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Neuroprotective Effect of Bacopa Monnieri in Scopolamine-induced Memory Impairment in Rats

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Objective & Aim: The present study aimed to investigate the neuroprotective and cognitive-enhancing effects of Bacopa monnieri extract in scopolamine-induced memory-impaired rats. The primary objective was to evaluate the potential of Bacopa monnieri to ameliorate memory deficits and oxidative stress caused by scopolamine administration, while the secondary objectives included assessing its effects on behavioral, biochemical, and histopathological parameters related to learning and memory, and comparing its efficacy with a standard nootropic drug.

Methods: Adult Wistar rats were divided into control, scopolamine-treated, standard (piracetam-treated), and *Bacopa monnieri* extract-treated groups. Memory impairment was induced by intraperitoneal injection of scopolamine (1 mg/kg). *Bacopa monnieri* extract was administered orally for 14 consecutive days. Cognitive performance was assessed using behavioral models such as the Morris water maze and passive avoidance tests. Biochemical estimations of acetylcholinesterase activity, malondialdehyde (MDA), superoxide dismutase (SOD), catalase (CAT), and glutathione (GSH) levels were conducted in brain homogenates. Histopathological examination of hippocampal tissue was performed to evaluate neuroprotective effects.

Results: Scopolamine administration significantly impaired learning and memory performance and increased oxidative stress markers in rat brains. Treatment with *Bacopa monnieri* extract markedly improved cognitive function, decreased acetylcholinesterase activity, and restored antioxidant enzyme levels toward normal values ($p < 0.05$). Histopathological findings revealed preservation of hippocampal neuronal integrity in treated groups compared to scopolamine controls.

Conclusion: *Bacopa monnieri* exhibits significant neuroprotective and cognition-enhancing effects against scopolamine-induced memory impairment, likely mediated through cholinergic modulation and antioxidant mechanisms. These findings support its traditional use as a nootropic and its potential therapeutic role in managing cognitive disorders such as Alzheimer's disease.

Keywords: *Bacopa monnieri*, scopolamine, memory impairment, neuroprotection, oxidative stress, acetylcholinesterase, cognitive enhancement, Alzheimer's disease

Biography1: Mr. Janni Prasanth Kumar is pursuing his M.Pharmacy in **the** Department of Pharmacology at *Sri Venkateswara College of Pharmacy*. His research focuses on neuropharmacology, particularly the role of herbal compounds in cognitive enhancement. His

study on the *Neuroprotective Effect of Bacopa Monnieri in Scopolamine-induced Memory Impairment in Rats*

Biography2: Ms. N. Rajeswari, M.Pharm (Pharmacology), is an Assistant Professor at Sri Venkateswara College of Pharmacy with over 6 years of academic and research experience. Her interests include experimental pharmacology, toxicology and herbal drug research, with a focus on integrating traditional medicine with modern therapeutics.

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