In vitro antimicrobial activity of green synthesized silver nanoparticles against selected gram-negative foodborne pathogens

ABSTRACT

Silver nanoparticles (AgNPs) used in this study were synthesized using pu-erh tea leaves extract with particle size of 4.06 nm. The antibacterial activity of green synthesized AgNPs against a diverse range of Gram-negative foodborne pathogens was determined using disk diffusion method, resazurin microtitre-plate assay (minimum inhibitory concentration, MIC), and minimum bactericidal concentration test (MBC). The MIC and MBC of AgNPs against Escherichia coli, Klebsiella pneumoniae, Salmonella Typhimurium, and Salmonella Enteritidis were 7.8, 3.9, 3.9, 3.9 and 7.8, 3.9, 7.8, 3.9 µg/mL, respectively. Time-kill curves were used to evaluate the concentration between MIC and bactericidal activity of AgNPs at concentrations ranging from 0×MIC to 8×MIC. The killing activity of AgNPs was fast acting against all the Gram-negative bacteria tested; the reduction in the number of CFU mL-1 was >3 Log10 units (99.9%) in 1-2 h. This study indicates that AgNPs exhibit a strong antimicrobial activity and thus might be developed as a new type of antimicrobial agents for the treatment of bacterial infection including multidrug resistant bacterial infection.

Keyword: Gram-negative; Antimicrobial activity; Foodborne pathogens; Silver nanoparticles; Tea leave extracts; Time-kill curves