

Squat jump and jumping push-up performance of trained swimmers immediately before and after resistance exercise

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ABSTRACT

Introduction

When an action induces acute fatigue, it may be followed by a period of potentiated force production capability, termed as Postactivation Potentiation (Seitz, 2015). The aim of the study was to measure the effect on swimming performance of muscular contractions 5-20 minutes prior to the trials and to determine the possible causes of performance enhancement.

Methods

15 Elite Canadian swimmers volunteered to participate in this study. A repeated measures counterbalanced design was used in which swimmers performed 4 different activation protocols in 4 different sessions. Muscle performance was evaluated in each participant performing 3 maximal effort squat jumps, alternated with 3 maximal jumping push-ups. Both assessed from one ground reaction force plate. One bout of loaded conditioning exercise (CE) on the target muscles was randomly applied on the subjects after the basic muscle activation protocol (BME). Four repetitions of loaded back squat were applied when leg muscles were the target (CE-L). Four repetitions of loaded bench-press were applied when upper body muscles were the target group (CE-U). Loaded repetitions of back squat and bench press were combined applied when both limbs were the target (CE-BL). After CE, muscle performance was assessed again at 5, 8, 12 and 20 minutes, regardless the CE applied. One test condition without any CE was also given and acted as a control.

Results

Impulse in lower limbs was higher in the protocol CE-L (5min: 181.54 N·s; 8 min: 181.78 N·s), in comparison with pretest conditions (Pre: 175.18 N·s; $P = 0.05$). Impulse was also higher in CE-BL but it was achieved only after 8min of rest (181.16 N·s; $p = 0.05$) When comparisons with BME were made, the impulse in upper limbs was higher only in CE-U (50.58 N·s; $p = 0.05$), and this value was obtained at 8 minutes after load.



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Discussion & Conclusion

Improvements obtained in both limbs are in agreement with the physiological explanation of PAP. Changes happened in limbs after specific load application, but no influences were found when load applied in such limb was assessed in the other. Surprisingly, impulse was even higher at minute 8, and such effect achieved, could be related to a difference in involvement of motor units. Thus, although an improvement in performance is obtained after load application, PAP could not be considered only as an acute local effect generated by the myosin phosphorylation. This fact could suggest that some neural factors of the speed-strength behavior could be behind of the performance improvement of the system.

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DEP2014-59707-P: SWIM: Specific Water Innovative Measurements, applied to the development of International Swimmers in Short Swimming Events (50and100m).

References

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