

Green Synthesis of Silver Nanoparticle Using *Oscillatoria* sp. Extract, its Antibacterial, Antibiofilm Potential and Cytotoxicity Activity

Adebayo Salaam^a, Adebola Ajibade^b and Bukola Adebayo-Tayo^b

^aDepartment of Botany, Faculty of Science, University of Ibadan, Ibadan, Oyo state, Nigeria

^bDepartment of Microbiology, Faculty of Science, University of Ibadan, Ibadan, Oyo state, Nigeria

E-mail: bukola.tayo@gmail.com

Phone +234 8035522409

ABSTRACT

Green route biosynthesis of silver nanoparticles (SNPs) using methanol extract of *Oscillatoria* sp., was investigated. The *Oscillatoria* sp. silver nanoparticles (OsSNPs) was characterized by visual observation, UV-Vis spectrophotometry, Fourier Transform Infrared, Scanning Electron Microscopy, X-Ray Diffraction, Thermogravimetry, Energy Dispersed X-ray and Dynamic light scattering. The antibacterial, antibiofilm and in vitro cytotoxicity activity of the OsSNPs was determined. Changes in colour from dark brown to light brown were observed and the Surface Plasmon Resonance peak was at 500 nm. FTIR analysis shows 16 peaks which indicate some functional groups such as hydroxyl; alcohol, phosphate, and amine among others which was responsible for the capping and stabilization of proteins in the nanoparticles. The OsSNPs were spherical with size of 10 nm and can withstand high temperature to an extent without totally losing its weight. EDX analysis revealed a strong signal of silver element. DLS shows the particle diameter average of 0.000 nm and 558.1 nm with a polydispersity index of 0.580. The OsSNPs had effective antibacterial activity against the test bacterial pathogens with zone of inhibition ranged from 1 - 21 mm. *Escherichia coli* ATCC 35218 were the most susceptible. The biosynthesized SNPs exhibited strong antibiofilm activity. However, the toxicity of the OsSNPs to *Artemia salina* (brine shrimp) was observed to be insignificant with the highest mortality at 4000 µg/mL and lethal dose (LC₅₀) of 2630.3 µg / mL. Greenly synthesized OsSNPs had effective antibacterial potency and low cytotoxicity which suggests its use in biomedical and pharmacological applications.

Keywords: *Oscillatoria* sp., Nanoparticles, Characterization, Antibacterial, Antibiofilm, Cytotoxicity

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