Impacts of Caffeine on Heart Rate

/ 5 My expectations for the title:
Your paper must have a title that provides the reader with the main idea or major result of your investigation.

Introduction and Hypothesis
The purpose of this lab was to determine the effect of caffeine on heart rate. Caffeine is a known stimulant (Vander et al 1993) that acts on the central nervous system. Actions of stimulants include increases in metabolism, ventilation (breathing), and cardiovascular function. Increases in cardiovascular function can be partially measured through heart rate.

The standing hypothesis of this project was that the subjects’ heart rate will be higher after caffeine ingestion in both supine and standing positions that a heart rate recorded prior to caffeine ingestion.

/ 5 My expectations for the introduction and hypothesis:
/ 10 The introduction establishes a detailed context for the investigation, and then links the investigation to known scientific knowledge. The introduction tells the reader why the research question matters. The introduction provides the reader with enough background to understand the context of the investigation. Normally, this would include lots of references to know facts or publications on the topic, using (Author, and year of publication) format. For this class, I expect you to summarize what you have learned from your textbook on the topics covered in your lab report.

/ 5 The hypothesis states the predicted outcome of the experiment. Student should form a question or hypothesis that can be investigated through collection and analysis of relevant empirical data and generally points toward a broader understanding of existing scientific relationships (e.g. interaction, dependency, correlation, causation.)

Methods:

One subject was used for this experiment. The subject (ST) was a 26-year-old male without any known medical or cardiovascular abnormalities.

The subject was brought into the lab at seven am on two different occasions. In both instances, heart rate was recorded in a supine and standing position. The supine measurement was taken after five minutes of normalization time. The standing measurement was taken after two minutes of normalization time.
Heart rate was recorded with a “polar accurex II” heart rate monitor. Heart rate was taken every twenty seconds during the test minute, with the reported rate as an average.

Prior to both testing sessions, the subject was instructed to fast for twelve hours prior to the test. The second session the subject was instructed to ingest two cups of brewed coffee one hour before testing time (7 a.m.).

**My expectations for the methods:**

_/ 10 The methods presents an experimental design that “should” provide data of adequate quality and quantity to address the question or hypothesis and to investigate possible relationships.

_/ 5 The methods is descriptive in nature and written in narrative form (third person, past tense.) The methods identifies, controls, and monitors relevant variables and describes a systematic investigative process that is clear and replicable.

**Results:**

<table>
<thead>
<tr>
<th>Heart Rate: Control</th>
<th>Heart Rate: Coffee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine 42 bpm</td>
<td>Supine: 56</td>
</tr>
<tr>
<td>Standing 53 bpm</td>
<td>Standing: 68</td>
</tr>
</tbody>
</table>

**My expectations for the results:**

_/ 5 Accurate raw data has been collected and recorded using appropriate units with quality and quantity consistent with the designed procedure.

_/ 5 Data has been displayed in a manner that utilizes formats that clarify and highlight relationships to be analyzed and explained

**Conclusion**

As hypothesized, we observed an increase in resting heart rate in both a standing and supine position in the subject. The change in heart rate from supine to standing was similar in both the control and experimental trials. However, the experimental trial showed an initial and final heart rate higher than the control. During the 2nd trial, caffeine ingestion occurred 1.5 hours prior to testing. This time was used to maximize the difference. It has been shown that peak blood caffeine content takes place 1.5 hours post-ingestion (Wilmore & Costill 1995).
Although much care was taken to eliminate any possible nutritional interaction and bias, the trials could be affected by the wake cycle of the subject between trial one and two. During trial two, the subject was required to wake up 1.5 hours earlier than the initial. This could have impacted the data. To eliminate this variable, the wake time should be the same for both trials, with water ingested prior to the control trial.

Care should also be taken to insure similar resting/sleep patterns prior to testing. If the subject slept for only 4 hours compared to 10 for example, the data could be skewed. Care should be made to keep the two trials as similar as possible exempting the independent variable. For example, did the subject follow the same transportation pattern for each trial? Problems could arise if the subject drove to the testing facility one morning and rode a bicycle the second time. For greater validity more subjects should be used, with a variety of gender, age, and fitness.

My expectations for the Conclusions:

___/ 5 The conclusions draws a valid conclusion that addresses the hypothesis, identifies relationships in the data, and explicitly explains how the conclusion is supported by the data.

___/ 5 The conclusion uses the results to analyze and critique the design and procedures providing any relevant sources of uncertainties and discusses how these might have affected the results.

___/ 5 The conclusions communicates the findings using relevant terminology to report results, explain possible patterns within the data, and if needed justifies alternate reasonable explanations. The conclusion may also suggest insightful improvements, revisions or extensions.