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In vitro antibacterial mechanism of action of crude garlic (*Allium sativum*) clove extract on selected probiotic *Bifidobacterium* species

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Abstract

It is generally reported that garlic (*Allium sativum*) harms pathogenic but not beneficial bacteria. Although numerous studies supporting the alleged garlic effects on pathogens are available, there are limited studies to prove this claim for beneficial bacteria. We have recently shown that garlic exhibits antibacterial activity against bifidobacteria. The aim of the current study was to elucidate the mechanism of action of garlic clove extract on selected *Bifidobacterium* species using scanning and transmission electron microscopy, SDS-PAGE and Fourier transform infrared (FT-IR) spectroscopy. Scanning electron micrographs revealed morphological changes such as cell elongation, cocci-shaped cells with cross-walls and distorted cells with bulbous ends. Aggregation of cytoplasmic material, cell wall and membrane disintegration as well as cell lysis were indicated by transmission electron microscopy. SDS-PAGE analysis did not reveal any differences in whole cell protein profiles of untreated and garlic clove extract treated cells. FT-IR spectroscopy showed changes in spectral features of lipids and fatty acids in cell membranes, proteins, polysaccharides and nucleic acids. Spectral data as per principle component analysis (PCA) revealed segregation of garlic-treated and untreated cells for all the tested bifidobacteria. These results indicated that garlic affects at least probiotic bifidobacteria in a manner similar to that exhibited in pathogens. Therefore, these results highlight that caution should be taken especially in the simultaneous use of raw garlic and probiotic bifidobacteria as their viability could be reduced by allicin released upon crushing of garlic cloves, thereby limiting health benefits that consumers anticipate to gain from probiotics.

Biography

Dr. Mapitsi S. Thantsha has completed her PhD at the age of 29 years from University of Pretoria, South Africa. She was employed during her Ph.D. studies as a junior lecturer in the Department of Microbiology and Plant Pathology in August 2004. She is now a senior Lecturer in the same Department. She has published several papers in reputed journals and has been involved in human capacity development in terms of both undergraduate and postgraduate students' training.