

Synthesis and characterization of 4-nitro benzaldehyde with ZnO-based nanoparticles for biomedical applications

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↗ VIEW METRICS

Abstract

Globally, cancer is the leading cause of death and morbidity, and skin cancer is the most common cancer diagnosis. Skin problems can be treated with nanoparticles (NPs), particularly with zinc oxide (ZnO) NPs, which have antioxidant, antibacterial, anti-inflammatory, and anticancer properties. An antibacterial activity of zinc oxide nanoparticles prepared in the presence of 4-nitrobenzaldehyde (4NB) was also tested in the present study. In addition, the influence of synthesized NPs on cell apoptosis, cell viability, mitochondrial membrane potential (MMP), endogenous reactive oxygen species (ROS) production, apoptosis, and cell adhesion was also examined. The synthesized 4-nitro benzaldehyde with ZnO (4NBZnO) NPs were confirmed via characterization techniques. 4NBZnO NPs showed superior antibacterial properties against the pathogens tested in antibacterial investigations. As a result of dose-based treatment with 4NBZnO NPs, cell viability, and MMP activity of melanoma cells (SK-MEL-3) cells were suppressed. A dose-dependent accumulation of ROS was observed in cells exposed to 4NBZnO NPs. As a result of exposure to 4NBZnO NPs in a dose-dependent manner, viable cells declined and apoptotic cells increased. This indicates that apoptotic cell death was higher. The cell adhesion test revealed that 4NBZnO NPs reduced cell adhesion and may promote apoptosis of cancer cells because of enhanced ROS levels.

CONFLICT OF INTEREST STATEMENT