A Comparison In Physiological Responses Between Cycle Ergometer And Elliptical Submaximal Exercise

Abstract

The specific purpose of this research was to determine if there were any physiological differences in cycle ergometer and elliptical submaximal exercises in terms of oxygen consumption, fat and carbohydrate metabolism, blood lactate production, and the amount of kilocalories metabolized.

Purpose

The specific purpose of this research was to determine if there were any physiological differences in cycle ergometer and elliptical submaximal exercises in terms of oxygen consumption, fat and carbohydrate metabolism, blood lactate production, and the amount of kilocalories metabolized.

Methods

- Subjects
  - All males
  - Moderately active (at least 150 minutes of cardiovascular exercise per week)
  - English-speaking
  - College-age students
- Instrumentation
  - Polar FT1 heart rate monitor
  - Accutrend Lactate Analyzer
- Blood Lactate
  - Resting, 10th, 20th, and 30th minute BLA recorded for each session
- Parvo Medics True Once 2400 Metabolic Measurement System
- Oxygen Consumption (VO2)
- Respiratory Exchange Ratio (RER)
- Kilocalories (Kcal)
- Measured in increments of 5 minutes

Methods (cont’d)

- Randomly assigned to:
  - Cycle Ergometer
  - Sport Excalibur
  - 30-minute submaximal exercise
  - 50 RPM
  - 50 W, 25 W added every minute
  - 50-60% Heart rate reserve
- Elliptical
  - Precor EFX
  - 30-minute submaximal exercise
  - 8% Grade cross ramp
  - 120 RPM
  - Resistance increased by 4 levels every minute
  - 50-60% Heart rate reserve

Results

Table 1: Subject Data

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>Height (m)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.02</td>
<td>1.75</td>
<td>70.3</td>
</tr>
<tr>
<td>17.02</td>
<td>1.75</td>
<td>68.0</td>
</tr>
<tr>
<td>17.02</td>
<td>1.75</td>
<td>69.0</td>
</tr>
<tr>
<td>17.02</td>
<td>1.75</td>
<td>71.0</td>
</tr>
<tr>
<td>17.02</td>
<td>1.75</td>
<td>70.0</td>
</tr>
</tbody>
</table>

- VO2 (ml/kg/min)
  - Cycle Ergometer: Mean = 0.94, SD = 0.02
  - Elliptical: Mean = 0.90, SD = 0.02
- V O2 (ml/kg/min) recorded for each session
- 1960.02
- 1.24 ml/kg/min with no significant difference found (p = 0.713).
- The kilocalories used by the subjects during the cycle ergometer was 280 ± 3.1 kcal and for the elliptical was 275.6 ± 48.9 kcal. This difference was not significant (p = 0.820).

- RER
  - Cycle Ergometer: Mean = 0.94, SD = 0.02
  - Elliptical: Mean = 0.90, SD = 0.02
- RER recorded for each session
- 1960.02
- The difference was not significant (p = .076).

- Blood Lactate
  - Cycle Ergometer: Mean = 0.94, SD = 0.02
  - Elliptical: Mean = 0.82, SD = 0.03
- Blood lactates were measured during the first minute of rest, and at the 10th, 20th, and 30th minute of submaximal exercise.

Discussion/Conclusions

The findings in the present study indicate that there was not a significant difference between the four variables (RER, VO2, kcals, and blood lactate) during a submaximal exercise on a cycle ergometer and an elliptical. Although there is a small amount of data, it appears that the cycle ergometer and the elliptical will conduct similar physiological responses during a 30-minute submaximal exercise at an intensity of 50-60% of heart rate reserve.

References