

Death In The Air

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How does the
chemical pollution
from VOCs emitted
by indoor items
affect the lifespan
of humans?

-Question

When exposed to
VOCs emitted by
the citrus essential
oil, the *Drosophila*
lifespan will
decrease.

-Hypothesis

The Impact

Humans are a thriving species that continues to live longer and healthier than most other species. However, in recent years, there's been a reported decline in human lifespan. There are many contributors to this percentage, but one main factor is the increase in chemical pollution present in households, leading people to breathe harmful substances on a daily basis. My goal is to understand how these harmful chemicals contribute to human aging while also raise awareness and push for research into reducing VOCs so we can all lead healthier lives.

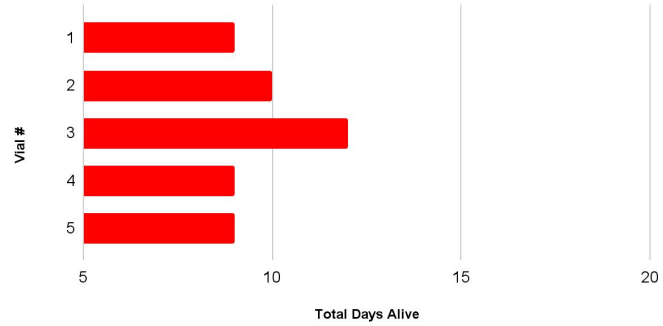
Variables & Constants

- The independent variable: the VOCs emitted by the citrus essential oil.
- The dependent variable: lifespan of the *Drosophila* .
- The control: *Drosophila* not exposed to the volatile chemical compounds emitted by essential oil.
- The constants are temperature fruit flies are kept in, conditions fruit flies are kept in, how much food each group of fruit flies gets, type of food fruit flies get, vial size, gender of fruit fly, age of fruit fly, same citrus oil for each test, and same amount of citrus oil for each test.

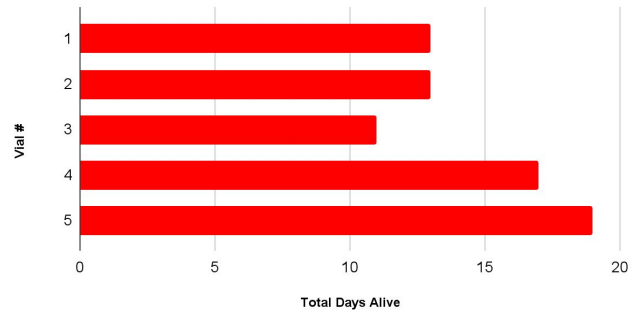
Data Analysis

Data was collected at the start and conclusion and it also reflected that fruit flies exposed to VOCs showed accelerated aging compared to those not exposed to the citrus oil. The average for experimental (9 days) and control groups (15 days) show a 6-day difference in mean- a 33% reduction in lifespan. When converted to human through Allometric scaling it is approximately 6 months decline in lifespan. The standard deviation for the experimental group is 1.3 days, while the standard deviation for the control group is 3.3 days showing that the data is highly consistent, but control has more variation. Since Vial C3 had human error that affected the data when removed from the data it shows a average lifespan decreased for fruit flies is 36.8% which converted to humans is 7 months decreased in lifespan. Overall, the data clearly show that fruit flies in environments with reduced VOC exposure outlived those in higher VOC conditions.

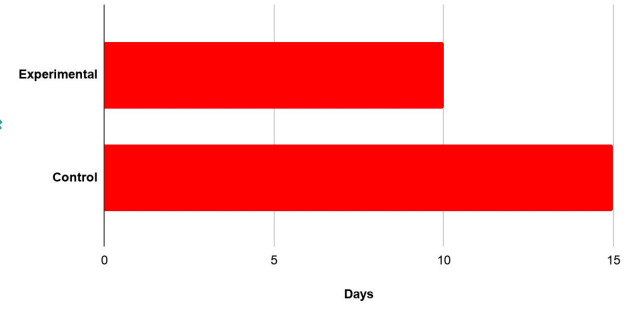
Experimental Lifespan



Control Lifespan



Average



Data

The experiment generally supports my hypothesis though one minor data inconsistency remains. The error was that vial C3 underperformed compared to vial E3, dying a day later than C3, which contradicts the hypothesis. This is due to human error as vial C3 flies died from drowning in runny media. To improve accuracy, increasing the number of fruit flies per vial would provide more reliable data. Lowering the temperature from 29 to 25 degrees Celsius would also create a more suitable environment for the flies in future trials. These changes can yield more accurate results about the risks of VOC to humans.

DISCUSSION

Conclusion

The data reflected that *Drosophila* that inhaled a higher amount of volatile chemical compounds died prematurely compared to the control group, which was subjected to a lower level of VOC. This trend supports the hypothesis, as it was predicted that VOC exposure would negatively impact lifespan. It was found that the fruit flies' overall average lifespan decreased by 33%. Similar levels of volatile chemical exposure could reduce human lifespan by an estimated 6 months when these rates are converted using Allometric Scaling.