Trachyspermum ammi seed extract-mediated Ag nanoparticles: an insight into its *in vitro* biopotency

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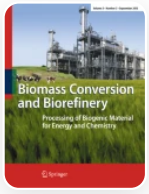

Biomass Conversion and Biorefinery

Aims and scope

Submit manuscript

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Abstract

Biosynthesized nanoparticles are becoming more prevalent because of their distinctive biological applications and the availability of naturally occurring bioactive secondary metabolites from plants that facilitate green synthesis. In the current study, silver nitrate solution was reduced in order to create silver nanoparticles using *Trachyspermum ammi* (*T. ammi*) seed extract. The production of bionanoparticles was confirmed by using UV–visible

spectroscopy, Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), energy dispersive X-ray analysis (EDX), and X-ray diffraction analysis (XRD). The green synthetic AgNPs are spherical in form and range in size from 50 to 90 nm. The antibacterial properties of the produced silver nanoparticles were tested by the minimum inhibitory concentration (MIC) method and disc diffusion assay. The antibacterial efficacy expressed was maximum against *Escherichia coli* and *Enterococcus faecalis* with ZOI of 15.33 ± 0.4 and 15.0 ± 0.1 mm, respectively. The MIC values for *E. faecalis* and *E. coli* of the biosynthesized AgNPs were observed to be 12.5 µg/ml. To ascertain the mechanism of action of the created biosynthesized nanoparticles, estimates of the production of reactive oxygen species (ROS), lipid peroxidation (LPO), and reduced glutathione (GSH) levels were measured. The effect of biosynthesized AgNPs on cell proliferation, ROS induction, and cell cycle arrest was investigated through MTT, DCFDA staining, and flow cytometry assay. The cytotoxic efficiency of synthesized AgNPs against the human colorectal carcinoma (HCT) cell line was evaluated through MTT assays and showed 50% inhibitory concentration (IC_{50}) values at 62.5 µg/ml. The biosynthesized AgNPs presented high ROS production against MCF-7 cancer cells compared to control cells and revealed growth arrest in the G2/M phase through flow cytometry analysis. Hence, the present study suggested that the biosynthesized AgNPs using *T. ammi* could be used as a viable source for antibacterial and anticancer medicines with additional in vivo research.

Data availability

The data used to support the finding of this study are included within the manuscript.

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Contributions

V.K.S.: investigation, conceptualization, methodology, and writing original draft. R.S.: conceptualization, data curation, and writing original draft. M.K.: formal analysis and data curation. A.I. and N.R.: investigation, formal analysis, and review and editing.

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Ethics declarations

Ethics approval

Not applicable.

Competing interests

The authors declare no competing interests.

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