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GREEN SYNTHESIS OF SILVER NANOPARTICLES, THEIR CHARACTERIZATION AND APPLICATION FOR ANTIBACTERIAL ACTIVITY

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Abstract: Nanoparticles are an area of great interest because of their various applications in life sciences. Recent development in nanotoxicology has shown that colloidal silver nanoparticles (AgNPs) have toxicological properties due to their anti-bacterial activity. Silver nanoparticles are the most widely used nanomaterials for different purposes such as photography, catalysis, biological labeling, photonics, optoelectronics and Surface-Enhanced Raman Scattering (SERS) detection. Our recent research was focused on developing AgNPs and their characterization, which can be applied in medical research and environmental cleaning applications. Extracellular biosynthesis of AgNPs has been developed in an environmentally friendly manner. In this study, live plants such as *Magnolia grandiflora*, *Geranium*, *Aloe 'Tingtinkie'* leaves broth, *Actaea racemosa* (black cohosh), and *Eucalyptus angophoroides* extracts were used as reducing agents to produce nanoparticles. Synthesis of colloidal AgNPs was performed by UV-Visible spectroscopic analysis. UV-Visible spectrum showed a peak between 417-425 nm corresponding to the plasmon absorbance of the AgNPs that were formed within several minutes. The characterization of the AgNPs such as their size and shape was performed by Atom Force Microscopy (AFM), Dynamic Light Scattering (DLS), and Transmission Electron Microscopy (TEM) techniques which indicated a size range of 5 to 10 nm. The anti-bacterial activity of AgNPs was investigated at various concentrations (2-15ppm). *Staphylococcus aureus* and *Kocuria rhizophila* (Gram positive organisms); *Escherichia coli*, *Pseudomonas aeruginosa*, and *Salmonella typhimurium* (Gram negative organisms) were exposed to AgNPs using Bioscreen C to measure bacterial growth. The results indicated that AgNPs at a concentration of 2 and 4 ppm, significantly inhibited bacterial growth. Further studies will be carried out to determine the minimum inhibitory concentration of AgNPs for bacterial growth. Our future work is to investigate the cytotoxicity of biosynthesized AgNPs on normal and cancerous cells.

Key words: Cytotoxicity, Silver Nanoparticles (AgNPs), Bacterial growth

Acknowledgements: "We would like to acknowledge the support and assistance from Alabama Agricultural & Mechanical University's College of Agricultural, Life and Natural Sciences."