

In vitro evaluation of antimicrobial activities and antibiotic susceptibility profiling of culturable actinobacteria from fresh water streams

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Actinobacteria are major producers of antibiotics, industrially significant enzymes and many pharmaceutically important biologically active compounds. Twenty two actinobacterial strains were isolated from fresh water stream sediment samples of Murlen National Park, Mizoram, India. The actinobacterial strains were screened against antifungal pathogens (*Fusarium oxysporum*, *Fusarium udum*, *Fusarium proliferatum*, *Fusarium oxysporum ciceri* and *Fusarium graminearum*), and antibacterial activities against five bacterial pathogens (*Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Micrococcus luteus*, *Bacillus subtilis* and *Escherichia coli*) and a yeast pathogen *Candida albicans*. All strains showed antibacterial activity against *E. coli* and *F. proliferatum*. Based on the results of antagonistic, antibacterial and anti-yeast, two most potent strains *Kocuria* sp. and *Streptomyces intermidus* were further evaluated for their antibiotics susceptibility activity against 21 different antibiotics. *Kocuria* sp. showed resistance to 10 antibiotics whereas *Streptomyces intermidus* was resistance to 15 antibiotics. Modular genes Polyketide Synthase (PKS II) and Nonribosomal Peptide Synthetase (NRPS) were also detected in these two strains, which might be responsible for the production of secondary metabolites. Two volatile compounds, Di-N-octyl phthalate and 1-Bromo-3, 7-Dimethyloctane were identified from the extract of *Streptomyces intermidus* BPSWAC29 strain using Gas chromatography Mass spectrometry (GC-MS). This study highlights the promise of discovering novel actinobacteria with antimicrobial activity from underexplored niche biotopes such as fresh water stream sediments.

Keywords: 16S rRNA gene, Antibacterial, Antifungal, 1-bromo-3,7-Dimethyloctane, *Fusarium* spp., *Kocuria* sp., Di-N-Octyl phthalate, Polyketide synthase, Nonribosomal peptide synthetase, *Streptomyces intermidus*