**Original Paper**

# Antibiotic resistance in isolated bacteria from urban sewage and copper smeltery industrial wastewater

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## Abstract

**Background and Objective:** Pollution due to the heavy metals is a problem that may have negative consequences on the hydrosphere. Identification of microorganisms resistant to heavy metals plays an important role in relation to environmental pollution bioremediation. This study was done to assess the antibiotic resistance in isolated bacteria from urban sewage and copper smeltery industrial wastewater.

**Materials and Methods:** This laboratory study was done on the wastewater samples from urban sewage and copper smeltery in Isfahan-Iran, during 2011-12. Heavy metal resistant microorganisms were isolated and enumerated after serial dilution and culturing on PHG agar plates supplemented with 0.5 mM of each heavy metal. The pattern of resistance was assigned by Minimum Inhibitory Concentration (MIC). Antibiotic resistance toward following medicines Ofloxacine, Penicilline, Sulfometoxasole, Lincomycin, Kanamycin, Streptomycin, Clindamycin, Vancomycin, Cefradin and Neomycin were subsequently investigated.

**Results:** The greatest resistance in isolated bacteria has been related to the Ni (MIC: 24 mM) that's related to the genus of Klebsiella and its minimum MIC is 2mM that's of *Acinetobacter lwoffi*, *Providencia stuartii, Branhamella*. The minimum degree of resistance is related to Cu. Its Maximum MIC related to this metal in swage is 2 mM that's of *Klebsiella pneumoniae* and its minimum degree of resistance in copper smeltery effluent is arranged as 1mM related to genus of *Pseudomonas alkaligenes*. In examining multi metal resistance pattern, the greatest resistance with 8 mM MIC has been related to the Cd, that's of Ni resistant *Moraxella osloensis* in Copper smeltery effluent. The highest portion of isolated bacteria were resistant to Pb ($P<0.05$). The highest resistance of refirary wastewater was to Ni (MIC: 2 mM), which belong to *Klebsiella* ($P<0.05$). The lowest belong to Acine to bacter Lwoffi providencia *Stuartii*, *Branhamella* (MIC: 2mM) ($P<0.05$). In urban sewage: the highest resistance belong to copper, which was seen in *Klebsiella Pneumoniae* (MIC: 2mM). In Antibiogram tests of *Klebsiella, Moraxella* and *Escherichia*, it was demonstrated that the metal resistant bacteria were also resistant toward Lincomycin, Kanamycin, Streptomycin, Clindamycin, Vancomycin, Cefradin and Neomycin, as well.

**Conclusion:** Increasing heavy metal resistance in the environment leads to increased antibiotic resistance toward microorganisms.

**Keywords:** Antibiotic, Bacterial resistance, Heavy metal, Copper smeltery wastewater, Urban sewage

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