

Effect of Melatonin on cognitive function and BDNF factor and TNF-alpha in obese mice

Abstract

Background: Overweight and obesity are associated with an increased risk of developing dementia and cognitive deficits. Neuroinflammation is one of the most important mechanisms behind cognitive impairment in obese patients. In recent years, neuroendocrine hormone melatonin has been suggested to have therapeutic effects for memory decline in several neuropsychiatric and neurological conditions. However, the effects of melatonin on cognitive function under obesity conditions still needs to be clarified.

Aim: The purpose of this study was to determine whether melatonin treatment can improve cognitive impairment in obese mice.

Materials and Methods: To this end, male C57BL6 mice were treated with a high-fat diet (HFD) for 20 weeks to induce obesity. Animal received melatonin for 8 weeks. Cognitive functions were evaluated using the Y maze, object recognition test and the Morris water maze. We measured inflammatory cytokines including tumor necrosis factor (TNF)- α , interferon (IFN)- γ , and interleukin (IL)-17A, and brain-derived neurotrophic factor (BDNF) in the hippocampus of obese mice.

Results: Our results show that HFD-induced obesity significantly impaired working, spatial and recognition memory by increasing IFN- γ and IL-17A and decreasing BDNF levels in the hippocampus of mice. On the other hand, melatonin treatment effectively improved all cognitive impairments and reduced TNF- α , IFN- γ , and IL-17A and elevated BDNF levels in the hippocampus of obese mice.

Conclusion: Taken together, this study suggests that melatonin treatment could have a beneficial role in the treatment of cognitive impairment in obesity.

Keywords: Physical activity; Metabolic syndrome; Memory; Cognition; Hippocampus; Mice.