

Antimicrobial Activity of Biosynthesized Silver Nanoparticles Using Different Bacteria

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Abstract : Objectives of the study are: the biosynthesis of silver nanoparticles (AgNPs) using *Escherichia coli*, *Acinetobacter baumannii* and *Staphylococcus aureus*, characterization of silver nanoparticles and determination of antimicrobial activity against *E. coli*, *P. aeruginosa*, *S. aureus*, MRSA, and *C. Albicans*. Methods: *E. coli* (ATCC 25922), *A. baumannii* (clinical strain), *S. aureus* (clinical strain) cultured in nutrient broth medium were used for biosynthesis of AgNPs. Culture conditions (AgNO₃ concentration, pH, incubation time and temperature) were optimized. Characterization of synthesized NPs was done by UV-Visible spectroscopy. The antimicrobial activity of the synthesized NPs was studied using the good diffusion assay against *E. coli*, *S. aureus*, MRSA (Methicillin-resistant *Staphylococcus aureus*), *P. aeruginosa* and *C. Albicans*. Results: All the selected bacteria produced silver nanoparticles at alkaline pH above 0.3 g/L AgNO₃ concentration. The optimum reaction temperature was 60°C. According to the UV-Visible spectroscopy, the maximum absorbance was found to be around 420 - 430 nm indicating the presence of AgNPs. According to the good diffusion results, AgNPs produced by *S. aureus* resulted in the larger zone of inhibition (ZOI) against the selected pathogens, while AgNPs produced by *E. coli* showed comparatively smaller ZOI. In general, biosynthesized AgNPs were highly effective against gram-negative bacteria compared to gram-positive bacterial and fungal species. Conclusions: Green AgNPs produced by each bacterium show antimicrobial activity against the selected pathogens. AgNPs produced by *S. aureus* are the most effective NPs among tested AgNPs, while AgNPs produced by *E. coli* are the least effective. Further characterization of NPs is required to study the physical properties of silver NPs.

Keywords : green nanotechnology, silver nanoparticles, bacteria, antimicrobial activity

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