The Effect of Dietary Phoenix dactylifera on Gut Microbial Composition and Memory in Drosophila melanogaster Expressing the Amyloid Precursor Protein (APP)

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This study aimed to investigate the impact of Phoenix dactylifera (dates) on the progression of Alzheimer's disease (AD) in Drosophila melanogaster. AD is a prevalent neurodegenerative disorder that causes memory loss. It is hypothesized that incorporating dates into the diet of genetically modified Drosophila (fruit flies) expressing the amyloid precursor protein (APP) would alleviate memory loss. The experimental design involved two tests. The first utilized four groups: wild-type and three APP-modified groups with 0%, 2%, and 4% date concentration diets. A T-maze with olfactory learning assessed the flies' memory retention, associating a positive reinforcement with a banana odor and a negative reinforcement with an electrical shock. Flies with the 4% date concentration had a P-value of .95 when compared to wild-type, showing adequate memory performance. The second part of the experiment separated flies into two wild-type groups, receiving 4% and 0% dietary date concentrations, and two APP-modified groups receiving 4% and 0% dietary date concentrations. Upon DNA extraction from midguts, PCR, and sequencing, the results showed that flies with AD 0% date had significantly more Proteobacteria, a phylum of bacteria that induce neuroinflammation. For the AD group with 4% date, the relative abundance of Proteobacteria decreased and the relative abundance of Firmicutes increased, a phylum of bacteria that reduces neuroinflammation. This shows that dates have a positive effect on the gut microbiome, and this could be what makes them beneficial for lowering the expression of AD.

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