ABSTRACT

Meniran (*Phyllanthus urinaria* L.) is a herbal plant containing polyphenols. The content of these compounds can be maximized through fermentation as an effort to enhance the bioactivity of secondary metabolite compounds, allowing compounds still bound to the cell walls to be released in their free form. Polyphenol compounds with antioxidant properties in plants can be utilized to reduce Ag^{+} ions to Ag^{0}. Additionally, polyphenols can act as stabilizers for the particles formed during the synthesis reaction process. The use of meniran leaf extract as a bioreductor represents a more environmentally friendly and biocompatible alternative for the synthesis of silver nanoparticles. The research was conducted through several stages, including the fermentation of meniran leaves for 48 hours using *A. niger*, analysis of total flavonoid content (TFC) and total phenolic content (TPC). Subsequently, green reduction of silver ions was carried out by reacting PU/FPU with silver nitrate ($AgNO_3$). The formed silver particles (PP) were characterized using UV-Vis and FTIR, and their bioactivity was tested through antibacterial activity using the disk diffusion method (Kirby-Bauer) and toxicity testing using the BSLT method. The TPC values of meniran leaves before (PU) and after fermentation (FPU) were 95.64 and 107.07 mg GAE/g, respectively. Additionally, the TFC values of PU and FPU extracts were 5.01 and 4.76 mg QE/g, respectively. The selected conditions for the green synthesis of PP-PU and PP-FPU were conducted at a concentration of 100 ppm with a ratio of extract to precursor of 1:3. PP-FPU exhibited a more stable color change and higher absorbance when observed over 96 hours. Characterization of silver particles using UV-Vis spectrophotometer indicated higher absorbance for PP-FPU compared to PP-PU. FTIR absorption showed changes in transmittance intensity and a shift in absorption bands from 3451.24 to 3444.30 cm^{-1} (O-H) and 1637.94 to 1635.20 cm^{-1} (C=O). The antibacterial activity of PP-FPU demonstrated larger inhibition zones in both *E. coli* and *S. aureus*. The toxicity of PP-FPU and PP-PU were 67.5% and 62.5%, respectively, showing a decrease compared to the toxicity of silver in the form of $AgNO_3$, which was 80%.

Keywords: Meniran leaves, Fermentation, Green synthesis, Silver particles