

SILVER NANOPARTICLES SYNTHESIS USING EXTRA AND INTRA CELLULAR METABOLITES OF *Aspergillus* sp. AND THEIR ANTIMICROBIAL POTENTIAL

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This study explores the potential of *Aspergillus* sp. to synthesize Silver Nanoparticles (AgNPs) and analyse their antimicrobial activity against selected food-borne pathogens. *Aspergillus* sp. was grown under different growth conditions [pH; 5.6, 7 and 8, media; Potato dextrose broth (PDB), Sabouraud dextrose broth (SDB) and Starch broth (SB)] for varying incubation periods (5 and 10 days) to evaluate their production potential for AgNP synthesis. Following incubation, both intracellular and extracellular metabolites were extracted. Intracellular metabolites were obtained by mixing 1 g of air-dried fungal biomass with sterile distilled water at a 1:30 ratio. The filtrate, excluding the fungal biomass, was used as the source of extracellular metabolites. Equal volumes (10 ml) of fungal extract and 1 mM AgNO₃ solution were mixed and incubated for 48 hrs under dark conditions to promote AgNPs synthesis. Synthesised AgNPs were characterised using UV-vis spectroscopy, FTIR and SEM, and their antimicrobial potential on selected food-borne pathogens was evaluated via the well-diffusion method. Intracellular metabolite-based AgNPs synthesised using pH 8 cultures in SDB and SB displayed absorbance peaks at 405-419 nm compared to AgNPs synthesised using extracellular metabolites under similar conditions (350-370 nm). FTIR analysis identified peaks at 3422 cm⁻¹ and 1650 cm⁻¹, corresponding to primary amine (N-H) stretching and amide (N-H) bending vibrations, confirming the protein involvement in AgNPs stabilization. SEM analysis showed AgNPs were spherical to cubic in shape with 84 nm–188 nm in size. Antimicrobial assays revealed that all the synthesised AgNPs exhibited inhibitory effects against *Escherichia coli* (diameter: 1.12 ± 0.08 – 1.40 ± 0.33 cm), *Enterobacter faecalis* (diameter: 1.12 ± 0.13 – 1.35 ± 0.13 cm) and *Salmonella typhi* (diameter: 1.16 ± 0.05 – 1.31 ± 0.05 cm). The results demonstrate the successful synthesis of AgNPs using *Aspergillus* sp., highlighting its potential as a fungal agent for AgNP synthesis. Further optimising fungal growth conditions is crucial to engineer AgNPs with tailored size, shape, and properties.

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