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Preparation of biofunctionalized silver nanoparticles using *Clerodendrum glandulosum* leaf extract for evaluation of its antibacterial efficacy

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Abstract
Antimicrobial resistance (AMR) poses a serious threat to public health on a worldwide scale and has made it extremely difficult to effectively control connected infectious diseases. Due to rapid spread of antibacterial resistance among bacteria, it has become necessary to unveil alternative therapies and medications to combat AMR as commercially available antibiotics are becoming less effective. Recently, nanotechnology has become a fast expanding field with several applications in biomedical sciences. Simultaneously, silver has gained popularity as a comparatively safe antibacterial substance and disinfectant. A wide range of antibacterial, antifungal, and antiviral activities are exhibited by silver nanoparticles. In this current study, *Clerodendrum glandulosum* leaf extract was used for a simple, economical, and environmentally friendly production of biofunctionalized silver nanoparticles for evaluation of antibacterial efficacy. UV–visible spectroscopy confirmed the synthesis of silver nanoparticles giving absorption maxima at 450 nm due to surface plasmon resonance. From the scanning electron microscopy and dynamic light scattering, the average size of the particles was determined to be 150–200 nm. Energy-dispersive X-ray analysis was used to confirm the elemental composition of the biofunctionalized silver nanoparticles. The X-ray diffraction pattern and the Fourier transform infrared spectrogram have confirmed the crystalline nature and successful biofabrication of silver nanoparticles. The MBC values of the silver nanoparticles have been reported to be in the range of 10–20 µg/ml for a fixed population of bacteria, which is significant when compared to the MBC values of gentamicin against the same four strains. Therefore, biofunctionalization of phytoconstituents on nanosurface might improve silver nanoparticles' antibacterial activity as well as their biocompatibility.

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