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Antibacterial and antifungal activities of Ag nanoparticles prepared by Artocarpus gomezianus fruit mediated facile green combustion method

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Abstract: The silver nanoparticles are utilized in the field of nanomedicine is keeping pace and improving with the regularly extending skyline of Nanobiotechnology. The present investigation manages the synthesis, characterization of silver nanoparticles and its antimicrobial action.Spherical Ag nanoparticles (Ag NPs) were synthesized by eco-friendly green combustion method using citrate containing Artocarpus gomezianus fruit extract as a fuel. The structure, morphology and compositions of the product were characterized by Powder X-ray Diffraction (PXRD), Scanning Electron Microscopy (SEM) and Fourier Transform Infrared (FTIR). The highly uniform spherical Ag NPs were subjecte to antibacterial and antifungal activities. PXRD patterns demonstrate that the formed product belon to crystalline face centered cubic structure of silver Nps. SEM micrographs show that the particles ar uniform with well distributed elliptical/spherical particles with a size range from 5 to 50 nm with inter-particle distance. The average crystallite sizes were calculated from Scherrer's method are found to be ≈20 nm for Ag NPs prepared with 10, 15, 20 and 25 mL of 10% Artocarpus gomezianus fruit extract respectively. Micro titer plate method (96 wells) to check the Minimum Inhibition Concentration of Ag Nps, exhibit significant antibacterial activity against two gram positive organisms (Bacillus cereus, Staphylococcus aureus) and two gram negative organisms (Escherichia coli, Serratia marcescens). Zone of inhibition method shows the spherical Ag NPs also exhibit significant antifungal activity against Aspergillus niger. The synthesize Ag NPs finds plausible biological applications.

Keywords: Green synthesis; Ag nanoparticles; Antifungal; Antibacterial; Artocarpus gomezianus; XRD; SEM; FTIR