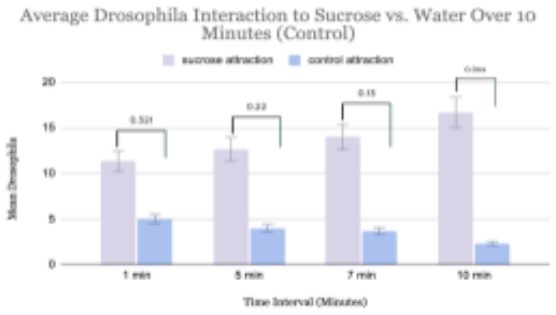
Analysis:

The purpose of conducting preliminary testing was to evaluate the effects of GABA deficiency on sensory and motor function in Drosophila and to assess the potential of Ashwagandha as a therapeutic intervention. By analyzing the flies' attraction to sucrose and their ability to perform negative geotaxis, we aimed to establish a behavioral model for catatonia-like symptoms and explore the impact of Ashwagandha supplementation on motor and sensory deficits.

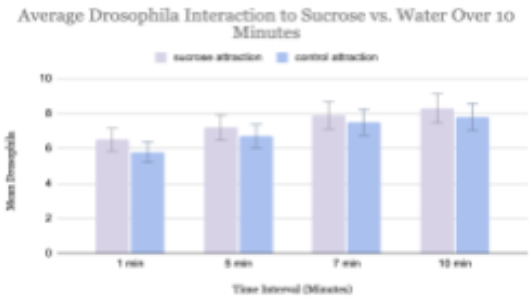
Chemosensory Assay

In the first graph, representing the chemosensory assay for wild type Drosophila (control group), the p-values at various time points (1 min: 0.321, 5 min: 0.22, 7 min: 0.13, 10 min: 0.064) were all greater than 0.05, indicating that there was no statistically significant difference in sucrose attraction across the time intervals. This result aligns with the expectation that the wild-type Drosophila, with normal GABA function, should not show notable changes in attraction under the experimental conditions. The lack of significant difference confirms the reliability of the control data and indicates that wild-type flies did not exhibit any abnormal chemosensory response during the assay.



Graph 1: This graph shows the average attraction of wild-type Drosophila to sucrose compared to water over a 10-minute period. As expected for the control group, Drosophila exhibited a stronger attraction to sucrose, demonstrating normal chemosensory behavior. The consistent attraction to sucrose over time indicates typical sensory processing, supporting the reliability of the control group in assessing Drosophila's natural response to sucrose.

In the second graph, which represents the chemosensory assay for Drosophila in the rdl gene (with reduced GABA levels), the ANOVA test yielded a p-value of 0.017 which is below 0.05, confirming

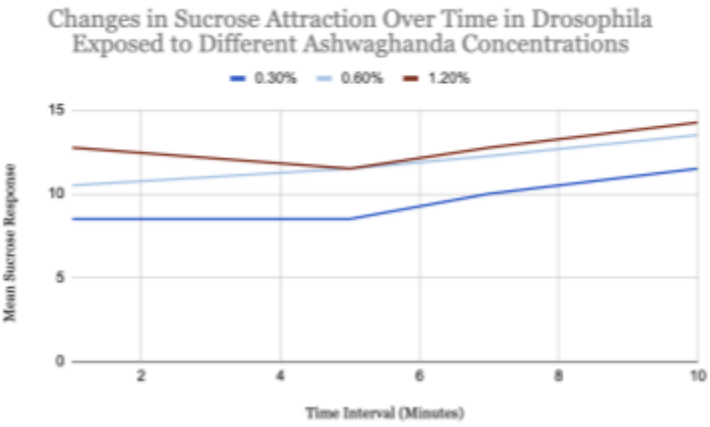


Graph 2: This graph shows the average attraction to sucrose versus water over a 10-minute period in Drosophila with a mutation in the rdl gene, leading to reduced GABA levels. Unlike the control group, these GABA-deficient flies exhibited a significantly decreased attraction to sucrose, indicating impaired sensory processing. The difference in attraction between sucrose and water highlights the sensory deficits caused by the GABA mutation, supporting the use of rdl mutant Drosophila as a model for studying catatonia-like symptoms.

that the differences observed in sucrose attraction across the groups were statistically significant. The significant result not only substantiates the hypothesis that GABA deficiency impacts sensory processing, but also reinforces the validity of using low GABA Drosophila as a model for catatonia. The observed impairment in sucrose attraction supports the idea that these flies exhibit sensory processing deficits which mirror the symptoms commonly seen in catatonia. This strengthens the case for using altered GABA Drosophila as a valuable model for understanding the sensory impairments related to GABA dysfunction, specifically in disease states like catatonia.

Time-Dependent Sucrose Attraction with Ashwagandha Supplementation

The line graph depicting the mean sucrose attraction response of Drosophila across different Ashwagandha concentrations is a crucial part of the chemosensory experiment. It evaluates how Ashwagandha supplementation might alter the chemosensory behavior of GABA-deficient flies. As the concentration of Ashwagandha increases, the graph shows an upward trend in the number of flies attracted to sucrose, suggesting that Ashwagandha positively impacts sensory function. This finding is particularly relevant as it implies that higher concentrations of Ashwagandha may help mitigate the sensory processing deficits typically observed in GABA-deficient Drosophila. The ANOVA test applied to this data confirmed that the differences in sucrose attraction across the varying concentrations of Ashwagandha were statistically significant (p-value < 0.05). This means that the observed increase in sucrose

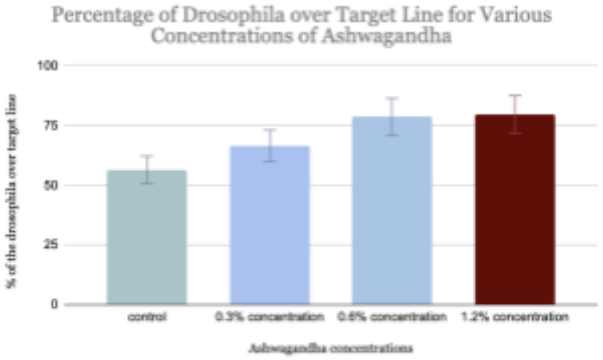


Graph 3: This line graph shows the change in sucrose attraction of Drosophila with the rdl mutation (low GABA) when exposed to different concentrations of Ashwagandha. The graph demonstrates an increasing trend in sucrose attraction as Ashwagandha concentration rises, indicating a potential improvement in sensory function and mitigation of catatonia-like symptoms in GABA-deficient flies.

attraction is not due to random chance, but rather a genuine effect of Ashwagandha on the sensory responses of the flies. These results support the idea that Ashwagandha supplementation can improve sensory deficits associated with GABA dysfunction, making it a potential therapeutic agent for catatonia-like symptoms caused by GABA deficiency.

Negative Geotaxis Assay

The second experiment assessed the motor function of Drosophila through the negative geotaxis assay, which measures their ability to climb past a set target line. The experiment compared different concentrations of Ashwagandha to determine its potential role in improving locomotion. The results show that higher concentrations of Ashwagandha appeared to improve the climbing ability of GABA-deficient Drosophila. The ANOVA test produced a **p-value of 0.0261**, which is below the standard significance threshold of 0.05, indicating a statistically significant effect. This suggests that Ashwagandha may have a positive impact on motor function, potentially mitigating the motor impairments associated with GABA deficiency. The data supports the hypothesis that Ashwagandha supplementation could help restore motor function in Drosophila with GABA-related dysfunction, offering further validation for using Ashwagandha as a potential therapeutic agent for motor impairments related to GABA deficiencies. The positive correlation between Ashwagandha concentration and motor performance strengthens the idea that Ashwagandha has a modulating effect on locomotor ability, reinforcing the importance of further investigation into its therapeutic potential for motor and sensory dysfunctions.



Graph 4: This is a bar graph representing the percentage of Drosophila with the rdl mutation (low GABA) that successfully crossed the target line in the negative geotaxis assay at different concentrations of Ashwagandha. The results show a trend of increased climbing ability with higher Ashwagandha concentrations, suggesting a potential improvement in motor function and alleviation of catatonia-like symptoms in GABA-deficient flies.