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Biological synthesis of zinc-oxide nanoparticle using wide-spread Lentinus sajor-caju extract as a carrier for natural-compounds

Abstract

The use of nanotechnology in industry and medicine has recently become a hot topic of research. This study focused on synthesizing zinc oxide nanoparticles (ZnONPs) using Lentinus sajor-caju extract, followed by applying the nanoparticle as a carrier for natural compounds. Energy dispersive X-ray spectroscopy (EDX), X-ray diffractometer (XRD), Fourier transform infrared spectroscopy (FTIR), Field-emission scanning electron microscopy (FESEM), Filed-emission transmission electron microscopy (FETEM), and zeta potential measurements were used to characterize the synthesized nanoparticles. The synthesis of ZnONPs was also confirmed by UV–visible spectroscopy. The ZnONPs had a spherical shape with an average size of 28 nm in diameter, according to FETEM and FESEM. X-ray powder diffraction and selected area electron diffraction showed that the ZnONPs were crystalline in structure. The active components of the L. sajor-caju extracts were found to cap the ZnONPs, according to FTIR analysis. Additionally, EDX analysis revealed test showed the elemental composition of ZnONP's. The performance of the L. sajor-caju-capped ZnONP conjugated with a drug was studied in terms of inhibition of microbial growth against gram-negative and gram-positive bacteria through the disc diffusion method. The results demonstrated a considerable inhibition of both bacteria, demonstrating ZnONP's potential for use in biomedicine.

Keywords

Antibacterial activity; Drug delivery; Escherichia coli; Lentinus sajor-caju; Zinc-oxide nanoparticle