Assessment of Modified Citrus Pectin's Effects on Dementia in the Scopolamine-Induced Alzheimer's Model in Adult Male Wistar Rats

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Abstract

Modified citrus pectin (MCP) modulates galectin-3, a key player in neuroinflammation linked to Alzheimer's disease. By inhibiting galectin-3, MCP reduces the brain's inflammatory response and may alleviate cognitive decline. This study examines MCP's impact on neuroinflammation, cognitive function, and its role in galectin-3 inhibition in a dementia model. Male Wistar rats were assigned to four groups: control (n = 6), scopolamine (SCP) (n = 7), SCP + MCP (n = 7), and MCP only (n = 7). MCP was administered orally at 100 mg/kg/day via drinking water for six weeks. SCP was injected intraperitoneally at 1 mg/kg for seven days to induce an Alzheimer's-type dementia model. The researchers assessed cognitive performance through the Morris Water Maze (MWM) test. After behavioral tests, blood and brain tissues, including the hippocampus, were collected and stored at -80 °C for analysis. Immunohistochemistry was used to evaluate superoxide dismutase (SOD) activity, malondialdehyde (MDA) levels, brain-derived neurotrophic factor (BDNF), and inflammatory markers (IL-1β, IL-6, TNF-α, and galectin-3). The data were analyzed with SPSS 22. SCP treatment increased lipid peroxidation (MDA) and elevated inflammatory markers (TNF-α, IL-6, and galectin-3), while reducing BDNF and impairing

spatial memory. Co-administering MCP with SCP significantly reduced TNF-α, IL-6, and galectin-3 levels; increased BDNF; and improved memory performance. Although MCP did not lower MDA levels, it boosted SOD activity, suggesting antioxidant effects. Modified citrus pectin (MCP) alleviated cognitive impairments and reduced neuroinflammation in Alzheimer's-type dementia by inhibiting galectin-3. MCP also exhibited antioxidant potential, underscoring its therapeutic promise for neurodegenerative diseases.

Keywords: Alzheimer's; anti-inflammatory effect; antioxidant effect; dementia; galectin-3; modified citrus pectin.

Figures

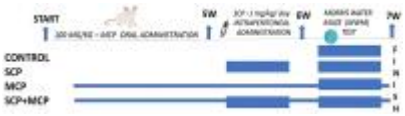

Figure 1 Experimental design.

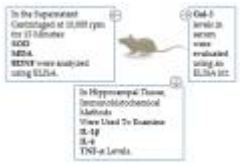

Figure 2 Representation of tests with a...

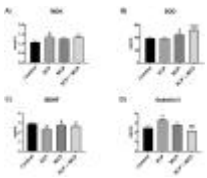

Figure 3 The changes in the hippocampal...

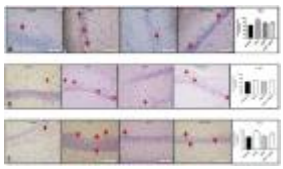

Figure 4 Representative immunohistochemical staining micrographs and…

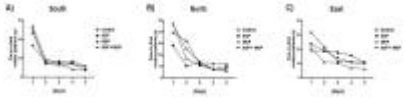

Figure 5 Morris water maze training days…

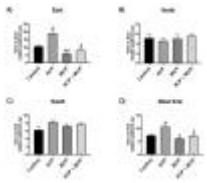

Figure 6 Morris water maze test results…

References

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