alvarezii* was studies against *Salmonella sp* and *Klebsiella sp* [4].

In this study the organic solvent extracts of *Ulva sp* was tested *invitro* for its antimicrobial activities against seven pathogenic microbes such as *Aeromonas hydrophila, Edwardsiella tarda, Psuedomonas fluorescens, Salmonella typhi, Pseudomonas aeruginosa, Staphylococcus aureus* and *Escherichia coli* using agar well diffusion method.

EXPERIMENTAL SECTION

***Preparation of Extracts*:**

The algal sample was dried, powdered and 5 gms of it was used for the study. The samples were soaked in various organic solvents like methanol, ethanol and ethanol: chloroform (1:1). After 48 hours the sample dissolved in each solvent was filtered using Whatman No1 filter paper to separate the filtrate for further use in antimicrobial testing of algal samples.

Test Microorganisms:
Antibacterial activity was tested against the pathogenic strains of *Aeromonas hydrophila, Edwardsiella tarda, Escherichia coli, Pseudomonas aeruginosa, Pseudomonas fluorescens, Salmonella typhi,* and *Staphylococcus aureus*. A loopfull of sample from each pure culture was inoculated in sterile nutrient broth and kept overnight at 37°C for growth.

***Plate Assay Method*:**
Antibacterial activity was assayed using the agar well diffusion test technique in Muller Hinton Agar Medium [4,5]. Concentrations ranging from 50 µl, 75 µl and 100 µlof algal extract was placed in the wells and allowed to diffuse at room temperature for 30 minutes. The extract loaded plates were kept for incubation at 37°C for 24 hours. After incubation, a clear zone was observed around the well which was the evidence for the presence of antibacterial active compounds in the algal extracts. Diameters of the zone of inhibition were measured in millimetres (including the diameter of the well).

RESULTS AND DISCUSSION

Seaweeds are rich in varied source of bioactive natural products and have been studied as potential biochemical and pharmaceutical agents. The main objective of the work was to evaluate the ability of the *Ulva sp* collected from the southwest coast of India to synthesize bioactive compounds of potential therapeutic interests.

The extracts of *Ulva sp.,* was tested for its antimicrobial activity against seven strains of microorganisms *Aeromonas hdrophila, Edwardsiella tarda, Escherichia coli, Pseudomonas aeruginosa, Pseudomonas fluorescens, Salmonella typhi* and *Staphylococcus aurues*, by agar well diffusion method and the results are tabulated in the Table-1

Table-1 Antibacterial activity of extracts of *Ulva sp*

S. No	Test organism	Zone of inhibition mm		
		Ethanol	Methanol	Ethanol+Chloroform
1	*Aeromonas hydrophila*	-	-	-
2	*Edwardsiella tarda*	-	4	6
3	*Escherichia coli*	7	-	8
4	*Pseudomonas aeruginosa*	-	-	-
5	*Pseudomonas fluorescens*	9	5	3
6	*Salmonella typhi*	6	-	8
7	*Staphylococcus aurues*	4	8	5

None of the solvent extracts showed activity against *Aeromonas hydrophila* and *Pseudomonas aeroginosa* Table-1. In case of *Edwardsiella tarda*, ethanol: chloroform (1:1) was the best solvent showing a zone of inhibition of 6 mm. Ethanol extracts were inactive against *Edwardsiella tarda.* There was a zone of inhibition of 4 mm in methanol extracts (Fig-1).

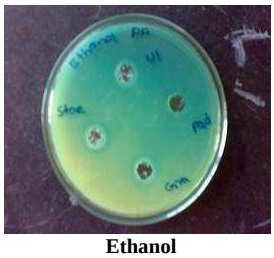
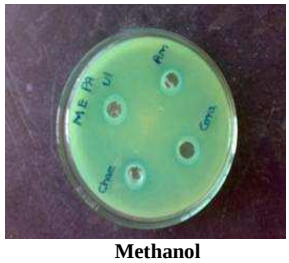
Methanol **Ethanol + Chloroform**

Fig- 1: Antibacterial activity of methanol and ethanol+chloroform extracts of *Ulva sp* against *Edwardsiella tarda*


Ethanol + chloroform **Ethanol**

Fig- 2: Antibacterial activity of ethanol and ethanol+chloroform extracts of *Ulva sp* against *Escherichia coli*

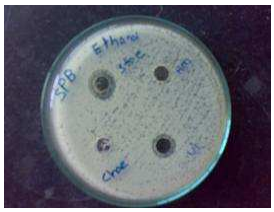
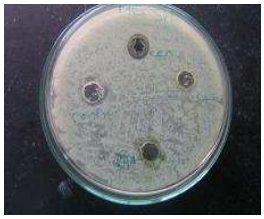
In case of *Escherichia coli*, ethanol and ethanol+chloroform showed activity. In comparison with ethanol and ethanol: chloroform (1:1) extracts, methanol extracts did not show any activity (Fig-2).

Ethanol+chloroform **Ethanol** **Methanol**

Fig- 3: Antibacterial activity of extracts of *Ulva sp* against *Pseudomonas fluorescens*

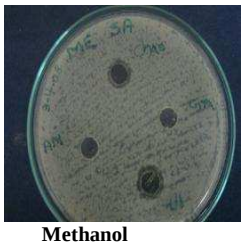
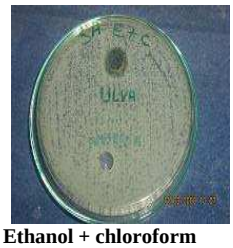
In case of *Pseudomonas fluorescens* ethanol was rated the best solvent though there was significant activity in the other two extracts. The ethanol extract of *Ulva* (9 mm) showed maximum activity (Fig- 3).

Ethanol **Ethanol+Chloroform**

Fig- 4: Antibacterial activity of ethanol and ethanol + chloroform extracts of *Ulva sp,* against *Salmonella typhi*

The algal extract showed antibacterial activity against *Salmonella typhi* and *Staphylococcus aureus* (Fig- 4 and Fig-5).

Ethanol **Methanol** **Ethanol + chloroform**

Fig-5 Antibacterial activity of *Ulva sp* against *Staphylococcus aureus*

Screening for antimicrobial activity has been done for many seaweeds [6,7]. Marine algae have also been a source of bioactive compounds that have pharmaceutical value [8].

CONCLUSION

In the current study *Ulva sp* extracts showed antimicrobial activity against all organisms excepting for *Aeromonas hydrophila* and *Pseudomonas aeroginosa.* All the three solvent extraction systems had responded quite well. The results indicate the presence of bioactive compounds in *Ulva sp* which is to be studied in detail.

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