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ANTIMICROBIAL ACTIVITY OF CYANOBACTERIA : *NOSTOC MUSCORUM*

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ABSTRACT : Cyanobacteria (*Nostoc muscorun*) the photosynthetic microalgal strains, contain antimicrobial substances. Cyanobacteria isolated from different freshwater reservoirs, situated in various regions, were tested in compliance with the agar-well diffusion method. Cyanobacteria show antagonistic activities against certain gram negative, gram positive bacteria and filamentous fungi (*Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Candida albicans* and *Saccharomyces cerevisiae*) Abroad spectrum antimicrobial antibiotic is produced by *Nostoc muscarum* during the post exponential phase of growth. Prodoctim appears to be dependent upon the limitation of one or more nutrients in the medium. This study reveals that the bioactive substance is maintained, against antimicrobial activity of acetone and ether extracts on gram negative bacteria while methanol extracts on gram positive bacteria. Cyanobacteria : *Nostoc moscurm* produce extracellular and intracellular products which are bioactive compounds and produce secondary metabolites, such as hydrocarbons, lipids, fatty acids, aminoacids and aromatic compound etc. The main objective of this study to test this microalga isolated from various freshwater reservoir and to face their antimicrobial activities on various microorganisms. It also optimize the condition for the production of an antimicrobial agents.

Key words : *Cyanobacteria, Nostoc moscurm, Antimicrobial activity, Bio-active substance.*

INTRODUCTION

Most of the antibiotic production is mainly based on chemoheterotrops, such as bacteria and fungi. Till today, yet a very few attention is given on the other groups, such as cyanobacteria for pharmaceuticals, antibiotics and other biologically active compounds, cyanobacteria. (*Nostoc moscorum*) are photosynthetic photoautotrophic prokaryotes. They have potential for the control of pathogenic bacteria and fungi. Cyanobacteria (*Nostoc moscorum*) strains were isolated from various regions. This group of photosynthetic, filamentous, microorganisms found in almost all the ecological niche and are good source of biologically active compounds (Metting and Dyne,1986). Microalgae, such as blue green algae produce toxins, that may have potential pharmaceutical applications (Borowitzka and Borowitzka,1992).

The bioactive compound from *Nostoc moscorum* produce maximally after 12 days of incubation in culture media, chu-10 medium at 28°C at pH 7.5. The extracellular products were obtained by concentration and sterilization of the culture medium where cyanobacteria were grown. Cyanobacterial substances promoted or inhibit fungal growth, according to the fungal and cyanobacterial strains tested. Their role as antiviral, anti-tumor, antibacterial, anti-inflamatory, anti-cancer, anti HIV and a food additive have been well established. The production of cyanobacteira in artificial and natural environment have been fully exploited. Temperature of incubation, pH of the culture medium, incubation period, medium constituent and light intensity are the important factors influencing anti-microbial agent production (Noaman *et al.*,2004).

Now a days the cyanobacteria are become an economic source of New drug and commercially important compounds. The pharmacological effect from cyanobacteria has increased recently. Some species of cyanobacteria Produced secondary metabolities which are rich source of bioactive compounds to produce medicines. Cyanobacteria are a rich source of natural products and are known to produce terpenoids. These bacteria are the major source of the musty-smelling terpenes geosmin, which are found in many fresh water supplies. Terpenoids constitute the largest group of natural products, containing over 20,000 described compounds (Devis and Croteau,2000). These compounds have a wide range of biological function and are synthesized by plants and microbes as for example, pigments, hormones and signaling molecules, antibiotics, antifeedants, or pollinator attractant. Many of these compounds are present in minute quantities and have been an impartant target synthetic chemists (Huang and Frontier,2008) and metabolic engineers (Takahashi *et al.*,2007).

MATERIAL AND METHODS

Collection and isolation of microalgae were made from the fresh water sources. Microalgae were increase in number routinely in Chu no. 10 medium having, with light intensity and temperature of 28°C at pH 7.5.

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Test organisms : The antimicrobial activity of *Nostoc moscurum* was tested on some bacterial and fungal strains. The bacterial strains were incubated into Nutrient broth for 24 hrs and yeast strains were incubated into media for 48 hrs.

Dry weight detection : The cyanobacterial cell were separated from the culture filtrate by centrifugation, collect the pallet and wash with distilled water several times. Biomass were filtered and transferred to a preweighed filter paper in an oven at 60°C, overnight to reach a fixed weight.

Preparation of extract : The axenic exponential culture of the microalgal strains growing in chu-10 medium were separated from the culture medium by centrifugation. These pallets were dried in an oven at 60°C for 24 hrs, according to the method of Khan *et al.* (1988) and Viachos *et al.* (1996). The methanol extract to be prepared and dry algal mass (ratio 1:15g/ml) was extracted through out 24 hrs. After the extraction phase being separated, this method was used for the chloroform, acetone, ethanol and ether respectively. These extracts were preserved at 4°C.

Agar well diffusion method for inhibitory effects : Agar well-diffusion method were used to test the antimicrobial effect of microalgae. After this we compared the antimicrobial activity of it with antibiotics, such as erythromycin and tetraacyclines and fungicide such as flocanizode. The bacterial culture were grown on EMB and yeasts on PDA media, now inoculated the plate with the extract and incubate for 24 hrs at 37°C. After incubation a clear zone of inhibition was measured with calipers.

RESULTS AND DISCUSSION

Cyanobacterial extracts and extrtacellular products have been found to have antimicrobial activity. pH of the medium, incubation period and temperature of incubation were important for the biosynthesis of bioactive products. In this study optimum pH 7.5, incubation period 24 hrs and 28°C temperature were were chosen for best growth and production of antimicrobial agents. Photosynthetic microalgae cyanobacteria has produced antimicrobial agents, for its biological activity against different species of bacteria and fungi (*E.coli, Candida, Saccharomyces cerevisiae*). As the results reveals that, acetone and ether extracts exhibit antimicrobial activity on gram- ve bacteria while methanol extract exhibit their activity on gram +ve bacteria, on the other hand, ethanol extracts exhibited antimicrobial activity on both gram +ve and gram -ve organisms. Yet chloroform extracts did not exhibit any antimicrobial activity. There are number of reports on antibiotic and other pharmacological effects from cyanobacteria. The genus *Cyanobacteria* generally studied for antimicrobial activity are *Nostoc* sp. (Knubel *et al.*,1990).

The extracts of cyanobacterial strains were prepared for their antibiotic activities against certain microoganisms by Kreitlowel *et al.* (1999). All cyanobacterial samples or extracts were concluded to inhibit the growth of at least one of the gram+ve bacteria. *Staphylococcus* occurs finally, the hexane and dichloromethane extracts were shown to exhibit antimicrobial effects. De Mule *et al.* (1991) determined that the methanol extracts of *Nostoc muscorum* revealed antibacterial activity on *Sclerotinia sclerotiorum.*

It was observed that the extracts obtained from various solvents used in this study had antibacterial and antifungal activities; and these extracts could be much more effective, when compared with other antibiotics & fungicides.

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