

## عنوان مقاله:

Zinc Oxide Nanoparticles: A Promising Solution for Controlling the Growth of Gentamicin-Resistant Uropathogenic Escherichia coli

## محل انتشار:

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## خلاصه مقاله:

Backgrounds: Uropathogenic Escherichia coli is one of the most important etiological agents of UTI. The aim of this study was to investigate the antibacterial effects of zinc oxide nanoparticles (ZnONPs) on aminoglycoside-resistant E. coli isolates from patients with UTI. Materials & Methods: After identifying E. coli strains in 100 out of 250 urine samples, antibiotic susceptibility was evaluated against six antibiotic classes (with emphasis on aminoglycosides) by disk diffusion method according to CLSI-2020 guidelines. The presence of aac(6)-Ie-aph(2) gene in isolates was investigated by PCR. Antibacterial properties and minimum inhibitory concentration (MIC) of zinc oxide nanoparticles were evaluated by agar well diffusion and broth microdilution assays, respectively. Findings: Among 100 E. coli isolates, the highest and lowest antibiotic resistance rates were observed against tetracycline (70%) and ofloxacin (10%), respectively. Of 30 gentamicin-resistant E. coli isolates, 17 (56.5%) isolates harbored the aac(6)-Ie-aph(2) gene. In agar well diffusion assay, 22 (73%) gentamicin-resistant isolates were eliminated by zinc oxide nanoparticles at a concentration of 150 mg/L, while ZnONPs at 300 mg/L could eliminate all gentamicin-resistant isolates. Furthermore, ZnONPs could inhibit all bacteria at a concentration of 200 µg/mL (MIC<sub>90</sub> ≥ 100). Conclusion: Spread of the aac(6)-Ie-aph(2) gene could increase gentamicin resistance among E. coli strains causing UTI. Given the favorable antibacterial effects of zinc oxide nanoparticles in vitro, the clinical application of these nanoparticles in the treatment of UTIs caused by multidrug-resistant E. coli could be investigated in future studies.

## کلمات کلیدی:

Aminoglycoside resistance, Uropathogenic Escherichia coli, Zinc oxide

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