Study of antibacterial activity in biogenic silver nanoparticles prepared from *Eichhornia crassipes*(Mart.) Solms

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Abstract

The increase of antibiotic resistance in bacteria has become a major problem. Therefore, alternative antimicrobial agents are required to address this problem. Among all the metals silver has shown to have a higher antibacterial activity. Silver is found to be more effective when it is in the nanoscale. Present study aimed to examine the antibacterial activity of silver nanoparticles (AgNPs) prepared from aqueous extract of *Eichhornia crassipes* (Mart.) Solms (water hyasinth) which is an invasive plant species found in Sri Lanka. Biogenic AgNPs were synthesized using four different methods by changing pH, concentration of $AgNO_3$ solution (0.01M, 1mM) and the concentration of plant extract. Synthesis of AgNPs was monitored by UV-Visible spectrophotometer. Thereafter, the prepared AgNPs were characterized using scanning electron microscope and energy dispersive X-ray. Synthesized AgNPs and aqueous extract of *E.crassipes* were subsequently tested against *Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 25923 and three different MRSA strains by using broth- micro dilution method. The Prepared AgNPs were spherical in shape and displayed absorption peak at 360 nm – 440 nm in UV- Vis spectra. According to the EDX analysis higher Ag percentage can be seen in the method which used 1mM $AgNO_3$ solution and 0.05% of plant extract. Additionally, that method resulted six different sizes of nanoparticles (which are range from 41 to 103 nm). The minimum inhibitory concentration (MIC) were 0.0625 mg/mL against MRSA strains, 0.0125mg/mL against *Salmonella typhi* , 0.015 mg/mL against *S. aureus* and 1.0 mg/mL against *E.coli*. Aqueous extract of *E.crassipes* did not show inhibition against any of the above organisms tested. These results indicate that AgNPs prepared from *E.crassipes* has displayed plausible antibacterial activity indicating its potential use as a disinfectant.

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