The Effects of Alcohol on Zebrafish Development

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ABSTRACT: *The purpose of the experiment was to understand how a certain chemical can cause a problem with the hatching rate of an organism. The approach was to study things that have been known to cause a problem on the embryos of human children. The key results of the effects of ethanol were not statistically significant to the problem that was originally planned to be answered. The environmental factors of an embryo will always proceed to show how the embryo will develop and live after it is hatched, and harmful chemicals will almost always cause a differential look than if an embryo was not exposed to the chemical.*

INTRODUCTION: This environmental toxicity experiment examined how the amount of ethanol will affect the growth rate and development of a zebrafish embryo. In the article "*Why Use Zebrafish to Study Human to Study Human Diseases?"* author Elizabeth Burke explained how humans can be studied through zebrafish. She explained that people can learn from fish better than patients' cells or tissue samples, because often experimenters need experimental animal models (year article was published).

This experiment was conducted to find out what happens to zebrafish when they are exposed to ethanol, a harmful chemical that is sometimes consumed by pregnant women, and how it relates to the way it would affect the development of human embryos. The hypothesis of this experiment was that the ethanol will cause stunted growth and that is because alcohol can kill brain cells and good nutrients in the body. It was also hypothesized that the higher the concentration of ethanol, the slower the embryos will develop.

MATERIALS AND METHODS:

Materials:

- 30, 100, 300 mM Ethanol
- Beaker for dead embryos and liquid disposal
- Sharpie
- Instant Ocean/Embryo Media Solution
- Disposable pipette 1mL
- Plate with wells
- 28.5C Incubator
- Depression slide with cover slip
- Zebrafish embryos from UW Milwaukee
- Dissecting and compound microscope

Methods:

- Day 1: Spawning tank was set up, and brine shrimp were feed.
- Day 2:
    - A. Obtain rinsed embryos from your teacher.
    - B. Labeled the Plates. (A1-A4, B1-B4, C1-C4)

C. Filled the wells with the right amount of solution for each.
D. Recorded the numbers of live embryos.

- Day 3:

A. Teacher took the well plate out of the incubator, and placed it onto the lab table.

B. Students grabbed materials needed and then replaced solution in all wells.
C. Students recorded the data needed, and put it into the data sheets.
D. Students put away the materials used, and cleaned up lab stations.

- Day 4:

A. Student's continued experiment one day longer than the other lab participants.
B. The zebrafish embryos were studied under the microscope.
C. The data was recorded.
D. Specimens were discarded.
E. Experiment was concluded.

RESULTS: The data recorded in the experiment did not show any significant statistical changes. It was recorded to show that the ethanol in this experiment will affect the development of zebrafish hatching. It is believed that ethanol will affect the development of the zebrafish embryos. The results recorded in this experiment supported the hypothesis because some of the zebrafish had developmental problems, like a curved spine. However, the results did not support the hypothesis by having more survive and be okay in the experimental groups than in the control group.

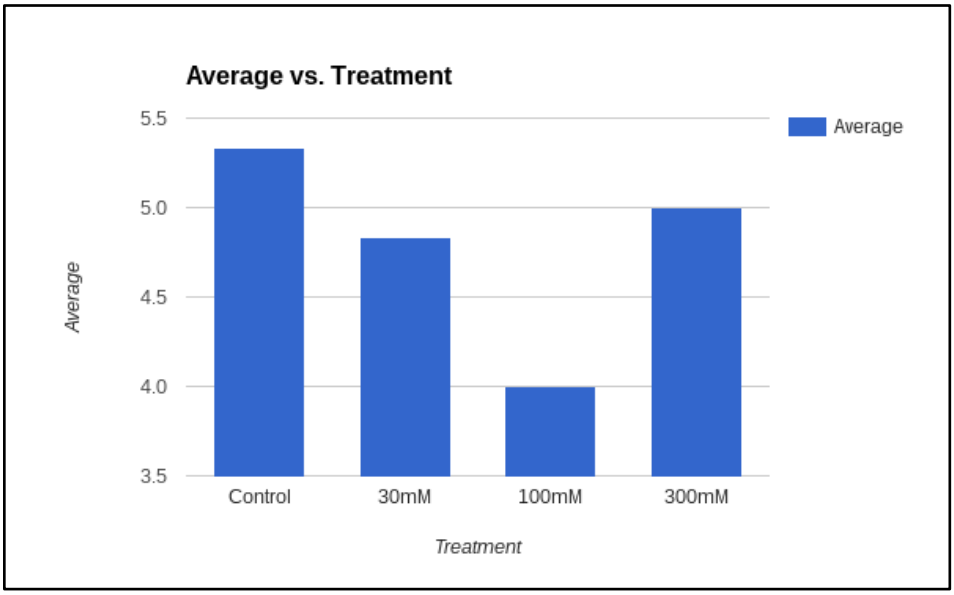
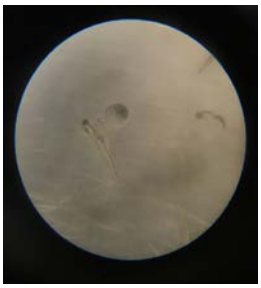


Table 1: Shows the amount of zebrafish that lived in each group, control or experimental, for the 72 hours recorded.



Picture 1: Shows a curved spine in 30mM Ethanol plate after 48 hours.

Picture 2: Shows the control group after 48 hours.

Treatment	Total Number of Starting Embryos	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Average	Probability	Result
Control	20	0	10	10	9	1	2	5.3	-	-
30mM	20	2	8	8	9	1	1	4.8	p =0.8466	not statistically significant
100mM	20	0	8	9	7	0	0	4.0	p =0.6279	not statistically significant
300mM	20	0	10	10	10	0	0	5.0	p = 0.9130	not statistically significant

Table 1: Indicates the amount of treatment, and shows progression of zebrafish embryos.

DISCUSSION: The results recorded were that zebrafish hatched and lived in the ethanol better than they lived in the control group. In the original hypothesis is was determined that the ethanol would slow down the growth of the zebrafish and the control would keep them strong. The reason they could have survived better is that by mistake the ethanol could have gotten in the control group. The results state that zebrafish in ethanol grow much better than they do in water. The results of this research is that in ethanol there can be defects development, like problems

with the spine. In further research this experiment would need to be repeated. Future experiments should change the concentration of fluids and change it up to really see what would happen to the zebrafish embryos in the next experiment.

REFERENCES: Common knowledge, information from the teacher, "*Why Use Zebrafish to Study Human to Study Human Diseases?" by* Elizabeth Burke, "*Using Model Organisms to Study Health and Disease"* by The National Institute of General Medical Sciences, "*Drinks like a fish: zebra fish (Danio rerio) as a behavior genetic model to study alcohol effects" by* Genetic Modifications: Tools for Studying Pharmacology and Behavior*, "Ethanol exposure alters zebrafish development: A novel model of fetal alcohol syndrome" by* The Use of Zebrafish (Danio Rerio) as a Model System in Neurobehavioral Toxicology, and "*Effects of Ethanol on the developing Zebrafish Embryo" by* Ms. Corado Koeppel