6-S MAXIMAL CYCLING SPRINT TEST: THE PREDICTION OF OPTIMUM LOADING FOR MAXIMIZING MUSCLE POWER OUTPUT

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Introduction

6-s maximal cycling sprint test has been widely used for the assessment of muscle power output (MPO). It has been generally presumed that there is an optimum external loading (Lopt) that allows for the muscular system to maximize MPO (Hill, 1938). In cycling task, Lopt has been shown to be within 5-10% of body weight (BW) for Wingate test (Dotan and Bar-Or, 1983) or 5-12% of BW for 6-s maximal cycling sprint test (Pazin et al., 2011). The aim of this study was to investigate the regression model that could predict Lopt. Since the higher relative loads could be more sensitive for the differences among MPO recorded in individuals with different training history (Pazin et al., 2011), we hypothesized that the relation between Lopt and MPO would be higher for higher relative loads.

Methods

Forty-one healthy male subjects with different training history were tested through the standard 6-s maximal cycling sprint test protocol on a mechanically braked cycle ergometer (834 E, Monark). Eight different loads relative to the subjects' body weight (i.e., 5-12% of BW) were applied. In order to determine Lopt, the obtained data were plotted for each individual subject and a second order polynomial regression was employed to assess the changes in MPO associated with changes in loading conditions (Pazin et al., 2011). Thereafter, the obtained Lopt were plotted against the recorded MPO normalized for BW (i.e., W/kg0.67). The calculated linear regression model and corresponding correlation coefficients were taken for further analysis.

Results

The applied second order polynomial regression revealed the average value of Lopt 8.9% of BW (range: 5.6-11.4%). The calculated linear regression models appear to be relatively stable across different loading conditions. The corresponding correlation coefficients (R2) were: 0.21, 0.20, 0.31, 0.34, 0.44, 0.58, 0.61 and 0.72, calculated for 5-12% of BW, respectively.

Discussion

The relatively stable outcomes of the conducted analysis suggest that the applied regression model could be considered as a valid method for the prediction of Lopt. The hypothesized higher correlation coefficients indicate increased significance of the prediction model when the higher relative loads are used (i.e., 12% of BW). The valid prediction of Lopt that maximize MPO could be of utmost importance for improvement of routine testing of neuromuscular system and its adaptations to training and rehabilitation procedures.

References

Hill AV. (1938). Proc R Soc Med, 126, 136–195.
Dotan R, Bar-Or O. (1983). Eur J Appl Physiol Occup Physiol, 51, 409–417.
Pazin N, Bozic P, Bobana B, Nedeljkovic A, Jaric S. (2011). Eur J Appl Physiol. Epub ahead of print.

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