



How Do Disinfecting Wipes Affect an Earthworm's (*Lumbricus terrestris*) Burrowing Behavior?

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Abstract

Disinfecting wipes are an effective and easy solution to kill germs from different types of surfaces that people use every day. While wipes mostly contain water they also contain cleaning agents such as detergents and antimicrobials as well as chemicals such as alkyl dimethyl benzyl ammonium chloride. These wipes can affect the skin of a human by causing dried out, red, itchy, or peeling skin. To determine the effects of disinfecting wipes, we put six worms on disinfecting wipes. After, we placed the worms in a dirt cup and timed how long it took for the worms to burrow and repeated the experiment with water-soaked paper towels. On average, the disinfecting wipes caused the worms to burrow 26 seconds slower than water. We should care about this experiment because it demonstrates how the chemicals dramatically affect worms. The harsh chemicals in disinfecting wipes are designed to be used with our bare hands, yet the worms are negatively affected by the liquid and become disoriented and greatly injured.

Introduction

Disinfecting wipes are an effective and easy solution to kill germs from different types of surfaces without causing harm to the skin. Wipes became popular when Mr. Clean Up and Clorox wipes were introduced to the public on July 4th of 2000. Before the 2000's wipes were for only extreme situations, but now wipes are used to clean anything from a toilet to a stove. While wipes mostly contain water they also contain cleaning agents such as detergents and antimicrobials. Alkyl dimethylbenzyl ammonium chloride and alkyl dimethylethylbenzyl ammonium chloride are examples of the dangerous chemicals that are found in disinfecting wipes. (Soto, 2019)

Our research question was 'how does disinfecting wipes affect an earthworms burrowing behavior.' We hypothesized that the wipes would make the worm burrow slower because the chemicals would hurt the worm by putting it in shock, causing it to get disoriented and burrow slower.

Materials and Methods

- I. Gather materials (Worms, Great Value Disinfecting Wipes, Paper Towel, Water, Stopwatch, Cup with Dirt, and a Beaker)
- II. Squeeze disinfecting wipe liquid into beaker
- III. Soak paper towels in disinfecting liquid and water
- IV. Fill a cup with dirt
- V. Place a worm on the paper towel soaked with water for a minute
- VI. Place a worm in the cup and start timing
- VII. When the worm burrows its head into the dirt, stop the timer
- VIII. Record data
- IX. Repeat the process 2 more times
- X. Repeat with 5 other worms and switch to the disinfecting wipe liquid and repeat
- XI. Analyze data by using the unpaired T-Test
- XII. Create a graph
- XIII. Make a conclusion

Results

In our experiment, we tested six worms with three trials each and averaged out the three trials. On average, the disinfecting wipes caused the worms to burrow 26 seconds slower than water. Our graph shows the average burrowing times of each of the worms and compares water vs. disinfecting wipes. An observation our group made was that the worms placed in the disinfecting wipe liquid would look and act disoriented for around 10-30 seconds.

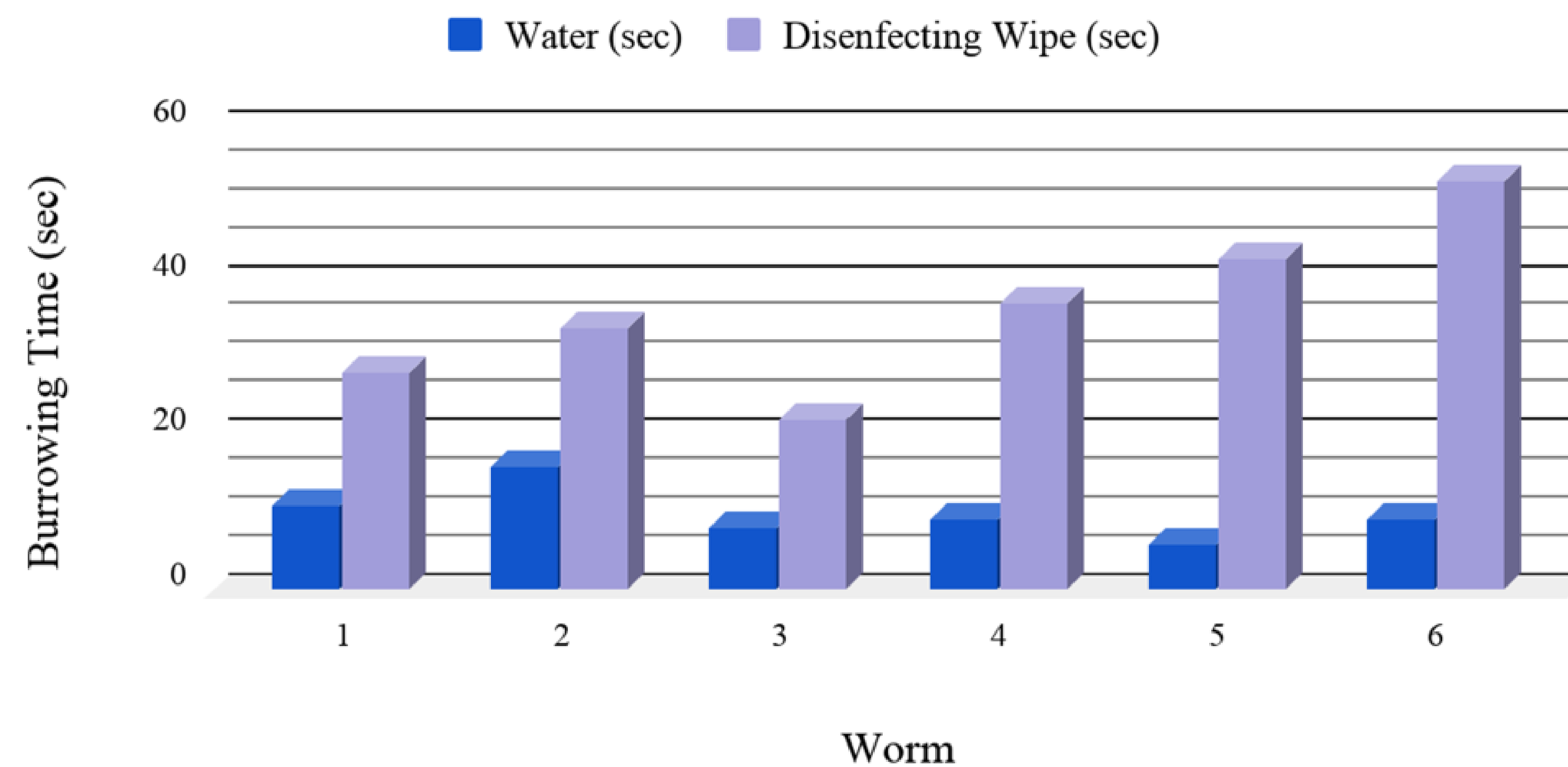
The independent variable in this experiment is the type of liquid our worm was placed in before the testing. The dependent variable was how long it took for the worm to bury its head under the soil. Variables we controlled were the brand of wipe we used, the amount of soil in the cup, the size of the water soaked paper towel, and the time of day. The independent variable affected the burrowing time significantly between the two liquids.

We used the unpaired T-Test to determine if our results were significant and not based on outside factors. In our T-Test, we got 0.001580774806, meaning our results were indeed significant.

Discussion

The experiment had significant results. On average, the disinfecting wipes caused the worms to burrow over 26 seconds slower than water. Our data does support our hypothesis because we thought that the disinfecting wipes would affect the worms burrowing behavior negatively. The disinfecting wipe did indeed cause worms to burrow slower in dirt than water. We did not get the results we expected because the chemicals affected the worm more than we thought. One limitation in the experiment was when we put the worm in the dirt it would sometimes run into the sides of the tub, most often when the worm was soaked in the wipe liquid. Another limitation was that we weren't able to put the worm in the same place in the dirt every time. We should care about this experiment because it demonstrates how the chemicals dramatically affect the worms burrowing time. The harsh chemicals in disinfecting wipes are designed to be used with our bare hands, yet the worms are negatively affected by the liquid and become disoriented. These experiments prove that disinfecting wipes can be dangerous and are only needed for extreme situations and not for everyday uses. A future research topic that could be researched is seeing how hand sanitizer affects worm burrowing time because it is another chemical solution that humans handle very often.

The Effect of Disinfecting Wipe Liquid on Earthworm Burrowing Times



Data Table

Worm	Water (sec)	Disinfecting Wipe (sec)
1	11	28
2	16	34
3	8	22
4	9	37
5	6	43
6	9	53
Average	10	36

Acknowledgements

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Works Cited

Soto, Pela. "Are Cleaning Wipes Safe?" *Cleaning Wipes*, National Capital Poison Center, 31 July 2019, www.poison.org/articles/are-cleaning-wipes-safe-192.