Effects of far-infrared emitting fabric on knee extensor isokinetic exercise performance.


Abstract

Technological materials emitting infrared may exert positive physiological effects on skeletal muscle. Studies have shown that far-infrared (FIR) can increase availability of nitric oxide and calcium in cell culture, and delay fatigue during ex-vivo skeletal muscle contractions. However, FIR effects on muscle performance are poorly studied. Here, using a double-blind, placebo-controlled, crossover design, we show that individuals in FIR condition had a higher maximum knee extensors torque before and after fatigue protocol and obtained higher values of total work in dynamic exercise. These findings demonstrate the ergogenic effect of FIR on neuromuscular performance in humans.

Key words:
Light therapy, Fatigue, Ergogenic Aid.

Table 1. Measurement Variables

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<tr>
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<th>FIR</th>
<th>PLACEBO</th>
<th>P</th>
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<tbody>
<tr>
<td>Mean</td>
<td>Pre MIPT (Nm)</td>
<td>318.5</td>
<td>284.1</td>
</tr>
<tr>
<td>SD</td>
<td>Post MIPT (Nm)</td>
<td>68.7</td>
<td>58.2</td>
</tr>
<tr>
<td>TW (J)</td>
<td>4142.2</td>
<td>699.8</td>
<td>4009.3</td>
</tr>
<tr>
<td>FI (%)</td>
<td>41.7</td>
<td>6.6</td>
<td>40.3</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>32.48</td>
<td>0.77</td>
<td>32.42</td>
</tr>
</tbody>
</table>

SD, standard deviation; MIPT, maximum isometric peak torque; TW, total work; FI, fatigue index; Temperature, Quadriceps temperature (FLIR® T430scc - FLIR Systems Inc, Wilsonville, Oregon, USA). P values were obtained by paired T-test and considered significant at P<0.05.

Conclusions

Our results demonstrate the effectiveness of FIR emitting fabric to increase performance in isometric and dynamic exercise. Further, FIR decreased the fall in strength after exhaustive exercise suggesting a reduction in fatigue. These findings corroborate a study using other source of IR. In addition, we suggest that these effects are related to neuromuscular recruitment and muscle contractile machinery improvements and not a greater production of ATP by mitochondria. This idea is reinforced by performance increased in Pre MIPT an exertion of short duration (5 seconds), type of exercise that is little dependent on aerobic energy production path. Finally, studies are necessary to determine the optimal dose and cellular mechanisms responsible for FIR effects.

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