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Inhibitory Mechanism of Ag and Fe Colloidal Nanoparticles on P. aeruginosa and E.coli Growth

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Abstract : Growing resistance of microorganisms to potent antibiotics has renewed a great interest towards investigating bactericidal properties of nanoparticles and their Nano composites as an alternative. The use of metal nanoparticles to combat bacterial infections is one of the most wide spread applications of nanotechnology in the field of antibacterial. Nanomaterials have unique properties compared to their bulk counterparts. In this report, we demonstrate the antimicrobial activity of zerovalent Iron(ZVI) and Ag(silver) nanoparticles against Gram-negative bacteria E.coli(DH5α) and Pseudomonas aeruginosa. At first ZVI and Ag nanoparticles were synthesized by chemical reduction method and using scanning electron microscopy (SEM) the nanoparticle size determined. Different concentrations of Ag and ZVI nanoparticles were added to bacteria on nutrient agar medium. Minimum inhibitory concentration (MIC) of Ag and Fe nanoparticles for P. aeruginosa were 5µM and 1µg as well as for E.coli were 6µM. and 10 µg, respectively. Among the two nanoparticles, ZVI showed that the greatest antimicrobial activity against E.coli and Ag nanoparticle on P.aeruginosa. Results suggested that the bactericidal effect of metal nanoparticles has been attributed to their small size as well as high surface to volume ratio and NPs could be used as an effective antibacterial material.

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