Biosorption of Lead and Copper by Heavy Metal Resistance Bacterium using Fourier Transform Infrared Spectrophotometer (FT-IR)

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Abstract

Background and Objectives: Contamination of environment to lead and copper is rising due to human activities. One of the best methods to remove heavy metals from the environment is bacterial remediation. This study aimed to isolate bacteria and investigate the mechanism of lead and copper bioremediation.

Material and Methods: Heavy metal resistant bacteria were isolated from contaminated wastewater samples. The isolates with high resistance to lead and copper were selected for further studies and bioremediation was assessed by atomic absorption spectrophotometer. To determine the functional groups to remove metals, FT-IR was employed. In addition, plasmid curing was studied to determine the location of the genes that are resistance to heavy metals.

Results: Ten bacterial isolates that are resistance to heavy metals were isolated. Among these, MKH3 with the highest remediation activity removed %90 lead and %92 copper from the growth medium. The absorption mechanism of MKH3 indicated that the functional groups such as carboxyl, amide, carbonyl and hydroxyl were most effective for removal of heavy metals from the growth medium. The results revealed that heavy metal resistant genes may be located on plasmid DNA. Furthermore, molecular identification demonstrated that MKH3 was similar to *Enterobacterhormaechei* with 98% homology.

Conclusion: Bacterium isolated from a contaminated site showed the ability to remove a high amount of lead and copper. Thus, MKH3 could be useful for the bioremediation of heavy metals, particularly lead and copper, from industrial wastewater and contaminated sites.

Keywords: Biosorption, Bacteria, Lead, Copper, FT-IR

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