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Preparation, Characterisation, and Antibacterial Activity of Green-Biosynthesised Silver Nanoparticles Using Clinacanthus Nutans Extract

Authors : Salahaedin Waiezi, Nik Ahmad Nizam Nik Malek, Hassan Abdelmagid Elzamzami, Shahrulnizahana Mohammad Din

Abstract : A green and safe approach to the synthesis of silver nanoparticles (AgNP) can be performed using plant leaf extract as the reducing agent. Hence, this paper reports the biosynthesis of AgNP using Clinacanthus nutans plant extract. C. nutans is known as belalai gajah in Malaysia and is widely used as a medicinal herb locally. The biosynthesized AgNP, using C. nutans aqueous extract at pH 10, with the reaction temperature of 70°C and 48 h reaction time, was characterized by UV-Vis spectroscopy, X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), energy dispersive X-ray (EDX), and transmission electron microscope (TEM). A peak appeared in the UV-Vis spectra at around 400 nm, while XRD confirmed the crystal structure of AgNP, with the average size between 20 to 30 nm, as shown in FESEM and TEM. The antibacterial activity of the biosynthesized AgNP, which was performed using the disc diffusion technique (DDT) indicated effective inhibition against Escherichia coli, Pseudomonas aeruginosa, and Staphylococcus aureus. In contrast, minimal antibacterial activity was detected against Enterococcus faecalis and methicillin-resistant Staphylococcus aureus (MRSA). In general, AgNP produced using C. nutans leaf extract possesses potential antibacterial activity.

Keywords : silver nanoparticles, Clinacanthus nutans, antibacterial agent, biosynthesis
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