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Antimicrobial activity of some cyanobacteria collected from local chours of Madhepura district, Bihar

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ABSTRACT

Members of Cyanobacteria produces several bioactive compounds, some of which have antimicrobial properties. In the present study, antimicrobial properties of three local isolates- *Oscillatoria limosa, Anabaena macrospora* and *Lyngbya contorta* was tested against two pathogenic bacteria- *Klebsiella, Proteus* and two pathogenic fungi- *Alternaria* and *Fusarium*. It was observed that extract of *Oscillatoria* and *Lyngbya* in Methanol, Ethanol and Acetone showed maximum inhibition against *Proteus* (40.6mm and 35.5mm respectively in Methanol extract, 36.7mm and 30.6mm in Ethanol extract and 27.5mm and 22.8mm in Acetone extract) while extracts of *Anabaena* showed maximum inhibition against *Klebsiella.*

Key Words - Inhibition zone, Antimicrobial activity, Bioactive compounds.

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INTRODUCTION

Cyanobacteria produces a variety of compounds collectivity known as secondary metabolites. These compounds are produced at the stationary phase of growth and at the end of primary growth. These secondary metabolites include Cyanotoxin and a variety of bioactive compounds. These bioactive compounds have antibacterial, antifungal and antiviral properties (Sheekh *et al.*, 2006). In several studies it was demonstrated that organic solvent extract of Cyanobacteria like *Oscillatoria*, *Anabaena* possesses antibacterial activity.

Cyanobacteria with reference to their antimicrobial activity and their pharmaceutical application have been studied by various workers (Archana Tiwari and Sharma, 2013, Kumar *et al.*, 2013, Shrivastava *et al.*, 2014, Suman Das,2014).

The aim of present work was to study antimicrobial and antifungal activity of local Cyanobacterial isolates against pathogenic bacteria and fungal plant pathogens.

MATERIAL & METHOD

Axenic Culture of Cyanobacteria: Three local isolates of *Oscillatoria limosa, Anabaena macrospora* and *Lyngbya contorta* were selected for antimicrobial activity. All isolates were grown in BG-11 medium. Axenic culture of each isolate was prepared.

Preparation of extract: From each isolate, 15 days old Axenic culture was centrifuged and pellets were collected and extracted with 10ml of three different solvents- Ethanol, Acetone and Methanol.

Test Organisms: Test organisms selected for present work were two gram negative bacteria- *Klebsiella pneumonae*, *Proteus vulgaris* and two plant pathogenic fungi- *Alternaria solani* and *Fusarium oxysporum*. Both bacteria were collected from local pathological lab and both fungi were collected from field. Bacteria were cultured on MacConkey agar and fungi were cultured on PDA medium.

Study of antimicrobial assay: Paper disc method was followed for antimicrobial assay. Sterile paper

disc was impregnated with Cyanobacterial extract of Methanol, Ethanol and Acetone. Paper disc were air dried. Paper disc were also impregnated in solvents (Methanol, Ethanol and Acetone) and air dried. Paper disc impregnated with solvents were used as control. Bacterial culture plates were prepared with MacConkey agar and lawn cultured. In periphery of each plate paper discs were placed over agar surface. All plates were incubated at 37^0C for 24 hrs. Zone of inhibition was measured by Calipers.

Fungal culture plates were prepared with PDA medium. Plates were lawn cultured with liquid culture of *Alternaria solani* and *Fusarium oxysporum* in triplicate. In periphery of each plate paper discs were placed on surface of PDA medium. Culture was incubated at 37^0C for 48 hrs. Inhibition zone was measured with Calipers.

RESULT

In the present study, antimicrobial activity of three isolates of Cyanobacteria was tested against two pathogenic bacteria- *Klebsiella* and *Proteus* as well as two pathogenic fungi- *Alternaria* and *Fusarium* by disc method. Inhibition zone was measured in mm.

Cyanobacterial extract was prepared in three organic solvents- Methanol, Ethanol and Acetone. Inhibition of pathogenic growth was also measured with solvents and considered as control. Inhibition zone by Methanol was maximum against all pathogens and inhibition zone by Acetone was minimum. *Oscillatoria limosa* and *Lyngbya contorta* showed maximum inhibition against *Proteus* (40.6 & 32.4) while *Anabaena macrospora* showed maximum inhibition against *Klebsiella* (38.6).

Table 1- Antimicrobial activity of *Oscillatoria limosa*

Organisms	Inhibition zone in mm					
	Methanol		Ethanol		Acetone	
	Algal extract	Control	Algal extract	Control	Algal extract	Control
Klebsiella	32.5	6.4	30.4	5.6	24.3	4.7
Proteus	40.6	5.7	36.7	6.2	27.5	4.8
Alternaria	25.7	5.2	23.5	5.8	22.4	3.9
Fusarium	29.4	6.3	24.3	6.2	27.5	3.5

Table 2- Antimicrobial activity of *Anabaena macrospora*

Organisms	Inhibition zone in mm					
	Methanol		Ethanol		Acetone	
	Algal extract	Control	Algal extract	Control	Algal extract	Control
Klebsiella	38.6	6.4	37.6	5.6	28.5	4.7
Proteus	35.5	5.7	34.4	6.2	25.3	4.8
Alternaria	22.4	5.2	20.5	5.8	21.7	3.9
Fusarium	28.6	6.3	21.4	6.2	24.5	3.5

Table 3- Antimicrobial activity of *Lyngbya contorta*

Organisms	Inhibition zone in mm					
	Methanol		Ethanol		Acetone	
	Algal extract	Control	Algal extract	Control	Algal extract	Control
Klebsiella	28.5	6.4	25.5	5.6	20.7	4.7
Proteus	32.4	5.7	30.6	6.2	22.8	4.8
Alternaria	19.6	5.2	18.5	5.8	18.5	3.9
Fusarium	21.4	6.3	19.6	6.2	22.7	3.5

CONCLUSION

Antimicrobial activity of *Oscillatoria limosa, Anabaena macrospora* and *Lyngbya contorta* was assessed against *Klebsiella, Proteus, Alternaria* and *Fusarium.* Maximum inhibition zone of *Oscillatoria* and *Lyngbya* was observed against *Proteus* while extract of *Anabaena* showed maximum inhibition against *Klebsiella. Oscillatoria limosa* and *Lyngbya contorta* showed maximum inhibition against *Proteus* (40.6 & 32.4) while *Anabaena macrospora* showed maximum inhibition against *Klebsiella* (38.6).

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