

# Prevention of nosocomial transmission and biofilm formation on novel biocompatible antimicrobial gloves impregnated with silver nanoparticles synthesized using *Eucalyptus citriodora* leaf extract

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January 22, 2021

## Abstract

Failure in the prevention of cross-transmission from contaminated gloves has been recognized as an important factor that contributes to the spread of several healthcare-associated infections. Ex situ coating process with silver nanoparticles (AgNPs) using *Eucalyptus citriodora* ethanolic leaf extract as reducing and capping agents to coat glove surfaces has been developed to prevent this mode of transmission. Elemental analysis of coated gloves showed 24.8 Wt% silver densely adhere on the glove surface. The coated gloves fully eradicated important hospital-acquired pathogens including Gram-positive bacteria, Gram-negative bacteria, and yeasts within 1 h. The coated gloves showed significant reduction, an average of 5 logs when tested against all standard strains and most clinical isolates ( $p < 0.01$ ). Following prolonged exposure, the coating significantly reduced the numbers of most adhered pathogenic species, compared with uncoated gloves ( $p < 0.0001$ ), which was observed by fluorescence microscopy. Scanning electron microscopy further confirmed that AgNPs coated-gloves reduced microbial adhesion of mixed-species biofilms, compared with uncoated gloves. A series of contamination and transmission assays demonstrated no transmission of viable organisms. Biocompatibility analysis confirmed high cell viability of HaCaT and L929 cells at all concentrations of AgNPs tested. The coated gloves were non-toxic with direct contact with L929 cells.

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