

## BACTERIA-MEDIATED BIOSYNTHESIZED SILVER NANOPARTICLES: A POTENTIAL ANTIMICROBIAL AGENT

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### Introduction:

Silver is well known for its' microbicidal properties. Biological synthesis of nanosilver (AgNPs) is an emerging field in nanotechnology.

### Objectives:

To synthesize AgNPs using *Pseudomonas aeruginosa* and determination of their antimicrobial activity against *P. aeruginosa*, *E. coli*, *S. aureus*, MRSA and *C. albicans*.

### Methods:

*Pseudomonas aeruginosa* (ATCC 27853) cultured in nutrient broth was used for biosynthesis of AgNPs. Synthesized AgNPs were characterized by UV-Visible spectroscopy and Transmission Electron Microscopy (TEM). The stability of AgNPs was studied in the presence of electrolytes (NaCl). The well diffusion method and plate coating method were performed to study the antimicrobial activity of the synthesized NPs against *E. coli* (ATCC 25922), *S. aureus* (ATCC 25923), *P. aeruginosa* (ATCC 27853), MRSA (clinical strain) and *C. albicans* (ATCC 10231).

### Results:

*P. aeruginosa* culture supernatant yielded maximum AgNPs after adding 0.4 g/L of AgNO<sub>3</sub> concentration at 70 °C under alkaline pH (9.0). According to the UV-Visible spectroscopy the maximum absorbance was around 420 nm confirming the presence of AgNPs. As observed in TEM, the particles were spherical with average size of  $11.71 \pm 2.73$  nm. The biosynthesized AgNPs exhibited higher stability in the presence of NaCl when compared to chemically synthesized AgNPs. The biosynthesized green AgNPs showed exhibited antimicrobial activity against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, methicillin-resistant *Staphylococcus aureus* (MRSA) and *Candida albicans*. When compared to gram-negative bacteria, gram- positive bacteria required higher contact time in the plate coating method with biosynthesized AgNPs produced by *P. aeruginosa* to achieve 100% inhibition.

### Conclusions:

Green AgNPs showed antimicrobial activity against the tested microorganisms. Gram negative bacteria were more sensitive than Gram positive bacteria to green AgNPs produced by *P. aeruginosa* most probably due to their difference in cell wall thickness.

**Key words:** Nanosilver, TEM, UV-Visible spectroscopy

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