World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:11, No:03, 2017

Microwave-Assisted Synthesis of Silver Nanoparticles from Dioscorea Deltoidea Callus Extract and Evaluation of Its Antimicrobial Activity

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Abstract : Dioscorea deltoidea belongs to the Dioscoreaceae family, is usually found in the north-western Himalayas and some other parts of the world up to an altitude of 1000–3000 m. D. deltoidea commonly known as yam and is an extensively used medicinal plant in the indigenous system of medicine. It has been reported to contain dioscine a steroidal glycoside in higher concentration. In the present investigation, silver nanoparticles (AgNPs) have been synthesized by a simple, efficient, environmentally benevolent and economic microwave-assisted method. Callus culture of D. deltoidea was developed and maintained on Murashige and skooge basal medium supplemented with different combination and concentration of plant growth regulators. Aqueous extract of callus culture was used as the reducing and stabilizing agent. The synthesized nanoparticles have been characterized by UV–Vis spectroscopy, Fourier transform infrared spectroscopy (FT-IR), transmission electron microscopy (TEM), scanning electron microscopy (SEM) and X-ray diffraction (XRD analysis. The presence of a characteristic surface plasmon resonance (SPR) absorption band at 430 nm in UV–Vis reveals the reduction of silver metal ions into silver nanoparticles. Whereas FTIR analysis was performed to probe the possible functional group involved in the synthesis of AgNPs. Further extract and AgNPs were evaluated for antimicrobial activity against different pathogenic microorganisms.

Keywords : antimicrobial, Dioscorea deltoidea, microwave, silver, nanoparticles
Conference Title : ICHBMCR 2017 : International Conference on Herbal and Botanical Medicine, Challenges and Regulations
Conference Location : Rome, Italy
Conference Dates : March 05-06, 2017