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Use of green silver nano-particles as an antimicrobial agent - A preliminary study

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Nanotechnology provides a sustainable solution to technical and environmental challenges in scientific fields. Green synthesis of nano-particles using microorganisms is an emerging branch of science leading to non-toxic, eco-friendly, low cost and rapid synthesizing methods. This study was undertaken to biosynthesize silver nano-particles (AgNPs) using *Pseudomonas aeruginosa* and determine the antimicrobial activity of AgNPs against *E. coli*, *S. aureus* and *C. albicans*.

Pseudomonas aeruginosa (ATCC 25853) cultured in nutrient broth was used for the biosynthesis of AgNPs with optimal AgNO₃ concentration and pH. Characterization of synthesized NPs was done by UV-Visible spectroscopy. The well diffusion assay was used to screen for the antimicrobial activity of the synthesized NPs against *E. coli*, *S. aureus*, *P. aeruginosa* and *C. albicans*. A quantitative assay for antimicrobial activity of NPs against *E. coli* was carried out using the plate coating method.

P. aeruginosa culture supernatant produced the maximum AgNPs at a pH of 8.0 and an optimum AgNO₃ concentration of 0.2 g/L. According to the UV-Visible spectroscopy the maximum absorbance was found to be 420 nm indicating the presence of AgNPs. A mean zone of inhibition of 12.3 mm, 13.0 mm, 11.3 mm and 13.6 mm for *S. aureus*, *P. aeruginosa*, *E. coli* and *C. albicans* were obtained, respectively for the biosynthesized AgNPs. Against *E. coli*, an effective reduction in bacterial count was observed after one hour in contact with the AgNPs by the plate coating method.

Green AgNPs show antimicrobial activity against the tested microorganisms. Further characterization of the NPs and optimization of biosynthesis parameters are needed to obtain optimal concentrations of AgNPs.

Key words: Green silver nano-particles, antimicrobial agents, *S. aureus*, *P. aeruginosa*.