ABSTRACT

Copper nanoparticles, due to their interesting properties, low cost preparation and many potential applications in catalysis, cooling fluid or conductive inks, have attracted a lot of interest in recent years. In this study, copper nanoparticles were synthesized through the chemical reduction of copper nitrate with ascorbic acid and sodium borohydride in water without inert gas protection and also by using ginger and garlic extract in eco-friendly green synthesis method. In our synthesis route, ascorbic acid (natural vitamin C) was used as a protective agent to prevent the Cu nanoparticles from oxidation during the synthesis process and in storage. Doxycycline was added and worked both as a size controller and as a capping agent. Scanning electron microscopy (SEM) and UV–vis spectrometry contributed to the analysis of morpgology, shape, size and optical properties of the nanoparticles, respectively Cu nanoparticles were characterized by Fourier transform infrared (FT-IR) spectroscopy to investigate the coordination between Cu nanoparticles and Doxycycline. The average crystal sizes of the particles at room temperature were less than 10nm. This work reports action of the antibacterial and anticancer properties of copper nanoparticles against pathogenic *Escherichia coli* and *Pseudomonas aeruginosa*. Antibacterial activity of the samples was evaluated by using the standard Disc diffusion method and anticancer activity was evaluated by cytotoxic MTT assay against HeLa (cervical cancer) and HepG2 (liver cancer) cell lines. The chemically manufactured nanoparticles displayed more significant antimicrobial activity on selected gram negative bacteria (*E.coli* and *P. aerugenosa*) than green synthesized nanoparticles (ginger and garlic) and green synthesized nanoparticles showed greater anti-cancerous activity against HeLa and HepG2 cell lines than chemically synthesized nanoparticles.