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Soil Actinomycetes: potential source of novel antimicrobial substances

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Antimicrobial resistance has been recognized as an escalating problem that makes a huge impact on health and brings the economic outcomes down, through the increase of hospital costs, resource utilization and health care costs. Over-prescription of antibiotics and improper use of antimicrobials are currently described as the major causes for the development of resistant microbial strains. Thus, to overcome this issue, developing novel antimicrobial substances active against microorganisms resistant to currently used antimicrobials is equally important as refraining from over-prescription and improper use of them. Actinomycetes, dominant in soil have been recognized as one of the best antimicrobial compound producers. Therefore, in this study Actinomycetes were isolated from soil using the spread plate technique on Starch Casein Agar supplemented with Cyclohexamide and Nalidixic acid. Sixteen isolates were identified as the members of the order Actinomycetales by studying their morphological characteristics as described in the Bergey's Manual of Systematic Bacteriology. They were screened for the production of antibacterial and antifungal agents against selected pathogens; *Staphylococcus aureus*, *Escherichia.coli*, *Klebsiella pneumoniae*, *Listeria monocytogenes*, *Bacillus cereus*, *Aspergillus* sp. and *Candida* sp., both on solid media and liquid media by culturing them in triplicate on Nutrient agar and Starch Casein Broth respectively. The screening on the solid medium revealed that two of the actinomycetes isolates produce antimicrobial compounds against *S. aureus*, while three of them were producing antimicrobial compounds against *E. coli*. Furthermore, three of them exhibited antimicrobial activity against *K. pneumoniae*, while *L. monocytogenes* was inhibited by two of them. Four of the isolates showed inhibitory effect against *B. cereus*, whereas six and two of the isolates exhibited antimicrobial activity against *Aspergillus* spp. and *Candida* spp. respectively. Through the screening carried out on the broth media in triplicates, it was found that three isolates produce antimicrobial compounds against *S. aureus*, three against *E. coli*, two against *K pneumoniae*, four against *L. monocytogenes*, four against *B. cereus*, one against *Aspergillus* sp. and one against *Candida* sp. This reveals that there is a noticeable difference in the pattern of antimicrobial compound production in solid and liquid media. This could mainly be due to the differences of composition of the media used or differences of the concentration of the antimicrobials in these two types of media. As the next step of this study, it is important to test these antibacterial substances against pathogenic organisms resistant to existing antimicrobials.

Keywords: Actinomycetes, Antimicrobial compounds, Antimicrobial resistance