

Significance was set at $P < 0.05$.

RESULTS

Normality of data was examined using the Kolmogorov-Smirnov test and subsequently confirmed. No correlation was found between CJ (CJ1: 21.4 ± 2.6 jumps; CJ2: 23.3 ± 2.6 jumps) and the variables examined from the WAnT (FI: $48.3 \pm 7.1\%$; mP: 459.1 ± 45.3 W; pP: 667.8 ± 93.7 W). The two CJ were significantly correlated with each other ($P < 0.05$; ICC = 0.99). The LoA for the CJ scores was -1.5 ± 2.35 jumps, producing a range of $+0.85$ to -2.85 jumps.

DISCUSSION

The results indicated that the CJ is not a valid measure of anaerobic leg power. This can be attributed to a) the lack of a fixed resistance for the generated upward impulse, and b) the different movement mechanics required (3) compared to the WAnT. Additionally, although CJ is reliable, the LoA in which results from a re-test should lie in (1) are wide, making meaningful interpretation of results difficult. Therefore, coaches must be cautious when utilising the CJ for evaluation and monitoring purposes. Future studies should consider a) a larger sample, b) investigating other muscular performance parameters, and c) conducting the CJ for 60 seconds.

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RELATIONSHIPS BETWEEN ENERGY COST, SWIMMING VELOCITY AND SPEED FLUCTUATION IN ELITE BUTTERFLIERS.

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INTRODUCTION

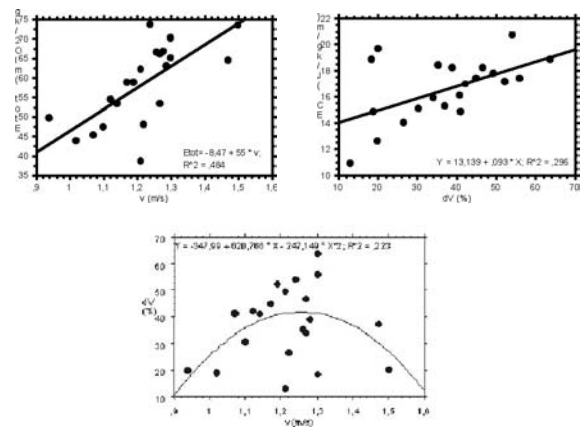
The purpose of this study was to analyse the relationships between the total energy expenditure (\dot{E}_{tot}), the energy cost (EC), the intra-cycle variation of the horizontal velocity of displacement of centre of mass (dv) and the mean swimming velocity (v) in elite butterflyers.

METHODS

Four elite butterfly swimmers were submitted to an incremental set of $nx200$ -m swims ($n \leq 8$). The velocity was increased by $0.05 \text{ m}\cdot\text{s}^{-1}$ after each swim until exhaustion. Cardio-pulmonary and gas exchange parameters were measured breath-by-breath for each swim to analyse oxygen consumption (VO_2) and other

energetic parameters by portable metabolic cart (K4b², Cosmed, Italy). A respiratory snorkel and valve system with low hydrodynamic resistance was used to measure pulmonary ventilation and to collect breathing air samples. Blood samples from the ear lobe were collected before and after each swim to analyse blood lactate concentration (YSI 1500L, Yellow Springs, US). $\dot{E}_{tot} = \text{VO}_{2\text{net}} + 2.7[\text{La}^-]_{\text{net}}$ and $\text{EC} = \dot{E}_{tot} \cdot v^{-1}$ were calculated for each swim. The swims were videotaped in sagittal plane with a set of two cameras providing dual projection from both underwater and above the water surface as described elsewhere (Barbosa et al., 2005). APAS system (Ariel Dynamics Inc, USA) was used to analyse dv. Linear regressions between the \dot{E}_{tot} and v, between EC and dv, between EC and v and polynomial regressions between dv and v were computed. Partial correlations between EC and dv controlling v and between EC and v controlling dv were also calculated.

RESULTS AND DISCUSSION



The individual correlations between \dot{E}_{tot} and v ranged from $r=0.95$ ($p=0.05$) to $r=0.90$ ($p<0.01$). For pooled data the relationship was $r=0.70$ ($p<0.01$). The individual correlations between EC and dv controlling the effect of v ranged from $r=0.99$ ($p=0.06$) to $r=-0.81$ ($p=0.09$). For pooled data, the relationship between EC and dv was $r=0.55$ ($p=0.01$). The individual correlations between EC and v controlling the effect of dv ranged from $r=0.92$ ($p=0.02$) to $r=-0.84$ ($p=0.36$). When the pooled data was plotted it was observed a relationship of $r=0.51$ ($p=0.02$). The individual correlations between dv and v ranged from $r=0.99$ ($p=0.04$) to $r=-0.83$ ($p=0.16$). For pooled data, the relationship between dv and v was $r=0.47$ ($p=0.05$). Therefore, when analysed on individual bases, it is possible to observe different profiles between EC and dv, as well as, between EC and v. However, for pooled sample, it seems that increases of EC were related to increases of dv and v.

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