

The Effects of Post-Vaporized Vape Fluid with Nicotine on Zebrafish Development

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ABSTRACT: *The purpose of this experiment was to determine the effects of nicotine (post vape) on developing zebrafish embryos. This experiment is important because it determines whether or not vaping fluid with nicotine is safe for a mother to inhale while pregnant. Everyday in this experiment the zebrafish embryos were taken out of the incubator and counted. Once the ratio of hatched/alive zebrafish was recorded, one fish was taken out of each variety of well and looked at under a microscope. The reaction time of the zebrafish was only tested on the last day of experimentation. The reaction time of the zebrafish was tested by inserting a pipet into the well and trying to agitate the zebrafish.*

INTRODUCTION: Zebrafish are typically freshwater fish in the minnow family. The name “zebrafish” comes from the blue horizontal stripes on each side of their bodies, an adult zebrafish can produce up to 300 eggs at a time every ten days. The scientific name for zebrafish is *Danio rerio*. Zebrafish share 70% of the same genes as humans. This experiment is part of the environmental health field of science. In the beginning of the experiment, it was hypothesized that the zebrafish affected by nicotine (post vape) will end up dying. Vaping fluid is the fluid that is warmed up and inhaled while vaping, vaping is dangerous because it’s the act of inhaling and exhaling aerosol as well as the small particles that are in nicotine. This experiment was done to provide evidence to determine if vaping while pregnant can put a mother and her babies’ health at risk. This is being tested on zebrafish by placing them in differing amounts of nicotine, it is hypothesized that the nicotine will put the health of the zebrafish at risk and has the potential to lead to deformations when the zebrafish hatch.

MATERIALS AND METHODS: The materials that were used during this experiment were disposable pipets, one 12- well plate, a beaker of clean embryo media solution, a beaker for dead embryo media solution, 28.5°C incubator. There was one bottle of vaping fluid with nicotine and flavoring post vape Low concentration, one bottle of vaping fluid with nicotine and flavoring post vape Medium concentration, one bottle of vaping fluid with nicotine and flavoring post vape High concentration, gloves, goggles, one compound microscope, one stereo microscope, one depression slide with coverslip.

The embryos arrived from UW- Milwaukee’s science education partnership award. Divided the embryos and were put into 5 wells and then filled each well with several ML of embryo media solution. Went through each well to discard any dead embryos. They were planned out the well plate by labeling each well plate and labeling the diagram on the data sheet. Replaced the embryo media solution with the solution was chosen. They were placed in the incubator that is at 28.5°C. After one day of treatment remove from the incubator. Replace the old solution for each well depending on it’s a control, low concentration vaping fluid with nicotine and flavoring post vape, medium concentration vaping fluid with nicotine and flavoring post vape, or high concentration vaping fluid with nicotine and flavoring post vape. Discard the dead embryos if there was any. Then get one or two embryos and put them on a depression slide and cover with the coverslip and observe the embryos under the compound microscope. Record the number of living embryos, and the number of embryos hatched. Then returning the well plate to the incubator.

REFERENCES:

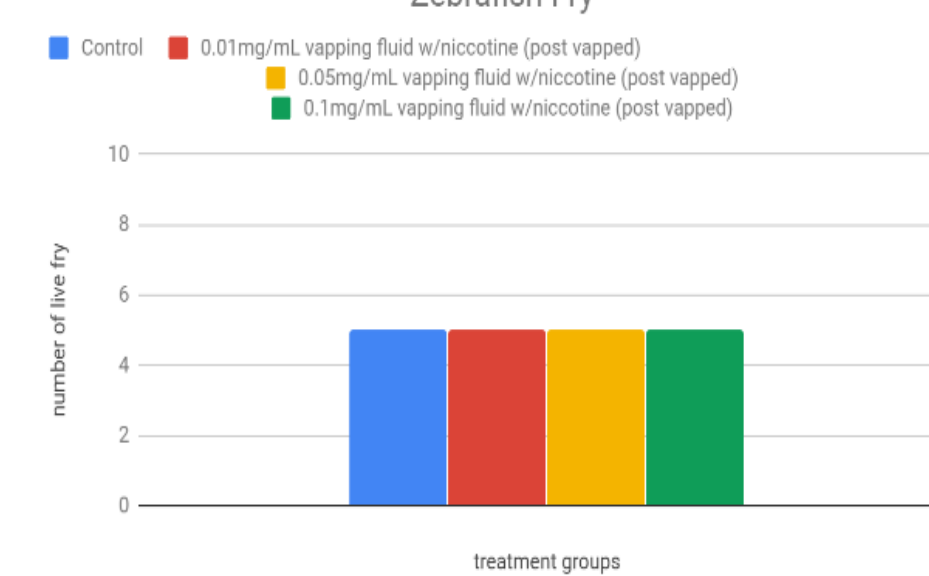
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RESULTS: This experiment was conducted to show the effects of nicotine on a developing embryo. It was hypothesized that the zebrafish exposed to varying amounts of nicotine (post vape) would all die. The independent variable was the different amounts of nicotine (post vape) added to the wells containing zebrafish embryos. The dependant variable was the mortality rate of the zebrafish. In all of the wells it was discovered that 100% of the zebrafish lived. Not only that, but all of them hatched too. These results did not support the hypothesis, in fact, the results yielded are the exact opposite outcome than what was expected.

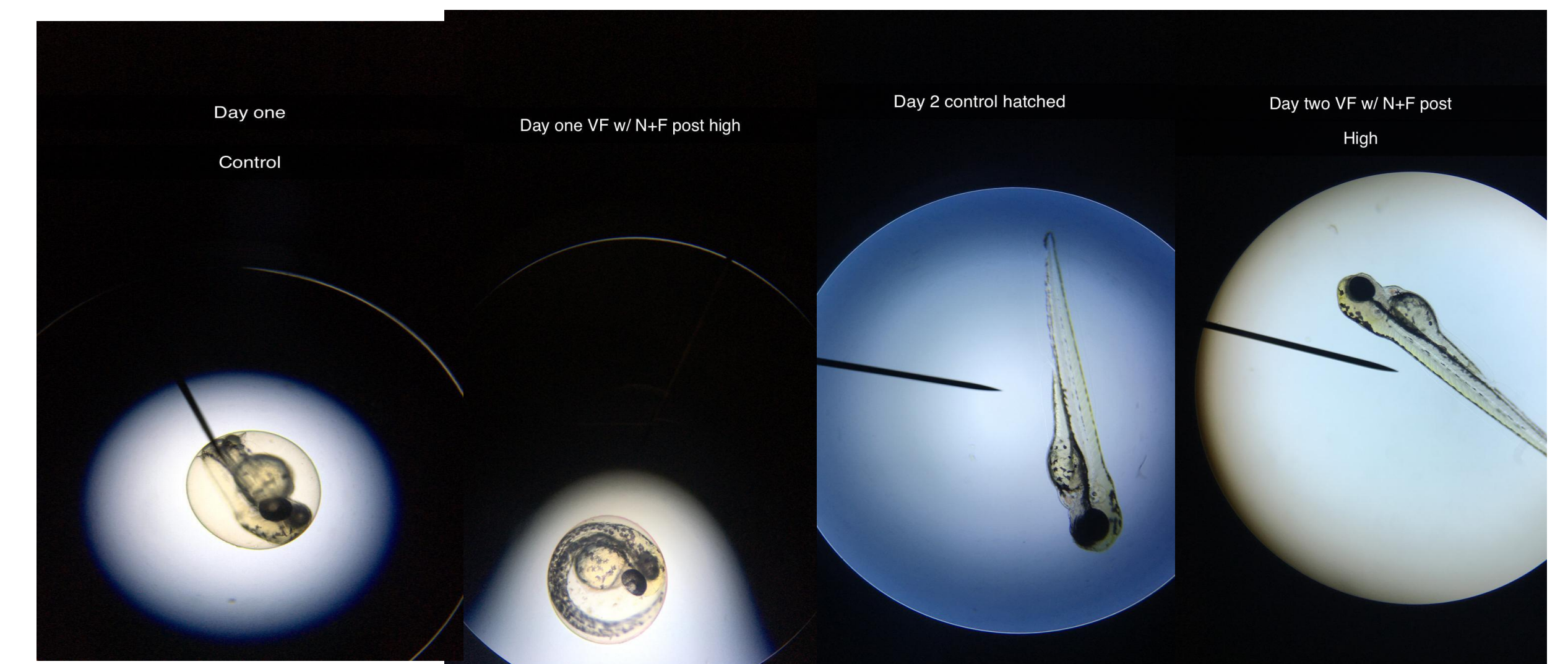
Table 1: This chart shows the number of living zebrafish on the last day of the experiment correlating with the different treatment groups. Additionally, this chart is exactly the same as a chart that shows the number of hatched zebrafish on the last day of the experiment.

Treatment	Well 1	Well 2	Well 3	Average
control	5	5	5	5
0.01mg/ml vaping fluid w/nicotine (post vaped)	5	5	5	5
0.05mg/ml vaping fluid w/nicotine (post vaped)	5	5	5	5
0.1mg/ml vaping fluid w/nicotine (post vaped)	5	5	5	5

The Effects of Nicotine (Post Vape) On The Mortality Rate of Zebrafish Fry



Graph 1: This graph shows the effects of nicotine (post vape) on the mortality rate of zebrafish fry. Additionally, all of the alive zebrafish hatched on the last day of the experiment.



DISCUSSION: In this experiment, the effect of nicotine and vaping fluid on developing zebrafish embryos was tested. With all three concentrations of the vape fluid with nicotine and flavoring (post vape) none of them died, but there were three with curved spines. Considering the three defects were in the control, low, and medium wells, it is believed that the defects have nothing to do with the different amounts of nicotine, more research is needed. The reaction time of the zebrafish was measured by inserting a pipet into the well to agitate the zebrafish, it was discovered that the control, low, and medium concentration wells had very similar reaction times, the high concentration well, however, had a slightly slower reaction time.

The hypothesis was that all of the zebrafish that were exposed to the nicotine (post vape) added to the wells would die. The results of the experiment did not support the hypothesis. All of the zebrafish survived however, the reaction time of the zebrafish in the high concentration nicotine (post vape) well was slightly slower than that of the other wells. The three deformed fish may have been deformed due to rough transportation to and from the microscope. The results yielded from this experiment show that the effects of a mother vaping while pregnant on her child are little to none. These results are relevant because of the recent influx in amount of people vaping. More zebrafish need to be used as in this experiment there were only five embryos per well which is not nearly enough to come to any sort of conclusion of the effects of nicotine (post vape) on a developing embryo.