The Biobrio ISSN : 2393-9508 e-ISSN: 2582-4902
An International Quarterly Journal of Life Sciences
Website: www.thebiobrio.in SJIF 2023:8.16
10 (1&2): 929-931, 2023

Antimicrobial effect of Cyanobacterial isolates on some pathogenic bacteria

Sneha Kumari[1] & Shikha Chaudhury[2]
[1]University Department of Botany, B.N.M.University, Madhepura, Bihar, India
[2]Department of Botany, M.L.T. College, Saharsa, Bihar, India

Received : 08th December, 2022 ; Accepted : 09th January, 2023

ABSTRACT

Two isolates of *Oscillatoria limnosa* and *Lyngbya major* collected from a chour of Supaul district were tested for their antimicrobial activity. It was observed that both isolates were able to inhibit the growth of all four pathogenic bacteria- *Proteus, Staphylococcus, Pseudomonas* and *Klebsiella.*

Key Words - Antimicrobial activity, Inhibition zone, Pathogenic bacteria, *Lyngbya major, Oscillatoria limnosa*

***Corresponding author :** shikhachoudhury27@gmail.com

INTRODUCTION

Cyanobacteria produces intracellular and extracellular metabolites which are bioactive against a large number of microbes. Secondary metabolites produces by several Cyanobacteria shows antibacterial, antifungal and antiviral activities (EI- Sheek *et al.,* 2014). Several secondary metabolites produced by Cyanobacteria have industrial and medicinal importance (Gupta *et al.,*2013). Cyanobacteria like *Oscillatoria, Lyngbya, Aphanizomenon, Nodularia, Anabaena* produces toxin. Toxin produced by Cyanobacteria is known was cyanotoxin. Cyanotoxins are classified functionally into Heptaotoxins and Neurotoxins. Additionally some bacteria produces less effective toxin which is known as lipopolysaccharides. Hepatotoxin is an organophosphate while neurotoxin is an alkaloid.

Neurotoxin may be further classified in 6 groups on the basis of symptoms they produce in mice- Anatoxin-A, Anatoxin-a(s), Anatoxin-b, Anatoxin-b(s) and anatoxin-C. Further cyanotoxins are also given their name on the basis of their extraction from particular species such as Cyanotoxin extracted from *Microcystis* is named as Microcistin, cyanotoxin from *Cylindrospermum* is known as cylindrospermopsin and cyanotoxin from *Nodularia* is known as Nodulirin.

Cyanobacteria are potential source of fine chemicals, renewable fuel and as a biofertilizer. Recently Cyanobacteria are being used for bioremediation and pollution control. They are highly effective as accumulator and degraders of different environmental pollutants such as pesticides, crude oil, naphthalene, phenol phthalein, phenol etc..

MATERIAL & METHODS

Cyanobacteria isolates were collected from a local chour (water body) of Supaul district and cultured in BG-11 medium. Axenic culture of isolates were prepare by repeated sub-culturing in cyclohexamide supplemented medium and antibiotic supplemented medium.

Extract preparation: One isolate of *Oscillatoria limnosa* and one isolate of *Lyngbya major* were

selected for antimicrobial study. Both isolates were centrifuged at 2000 rpm and pellets were collected. Pellets were extracted in distilled water. Extract of both isolate was kept for antimicrobial study.

Pathogenic bacteria: Four pathogenic - *Proteus, Staphylococcus, Pseudomonas* and *Klebsiella* were obtained from local pathological lab. All pathogens were cultured in Nutrient agar medium at 30°C for 24 hours.

Antimicrobial assay: Antimicrobial assay was performed by well diffusion method. Ten plates were prepared with Mueller Hinton medium. In each plate a well of 1mm diameter was made in center.

Two plates from each pathogen were inoculated by lawn culture method. In 5 plates extract of isolate from *Oscillatoria* and in other 5 plates extract of isolate from *Lyngbya* was filled in well. All plates were incubated at 30°C for 24 hours. Inhibition zone in each plate was measured by Calipers.

RESULT

Pathogen	Isolate	Inhibition zone in mm
Proteus	*Oscillatoria*	12.3
	Lyngbya	10.5
Staphylococcus	*Oscillatoria*	13.5
	Lyngbya	11.3
Pseudomonas	*Oscillatoria*	9.7
	Lyngbya	8.9
Klebsiella	*Oscillatoria*	10.8
	Lyngbya	9.5

Antimicrobial activity of two isolates of *Oscillatoria limnosa* and *Lyngbya major* was tested against 4 pathogenic bacteria by well diffusion method. The inhibition zone was measured in mm with the help of Calipers. It was observed that both isolates inhibited the growth of all test bacteria. The inhibition zone of *Oscillatoria* isolate was measured as 12.3mm, 13.5mm, 9.7mm and 10.8mm against *Proteus, Staphylococcus, Psuedomonas* and *Klebsiella* respectively. The inhibition zone of isolate of *Lyngbya major* against *Proteus, Staphylococcus, Psuedomonas* and *Klebsiella* were 10.5mm, 11.3mm, 8.9mm and 9.5mm respectively. The maximum inhibition of *Oscillatoria limnosa* isolate was shown against *Staphylococcus* (13.5mm) and minimum against *Pseudomonas* (9.7mm). Maximum inhibition of *Lyngbya* isolate was recorded against *Staphylococcus* (11.3mm) and minimum against *Pseudomonas* (8.9mm).

CONCLUSION

Isolates of *Oscillatoria limnnosa* and *Lyngbya major* showed antimicrobial activity against pathogenic bacteria. Both isolates inhibited the growth of all four pathogenic bacteria i.e. *Proteus, Staphylococcus, Pseudomonas* and *Klebsiella*. Maximum inhibition was observed against *Staphylococcus* and minimum against *Pseudomonas*. Inhibition zone was measured in mm.

REFERENCE

Archana Tiwari & Deepika Sharma 2013. Antibacterial activity of bloom forming Cyanobacteria against clinically isolated human pathogenic microbes. *J. Al. Biomass. Utln.* 4(1): 83-89.

Bold H. C. & Wynne M. J. 1978. Introducton of the Algaue: Structure and reproduction, Prentice-Hall, Englewood Cliffs, New Jersey.

Desikachary T. V. 1959. Cyanophyta. Indian Council of Agriculture Research, New Delhi.

EI-Sheek M. M., Daboor S. M., Swelim M. A. & Mohamed S. 2014. Production and characterization of antimicrobial active substance from *Arthrospira platensis*. *Iranian J. Microbiol.* 6(2): 112-119.

Gupta V., Ratha S. K., Sood A., Chaudhary V. & Prasanna R. 2013. New insights into the biodiversity and applications of Cyano bacteria (Blue-green algae)-prospects and challenges. *Algal Res.* 2: 69-97.

Malathi T., Ramesh Babu M., Lalitha Kumari K. & Digambar Rao B. 2015. Antimicrobial activity of soil Cyanobacteria *Cylindrospermum majus. Int. J. Rec. Sci. Res.* 6(5): 3859-3863.

Prescott G. W. 1951. Algae of the western great lakes area.

Purshotam Kaushik & Abhishek Chauhan. 2009. A hand book of Cyanobacteria antibacterial activity. New India Publishing Agency, New Delhi. 1-198.

Rasha K. Osman, Hanan A. Goda & Aziz M. Higazy. 2015. Evaluation of some extra- and intracellular cyanobacterial extracts as antimicrobial agents. *Int. J. Adv. Res.* 3(5): 852-865.

Singh R. N. 1961. Role of blue-green algae in Nitrogen economy of Indian agriculture. ICAR, new Delhi.