ABSTRACT

Synthesis of nanomaterials can be a key to solving unusual problems by virtue of their unusual properties and as such they hold infinite possibilities. As nanotechnology has started to emerge out of confines of laboratory and is revolutionizing the field of medicine by its myriad applications, it has become immensely crucial to discover novel and cheaper techniques of synthesis. Green synthesis of metallic nanoparticles has become the need of the hour because of its eco-friendly, nontoxic, and economic nature. In this study, leaf extracts of *Rosa damascene* and *Mentha piperita* were used as a bioreductant to reduce silver nitrate and chloroauric acid respectively, leading to synthesis of silver nanoparticles (AgNPs) and gold nanoparticles (AuNPs) in a single step, without the use of any additional reducing or capping agents. The synthesized nanoparticles were characterized by the use of UV-visible spectroscopy, fourier transform infrared spectroscopy, dynamic light scattering, transmission electron microscopy, and field emission scanning electron microscopy. Kinetics (volume of leaf extracts, concentration of precursors, pH, and temperature) of biosynthesized metallic nanoparticles were studied spectrophotometrically.

These biologically synthesized metallic nanoparticles were tested and exhibited significant antibacterial activity against Gram-negative bacteria species but not against Gram-positive ones (*Escherichia coli* and *Bacillus cereus*). These synthesized metallic nanoparticles also displayed antifungal activity against the *Candida albicans* and *Aspergillus niger*. Cytotoxicity of AgNPs and AuNPs was measured against cancer cell lines and normal ones and the results reinforce the belief that these nanoparticles can be used to selectively target cancer cells. Anti-inflammatory and analgesic activities were studied on a Wistar rat model to gauge the impact of nanoparticles for a probable role in these applications. Both the metallic nanoparticles tested positive for both these activities, although the potency was less as compared to the standard drugs.