Antibacterial and antibiofilm activity of nanochelating based silver nanoparticles against several nosocomial pathogens

Seyedeh Mahsan Hoseini-Alfatemi, Abdollah Karimi, Shahnaz Armin, , Fatemeh Fallah, Somayeh Kalanaky
First published: 28 February 2018

https://doi.org/10.1002/aoc.4327

Abstract

The emergence of multi-drug resistant (MDR) bacteria and dynamic pattern of infectious diseases demand to develop alternative and more effective therapeutic strategies. Silver nanoparticles (AgNPs) are among the most widely commercialized engineered nanomaterials, because of their unique properties and increasing use for various applications in nanomedicine. This study for the first time aimed to evaluate the antibacterial and antibiofilm activities of newly synthesized nanochelating based AgNPs against several Gram-positive and -negative nosocomial pathogens.

Nanochelating technology was used to design and synthesize the AgNPs. The cytotoxicity was tested in human cell line using the MTT assay. AgNPs minimal inhibitory concentration (MIC) was determined by standard broth microdilution. Antibiofilm activity was assayed by a microtiter-plate screening method.

The two synthesized AgNPs including AgNPs (A) with the size of about 20-25 nm, and AgNPs (B) with 30-35 nm were tested against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa*. AgNPs exhibited higher antibacterial activity against Gram-positive strains. AgNPs were found to significantly inhibit the biofilm formation of tested strains in concentration 0.01 to 10 mg/mL. AgNPs (A) showed significant effective antibiofilm activity compared to AgNPs (B).

In summary, our results showed the promising antibacterial and antibiofilm activity of our new nanochelating based synthesized AgNPs against several nosocomial pathogens.