Abstract

Inflammation acts as the body's defense mechanism against infections, tissue injury, and cellular stress, however, prolonged inflammation can contribute to the development of chronic diseases. *Caesalpinia sappan* is a medicinal plant known to contain bioactive compounds, particularly brazilin, with potential anti-inflammatory properties. This study aimed to evaluate the anti-inflammatory activity of *Caesalpinia sappan* extract (CSE) in lipopolysaccharide (LPS)-induced RAW264.7 macrophages. FTIR spectroscopy was used to characterize the extract, while cytotoxicity was assessed using the WST-8 assay. The production of tumor necrosis factor-alpha (TNF-α), interleukin-6 (IL-6), and Nitric Oxide (NO) was measured using ELISA and Griess assays, respectively. Gene expression of *Tnf-a*, *Il-6*, and *Nos2* was determined using Reverse Transcription Quantitative Real-Time Polymerase Chain Reaction (RT-qPCR). FTIR analysis revealed the presence of functional groups associated with phenolic compounds. CSE concentrations ranging from 10–30 µg/mL maintained cell viability above 70%, indicating low cytotoxicity, with no significant effect on cell viability. Furthermore, CSE significantly reduced TNF-α, IL-6, and NO production ($p < 0.05$), with the greatest inhibitory effect observed at 30 µg/mL. RT-qPCR analysis also demonstrated downregulation of *Tnf-a*, *Il-6*, and *Nos2* expression following CSE treatment. These findings suggest that CSE possesses anti-inflammatory potential by suppressing pro-inflammatory gene expression and reducing inflammatory mediator production in LPS-induced RAW264.7 cells.

Keywords: inflammation, anti-inflammatory, *Caesalpinia sappan*, RAW264.7 cells