عنوان مقاله:

Inhibitory Effect of Iron Oxide Nanoparticles on CTX-M Gene Expression in Extended-Spectrum βeta-Lactamase-Producing Pseudomonas aeruginosa Isolated from Burn Patients

محل انتشار:

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نویسندگان:

Fatemeh Piri - *Dept. of Anesthesia, School of Allied Medical Sciences, Iran University of Medical Sciences, Tehran, Iran*

Kumarss Amini - *Dept. of Microbiology, Saveh Branch, Islamic Azad University, Saveh, Iran*

Minoo Mohammadi - *Dept. of Immunology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

خلاصه مقاله:

Background and Objective: Burn wound infections caused by Pseudomonas aeruginosa exhibiting β-lactam antibiotic resistance are one of the greatest challenges of antimicrobial treatment. In this context, P. aeruginosa strains harboring resistance mechanisms, such as production of extended-spectrum beta-lactamases have the highest clinical impact no the management of burn wound infections. The aim of this study was to investigate the antibacterial activity of iron oxide nanoparticles (IONPs) against P. aeruginosa harboring Cefotaximase-Munich (CTX-M) gene strains. Materials and Methods: In this study, ۶۰ isolates of P. aeruginosa were collected from burn wound infections referred to major hospitals of Tehran, Iran. All strains were assessed for the presence of beta-lactamase CTX-M gene by polymerase chain reaction. In- vitro antibacterial effect of IONPs against P. aeruginosa harboring CTX-M strains was assessed by microdilution assay and CTX-M gene expression profile using Real-time PCR. Results: Our results demonstrated that ۱۲/۶۰ isolates were identified to be CTX-M-producing P. aeruginosa with multidrug resistance phenotypes. Our results indicated that the CTX-M gene frequency was ۲۰%. We found that the expression of CTX-M gene in P. aeruginosa strains treated with IONPs (۶.۲۱±۴.۱) was much lower than that of non-treated (۹.۷۳±۲.۰۲) nanoparticles (P=۰.۰۰۰). Also, IONPs at ۲۵۶ µg/ml had inhibitory effect on the growth of P. aeruginosa by suppressing CTX-M expression. Conclusion: IONPs have potent antibacterial properties against P. aeruginosa through the suppression of CTX-M expression. According to our results, IONPs are promising tools for the development of new antimicrobial drugs against P. aeruginosa, since these composites have potential to decrease antibiotic resistance.

کلمات کلیدی:

Iron oxide nanoparticles, Pseudomonas aeruginosa, ESBL, CTX, Real-Time-PCR