

Thesis Title Effects of *Bacopa monnieri* Extract and Its Microcapsules on Improving Cognitive Functions in a Lipopolysaccharide-induced Dementia *In Vivo* Model

Author Sasithon Aunsorn

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Advisor Associate Professor Sasitorn Chusri, Ph. D.

Co-Advisor Professor Shang Yazhen, Ph. D.

ABSTRACT

Bacopa monnieri (BM) is a traditional medicinal herb with neuroprotective and cognitive-enhancing properties, but poor stability and bioavailability limit its practical application. In this study, the effects of BM extract and its microencapsulated formulation (BM110-180) were evaluated in a lipopolysaccharide (LPS)-induced dementia rat model. The BM extract contained high levels of key bioactive compounds, including phenolics and flavonoids, and showed potent antioxidant activity through single electron transfer (SET) and hydrogen atom transfer (HAT) mechanisms. Safety assessment in *C. elegans* confirmed that the extract had no toxicity or adverse effects on feeding behavior. BM110-180 was prepared through spray-drying with maltodextrin and unripe banana flour to improve stability, protect bioactive compounds, and potentially enhance bioavailability. In LPS-treated rats, both BM extract and BM110-180 improved cognitive functions, including spatial learning, memory, and exploratory behavior, while reducing behavioral disturbances associated with neuroinflammation. These findings suggest that BM extract and its microencapsulated form are effective neuroprotective interventions, with microencapsulation providing additional benefits for preserving bioactivity and enhancing therapeutic potential in dementia-related cognitive deficits.

Keywords: *Bacopa monnieri*, Microencapsulation, Neuroprotective Effect, Cognitive Function, Antioxidant Activity