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Cannabidiol (CBD) improves cognition and decreases anxiety in the SAMP8 mouse model of Alzheimer's

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Abstract

Background: The use of cannabidiol (CBD) has grown rapidly over the last few years. CBD has been purported to work on a range of conditions, including anxiety, pain, and psychosis. There has been recent interest in CBD as a treatment for age-related cognitive disorders due to its antioxidant and anti-inflammatory properties.

Method: Here, we tested the effects of chronic CBD administration on learning and memory in the SAMP8 mouse model of Alzheimer's disease. SAMP8 mice develop an age-related impairment in learning and memory which corresponds to an increase in amyloid-β (Aβ), hyperphosphorylated tau, oxidative stress, impaired efflux of Aβ across the blood-brain barrier and neuroinflammation. SAMP8 mice starting at 11 months of age were treated with CBD (0, 3 or 30 mg/kg) daily via oral administration for 60 days. A 3 month old SAMP8 group receiving vehicle served as an unimpaired control. After 30 days of treatment, learning and memory (T-maze and novel object recognition), activity in open field, anxiety in the elevated plus maze, and strength were assessed. At the end of behavioral testing brains were collected for analysis.

Result: Mice which received CBD 30 mg/kg had significant improvement in learning and memory in the T-maze, taking fewer trials to reach criterion than 12 month old vehicle treated mice. CBD improved novel object recognition memory of 12 month old SAMP8 mice, which spent significantly more time with the novel object in the 24-hour retention test than the age-matched vehicle treated controls. While there was no difference in total distance traveled measured by open field activity, the mice that that received CBD displayed decreased anxiety at both 3 and 30 mg/kg/day doses compared to the age-matched control. The mice that received 3 mg/kg/day had significantly less anxiety than the young control group. CBD had no significant effects on the measures of strength in the aged mice. Analysis of brain tissue indicate that CBD significantly decreased markers of oxidative stress.

Conclusion: Our results indicate that CBD improves both spatial and recognition memory and decreases anxiety. The actions appear to be primarily through its antioxidant properties. CBD is a potential treatment for age-related dementia.