Effects Of Caffeine On Blood Lactate During Submaximal Exercise In Women

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Abstract

The specific purpose of this research study was to ask the question does a pre-exercise caffeine supplementation increase heart rate, blood pressure, distance traveled and post-exercise blood lactate levels during a submaximal exercise bout while decreasing the overall rate of perceived exertion in a moderately trained individual.

Methods

Five women participants, ages 18-30 years old, volunteered for the study. All participants were considered to be in a healthy condition who could finish a 30-minute submaximal exercise bout on a cycle ergometer.

Two pre-exercise supplements pills, NoDoz and Tylenol, were used for this study. The purpose of the NoDoz supplement was to provide 200 mg of caffeine to boost performance during exercise. The Tylenol contained no caffeine and acted as a placebo.

Height, weight, body fat percentage, resting heart rate, resting blood pressure, and resting blood lactate were taken prior to administering supplementation. After subject took their designated supplement, a period of 30 minutes was taken before exercise was started so each supplement had time to reach full effect.

The control group ingested the Tylenol pill containing no caffeine and the experimental group ingested the caffeine supplement containing 200 mg of caffeine.

RESULTS

Upon completion of exercise, a final blood lactate was taken from each subject.

Heart rate, rate of perceived exertion, and blood pressure were measured every 10 mins during exercise until completion of the 30 minute bout.

The results of the from both sessions were compared for both experimental and control groups.

Table 1: Subject Data

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Mean</th>
<th>SD</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>167.1</td>
<td>±11.4</td>
<td>182.88</td>
<td>157.48</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.7</td>
<td>±5.2</td>
<td>70</td>
<td>58.06</td>
</tr>
<tr>
<td>Age (years)</td>
<td>23.2</td>
<td>±2.2</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Body Fat Percentage</td>
<td>24.2%</td>
<td>±0.4</td>
<td>28.30%</td>
<td>18%</td>
</tr>
<tr>
<td>Fat Free Mass (lbs)</td>
<td>49.6</td>
<td>±1.8</td>
<td>51.94</td>
<td>47.51</td>
</tr>
<tr>
<td>Fat Mass (lbs)</td>
<td>16.1</td>
<td>±3.9</td>
<td>19.7</td>
<td>10.45</td>
</tr>
<tr>
<td>Resting Heart Rate (bpm)</td>
<td>76.5</td>
<td>±9.1</td>
<td>94</td>
<td>62</td>
</tr>
<tr>
<td>Pre-exercise Blood Lactate (mmol/L)</td>
<td>1.5</td>
<td>±0.5</td>
<td>2.4</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Discussion/Conclusions

A dependent t-test analysis using repeated measures indicated that there was no significant change in comparison to both group’s blood lactate after 30 minutes of submaximal aerobic exercise.

Overall, the pre-exercise blood lactate was slightly higher in the control group, however, the post-exercise blood lactate was higher in the experimental group given that fact that the overall RPE was decreased for those exercising with the caffeine supplement compared to the placebo supplement.

Heart rate was higher in the experimental group at the minutes 10, 20, and 30.

Rate of perceived exertion was slightly higher in the experimental group at minute 10, but was lower at minutes 20 and 30 compared to the control group.

Total distance traveled was slightly higher in experimental group compared to control group.

Systolic blood pressure was also higher at minutes 10, 20, and 30 in experimental group compared to control group. As predicted, total distance traveled, heart rate, systolic blood pressure, and post-exercise blood lactate levels were higher while rate of perceived exertion was lower in experimental group.

Figure 2: Total Distance Traveled

Figure 1: Comparing Resting Blood Lactate Levels To Blood Lactate Levels After 30 Minutes of Submaximal Exercise