

ABSTRACT

Centella asiatica is a medicinal herb rich in bioactive compounds. The release of bioactive compounds can be enhanced through solid-state fermentation using *Lactobacillus plantarum*, while Microwave-Assisted Extraction (MAE) offers a faster and more efficient extraction method than conventional shaker extraction. This study aimed to optimize the extraction of fermented *C. asiatica* products using MAE. Short fermentation for 1 hour resulted in the highest total phenolic and triterpenoid contents compared with 2- and 3-hour fermentations. Fermented products extracted under the optimum MAE condition, FM6/6 (600 W, 60 s, 70% ethanol), showed a 16% increase in total phenolic content and a 38% increase in total triterpenoid content compared with 1-hour shaker extraction. Qualitative analysis confirmed that FM6/6 exhibited higher relative intensities of phenolic, terpenoid, and flavonoid compounds. Quantitative LC-MS analysis indicated the disappearance of the tentative compound quercetin in FM6/6. Tentative compounds including anethole, polyanthin, pentanoic acid octyl ester, and hexyl octanoate were detected in FM6/6. The relative abundances of gamma-aminobutyric acid, methyl eugenol, 24-(β -D-glucopyranosyloxy)-3 β ,15 α -dihydroxyurs-12-ene-11,21-dione, leucon, and isobavachin decreased, whereas madecassic acid, symplocosin, kaempferol, and acetyltingitanol increased in FM6/6. Compared with F1SE, FM6/6 exhibited very strong antioxidant activity in the ABTS assay, with an IC_{50} value of $21.74 \pm 0.22 \mu\text{g/mL}$, while DPPH radical scavenging activity and FRAP reducing power were categorized as moderate and weak, with IC_{50} values of 109.09 ± 0.33 and $155.73 \pm 0.04 \mu\text{g/mL}$, respectively. Furthermore, antiglycation activity increased to 73.43% inhibition at 50 ppm, antidenaturation activity reached 22.2% inhibition at 250 ppm, and antiaggregation activity evaluated by turbidimetric and Congo red decolorization methods showed moderate inhibition values of 67.3% and 46.07%, respectively, at 250 ppm.

Keywords : *Centella asiatica*, Solid-State Fermentation, Extraction, Microwave-Assisted Extraction, Bioactivity