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Original Research Article

Comparative Study on the Antibacterial Activity of *S. platensis* and *Oscillatoria sp*. Grown Invitro

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A B S T R A C T

Algae which are widely spread in the world are playing important roles in the nature. The importance is unlimited on structural materials in their cell walls, which include the extracted substances too. Antibiotics were produced from different microorganisms at the same time the bacterial infections are still the major problem in the world today. The present study is carried out to determine the antibacterial activity of extracts of *S. platensis and Oscillatoria sp*. against six pathogenic bacteria, *E. coli, S. typhi, Pseudomonas sp., V. cholerae, K. pnuemoniae* and *Enterobacter sp.*

Keywords

Antimicrobial activity, Cyanobacteria, Disc diffusion method.

Introduction

Cyanobacteria or blue-green algae are phototrophic microorganisms largely distributed in nature. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, of which many are based on their uses in traditional medicine. The search for cyanobacteria with antimicrobial activity has gained importance in recent years due to growing worldwide concern about alarming increase in the rate of infection by antibiotic-resistant micro-organisms. Various active substances with antibacterial, antiviral, fungicide, enzyme inhibiting, immunosuppressive and cytotoxic and algicide activity have been isolated from cyanobacterial biomass.

Most cyanobacteria and marine algae were tested for its antagonistic activity and in therapeutic use as an alternative medicine. Alternative medicine is often really nothing more than the replacement of drugs with natural ingredients (Ohta *et al*., 1995; Bork *et al*., 1996). The light inducing activity of extracts of marine Chlorella was given by Mira *et al*., 1993.

More recently, Spirulina has been studied because of its therapeutic properties (Belay *et al*., 1993) and the presence of antioxidant components (Miranda *et al*., 1998; Estrada *et al*., 2001) such as phenolics. *S. platensis* produce a diverse range of bioactive molecules, making them a rich source of different types of medicines. Pathogen

resistance to synthetic drugs and antibiotics that are already in use makes search for plants with antimicrobial activity more important, as they can substitute for synthetic antibiotics and drugs.

In recent years, a tremendous number of works were done on cyanobacteria for its increased value. An increasing number of natural marine products have been reported to display biological activities (Meyer *et al*., 1982; Seo *et al*., 2006). The water soluble extracts of *S. platensis* was found to have a sulphated polysaccharide, Calsium-Spirulinan (Ca-sp), which is an antiviral agent (Hayashi and Hayashi, 1996). *Spirulina* is most widely used as biotherapeutic agent against cancer, diabetes mellitus (Mani *et al*., 2000) cholesterol lowering effect (Nakaya and Honma, 1988) intestinal and vaginal infections (Elmer *et al*., 1996). A new type II restriction endonuclease, Ofo I was isolated from *Oscillatoria foreaui* (Matheshwaran Saravanan *et al*., 2003; Lyra *et al*., 2000).

Tadashi matsunaga et al., 1992 have identified an UV- absorbing biopterin glucoside from the marine planktonic cyanobacterium *Oscillatoria Sp.* By their quenching action of anti oxidative and anti inflammatory properties due to their high phycocyanin content blue green algae has a wide therapeutic use (Palozza and Krinsky, 1992; Bhat and Madyastha, 2000; Romay *et al*., 1999; Shimizu, 1996). The objective of present study focused on the investigation of the antibacterial activity of extracted materials of *S. platensis and Oscillatoria sp.*

Materials and Methods

Algal Source

The blue-green algae, *S. platensis and Oscillatoria sp.* were collected from "S.S Biotech", *Spirulina* production, Research and Training Centre at Sakkimangalam, Madurai and were maintained in Zarrouk's medium and CHU's NO.10 medium respectively at 30°C with 500 lux light intensity for 30 days (Fig 1). Samples were then shade dried and ground in pulverization to get coarse powder. Subsequently, the powdered samples were stored in refrigerator for further analysis.

Extraction of Antibacterial Components

Crude extracts of the cyanobacteria were prepared using different solvents viz., Acetone, Ethanol and Diethyl ether (Padmini Sreenivasa Rao, 1986). About 10 gm of powdered samples of *S. platensis and Oscillatoria sp* were separately ground with 50 ml of each solvent respectively. The mixtures were centrifuged at 1000 rpm for 15 min. The respective supernatants were transferred to sterile screw cap test tubes, labeled and stored at room temperature.

Antibacterial Assay

The collected cyanobacterial sample extracts were screened for antibacterial activity against six pathogenic bacteria- *E. coli, S. typhi, Pseudomonas sp., V. cholerae, K. pnuemoniae* and *Enterobacter sp.*

Disc Diffusion Method

Antibacterial activity by disc diffusion method (Padmini Sreenivasa Rao *et al*., 1986 and Caccanese *et al*., (1995) was observed. Whatmann no.1 Filter paper discs (5mm diameter), saturated with 5µl different extracts were dried under aseptic condition. The filter paper discs loaded with different extracts were placed on Muller Hinton Agar medium supplemented with the test organism using a sterile forceps. Disc fed with solvent alone serve as control. The

plates were incubated at 27°C and were observed for zone of inhibition after 24 - 48 hrs. The zone of inhibition was measured in mm (Fig 2).

Results and Discussion

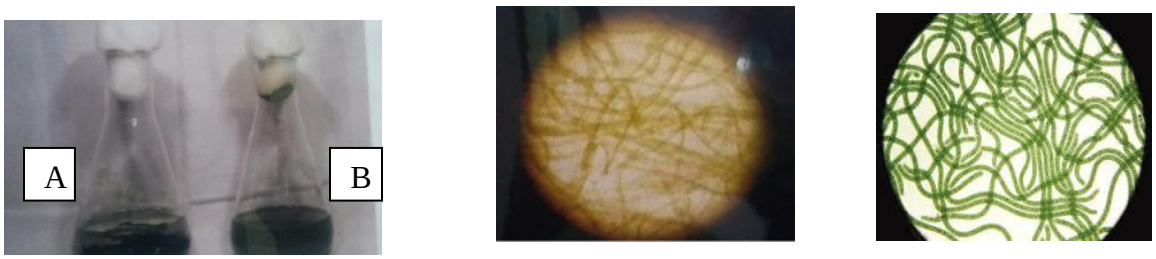
The Acetone, Ethanol and Diethyl ether extracts of *S. platensis and Oscillatoria sp.*were tested against - *E. coli, S. typhi, Pseudomonas sp., V. cholerae, K. pnuemoniae* and *Enterobacter sp.* (Table 1).

The Diethyl ether extracts of *S. platensis and Oscillatoria sp.* are sensitive to *E. coli, K.Pnuemoniae, Pseodomonas sp. Enterobacter sp.* and *S. typhi.* The Ethanol extracts show sensitiveness towards *E. coli, K.Pnuemoniae* and *Enterobacter sp.* The Acetone extracts show least or no sensitiveness to most bacteria except *Enterobacter sp.*and *K.Pnuemoniae.* Neither the extracts of *S. platensis and Oscillatoria sp.* show any activity on *V. cholera.*

Table.1 Antibacterial Activity of *S. Platensis* and *Oscillatoria sp*. against Different Extracts

Organisms	**Sample**	**Zone of Inhibition (mm)**		
		Ethanol Extract	**Acetone Extract**	**Diethyl ether Extract**
E. coli	*Oscillatoria sp.*	11	1	13
	S. platensis	20	1	12
Pseudomonas sp.	*Oscillatoria sp.*	1	1	10
	S. platensis	-	1	20
V. cholera	*Oscillatoria sp.*	-	-	-
	S. platensis	-	-	-
S. typhi	*Oscillatoria sp.*	-	1	9
	S. platensis	-	1	7
K.Pnuemoniae	*Oscillatoria sp.*	13	9	7
	S. platensis	11	10	14
Enterobacter sp.	*Oscillatoria sp.*	13	10	14
	S. platensis	15	13	7

Fig.1 *Cultivation of Oscillatoria sp.and Spirulina platensis Invitro*



A.*Oscillatoria sp.* B.*Spirulina platensis*

Fig.2 Antibacterial Activity of *Oscillatoria sp*.and *Spirulina platensis* Extracts against *E.coli*

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