

Antioxidant and Toxicity Evaluation of *Melastoma malabathricum* in Ethanol, Methanol and Aqueous Extraction Methods

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Structured Abstract

Background: An imbalance in reactive oxygen species (ROS) can cause oxidative stress, which contributes to many degenerative diseases. While synthetic antioxidants are widely used, their possible health risks have led to interest in safer, natural options. *Melastoma malabathricum*, especially its white flower variety, has been used in traditional medicine and contains bioactive compounds that may help reduce oxidative stress. This study aimed to evaluate the antioxidant activity and safety of its various extracts.

Methods: The white flowers of *M. malabathricum* were extracted using ethanol, methanol, and aqueous methods (decoction and maceration). Organic solvents were removed by rotary evaporation, while aqueous extracts were freeze-dried. Antioxidant activity was measured using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay, toxicity was assessed with the brine shrimp lethality test, and LC-MS was performed to identify bioactive compounds. Extraction yields were also calculated.

Results: The antioxidant activity of *M. malabathricum* white flower extracts was tested using the DPPH assay. The methanol extract showed the highest activity, while the aqueous decoction of powder was the lowest. Toxicity tests showed methanol extract was the most toxic, and the decoction of flower was the least. LC-MS confirmed the presence of flavonoids like Cyanidin-3-O- β -D-glucoside. Extraction yields ranged from 23.15% to 31.00%, showing a link between antioxidant activity, toxicity, and flavonoid content.

Conclusion: The extracts of *M. malabathricum* white flowers showed varying antioxidant activities, with the methanol extract (MMET) being the most effective. Toxicity levels also differed, where the decoction of flower (MMDF) was the least toxic and MMET the most. LC-MS confirmed the presence of flavonoids, supporting the plant's potential as a natural antioxidant source.

Keywords: *Melastoma malabathricum*, antioxidant activity, toxicity, LC-MS, flavonoids.

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