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Effects of cannabidiol (CBD) treatment in a mouse model of Alzheimer's disease through regulation of Interleukin-5

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Abstract

Background: With the rising prevalence as the main cause of dementia, Alzheimer's disease (AD) is emerging as one of the most important medical and social challenges for the healthcare system in both developed and developing countries. Despite significant advancement in our understanding of AD and improvement in therapeutic modalities for AD patients, however, there is currently a marked lack of definitive and effective treatment for AD. Therefore, there is an exigent need for an alternative therapy to treat the underlying causes of AD rather than its symptomatic effects. Cannabidiol (CBD) is a safe, non-psychoactive phytocannabinoid produced by cannabis plant. Increasing evidence from our laboratory and others suggests an immunomodulatory role for CBD in a variety of inflammatory conditions, potentially including neurodegenerative diseases such as AD. Recent evidence and studies have challenged the traditional view about the role of immune system in the pathogenesis of neuroinflammatory diseases specifically AD. There are several studies indicating that Interleukin (IL)-5, a Th2 type cytokine has the potential to alleviate the symptoms of cognitive decline in AD. Therefore, in this study we are investigating whether CBD can improve the symptoms of AD through activation of IL-5 signaling.

Method: Age matched normal (Wild type, WT) and 5XFAD (Mouse model for familial AD) were used to evaluate their cognitive function and anxiety by using Morris water maze and Open field behavioral tests. All animals were sacrificed, and their meninges, brain and blood were collected for further flowcytometry analysis, immunohistochemistry and immunofluorescence imaging.

Result: CBD was able to modulate the level of IL-5 expression which was associated with improvement in the behavioral and cognitive functions of AD mice.

Conclusion: Our findings suggest a possible alternative and therapeutic role for CBD in the treatment of AD. Further, these discoveries present evidence to support the beneficial role for IL-5 as a potential biomarker in the diagnosis and treatment of AD, opening a new horizon for research to find an effective therapeutic modality for AD.