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Antibacterial activity of magnesium oxide nanoparticles on *Escherichia coli* O157:H7 *Salmonella*, and *Campylobacter*

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The antibacterial effects of Magnesium Oxide Nanoparticles (MgO NPs, with an average size of 20 nm) against several important bacterial foodborne pathogens, including *Escherichia coli* O157:H7, *Salmonella enterica* Enteritidis, *Campylobacter jejuni* and *C. coli*, were investigated in this study. The viability of bacterial cells was measured during treatment with different concentrations of MgO NPs using a Resazurin (a redox sensitive dye) microplate assay. The results showed that the minimal inhibitory concentrations of MgO NPs using 10^4 CFU/ml of *E. coli* O157:H7, *Salmonella, i Campylobacter* were 1, 2, and 0.5 mg/ml, respectively, after 18 hr incubation. The time course for complete killing of 10^9 CFU/ml of the bacteria was obtained using a 6x6 drop plating method. At a concentration of 2 mg/ml MgO NPs, C. *jejuni* cells were completely killed within 2 hr, whereas *E. coli* O157:H7 and *S.* Enteritidis required at least 6-8 hr for inactivation at a concentration of 2-4 mg/ml MgO NPs. By scanning electron microscopy analysis, notable morphological changes were found in the bacterial cells treated with ≤4 mg/ml MgO NPs, suggesting the mechanism of MgO NPs acting on bacteria might be through distortion and damage of cell membrane and leakage of intracellular contents, which ultimately lead to cell death. A potential use of MgO NPs as an effective antibacterial agent in food processing and packaging is proposed.

Biography

Shakuntala Ingudam is Senior Scientist at Indian Council of Agricultural Research (ICAR) Research Complex for North Eastern Hill Region, Umiam, Meghalaya, India. She completed her Doctoral degree in Veterinary Public Health from Indian Veterinary Research Institute, Izatnagar, Barielly, India. Her research area includes molecular based detection of zoonotic and foodborne pathogens. She has published 20 research articles in indexed journals, edited 1 book and written 10 chapters in books and training manuals. Presently, she is at USDA-ARS-ERRC,Wyndmoor,PA under the Award of DBT Overseas Associateship for the year 2011-12, Department of Biotechnology, Government of India.

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