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قسم الميكروبيولوجيا الزراعية

جامعة الفيوم

البحث الأول

Mai A. Mwaheb; **Laila R. Abd Al Halim**; Tarob A. Abdel-Baset; Nada F. Hemeda **(2021).** Comparative in vitro study of the antimicrobial activity of metal-ZnO nanoparticles against several bacterial and fungal pathogens. Novel Research in Microbiology Journal 5(4): 1338-1350.	**البحث الأول**
مشترك مع آخرين خارج التخصص – منشور	**1**

Title	**Comparative in vitro study of the antimicrobial activity of metal-ZnO nanoparticles against several bacterial and fungal pathogens.**
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Journal	**Novel Research in Microbiology Journal 5(4): 1338-1350.**

ABSTRACT

Nowadays, the use of nanoparticles (NPs) has become useful in the different application fields. The aim of this study was to investigate the in vitro antimicrobial potential of metalZnO nanoparticles (ZnO NPs) against several bacterial and fungal strains including; *Escherichia coli* (ATCC 25922), *Bacillus cereus* (ATCC 13753), *Staphylococcus aureus* (ATCC 8095), *Pseudomonas aeruginosa* (ATCC10662*), Candida albicans* (ATCC10231) and *Aspergillus niger* (AUMC3663). Results obtained by X-ray diffraction analysis (XRD) showed that the NPs size was in the range of 35.1- 43.7 nm. Images of the scanning electron microscopy (SEM) demonstrated the rod shape nature of the ZnO NPs, and the semi-spherical shapes of the Zn9.7TM0.3O NPs. The effect of different concentrations of ZnO NPs on the in vitro growth of the bacterial and fungal strains was evaluated using the agar well diffusion assay. Current results showed that Cd-ZnO NP recorded the highest antimicrobial potency; expressing inhibition zones diameter range of 12- 45 mm, while ZnO NPs demonstrated the least activity exhibiting inhibition zones diameter that ranged from 0- 36 mm. Among all the examined ZnO-NPs, treatment of *E. coli* and *Staph. aureus* cells with

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Cd-ZnO proved to be the most effective in causing membrane leakage of reducing sugars, protein and DNA recording; 0.41 µg/ ml and 0.38 µg/ ml; 14.91 µg/ ml and 15.98 µg/ ml; 0.81 µg/ ml and 0.96 µg/ ml, respectively. This study emphasized that ZnO NPs could be used as alternative antimicrobial agents to control the bacterial and fungal pathogens. Manipulation of ZnO NPs is ecofriendly; as it reduces the use of the synthetic pesticides and chemical therapeutic agents, which pollute the environment. In the future, in vivo application of these NPs necessitates the proof that they have no phytotoxicity and\or cytotoxicity.