

Anti-inflammatory, anti-bacterial, and anti-cancer activities of ag-nanoparticles generated by *Plectranthus amboinicus*

Abstract

The present study aimed to synthesize and characterize silver nanoparticles using *Plectranthus amboinicus* leaf extract and investigated their cytotoxicity, anti-bacterial, anti-migratory, anti-inflammatory, and anti-cancer properties. Phyto-genic AgNPs were characterized by UV–visible spectroscopy, Dynamic light scattering, XRD, Transmission electron microscopy, energy dispersive X-ray (EDX), and Fourier-transformed infrared spectroscopy. Anti-proliferative, anti-migratory, anti-inflammatory, and anti-bacterial activities were examined by MTT assay, scratch assay, human RBC membrane stabilization, and Kirby-Bauer disc diffusion assay. Green synthesized AgNPs showed a surface plasmon peak at 430 nm under a UV–visible spectroscope. Spherical morphology with a size distribution between 20 and 70 nm was observed by TEM. Various biomolecule functional groups capping AgNPs were found by FTIR spectroscope. The crystalline structure of synthesized AgNPs was confirmed through XRD. These green synthesized AgNPs exhibited less toxicity to NIH/3T3 mouse embryonic fibroblast cells and showed good anti-cancer activity with IC₅₀ value of 2 µg/mL by inhibiting the proliferation and migration of melanoma cells. Heat-induced hemolysis of RBC was prevented significantly in a dose-dependent manner, indicating the anti-inflammatory activity of green synthesized AgNPs IC₅₀–35 µg/mL. The anti-bacterial activity against *E. coli*, *K. pneumonia*, and *S. aureus* results showed that the zone of inhibition was increased along with increased concentrations of AgNPs in all bacterial cultures.

Keywords

Cancer; Inflammation; Melanoma cells; *Plectranthus amboinicus*; Silver nanomaterial