

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 ($p\text{-value } 4.56 \times 10^{-8} < 0.01 \text{ alpha}$), 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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