

## Phytochemical Screening And Inhibitory Activities Of Synthesised Silver Nanoparticles From *Citrus Sinensis* Peel Against Some Selected Pathogens

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### Abstract

The increasing resistance of microorganisms to conventional antibiotics necessitates the development of novel antimicrobial agents. Silver nanoparticles (AgNPs) have emerged as an alternative due to their unique properties, such as high surface area to volume ratio and ability to disrupt microbial membranes. This study aims at investigating the phytochemical components, synthesising silver nanoparticles using *Citrus sinensis* peel extract, characterizing, and evaluating their inhibitory activities against some test organisms. *Citrus sinensis* peel extract was used to reduce silver nitrate to AgNPs. Phytochemical analysis was done using standard procedures. UV-Visible spectrophotometry, scanning electron microscopy (SEM), transmission electron microscopy (TEM), Fourier Transform Infrared (FTIR), energy-dispersive X-ray spectroscopy (EDX) and X-ray Diffraction (XRD) were used to characterise the AgNPs. The antimicrobial activity was assessed using the agar well diffusion method. Phytochemical analysis revealed that saponins, tannins, flavonoids, alkaloids and phenols were present. Alkaloids (1400 mg/100g) and flavonoids (710 mg/100g) Silver nanoparticles were synthesised and a change in colour from yellow to brown was observed, surface plasmon resonance peak was at 300 nm, the morphology of the AgNPs was spherical, cubical having size ranging from 50 - 150 nm. In the FTIR analysis, the peak at 3466.00 cm<sup>-1</sup> indicates Hydroxyl groups, 1820.00 cm<sup>-1</sup> is imine and 1042.00 cm<sup>-1</sup> is carbonyl and are responsible for the synthesis of AgNPs. XRD analysis confirmed the formation of crystalline nanoparticles. EDX confirmed the presence of silver element. The synthesised AgNPs exhibited significant inhibitory activity against *E. coli* (15±0.32 mm), *K. pneumoniae* (17±0.45 mm) and *Candida albican* (18±0.24 mm). The green synthesis of silver nanoparticles using *Citrus sinensis* peel extract is an eco-friendly method that utilizes natural properties of plants compounds which has inhibitory potential.

**Keywords:** *Citrus sinensis* peel extract, Silver nanoparticles, Antimicrobial activities, Phytochemical components, Green synthesis

