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Ecofriendly synthesis of silver nanoparticles using fenugreek seeds' aqueous extracts and its antimicrobial properties

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Recently, the green synthesis of silver nanoparticles (AgNPs) using different eco-friendly methods has gained popularity, due to improved safety, low cost ease of production and growing threat of microbial resistance against traditional antibiotics. Consequently, AgNPs were synthesized using fenugreek seeds' aqueous extracts that act as both reducing and capping agents. Briefly, the seeds' extracts (2.5 and 10% w/v) were allowed to interact for 24 hours with a silver nitrate solution (10 mM) at 30°C in the ratio of 1:10. The formation of AgNPs was confirmed by UV-visible spectroscopy. Their concentrations were determined using atomic absorption spectroscopy. The prepared nanoparticles were evaluated by transmission electron microscopy, measurement of zeta potential, release of silver ions from the prepared AgNPs and Fourier-transform infrared spectroscopy. Finally, their *in-vitro* antimicrobial properties were investigated. Results revealed that the formed AgNPs exhibited the characteristic surface plasmon resonance absorption peak between 433 to 440 nm. Both the size and concentration of the formed AgNPs increased with increasing concentration of the extracts. The developed AgNPs were almost spherical and polydisperse, with size ranging from 3.5-12.5 nm. Both negative zeta-potential values and FT-IR analysis indicated the stability of the particles. AgNPs presented a prolonged release of silver ions compared to silver nitrate solution of equal concentration. *In-vitro* antimicrobial evaluation revealed a good size and concentration-dependent activity of AgNPs against the tested organisms. In conclusion, AgNPs were successfully synthesized from a silver nitrate solution through a simple cheap green route, using fenugreek seeds' aqueous extracts.

Biography

Asmaa A Ashour has completed her Master's in Pharmaceutical Science from Faculty of Pharmacy, Alexandria University. She is an Assistant Lecturer at the Department of Pharmaceutics, Faculty of Pharmacy, Alexandria University. She previously presented two posters focused on the green synthesis of silver nanoparticles using different plant extracts in two international conferences held in Cairo, Egypt. She has also an accepted manuscript entitled; "Green synthesis of silver nanoparticles using cranberry powder aqueous extract: characterization and antimicrobial properties" under publication in the *International Journal of Nanomedicine*.

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