COMPARISON OF GLUTEAL MUSCLE ELECTROMYOGRAPHIC ACTIVITY ACROSS FIVE CARDIOVASCULAR EXERCISES IN HEALTHY YOUNG ADULTS

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Methods (Continued)

Introduction
Enhanced understanding of how muscle demands vary across cardiovascular exercises is essential for optimizing treatment and fitness interventions. Previous studies have investigated gluteal muscle function at.

Methods
Ten healthy adults (6 males, 4 females) with no known musculoskeletal or neurological disorders participated.

Table 1. Subject Characteristics (Mean ± SD)

<table>
<thead>
<tr>
<th></th>
<th>Age (yr)</th>
<th>Height (cm)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>25.1 ± 5.3</td>
<td>1.73 ± 0.1</td>
<td>74.0 ± 16.1</td>
</tr>
</tbody>
</table>

Instrumentation

Life Fitness™ Exercise Equipment
- Treadmill 97Ti
- Elliptical Cross-Trainer 95Xi
- Stairclimber 955Si
- Recumbent Bike 95Ri

Electromyography (MA-300, Motion Lab Systems)
- Fine-wire indwelling EMG electrodes
- 1200 Hz

Kinematics (Motion Analysis)
- 8 Eagle Digital cameras
- 60 Hz

Foot-Floor Contact Patterns (B & L Engineering)
- Bilateral compression-closing footswitches
- 60 Hz

Procedures

Sessions 1-3: Familiarization
- Subjects familiarized with cardiovascular equipment and instructed to exercise at a speed that could be maintained for thirty minutes

Executive 4: Data Collection
- Maximum voluntary contraction (MVC) recorded for each muscle
- Subjects performed JG (Figure 4A), EL (Figure 4B), SS (Figure 4C), WK (Figure 4D), and RB (Figure 4E) for five minutes each in a randomized order
- EMG activity in GM-U, GM-L, and GMED were recorded during final minute of each exercise

Data Analysis

Footswitches defined gait cycles for JG and WK
- Foot pedal kinematics defined movement cycles for EL, SS, and RB
- Dominant limb’s gluteal EMG activity patterns examined
  - Peak EMG activity expressed as percentage of MVC (% MVC)
  - Duration of EMG activity expressed as percentage of movement cycle (% Cycle)

Statistical Analysis

Data screened for normality.
- Normal distribution: 5x1 ANOVA with repeated measures followed by Holm-Sidak post-hoc test
- Non-normal distribution: Friedman repeated measures ANOVA on Ranks and Student-Newman-Keuls post-hoc test

Results

Enhanced understanding of how muscle demands vary across cardiovascular exercises is essential for optimizing treatment and fitness interventions. Previous studies have investigated gluteal muscle function at.

Table 2. EMG activity of Gluteus Maximus, Upper

<table>
<thead>
<tr>
<th></th>
<th>Peak† (% MVC)</th>
<th>Duration† (% Cycle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JG</td>
<td>Mean ± SD</td>
<td>Median</td>
</tr>
<tr>
<td>EL</td>
<td>25.4 ± 12.7</td>
<td>24.4</td>
</tr>
<tr>
<td>SS</td>
<td>16.2 ± 11.7</td>
<td>16.2</td>
</tr>
<tr>
<td>WK</td>
<td>15.8 ± 6.3</td>
<td>18.1</td>
</tr>
<tr>
<td>RB</td>
<td>10.2 ± 5.0</td>
<td>7.9</td>
</tr>
</tbody>
</table>

Significant Main Effect
- JG>EL>SS,WK>RB

Table 3. EMG activity of Gluteus Maximus, Lower

<table>
<thead>
<tr>
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<th>Peak† (% MVC)</th>
<th>Duration† (% Cycle)</th>
</tr>
</thead>
<tbody>
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Significant Main Effect
- JG>EL>SS,WK>RB

Table 4. EMG activity of Gluteus Medius

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Significant Main Effect
- JG>EL>SS,WK>RB

Conclusions

- Jogging and elliptical training consistently placed higher demands on each of the gluteal muscles tested compared to recumbent biking
- When maximizing gluteal effort is a desired therapeutic goal, jogging and elliptical training should be considered
- If protection of weak gluteals is required (e.g., with post polio affecting the single joint hip extensors), consideration of recumbent biking is warranted due to the diminished demand

References


Acknowledgements

We would like to gratefully acknowledge the support of the Daniel’s Fund (Denver, CO).