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Determination of Heavy Metal Tolerance and Removal Ability of the *Staphylococcus sp. TWSL_1* Isolated from an Industrial Effluent

CD Wijayarathna[1#], DMDC Dissanayake[1], WMAP Ranathunga[1]
WMNH Kumari[1] and NV Chandrasekharan[1]

[1] *Department of Chemistry, Faculty of Science, University of Colombo, Sri Lanka*

[#]dilruksh@chem.cmb.ac.lk

Heavy metal contamination has become a major threat to the environment as well as to mankind. Bacteria demonstrate a considerable resistance to heavy metals because of evolved metal resistance. Hence, it would be useful to identify metal resistant bacteria to be used in mitigating metal pollution. This study was carried out for the isolation, molecular characterization and determination of bioremediation capacity of a bacterial strain. Metal tolerant bacterial strains present in a textile industry effluent were screened on LB agar plates. Well isolated bacterial colonies were screened for heavy metal resistivity by observing their growth in media containing heavy metals. The bacterial strain *TWSL_1,* which grew well ($p<$ 0.0001) in metal spiked media was selected for further analysis and it's heavy metal tolerance was determined by observing the growth with time by measuring the optical density at 600 nm using a scanning UV-VIS spectrophotometer. Heavy metal removal ability was determined by measuring metal concentrations using AAS. Bioremoval ($p<0.05$) of *TWSL_1* was 65.85±1.85%, 43.07±1.70% and 70.98±1.41% for Cu^{2+}, Cd^{2+} and Pb^{2+} respectively and the highest MIC was for Pb^{2+} (1200 mg/L). To molecular characterize the isolate *TWSL_1*, the 16S rRNA gene sequence of extracted genomic DNA was amplified using universal primers and the amplified product (~1500 bp) was sequenced and analysed. The sequence was found to be similar (97%) to 16srDNA sequence of *Staphylococcus warneri* strain *RED5B* (Accession No: MW144878.1) in the NCBI database. Whole genome sequencing was carried out using next generation sequencing followed by De Novo assembly. The isolate *TWSL_1* was reconfirmed as *Staphylococcus warneri* and annotation data revealed the presence of several genes encoding proteins involved in heavy metal tolerance.

Keywords: *Staphylococcus sp. TWSL_1, heavy metals, bio-removal, Industrial effluent*