Effect of Soda and Water on Heart Rate in High School Freshman


Abstract

In our study my group tested the hypothesis that soda has more of an effect than water when it comes to raising a person's heart rate. We tested 10 students in Freshman Honors Biology, during the afternoon. One day we tested and recorded "normal" heart rates. The next day we gave each student a cup of caffeinated Coca-Cola and measured their heart rates. Thirdly, we had each student drink water and recorded their heart rates. Both measurements were taken after 15 minutes of drinking the beverage. We compared the BPM (beats per minute) of each student after they drank both beverages to see if there was a difference between the number of heart beats. We found no significant differences between the heart rates after drinking both soda and water, respectively. Our findings are not consistent with recent studies that indicate that there are increases in a person's heart rate after drinking soda. (Nawrot, P., S. Jordan, J. Eastwood, J. Rotstein, A. Hugenholtz, and M. Feeley, "Effects of Caffeine on Human Health."). Further studies that include caffeinated beverages and health should be explored in more depth.

Introduction

For many decades, there has been a perceived theory that caffeinated beverages, like soda, increase a person's heart significantly and should be avoided. In addition, water has been perceived as the opposite and it is theorized that water has little to do with an increase to a person's heart rate. In fact, in our conduction heart-rate was not affected by either beverage.
Homeostasis was implicated to show that the energy used to preserve a constant regulated condition within our test subjects was intensified- in order to average out the necessary liquids in their bodies. In recent conductions of heart rate and beverages, beverages that are more caffeinated appear to raise heart rates more than beverages that don't have caffeine (Nawrot, P., S. Jordan, J. Eastwood, J. Rotstein, A. Hugenholtz, and M. Feeley. "Effects of Caffeine on Human Health." Food Additives and Contaminates 20.1(2003):1-30. http://www.tandfonline.com/doi/abs/10.1080/0265203021000007840,Web.19 Sept.2012).

Researchers and doctors that suggest that caffeinated beverages are bad for your health, help shape our beliefs and therefore, our society believes that caffeinated drinks should be avoided or rarely consumed. Although these statements may not be valid, people form a bias to the idea that their health may be poorly impacted by drinking these beverages.

In our experiment, the group looked at the different heart rates of students based upon drinking a caffeinated beverage, Coca-Cola, and then drinking water. Our hypothesis was that Coca-Cola has more of an effect on raising a person's heart rate than water. Since there are more studies that show that caffeine raises heart rate versus water, we expected to find similar results.

**Material and Methods**

Our experiment was conducted in a Freshman Biology class at Reed High School in Sparks, Nevada. The student participants were between the ages of fourteen and fifteen years old. The beverages were administered at 12:52pm until 1:42pm in the first week of September, 2014. Our freshman class was tested with different types of beverages to determine if heart rate was impacted.
At the beginning of the Biology class, the ten students were assigned an order and were timed every minute to start. Then they were asked to wait fifteen minutes until the beverages had taken effect. After the fifteen minutes, the students had their pulse taken. After completing the experiment, we recorded the results for each drink. We measured the averages for each beverage as well as calculated the standard deviations. We used these findings to see if there were independent averages and equal variance.

Results

**Heart Rates of Students after consuming soda and water (TABLE):**

<table>
<thead>
<tr>
<th>BPM (Beats per minute)</th>
<th>Soda</th>
<th>Water</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>80</td>
<td>85.2</td>
<td>78.8</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>12.52</td>
<td>13.27</td>
<td>13.63</td>
</tr>
<tr>
<td>1SD + Average</td>
<td>92.52</td>
<td>98.47</td>
<td>92.43</td>
</tr>
<tr>
<td>1SD – Average</td>
<td>67.48</td>
<td>71.93</td>
<td>65.17</td>
</tr>
<tr>
<td>2SD + Average</td>
<td>105.04</td>
<td>111.74</td>
<td>106.06</td>
</tr>
<tr>
<td>2SD - Average</td>
<td>54.96</td>
<td>58.66</td>
<td>51.54</td>
</tr>
<tr>
<td>2SD</td>
<td>25.04</td>
<td>26.54</td>
<td>27.26</td>
</tr>
</tbody>
</table>
Heart Rates of Students after consuming soda and water (GRAPH):

The group calculated the average number of heart beats for both soda and water (see below table). The average for normal heart-rate was 78.8(BPM), the average number of heart beats after drinking the soda was 80(BPM), the average heart beats after drinking the water was 85.2(BPM). The standard deviations were 13.63(BPM) for normal heart-rate, 12.52(BPM) for the soda, and 13.27(BPM) for the water. We found that there was no significant differences in heart rate for soda nor water- since the average for soda plus one standard deviation was larger than the average for water minus one standard deviation.

Discussion

Our results failed to support our hypothesis. Our hypothesis was that soda would raise heart rate more than water. We saw no direct correlation between heart rate and drinking caffeinated beverages or water.
There were several abnormalities that could have influenced our results. For starters, there were more female students than male students. Our results indicated that gender did not seem to have an impact. We also allowed the student participants to take their own pulse. This eliminated the possibility that the group could have inaccurately counted their heartbeats. This as well did not alter the outcome of our results. Finally, the amount of each beverage could have impacted our results. The group did not believe that any of the above variables had a substantial influence on our results of the experiment.

These results are not consistent with recent research since it shows that caffeinated beverages raise your heart rate more than water. Homeostasis is the process to regulate internal conditions so, we believe that homeostasis could have regulated heart rate as the students drank their beverages. We are confident that our results can disprove that caffeinated drinks raise heart rate more than water, and instead, conclude that caffeinated drinks, like soda, have no effect on raising heart rate no more than water. Rather, that liquids in general raise a person’s heart-rate – since the average necessary liquids in their bodies help level the amount of solutes in the blood.

Our study only focused on soda and not other caffeinated beverages, such as coffee. Follow-up studies that look at other caffeinated drinks may show alternative results. This may contribute to a better understanding of caffeinated beverages and their impact on heart rate. The results also conclude that if similar studies were done in other age groups, it might show caffeinated beverages do increase heart rate compared to water. Finally, we strongly assert that the amount of evidence that dictates that beverages containing caffeine raises heart-rate and that a person's health is adversely affected may not be entirely true - due to the findings from our experiment, that showed that either beverage had a significant difference on an individual's heart-rate. Further, more conclusive, research and experiments with different age groups and
other various factors, may need to be conducted to link caffeine as the primary root cause to an increase in heart rate and the correlation to poor health.

**Literature cited**
