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Production and Characterization of *Bridelia ferruginea* Selenium and Titanium Nanoparticles and its antibacterial activity against Multidrug Resistance *E. coli*

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ABSTRACT

Green synthesis of selenium and titanium nanoparticles (SeNPs) (TiNPs) was carried out using aqueous and methanol extracts of *Bridelia ferruginea* bark (BFa and BFm). The biosynthesized aqueous and methanol extracts *Bridelia ferruginea* selenium and titanium nanoparticles (BFaSeNPs, BFmSeNPs, BFaTiNPs and BFmTiNPs) were characterized by UV-Vis spectroscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR), Energy Disperse X-ray (EDX) and elemental analysis by X-ray Diffractometry (XRD) and Thermogravimetric analysis (TGA). Antibacterial activity was evaluated. Aqueous and methanol extracts of *Bridelia ferruginea* bio-reduced sodium selenite and titanium oxide for the production of BFaSeNPs, BFmSeNPs, BFaTiNPs and BFmTiNPs. Changes in colour of the reaction mixture from cream to red and white to deep brown was observed for the selenium and titanium nanoparticles. The Surface Plasmon Resonance peaks were observed at 500nm and 600 nm for BFaSeNPs and BFmSeNPs while SRP of 450 and 480 nm was observed for BFaTiNPs and BFmTiNPs. Hydroxyl, alkene and amine and alkane and halo compound were the function group present in BFmSeNPs and BFmTiNPs samples. BFmSeNPs and BFmTiNPs were smooth, spherical, agglomerated and isolated particles with crystalline face centered cubic. BFmSeNPs and BFmTiNPs were thermally stable and Selenium and titanium were the major element present in the nanoparticles. The nanoparticles had varied antibacterial activity against the test pathogens. BFaSeNPs and BFmSeNPs have the highest antagonistic activity against 90% and 40 % of the test pathogens while BFaTiNPs and BFmTiNPs had antagonistic activity against 100% and 90 % of the test pathogens. The highest antibacterial activity was against *E. coli* U104 (12.0 mm). In conclusion, *Bridelia ferruginea* aqueous and methanol extracts are potent bio-reducing and capping agent for selenium and titanium nanoparticles production. The nanoparticles are good antibacterial agents.

Keywords: *Bridelia ferruginea*, Aqueous and Methanol Extracts, Selenium and Titanium Nanoparticles, Antibacterial activity

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