Impact of Native Iranian Probiotic Mixture on the expression of Tau protein, Memory Impairment and Antioxidant Markers in a Beta-Amyloid-Induced Alzheimer's Rat Model

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Abstract

Background and Aim: Alzheimer's disease, a prevalent neurodegenerative disorder affecting the elderly, is characterized by the accumulation of amyloid-beta and tau proteins. Recent research suggests that a well-balanced microbiome, modulated by probiotics, may alleviate AD symptoms by enhancing antioxidant production and neutralizing reactive oxygen species in the gastrointestinal tract. This study examined the effects of a probiotic mixture containing Lactobacillus acidophilus, L. paracasei, L. rhamnosus, L. reuteri, L. coagulans, and Bifidobacterium longum on memory impairment and antioxidant levels in a rat model of Alzheimer's induced by beta-amyloid injection

Methods: Twenty-one rats were divided into three groups: control group, and two experimental groups in which Alzheimer's disease was induced by beta-amyloid injection into the CA1 region. One experimental group received probiotics for three weeks, while the other was given distilled water. The study involved conducting behavioral assessments such as the shuttle box and elevated plus maze tests. Additionally, ELISA analyses levels of antioxidant markers, and western blot was used to assess the Tau protein expression

Results: The results showed that beta-amyloid injection significantly decreased cognitive function, increased tau protein expression and MDA serum level, and decreased SOD activity. However, probiotic treatment significantly improved learning, reduced oxidative stress, and enhanced neuronal regeneration.

Conclusion: These findings suggest that indigenous Iranian probiotics can enhance cognitive function and mitigate AD symptoms through their antioxidant effects.

Keywords : AD, Iranian probiotics mixture, Tau protein, antioxidant