Public Abstract
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Title:A STUDY OF ENGINEERED NANOPARTICLES AS POTENTIAL FOOD CONTAMINANTS AND THEIR TOXICITY ON CACO-2 CELLS

There has been growing interest in recent years in using engineered nanoparticles (ENP) in various fields such as electronics, agriculture, medicine, cosmetics, and food packaging. However, little is known about the toxicity of ENP as food contaminants and there has been increasing concern about their safety via ingestion that may pose health risks to consumers. In this study, confluent cells of enterocyte-like Caco-2 cell line were used as an in vitro model to investigate the toxicity of ENP. The Caco-2 cells were exposed to zinc oxide nanoparticles (ZnO NPs) and silver nanoparticles (Ag NPs) for 24 h. After exposure, cells were subjected to the MTT cell proliferation assay to determine the effect of the ENP on cell viability based on reduction of tetrazolium salts. Absorbance was read at 570 nm. A significant inhibition of cell viability was observed at three different concentrations of ZnO NPs (1, 3, 6, and 12 mM), Ag NPs (0.1, 0.5, 1.5, and 3 mM). To mimic pH changes in the human digestive system, ZnO and Ag NPs were incubated under low pH (~1.2) for 3 h, neutralized NP solutions were adjusted to experimental concentrations and then dosed to Caco-2 cells. Our results demonstrate that simulated gastric fluid (SGF) treatment totally decreased the toxicity of ZnO NPs and the changes in their physical and chemical properties may be an important factor. The SGF treatment in Ag NPs has little effect on cell viability as compared to the control group. In addition, the penetration of NPs in Caco-2 cells was investigated by scanning transmission electron microscopy (STEM). The results demonstrate that Ag NPs penetrated the membrane of Caco-2 cells and into the cytoplasm. The energy dispersive X-ray spectrometer (EDS) results confirm that the elemental composition of NPs was of Ag element. However, the penetration of ZnO NPs was not observed for the Caco-2 cells treated with ZnO NPs probably due to bigger size of ZnO NPs.