Multifaceted phytogenic silver nanoparticles by an insectivorous plant drosera spatulata Labill var. bakoensis and its potential therapeutic applications

ABSTRACT

The current investigation highlights the green synthesis of silver nanoparticles (AgNPs) by the insectivorous plant Drosera spatulata Labill var. bakoensis, which is the first of its kind. The biosynthesized nanoparticles revealed a UV visible surface plasmon resonance (SPR) band at 427 nm. The natural phytoconstituents which reduce the monovalent silver were identified by FTIR. The particle size of the Ds-AgNPs was detected by the Nanoparticle size analyzer confirms that the average size of nanoparticles was around 23 ± 2 nm. Ds-AgNPs exhibit high stability because of its high negative zeta potential (− 34.1 mV). AFM studies also revealed that the Ds-AgNPs were spherical in shape and average size ranges from 10 to 20 ± 5 nm. TEM analysis also revealed that the average size of Ds-AgNPs was also around 21 ± 4 nm and the shape is roughly spherical and well dispersed. The crystal nature of Ds-AgNPs was detected as a face-centered cube by the XRD analysis. Furthermore, studies on antibacterial and antifungal activities manifested outstanding antimicrobial activities of Ds-AgNPs compared with standard antibiotic Amoxyclav. In addition, demonstration of superior free radical scavenging efficacy coupled with potential in vitro cytotoxic significance on Human colon cancer cell lines (HT-29) suggests that the Ds-AgNPs attain excellent multifunctional therapeutic applications.