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Lab 4 Report

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**Data Indicates No Significant Difference in *Artemia salina* Activity Level in Varying Salt Concentrations**

**Abstract**

We hypothesized that *Artemia salina,* brine shrimp,will have higher activity levels in environments with higher salt concentration. The purpose of this study was to determine the effect of salinity on *Artemia salina* activity to better understand how the fishing industry can utilize salinity in respect to health and fitness of fish, specifically *Artemia salina* in this study. The significance of this study is to better understand environmental factors on fish because of the recent rise in ocean salinity due to global warming. The approach taken to the address the hypothesis included taking three day old *Artemia salina* and placing them in individual wells with varying salt concentrations (treatment levels were deionized water, 35 PPT ocean water, and 75 PPT). Each well included an average of 42 *Artemia salina*, and 5 minutes were given before measurements of activity level were taken. Three replicates of each treatment were taken and activity level was measured on a scale. The statistical analysis we used was an ANOVA and Tukey-Kramer test and the results were found to be not significant (p **≈** 0.113, α = 0.05) and this indicated that there was a no statistical difference between the means of different groups. The Tukey Kramer test found that there was no statistical difference between the groups as well. In conclusion this caused us to reject our alternative hypothesis and indicated that salinity levels does not impact activity level of *Artemia salina.*

**Methods**

The experiment conducted was testing the effect of salinity on *Artemia salina* activity level to better understand how global warming which has been increasing ocean salinity levels might affect *Artemia salina.* The first step was to place an average of 42 brine shrimp in a well plate and this was repeated for a total of nine wells. Then 5 ml of the respective treatment level was added to the wells and each treatment level (deionized water, 35 PPT ocean water, and 75 PPT) was added to total of nine wells. Then a drop of algae was added to each well for food supply just to make the level of energy available in the wells were constant, and five minutes were given before activity levels were measured. The activity level was measured on a scale of 1-4 (1 – dead, 2 – low activity, 3 – medium activity, 4 – high activity) and the measurements of activity level were measured by each group member and the score recorded was an average of all the measurements for that well. Activity levels were characterized by speed of movement and interactions with other fish. Then an ANOVA test was conducted on all groups and a threshold of α = 0.05. In addition, the Tukey-Kramer test was also ran to find significant differences between pairs of treatment groups and also had a similar threshold of α = 0.05.

**Results**

The overall findings of this study indicate that there is no significant difference in *Artemia salina* activity level and salinity level. An ANOVA and Tukey-Kramer test results were found to be not significant (p **≈** 0.113, α = 0.05) and no statistical differences between any of the treatment groups. Referring to Figure 1, the mean activity level for the deionized water treatment level was 2, 35 PPT was 3.33, and 75 PPT was 3.33 as well. (Figure 1)

**Discussion**

We hypothesized that the *Artemia salina* will have higher activity levels in environments with higher salt concentration, and based on the ANOVA and Tukey-Kramer test conducted we found that there was no significant difference in activity level of the brine shrimp. The p-value was 0.113 and was higher than the established alpha threshold value of 0.05. Thus, we rejected the alternative hypothesis and there was no significant difference between the treatment levels.

Similar studies have been conducted, and in specific a study conducted by the University of London found similar results to us in the fact that *Artemia salina* grown in brine solution (140% salinity) and those grown in sea water ~~did~~ had similar magnitudes of oxygen consumption. This corroborates the results of our study because oxygen consumption levels are a much more accurate and quantitative measure of activity level. This basically indicates that salinity does not play a real role in the physical fitness of brine shrimp and that it is not a factor that should be given much importance when growing or utilizing brine shrimp. This possibly may have been due to the fact that salinity did not have an impact on the brine fish’s circulatory system or the salinity did not impact the food intake of the brine fish which would have not impacted the energy availability internally of the fish. Another reason that could explain the results in the study that we conducted is that there was not enough time for the brine fish to experience the effects of the salinity or we did not wait long enough to observe the effects.

Further improvements that can be made to the study are to increase the number of replicates to increase the accuracy of the results and either utilizing image recognition software or measure oxygen consumption to get a more definite measure for the dependent variable rather than a subjective scale. Improvements to these areas can lead to more accurate result and better connected findings. Another reason for our results is that the scale was too small which might have lead to misleading results. However, this data is important because it provides insight into the behaviors of *Artemia salina* in response to different salinity levels. This is especially important now due to rising salinity levels in the sea due to global warming. So this study provides a useful insight into how salinity might affect aquatic life such as *Artemia salina.*

**Figures and Tables**

**Figure 1. Average Activity Level of *A. salina* Under Different Salinity Levels.** Plastic wells were filled with brine shrimp with varying treatment levels (deionized, 35 PPT, & 75 PPT), and activity levels were measured after 5 minutes. Then an ANOVA test was conducted and no significant difference was found between the groups (p **≈** 0.113, α = 0.05).

**References**

1. Gilchrist, B.M. Hydrobiologia (1956) 8: 54. https://doi.org/10.1007/BF00047481

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