An Analysis of the Effects of Nicotine on Characteristics of the *Drosophila melanogaster*

BMED074

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Q1: Scientific Question

•In the scientific community, it is known that nicotine exposure in mammals such as rats leads to decreased survival rates and decreased adult weight (Clarke 1983). The found effects of nicotine on the development of the *Drosophila melanogaster* offered similar results (Velazquez-Ulloa 2017).

•**Guiding Questions:**

1) What are the effects of nicotine exposure in adult *Drosophila melanogaster* survival, locomotor ability, and mass?

2) Are the effects of nicotine exposure in *Drosophila melanogaster* similar to those described in other organisms?

•H_0: There is no correlation between nicotine exposure and decreased longevity, impaired locomotor activity, phenotypic changes, and decreased mass.

•H_a: There is a correlation between nicotine exposure and decreased longevity, impaired locomotor activity, phenotypic changes, and decreased mass.

Q2: Methodology

- 25 male and 25 female Wild-Type *Drosophila melanogaster* were placed in vials separate vials. In each of the 3 trails, there were 2 vials for each sex, one vial as the control standard and the other including the independent variable of nicotine infused medium.

•**Locomotor Ability:** A negative-geotaxis climbing assay was used. Each group of flies was observed climbing up a 20 cm tube and the percent of flies climbing past 10 cm within 10 sec was calculated.

•**Mass:** Each fly group was collected separately and weighed on an analytical balance at the end of the experiment to find the average weight of each type of fly.

•**Longevity:** The number of dead flies was counted every day (not including skipping days from weekends) and used to calculate the percent survival of the flies.

•Data collected was accessed for statistical significance using one-way ANOVA tests.

Negative Geotaxis Tube

Q3: Data Analysis & Results

Figure 6: Effect of nicotine on the phenotype of male flies.

Figure 2: Effect of nicotine on the phenotype of female flies.

Male Nicotine Average Weight	Male Control Average Weight	Female Nicotine Average Weight	Female Control Average Weight
3.5×10^{-4} g	8.5×10^{-4} g	3.5×10^{-4} g	1.15×10^{-3} g

Figure 5: Effect of nicotine on the mass of male and female flies.

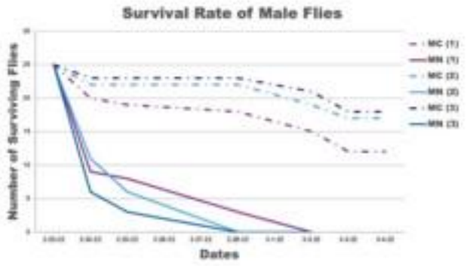

Figure 3: Effect of nicotine on the survival rate of male flies.

Figure 4: Effect of nicotine on the survival rate of female flies.

Q4: Interpretation & Conclusions

•Over the duration of the experiment, the survival rate of nicotine flies decreased at a higher rate than that of the control flies, the mass of the nicotine flies decreased significantly compared to that of the control flies, and a correlation between the nicotine exposure and impaired locomotor ability was found in females.

• These results matched nicotine's observed effect on other organisms.

•From these results, current scientific literature showcasing results such as these will be strengthened and used to provide more clarity about tobacco products including nicotine, especially less researched products like e-cigarettes.

•Mitigate poverty through the reduced usage of nicotine.

All graphs, diagrams, math calculations, and figures designed by student researcher.