The Reliability of a Team Sport-Specific Running Protocol on a Non-Motorised Treadmill

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Introduction

• At present there are few testing methods that reliably evaluate performance of the work demands of team sports (3,7).
• The purpose of this study was to report on the reliability of a new test and method for measuring team sport running performance on a non-motorised treadmill (NMT) in a laboratory.

Methods

Subjects

• 11 moderately-trained (VO2max = 52.6±4.5 ml·kg⁻¹·min⁻¹; age = 23.6±4.5 yrs; body mass = 77.5±6.2 kg) male team sport athletes participated in this study.
• Following a familiarisation session, each subject completed three 30 min team sport-specific running protocols on a NMT, separated by 6 days.

30 min Team Sport-Specific Running Protocol

• The activity profile of the 30 min team sport-specific running protocol was based on previous time and motion studies of various team sports including soccer, rugby league and Australian rules football (2,6).
• Two 15 min activity profiles were performed successively (separated by a 2 min rest) on a NMT (Force Tread Dynameter, Woodway, USA) to form a total duration of 30 min.
• Included in these activity profiles were six running speeds: standing (0% of maximal sprint speed (MSS)), walking (20% MSS), jogging (35% MSS), running (45% MSS), fast running (65% MSS) and sprinting (100% MSS) (see figure 1).
• The six movement categories were designated a particular duration based on time and motion data from team sports (2,6). Standing, walking and jogging were all assigned 8 s time durations. Running, fast running and sprinting were assigned 6 s, 4 s, and 3 s time durations, respectively.
• A specialised software package (Force Software, Innovations Joondalup, Australia) then randomised the movement data into a 15 min set protocol such that the total amount of running at any given speed would approximate that which occurred during a competitive match (1).
• The result was a 30 min team sport-specific running protocol, which comprised of 181 changes in speed (first 15 min period = 91 changes, second 15 min period = 90 changes).

Statistics

• One-way ANOVA was used to determine any significant differences in physiological and performance variables between the three trials (SPSS Inc., Version 12.0.1 for Windows, Chicago, USA).
• Typical error (TE), typical error expressed as a coefficient of variation (CV), and Intraclass correlation coefficient (ICC) were used to determine the reliability of each physiological and performance variable between the three trials (see table 1 and 2). TE and CV were calculated according to the methods of Hopkins (4).

Table 1: Typical error, typical error expressed as a coefficient of variation and Intraclass correlation coefficients for each important performance variable.

<table>
<thead>
<tr>
<th>Speed</th>
<th>Total Distance (m)</th>
<th>Peak Running Speed (km·h⁻¹)</th>
<th>5 x 6 s RSA Distance (m)</th>
<th>6 s Sprint Distance (m)</th>
<th>3 s Sprint Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1-2</td>
<td>TE</td>
<td>74.66</td>
<td>0.43</td>
<td>8.17</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td>CV (%)</td>
<td>2.21</td>
<td>1.73</td>
<td>2.40</td>
<td>3.26</td>
</tr>
<tr>
<td></td>
<td>ICC</td>
<td>0.62</td>
<td>0.89</td>
<td>0.68</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Trial 2-3</td>
<td>TE</td>
<td>65.04</td>
<td>0.53</td>
<td>12.75</td>
</tr>
<tr>
<td></td>
<td>CV (%)</td>
<td>1.91</td>
<td>2.01</td>
<td>3.51</td>
<td>0.87</td>
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<tr>
<td></td>
<td>ICC</td>
<td>0.74</td>
<td>0.85</td>
<td>0.62</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>Trial 1-3</td>
<td>TE</td>
<td>71.31</td>
<td>0.43</td>
<td>15.11</td>
</tr>
<tr>
<td></td>
<td>CV (%)</td>
<td>2.14</td>
<td>1.68</td>
<td>4.29</td>
<td>3.34</td>
</tr>
<tr>
<td></td>
<td>ICC</td>
<td>0.68</td>
<td>0.91</td>
<td>0.57</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Discussion & Conclusions

• The activity profile used to simulate team sport match running demands in this study elicited physiological responses that were similar to those reported from match play in a variety of team sports (2,6).
• The 30 min team sport-specific running protocol has a high reproducibility and can be considered more reliable than common field tests used to assess the physical capacity and performance of team sport athletes (5).
• A 6 s sprint is more reliable than a 3 s sprint on a NMT. Furthermore a 5 x 6 s RSA test can be used reliably on a NMT under pre-fatigued conditions.
• These results demonstrate that the NMT system and 30 min team sport-specific running protocol used provide a reliable tool for assessing both key performance variables and physiological measures in team sport athletes. Furthermore, these results indicate that two familiarisation sessions should be completed prior to testing on a NMT.
• The present results can be used to interpret meaningful changes in performance and also to determine the appropriate sample size needed for future studies using this protocol.

References