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THE ACUTE INFLUENCE OF A HIGH-VOLUME RESISTANCE TRAINING PROTOCOL ON ECCENTRIC AND AMORTIZATION FORCES DURING JUMPING

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ABSTRACT

Introduction: There is limited research on the acute influences of muscle damage from high volume resistance training (HVRT) on eccentric and amortization forces during jumping. Therefore, the purpose of this study was to determine differences in eccentric rate of force development (eRFD) and amortization force during the countermovement jump (CMJ) and drop jump (DJ) before and after a HVRT back squat protocol.

Methods: 9 young healthy participants performed 3 trials of CMJ and DJ on dual force platforms before and after a HVRT back squat protocol (10 set by 10 repetition at 60% of 1-RM). Participants were instructed to "jump as quickly as possible and as high as possible." eRFD during the CMJ was calculated as the difference in vertical ground reaction force (vGRF) from the unloading vGRF minimum to the first vGRF peak. Amortization force was calculated as the vGRF when the vertical velocity reached 0 m/s after the countermovement or landing phases for the CMJ and DJ, respectively. RSI and RSImod values were also calculated for analysis. Paired-samples t-tests analyzed dependent variables pre and post intervention.

Results: CMJ eRFD did not change following the intervention (pre: 6908.88 ± 3434.09 N/s; post: 6186.03 ± 3076.72 N/s; p>0.05)). CMJ amortization forces significantly decreased following HRVT (pre: 24.502 ± 2.68 N/kg; post: 22.044 ± 2.16 N/kg; p<0.05). CMJ RSImod did not change following the intervention (pre: 0.375 ± 0.129; post: 0.321 ± 0.110, p>0.05). DJ amortization forces significantly decreased following the intervention (pre: 27.68 ± 4.35 N/kg; post: 25.04 ± 2.42 N/kg . DJ RSI significantly decreased following the intervention (pre: 0.88 ± 0.27; post: 0.69 ± 0.17.

Conclusion: The HVRT protocol led to a marked decrease in eccentric and amortization forces in addition to RSI in both CMJ and DJ. From an athlete monitoring perspective, the decreases in performance observed following the HVRT could be used as a benchmark or reference to compare observed performance decreases due to fatigue from practice, training, and competition. Performance changes from simple, muscle damaging workouts may help coaches understand the meaningfulness of performance changes due to multifactor sporting workloads.

INTRODUCTION

There is limited research on the acute influences of muscle damage from high volume resistance training (HVRT) on eccentric and amortization forces during jumping. Therefore, the purpose of this study was to determine differences in eccentric rate of force development (eRFD) and amortization force during the countermovement jump (CMJ) and drop jump (DJ) before and after a HVRT back squat protocol.

METHODS

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RESULTS

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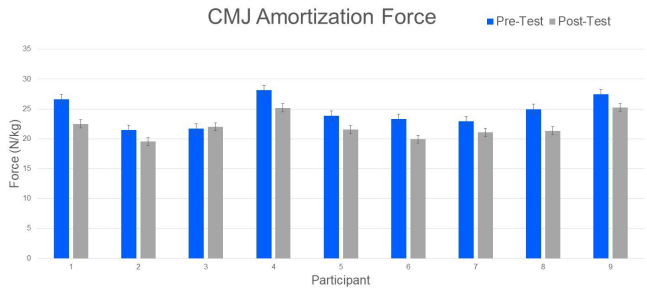

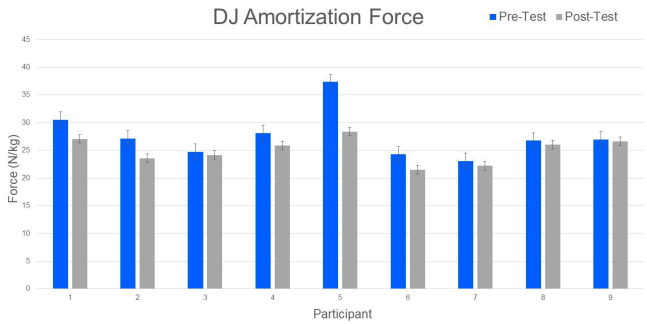

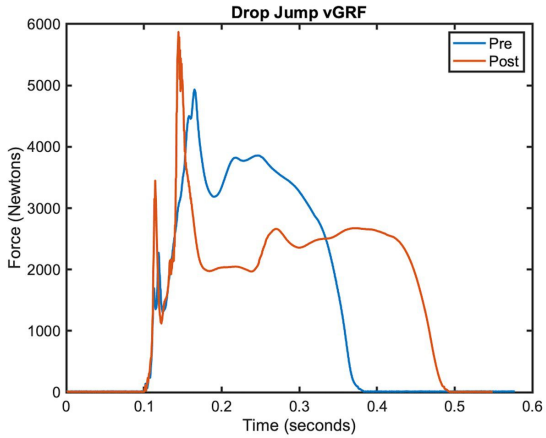

DISCUSSION

The HVRT protocol led to a marked decrease in eccentric and amortization forces in addition to RSI in both CMJ and DJ. From an athlete monitoring perspective, the decreases in performance observed following the HVRT could be used as a benchmark or reference to compare observed performance decreases due to fatigue from practice, training, and competition. Performance changes from simple, muscle damaging workouts may help coaches understand the meaningfulness of performance changes due to multifactor sporting workloads.

PRACTICAL APPLICATIONS

The HVRT protocol reduced the amortization forces for both the counter-movement jump and the drop jump. A decrease in amortization forces and jump performance appears to be a strong assessment of acute fatigue. Within sporting organizations, practitioners may consider using the drop jump before and after practices or competition to determine the stress of those activities.

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