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NANOPARTICLES SYNTHESIZED FROM EXTRACTS OF TETRADENIA RIPARIA REVEAL PHARMACOLOGICAL PROPERTIES

Abstract:

Plant-mediated synthesis of metallic nanoparticles is a growing area of interest in the fields of green synthesis and nanotechnology. In this study, the synthesis of gold and silver nanoparticles (AuNPs and AgNPs, respectively) in flowers, leaves and stems of Tetradenia riparia using methanol and water was investigated. Following observation by colour change, the nanoparticles were confirmed by ultraviolet (UV) visible spectroscopy, scanning electron microscopy (SEM), energy dispersive X-ray (EDX) analysis and Fourier transform infrared spectroscopy (FTIR). UV peaks for AgNPs and AuNPs were recorded at 410 nm and 540 nm, respectively. FTIR analysis indicated that the reducing agents included terpenoids and pyrones which were responsible for reducing and capping the nanoparticles. Furthermore, crude methanol leaf extracts indicated the presence of phenolics and flavonoids (77.9±8.5 and 4.0±0.9 mg g-1 dry weight, respectively). The synthesised nanoparticles were tested for anti-bacterial activity on five pathogenic bacteria. AgNPs were active and showed MIC against E. coli (1.56 µl ml-1), E. faecalis (1.56 µl ml-1), K. pneumonia (1.56 µl ml-1), P. aeruginosa (12.5 µl ml-1) and S. aureus (50 µl ml-1). MIC using AuNPs was as follows: K. pneumonia (1.56 µl ml-1), E. faecalis (1.56 µl ml-1), E. coli (6.25 µl ml-1), P. aeruginosa (12.5 µl ml-1) and S. aureus (50 µl ml-1). The in vitro screening of the nanoparticles showed potential cytotoxic activity against the human breast cancer (MCF7) cell line. Data generated were used to plot a dose-response curve of which the concentration of extract required to kill 50% of MCF7 cell population (IC50) was determined to be 5 and 375 µg ml-1 for AgNPs and AuNPs, respectively, after 96 hrs.

Keywords:

Cytotoxicity, Iboza, Green synthesis, Nanoparticles, Plant extract

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