Knee Extension and Flexion Strength in Recreational Surfers

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Abstract

Background: A trend for increased leg strength in the leg positioned in the back compared to front of the surfboard has been reported previously in a study with limited sample size. This preliminary data suggests that an asymmetry may exist in surfer’s leg strength and that this may be influenced by surfer’s stance on the surfboard. Purpose: The purpose of this investigation was to test the hypothesis that leg strength in surfers, as assessed by isokinetic knee extension and flexion at contraction velocities ranging from 60-300 deg/sec, would be greater in the leg positioned in the back compared to front of the surfboard. Methods: Forty-four recreational surfers (5 female, 39 male) with a mean age of 24.6±2.8 yrs participated in this study. Leg dominance was assessed in all subjects using a ball kicking task prior to measurements of strength. Single leg isokinetic knee extension and flexion strength was measured in both legs using an isokinetic dynamometer (Biodex, System 3). Following a five-minute warm-up on a cycle ergometer (Monark), subjects performed five repetitions of maximal knee extension and flexion at contraction velocities of 60, 120, 180, 240, and 300 deg/sec. A thirty-second recovery period was provided between each contraction velocity. Results: All subjects reported surfing to be their primary form of physical activity with 8.6±0.8 hrs/wk and an 23.2±2.2 yrs of surfing experience. There were significant differences in torque between legs for leg extension (60 deg/sec: 141.4±33.5 vs. 150.1±38.9, 120 deg/sec: 107.2±42.4 vs. 109.8±47.1, 180 deg/sec: 84.4±35.8 vs. 87.2±43.7, 240 deg/sec: 77.9±31.5 vs. 72.9±28.5, 300 deg/sec: 61.7±34.9 vs. 63.0±31.8 lbs) and flexion (60 deg/sec: 86.8±31.5 vs. 97.2±33.4, 120 deg/sec: 72.1±23.9 vs. 72.3±23.7, 180 deg/sec: 62.1±23.6 vs. 62.3±23.5, 240 deg/sec: 56.3±26.2 vs. 56.8±24.9, 300 deg/sec: 49.0±24.2 vs. 49.2±23.5 lbs) across all contraction velocities. Conclusions: Contrary to previously reported data, the current results suggest that recreational surfers’ leg strength is not influenced by surfing stance.

Overall Results

Figure 1. Peak knee extension torque of front vs. back leg at multiple contraction velocities.

Figure 2. Peak knee flexion torque of front vs. back leg at multiple contraction velocities.

Subgroup Results

Figure 3. Peak knee extension torque of front vs. back leg for subgroup where dominant leg was not the back leg at multiple contraction velocities.

Figure 4. Peak knee flexion torque of front vs. back leg for subgroup where dominant leg was not the back leg at multiple contraction velocities.

Characteristics Results

Table 1. Summary of subject characteristics expressed in mean ± SE.

<table>
<thead>
<tr>
<th>Sex (f # of subjects)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>39.9±2.3</td>
<td>49.6±2.3</td>
<td>41.3±2.1</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.80±0.01</td>
<td>1.67±0.03</td>
<td>1.79±0.12</td>
</tr>
<tr>
<td>Body Weight (kg)</td>
<td>80.6±1.8</td>
<td>62.0±4.3</td>
<td>78.5±1.9</td>
</tr>
<tr>
<td>Body Fat Percentage (%)</td>
<td>15.3±0.9</td>
<td>24.8±2.1</td>
<td>16.4±0.9</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>24.9±0.5</td>
<td>22.1±1.0</td>
<td>24.6±0.5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Kicking Leg (# of Subjects)</th>
<th>Right</th>
<th>Left</th>
<th>Right</th>
<th>Left</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td>36</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>41</td>
<td>3</td>
</tr>
<tr>
<td>Goofy</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>1</td>
</tr>
</tbody>
</table>

Sprinting Experience (years) | 25.2±2.4 | 13.8±4.4 | 23.9±2.2 |

Time spent surfing (hrs/week) | 8.8±0.8 | 9.5±1.9 | 8.8±0.8 |

Conclusions

- There were no significant differences in torque between the front and back leg for knee extension in a subgroup of subjects whose back leg was not their dominant leg (Figures 1 & 3).
- There were no significant differences in torque between front and back legs for knee flexion across all contraction velocities (60-300 deg/sec) (Figures 2 & 4).
- Contradictory to previously reported data, the current results suggest that recreational surfers’ leg strength is not influenced by surfing stance.

References


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