Evaluating Behavioral Outcomes and Gut Microbiome Diversity in Drosophila melanogaster Following Exposure to Natural Versus Prescription ADHD Interventions

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Attention-deficit/hyperactivity disorder (ADHD) is routinely treated with pharmacological agents such as atomoxetine, yet the downstream effects of these medications on gut microbiome remain poorly characterized. Ginkgo biloba is viewed as a herbal alternative to ADHD medication however, current studies emphasize treatment for neurodegeneration, not neurodivergency. This study investigated whether the natural supplement Ginkgo biloba could improve ADHD-associated behaviors while preserving gut microbial health. A ELAV-GAL4 × UAS-DAT-RNAi cross of Drosophila melanogaster model was used to compare behavioral and gut microbe outcomes following exposure to atomoxetine, Ginkgo, and combination treatments. A 1% dilution of both remedies followed by three 1:10 dilutions respectively were prepared. 75% of Ginkgo biloba and 25% of atomoxetine was combined along with 50% of both solutions. Oxford Nanopore Technology was used to assess gut microbiome, a negative geotaxis assay was performed to assess motor function and aggression were assessed through videoing and observing boxing, lunging, wing flaps and approaching speed of male D. melanogaster. The results indicated that a 0.01% of Ginkgo biloba was most beneficial in improving locomotion, a one-way ANOVA identified (p-value 4.56×10-8 < 0.01 alpha), there is sufficient evidence to connect Ginkgo biloba as a possible treatment for ADHD through the observation of motor functions. This study provides novel experimental evidence linking ADHD to microbiome composition and demonstrates that Ginkgo biloba may serve as a microbiome-protectant. An analysis of the dopaminergic pathway after exposure to Ginkgo is necessary to further improve current medicine practices combining natural remedies with conventional pharmacological drugs.

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