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Antibiotic susceptibility study of metal-gentamicin complexes against *Pseudomonas aeruginosa* biofilms

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Introduction: Inherent resistance of biofilm bacteria to conventional antibiotics is alarming because biofilms induce antibiotic resistance to an order of three or more in magnitude greater than those displayed by planktonic bacteria. *Pseudomonas aeruginosa* is an infectious organism that causes the hallmark of chronic infections including hospital acquired infections that leads to high morbidity and mortality. One of the reasons for the occurrence of resistance is its ability to form biofilms. In this study, the resistance of *P. aeruginosa* biofilms against a series of metal-antibiotics, an alternative to the conventional antibiotics, was investigated. **Methods:** A series of metal-antibiotic complexes derived from gentamicin was synthesized to give metal-gentamicin complexes. The metal contents of all the compounds were determined using Atomic Absorption Spectroscopy (AAS). Antibiotic susceptibility testing of the gentamicin-antibiotic complexes against the biofilms was conducted using broth microdilution assay. **Results:** The results showed that *P. aeruginosa* is susceptible against all the metal-gentamicin complexes, which include, Ni(II), Fe(II), Cu(II), Zn(II) and Co(II) complexes; all were tested at 0.25 to 1 mmol concentrations. **Conclusions:** The results show that all metal-gentamicin complexes have higher antimicrobial activity than gentamicin (0.25 to 1 mmol) on its own. Finally, mechanisms of *P. aeruginosa* biofilms resistance to these metal-antibiotics are also proposed.

KEYWORDS: antibiotic resistance, biofilms, *Pseudomonas aeruginosa*, metal-antibiotics complexes