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COMMIPHORA WIGHTII GUM EXTRACT MEDIATED SYNTHESIS OF SILVER NANOPARTICLES AND THEIR BACTERICIDAL EFFICACY

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Nanobiotechnology is an important division in nanotechnology that involves various biological entities for nano-synthesis. Silver nanoparticles (AgNPs) received tremendous attention owing to their versatile and promising properties and their wide range of applications. Moreover, nano-synthesis using plants is a promising approach among other biological sources because of the presence of the high amount of phytochemicals and the feasible procedures required in nano-synthesis. However, AgNP synthesis by incorporating *Commiphora wightii* (guggul) plant gum is not attempted previously. *C. wightii*, belonging to the family Burseraceae, is used in ayurvedic medicine due to its anticancer, antimicrobial and anti-inflammatory properties. The objective of this study was to green synthesize AgNPs using the gummy extract of *C. wightii* in a feasible, cost-effective and environmentally-friendly manner and evaluate their bactericidal efficacy. AgNPs were fabricated by the addition of *C. wightii* extract to $AgNO_3$ while stirring and heating. Bactericidal efficacy was determined against *Escherichia coli* and *Staphylococcus aureus* using the standard Kirby-Bauer Disk diffusion method. A rapid colour transformation was observed from light brown to deep brown indicating AgNP formation, and it was confirmed by a characteristic band at 427 nm. X-Ray Diffraction patterns revealed the crystalline nature and the Face Centred Cubic structure of AgNPs. Moreover, Transmission Electron Microscopic analysis highlighted well-dispersed spherical AgNPs around 5-20 nm. Fourier Transform Infra-Red spectra revealed the presence and involvement of functional groups of steroids, flavonoids, terpenoids, carbohydrates etc. *C. wightii* gummy extract alone and AgNPs synthesized using gummy extract showed antibacterial potential against both *E. coli* and *S. aureus*. The diameters of zones of inhibition were 12.56±0.35 nm and 10.27±0.25 nm for *E. coli* and *S. aureus*, respectively. Therefore, this method was an effective, single-step green synthetic approach for the synthesis of stabilized AgNPs and bactericidal efficacy for both bacterial gram classes proposes their applicability in biomedical utilities. Moreover, further modifications of this green procedure must be carried out before any industrial-scale production and applications.

Keywords: Bactericidal activity, *Commiphora wightii*, Green synthesis, Silver nanoparticles