A Systematic Investigation Into the Efficacy of Withania somnifera on Mitigating Alzheimer's Disease Pathology: A Drosophila melanogaster Model

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Alzheimer’s disease (AD) is the 7th leading cause of death worldwide. It is characterized by the buildup of amyloid-ß plaques that trigger neuroinflammation and increase oxidative stress, causing impaired memory, depression, and more. Current treatments can incur fatal side effects like brain swelling, so new treatment options must be considered. This investigation determined the neuroprotective effects of Ashwagandha on Alzheimer’s disease pathology in a Drosophila melanogaster model. Ashwagandha, an adaptogen decreasing oxidative stress and neuroinflammation, could prevent the formation and proliferation of amyloid-ß plaques. Drosophila melanogaster was employed due to analogous nervous and digestive systems to humans. Previous studies suggest AD flies’ symptoms are shown by motor dysfunction. First, the optimal dosage of 20 mg/mL Ashwagandha was determined by conducting a longevity test on stock flies receiving various concentrations. Then, virgin flies of each genotype (elav-Gal4, UAS-Abeta 42, and w1118) were collected to establish crosses, resulting in six groups: elav x w1118, UAS x w1118, and AD flies which either received untreated or Ashwagandha-supplemented food. After pupa eclosed, the offspring were aged for ten days before conducting the climbing and flight assays. The results showcased that AD flies receiving Ashwagandha experienced a significant increase in motility and cognition, with a similar passing rate to control groups fed untreated food. Flies without AD also had enhanced motility and cognition when receiving Ashwagandha. These results suggest that Ashwagandha is a preventative treatment for AD, but further research is crucial to determine its effectiveness when factored with various genetic and health conditions.

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