Relationship of swimming power to sprint performance in swimming strokes

Arija, Alfredo1, Muñoz, Victor1, Júdez, Juan Luis1, Juarez, Daniel1, Juarez, Daniel, Ureña, German1, Gonzalez, Jose Mª1, Llop, Fernando1, Navarro, Fernando1

1Laboratory of Sport Training, Faculty of Sport Science, University of Castilla-La Mancha, Toledo, Spain

Introduction

Few investigations have sought to identify the contributions of strength and power to swimming performance. The correlation between arm power, measured during tethered swimming, and maximal sprinting velocity for 25 yd has been reported at 0.85 (Costill et al. 1986). Significant relationships were obtained between swim speed over 50m and peak power (r=0.82, p<0.001) with mean power (r=0.83, p<0.001) (Hawley & Williams, 1991, Hawley et al, 1992).

Methods

Twenty-two male and twenty female (n=42) swimmers participated in this investigation after giving informed consent. The mean (±SD) height, weight and age were for male and female 168.66 (±8.7) and 161.22 (±5.58) cm, 60.84 (±10.31) and 53.21 (±6.72) kg and 15.45 (±2.97) and 14.55 (±2.30) yr; respectively. Power was measured using a ten-trial increasing-resistance protocol on a Power Rack using a belt attached to the swimmer with 10 lb increments with 1’ rest among repetitions. The swimmers were instructed to swim as fast as possible until the distance given was completed. Sprint velocity was determined for a 15m swim using a video analysis. Each swimmer performed at least one stroke. Pearson product moment correlations and linear regression analyses were performed using the computer software package SPSS. v.12.0

Results

The Pearson product moment correlation coefficients (r²) between swimming power and sprint performance are shown (Table 1).

<table>
<thead>
<tr>
<th>Stroke</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>0.789**</td>
<td>0.596*</td>
<td>0.856**</td>
</tr>
<tr>
<td>Back</td>
<td>0.876**</td>
<td>0.537</td>
<td>0.860**</td>
</tr>
<tr>
<td>Fly</td>
<td>0.899**</td>
<td>0.670</td>
<td>0.919**</td>
</tr>
<tr>
<td>Breast</td>
<td>0.755**</td>
<td>0.927**</td>
<td>0.844**</td>
</tr>
</tbody>
</table>

Table 1.- Correlation coefficients swimming power and sprint-swim performance.

Discussion/Conclusion

Each of the ten power tests were moderately correlated (range 0.537 to 0.927) with sprinting velocity. All r² were elevated in all strokes. Gender differences were detected in this correlation, being the males who greatest correlations presented. In the present study a strong correlation was shown between the maximum-power and the 15m-sprint performance. It can be appreciated how swimming power increases in a parallel way with swimming speed in all strokes, following a similar slope among them (Figure 1).

The Power Rack™ can be employed as a useful implement by the coaches, allowing them to evaluate and monitor the specific swimming power in an objective manner during competition.

References

