Antiproliferative effect of green synthesised silver, copper and bimetallic Ag-Cu nanoparticles using *Achyranthes aspera* against human breast adenocarcinoma cancer cells *in vitro*.

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The green synthesis of metal nanoparticles utilising plant extract is an environmentally sustainable and economical approach for their production. The present study reports the synthesis of metallic nanoparticles (NPs) AgNPs, CuNPs, and bimetallic Ag-CuNPs using aqueous stem extract of *Achyranthes aspera* and characterised using UV-Visible spectroscopy, Fourier Transform Infra-Red (FTIR) spectra, Scanning Electron Microscopy (SEM), and X-ray diffraction (XRD) methods. The UV-Vis spectrum of the bimetallic Ag-CuNPs shows a strong peak at 400nm, and secondary peak at 540nm indicates the formation of nanoparticles. FTIR spectrum confirms the presence of phenolic groups, flavonoids, and alkaloids, which play a critical role in the reduction and stabilising the nanoparticles. SEM analysis revealed the bimetallic Ag-CuNPs exhibited both rod-like and spherical morphologies with size ranges from 124 to 198 nm. The XRD pattern showed characteristic peaks of 2θ at 16.51°, 20.92°, 26.68°, and 39.5° and corresponding crystal planes (111), (200), (220), and (400), indicating the face-centered cubic (FCC) and crystalline structure of the biosynthesised bimetallic Ag-CuNPs. Furthermore, *in vitro* cytotoxicity assays against MCF-7 breast cancer cell lines revealed a potent antiproliferative effect, with an IC_{50} value of 55.28 ± 0.517 µg/mL, highlighting the therapeutic potential of Ag-Cu bimetallic nanoparticles.

Keywords: Anticancer activity, AgNPs, CuNPs, Bimetallic Ag-CuNPs, MCF-7, MTT assay