

UNIVERSITI TEKNOLOGI MARA

**SOLVENT-FREE MICROWAVE
EXTRACTION (SFME) OF
PHENOLIC COMPOUNDS IN
CLINACANTHUS NUTANS LINDAU
(*C. NUTANS*) VIA VACUUM
TECHNIQUE**

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ABSTRACT

Medicinal herb from Acanthaceae family known as *Clinacanthus nutans* Lindau or *C. nutans* is a popular shrub in the Asia regions due to its high content of polyphenols. Numerous studies of conventional extractions have been used to extract biological activities compounds in *C. nutans*, however, the methods are usually associated with several contras such as use of high volume of organic solvent, low yield of extraction and time-consuming. In this study, extraction of *C. nutans* used vacuum solvent-free microwave extraction (V-SFME) and solvent-free microwave extraction (SFME) which was carried out in vacuum and ambient pressure were evaluated in terms of total phenol content (TPC) and extracted phytochemicals. Effect of process parameters on the extraction of *C. nutans* i.e., absorbed power density (APD) in both V-SFME and SFME methods at different microwave exposure time were studied. Results demonstrated that the highest value of TPC of 24.08 ± 0.51 mg GAE/g DW is acquired via V-SFME technique with 0.073 W/ml of APD, 6 ml/g of S/F ratio and 5 min. Kinetic modelling for polyphenols was carried out using Patricelli's model and kinetic curves for V-SFME, SFME, and normal infusion. V-SFME showed higher extraction yield of 27.0 mg GAE/g DW in faster extraction rate of 0.15 mg/g/min compared to SFME with extraction yield of 13.0 mg GAE/g DW in 0.08 mg/g/min of extraction rate. Normal infusion showed lower extraction yield in slower rate of extraction (10.1 mg GAE/g DW, 0.06 mg/g/min, respectively) due to only normal heating of 40 °C in warm water bath. The effect of APD in the V-SFME technique was found significant ($p < 0.05$) on the TPC and it was found not significantly changed over the microwave exposure time. The GC-MS analysis revealed that 2,3-dihydro benzofuran compounds, from the class of coumaran, presents as the major phytochemicals in *C. nutans* extracts obtained by V-SFME and SFME. Gallic acid, iso-orientin and vitexin was quantified by HPLC analysis and it was revealed that vitexin (334.84 μ g/g) appeared as the highest phenolic acid found in *C. nutans* extracts. *C. nutans* extracts therefore found to be a rich source of phenolic compounds and V-SFME showed high efficiency to recover such compounds under optimum APD, shorter microwave exposure time, and at the same time preserve the polyphenols content at low temperature.

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