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Green Synthesis, Characterization and Biological Applications of G. Indica Fruit Mediated Gold Nanoparticles

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The synthesis of gold nanoparticles (AuNPs) of medicinal plant extracts using green chemistry is the emerging area of research due to their applicability in nanomedicines. Secondary metabolites present in the plant extracts may serve as a good source of reducing and capping agent leads in nanoparticle synthesis. In this study, aqueous extracts of fruits medicinally and commercially important Garcinia indica (Kokum) has been utilized for the synthesis of AuNPs. UV-visible spectroscopy (UV-Vis), Fourier Transform Infrared Spectroscopy (FT-IR), X-ray Diffraction (XRD), Field Emission Scanning Electron Microscopy (FESEM), Energy Dispersive X-ray Spectroscopy (EDX) and High Resolution Transmission Electron Microscopy (HRTEM) techniques were used for the characterization of synthesized AuNPs. An absorption peak of the AuNPs is observed at 541 nm using UV-visible spectroscopy. The XRD patterns confirmed the face centered cubic structure and average crystallite size was calculated using the Debye-Scherrer equation and was found to be 9 nm. FTIR spectroscopy revealed that water soluble biomolecules from the aqueous extracts of the Garcinia species played important roles in the formation of AuNPs. FESEM showed the formation of AuNPs with regular spherical shape with average sizes of 2 to 10 nm. The cytotoxicity of AuNPs was examined against MCF-7 and exhibited potent anticancer activity with the IC50 value of 34.55 μg/ml for G. indica. Green synthesized AuNPs exerted considerable antibacterial activity against B. subtilisand E. coli.

Keywords: Garcinia, Gold nanoparticles, Green Synthesis, Biological applications