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MICROWAVE ASSISTED ONE-POT GREEN SYNTHESIS OF SILVER NANOPARTICLES USING LEAF EXTRACTS FROM *Vigna unguiculate:* EVALUATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES

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ABSTRACT

Oxidative stress is caused by the increased levels of free radicals in the body which leads to various diseases. Antioxidants are known to reduce the risk of diseases caused by oxidative stress as they have the ability to donate electrons to these harmful free radicals. In addition to the natural antioxidants present in fruits and vegetables, synthetic antioxidants are also available. With the emergence of nanotechnology, the applications possessed by nanoparticles are limitless. One such application is in nanomedicine where nanoparticles are incorporated to study biological systems. The properties of the nanoparticles depend on the type of metal used and the method of synthesis. The use of plants for the production of silver nanoparticles (AgNPs) is key point of interest as it is rapid, eco-friendly, non-pathogenic and economical. Furthermore, this "Green synthesis" requires a single step for the biosynthesis of the nanoparticles as the silver ions are reduced and stabilized from the biomolecules present in the plant extract, hence the term 'one-pot'. In this study, cowpea leaf extracts were used for the one-pot green synthesis of silver nanoparticles to determine its antioxidant properties using phytochemical assays; Total flavonoid content (TFC), total phenolic content (TPC), total antioxidant activity (TAC), and free radical scavenging assays; Ferric reducing antioxidant properties (FRAP), ABTS and DPPH. The phytochemical assays showed a greater activity in AgNPs compared to the water extracts except in the TFC. The free radical scavenging assays showed a higher scavenging activity in the water extracts compared to the AgNPs. The antimicrobial activities of the synthesized AgNPs were tested against two strains of bacteria which were gram positive methicillin-resistant *Staphylococus aureus* (MRSA) and gram-negative bacteria *Escherichia coli* (ATCC 10798), assessed by well diffusion method on Muller-Hinton agar petri plates using gentamycin as a positive control and distilled water as a negative control. The antimicrobial activity showed greater zones of inhibition (ZOI) in AgNPs compared to the water extracts for *Escherichia coli,* in contrast, *Staphylococcus aureus* showed a higher ZOI in the water extracts compared to the AgNPs.

Keywords: Silver nanoparticles, cowpea leaf, green synthesis, antioxidant, antimicrobial