

Synthesis of silver nanoparticles by using leaf extract of *Azadirachta indica* and its biomedical applications

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Abstract: Nowadays nanotechnology has gained a wide research interest in the scientific community. Green synthesis of nanoparticles is gaining much importance and is suggested to be a possible alternative than chemical and physical methods. Nanoparticles have various applications in imaging, diagnostics, and therapeutics of various diseases, especially cancer, which could be dealt efficiently with target drug delivery. For biomedical applications, the production of nanoparticles using plants is more preferable as it does not involve the productions of toxic byproducts, and hence, it could be considered as a non-toxic and cost-effective method. The present work reports the low cost, green synthesis of AgNPs using *Azadirachta indica* leaf extract. For the synthesis of AgNPs 10 Mm Silver nanoparticles were added to 100 ml of leaf extract at room temperature. The appearance of yellowish brown color confirms the synthesis of AgNPs nanoparticles.

The AgNPs were characterized by UV-Vis spectra, TEM, and FTIR. The formation of AgNPs was confirmed by the appearance of the peak at 400nm by UV-Vis spectra. The presence of functional groups was identified by FTIR analysis. The TEM analysis shows the AgNPs were spherical in shape and particle size ranges from 5-50 nm. The silver nanoparticles showed significant antibacterial against different bacterial pathogens viz, *P.aeruginosa*, *E.coli*, *B.subtilis* and *S.aureus* at 25µl/ml by disc diffusion method after 24 hours. The antimicrobial efficacy of AgNPs was also checked by combing them with amoxicillin against above-mentioned pathogens. Further AgNPs were evaluated for their antitumor activity against breast cancer cell lines (MDA-MB-231) cell lines by using MTT assay. The AgNPs showed remarkable cytotoxic activity against breast cancer cell lines (MDA-MB-231) and were effective by killing these cells.

Cytotoxicity in Breast cancer cell lines (MDA-MB-321) were observed with varying concentrations of AgNPs. The maximum inhibition percentage was 82% at 98µg/ml. The results of this study shows *Azadirachta indica* leaf extract containing phytochemicals such as alkaloids, terpenoids, flavonoids, carbohydrates and sterols which acts as reducing agents for the synthesis of AgNPs.

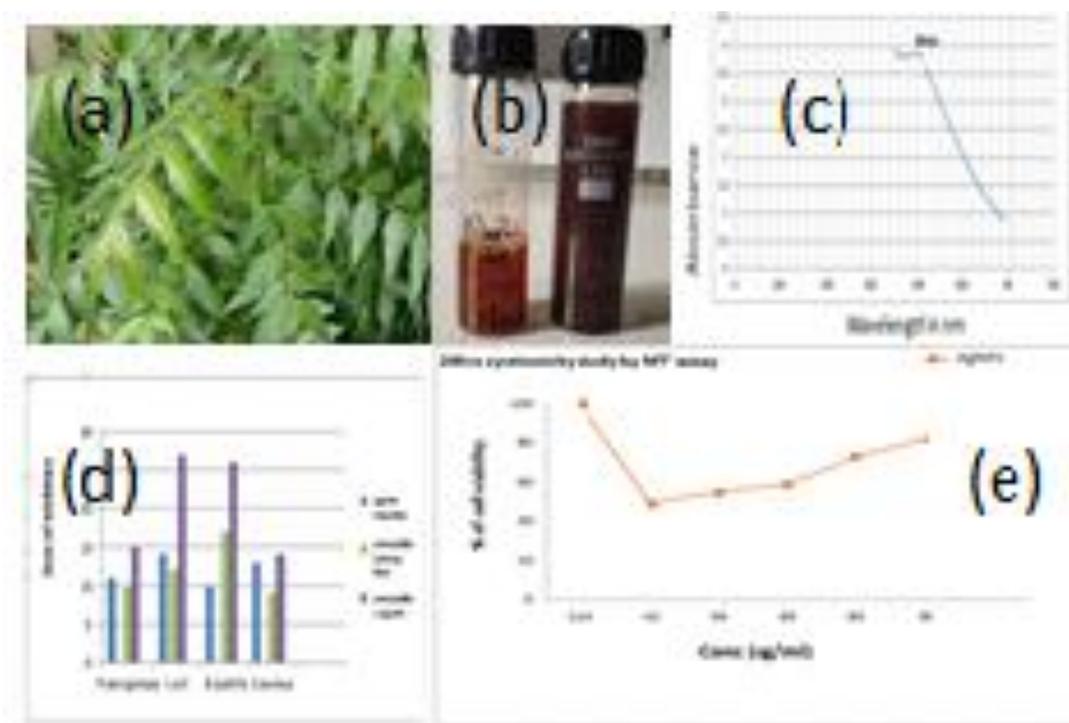


Figure 1: (a) shows the leaves of neem plant (b) Synthesis of AgNPs from leaf extract of *Azadirachta indica* after adding silver nitrate, (c) UV –Vis Spectra peak exactly at 400 nm (d) Antibacterial activity of biosynthesized silver nanoparticles (e) Antitumor activity of AgNPs at different concentrations.

References:

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