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ACADEMIC YEAR 2019-2020

S. No	Title of Paper	Name of Authors	Name of Journals	Is it listed in UGC Care list
1.	Screening and Characterization of Antimicrobial Compound Produced from Selected Marine Actinomycte	Mr. S. Kannan DR. K.K. Senthil Kumar Mr. G. M. Sivakumar DR. P. Perumal	Journal of Pharmaceutical Sciences and Research	Yes



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Screening and Characterization of Antimicrobial Compound Produced From Selected Marine Actinomycete

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Abstract:

In the present study, totally four strains of actinomycetes were isolated from marine soil in Bay of Bengal, near the Chennai of Tamilnadu in India. *Streptomyces species* was identified as potential antibiotic producer with antimicrobial activity against Gram-positive and Gram-negative species. Starch casein was shown to be the best growth medium as well as suitable substrate for antibiotic production. In the present study chalky white coloured and gray coloured isolated were noted. The production of citrase and oxidase are considered for characterizing *Streptomyces*. The present investigation revealed that *Streptomyces species* could produce detectable quantities of antimicrobial compounds in SCA medium. The antimicrobial compound extracted by using ethyl acetate were purified and separated by column and thin layer chromatography and was further characterized using UVspectra studies. The present study showed that the antibacterial efficacy of *Streptomyces species* was maximum against *Staphylococcus aureus* (38±0.44 mm) followed by *Bacillus subtilis* (29±0.36 mm), *Escherichia coli* (25±0.28 mm) and *Klebsiella pneumoniae* (11±0.24 mm). These results confirmed the presence of immense potential in screening and characterization of new compounds for therapeutic purposes. Thus, the present study was undertaken to identify new drugs from marine microorganisms against human pathogens.

Key words: Marine soil, *Streptomyces species*, Antibacterial activity and Human pathogens.

INTRODUCTION

The discovery of novel antibiotic and non-antibiotic compounds lead molecules of pharmaceutical interest through microbial secondary metabolite screening is becoming increasingly fruitful. There is wide acceptance that microorganisms are virtually unlimited sources of novel substances with many therapeutic applications. Among the microorganisms, actinomycetes gain special importance, as they are the most potent source for the production of antibiotics and other bioactive secondary metabolites *Streptomyces* is best recognized genus of actinomycetes. A marine microorganism has produced novel metabolites that ensure their survival in extreme habitats and also offers the potential for production of bioactive metabolites not observed in terrestrial microorganisms (Fenical *et al.*, 1999). Marine actinomycetes are efficient producers of new secondary metabolites that show a range of biological activities including antibacterial, antifungal, anticancer and insecticidal and enzyme inhibition. In the present work, antagonistic actinomycete strain was isolated and their bioactive novel compound was partially purified and characterized. To understand the actinomycetes population in Bay of Bengal, Chennai of Tamilnadu and to find out the potentiality of the production of antimicrobial compounds..

MATERIALS AND METHODS

Sea shore soil sample collection

The marine sea shore soil samples were collected from at the depth of 20cm, 20 meter near the sea side in Bay of Bengal, near the Chennai of Tamilnadu during the period of February 2019.

Isolation of actinomycetes

Starch casein agar medium was prepared and sterilized at 121°C in 15 lbs pressure for 15 min. Then it was supplemented with Amphotericin B (50 µg/l) and Tetracycline (20 µg/l) to prevent the bacterial and fungal growth. The medium was poured into the sterile Petri plates. 1g of marine sea shore soil sample was suspended in 9 ml of sterile double distilled water. Then the samples were serially diluted for up to 10⁻⁶ and 0.1 of the diluted samples was spread over the agar plates in triplets. The inoculated plates were incubated at 28±2°C for seven to ten days. After incubation, the actinomycetes were observed, purified using subculture method and maintained in starch casein agar medium for further investigation. For actinomycetes culture, Starch casein broth and Nutrient broth were used.

Identification of actinomycetes colonies

Morphological characterization

Morphological characterization was performed with a magnified lens on actinomycete strains grown for 3 to 14 days on starch casein agar plate. Colony morphology was recorded with respect to aerial colour, aerial mycelium, size, nature of colony, reverse side colour and pigmentation and the isolates were observed under the microscope and also performed the gram staining and acid fast staining.

Biochemical characterization

Biochemical characterization was performed with a actinomycete strains grown for 3 to 14 days on starch casein agar plate. Indole test, Methyl red test, Vogesproskauer test, Citrate utilization test, Catalase test, Oxidase test, Starch hydrolysis and Casein Hydrolysis test was performed.

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