UNIVERSITI TEKNOLOGI MARA

SYNTHESIS OF *Murdannia loriformis*-MEDIATED SILVER NANOPARTICLES AND ITS ANTIBACTERIAL PROPERTIES

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ABSTRACT

Silver is known for its antimicrobial effects and silver nanoparticles (AgNPs) are gaining their importance due to their antimicrobial activities. This study describes the synthesis of AgNPs using *Murdannia loriformis* extract (MLE) as a reducing agent and silver nitrate as a metal precursor. The effect of MLE concentration, $AgNO_3$ concentration, reaction time, and pH on the synthesis of MLE-mediated AgNPs was studied using one-factor-at-a-time (OFAT) method. From the TEM image, highly scattered AgNPs with a spherical shape and an average particle size of around 12.60 nm ± 2.83 nm was observed at optimized conditions (pH 8, 100% MLE concentration, 2mM of $AgNO_3$, and 60 min reaction time). The crystalline nature of the MLE-mediated AgNPs in face centre cubic (FCC) structure was confirmed by the peaks in XRD pattern. The flavonoids, sterols, carbohydrates, and proteins in MLE were believed responsible for Ag^+ reduction. For the colloidal stability study, polyvinylpyrrolidone (PVP) and sodium citrate (SC) were added as a stabilizing agent. From the TEM images, zeta potential and UV-vis SPR results, it can be concluded that the stability of AgNPs at high concentration (5 mM and 10 mM) is improved after the addition of stabilizing agent. From the zeta potential observation, MLE-mediated AgNPs modified with sodium citrate (MLE-AgNPs-SC) showed the better stability compared to MLE-mediated AgNPs and MLE-mediated AgNPs modified with polyvinylpyrrolidone (MLE-AgNPs-PVP). The antibacterial properties was performed by disk diffusion method. It was observed that MLE-mediated AgNPs showed enhanced antibacterial activity depicting the inhibition zone between 18.27 and 22.09 mm was reported against *Escherichia coli* compared to *Staphylococcus aureus*, which the inhibition zone between 9.11 and 10.99 mm. For AgNPs modified with polymer: MLE-AgNPs-PVP and MLE-AgNPs-SC against *Escherichia coli* and *Staphylococcus aureus* were decreased based on the inhibition zone of 8.82 – 8.94 mm and 8.77 – 8.95 mm, respectively. It can be concluded that the antibacterial properties of modified AgNPs with polymer as stabilizing agent (PVP and SC) decreased compared to MLE-mediated AgNPs at same concentration. More extensive analysis is required for the appropriate selection of the synthesis parameters and adequate concentration for use in biomedical applications and antibacterial control systems.

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