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Isolation, Characterization and Screening of Antimicrobial Producing Actinomycetes from Sediments of Persian Gulf

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Abstract : Actinomycetes, Gram-positive bacteria, are interesting as a main producer of secondary metabolites and are important industrially and pharmaceutically. The marine environment is a potential source for new actinomycetes, which can provide novel bioactive compounds and industrially important enzymes. The aims of this study were to isolate and identify novel actinomycetes from Persian Gulf sediments and screen these isolates for the production of secondary metabolites, especially antibiotics, Using phylogenetic (16S rRNA gene sequence), morphological and biochemical analyses. 15 different actinomycete strains from Persian Gulf sediments at a depth of 5-10 m were identified. DNA extraction was done using Cinnapure DNA Kit. PCR amplification of 16S rDNA gene was performed using F27 and R1492 primers. Phylogenetic tree analysis was performed using the MEGA 6 software. Most of the isolated strains belong to the genus namely Streptomyces (14), followed by Nocardiopsis (1). Antibacterial assay of the isolates supernatant was performed using a standard disc diffusion assay with replication (n=3). The results of disk diffusion assay showed that most active strain against Proteus volgaris and Bacillus cereus was AMJ1 (16.46±0.2mm and 13.78±0.2mm, respectively), against Salmonella sp. AMJ7 was the most effective strain (10.13±0.2mm), and AMJ1 and AHA5 showed more inhibitory activity against Escherichia coli (8.04±0.02 mm and 8.2±0.03). The AMJ6 strain showed best antibacterial activity against Klebsiella sp. (8.03±0.02mm). Antifungal activity of AMJ2 showed that it was most active strain against complex (16.05±0.02mm) and against Aspergillus flavus strain AMJ1 was most active strain (16.4±0.2mm) and highest antifungal activity against Trichophyton mentagrophytes, Microsporum gyp serum and Candida albicans, were shown by AHA1 (21.03±0.02mm), AHA3 and AHA7 (18±0.03mm), AMJ6 (21.03±0.2mm) respectively. Our results revealed that the marine actinomycetes of Persian Gulf sediments were potent source of novel antibiotics and bioactive compounds and indicated that the antimicrobial metabolites were extracellular. Most of the secondary metabolites and antibiotics are extracellular in nature and extracellular products of actinomycetes show potent antimicrobial activities.

Keywords : antibacterial activity, antifungal activity, marine actinomycetes, Persian Gulf
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