THE ACUTE EFFECTS OF ASSISTED AND RESISTED VARIABLE RESISTANCE BACK SQUATS ON COUNTERMOVEMENT JUMP PERFORMANCE

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Introduction

Back squat warm-up activities using elastic band (EB) resistance in combination with free weight resistance (FWR) can improve subsequent countermovement jump (CMJ) performance [1], a phenomenon termed post-activation performance enhancement (PAPE). However, limited warm-up is commonly utilised in these studies (1, 2), which could invalidate the potentiation often reported. Although sub-maximal loads of 85% are commonly used, more research is required on the effect of lighter loads on subsequent performance enhancement. The aim of the present study was to compare the effects of back squats at 50% 1-RM under two EB attachment sites, assisted (ASS) and resisted (RES), and FWR alone after a task-specific comprehensive warm-up on subsequent CMJ performance.

Figure 1. Demonstration of the experimental set-up for the ASS condition

Methods

Twenty active males (age = 24.9±3.7 y, height = 1.7±5.7 m, mass = 83.4±12.6 kg) volunteered for the study. Following a familiarisation session, participants completed three experimental conditions (FWR, RES, ASS) separated by 48 h following a randomised crossover design. During each condition, participants first completed baseline 1 (BL1), three initial CMJs followed by a task-specific comprehensive warm-up which included 5 min of cycling, two sets of 5 bodyweight squats, 5 continuous CMJs at 70% of perceived maximum, and maximal CMJs every 30 s until 3 consecutive jumps were within 3% of jump height. Baseline 2 (BL2), three CMJs were then completed and followed by three back squats under either the FWR, RES or ASS condition at 50% 1-RM with 35% of the load generated by EBs during the RES and ASS conditions. Participants then performed three CMJs separated by 15s at 30 s, 4 min, 8 min and 12 min.

Results

Significant increases (*P<0.05*) in both jump height (4.6-18.8%) and peak power (5.3-10.8%) were observed across all timepoints when compared with BL1 measure in all conditions. In the ASS condition, significant increases in jump height (4.6-11.8%) and peak power (6.5-2.0%) were observed at 30 s, 4 min, 8 min, and 12 min compared to BL2. In the RES condition, significant increases in jump height (7.1-1.2%) and peak power (2.3-5.4%) were observed at 30 s, 4 min, and 8 min, and in the FWR condition, significant increases in jump height (2.2-5.7%) and peak power (1-4.6%) were observed at 30 s and 4 min.

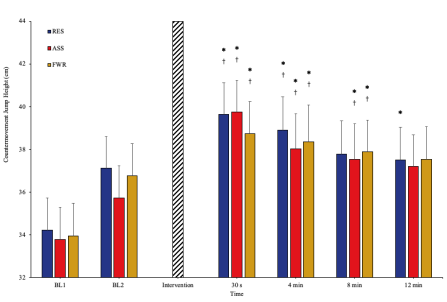

Figure 2. CMJ height (cm) following RES, ASS and FWR back squats. * = significant increase ($P < 0.05$) compared to BL1. † = significant increase compared to BL2. RES, resisted condition; ASS, assisted condition, FWR, free-weight resistance condition; CMJ, countermovement jump

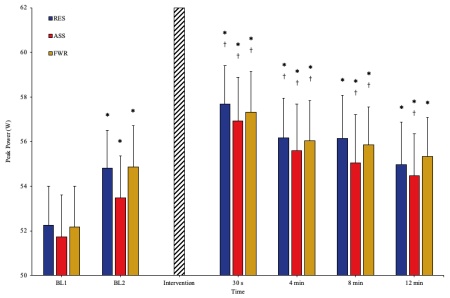

Figure 3. Peak power (W) during CMJs following RES, ASS and FWR back squats. * = significant increase ($P < 0.05$) compared to BL1. † = significant increase compared to BL2. RES, resisted condition; ASS, assisted condition, FWR, free-weight resistance condition; CMJ, countermovement jump

Discussion

Incorporating as part of a warm-up back squats at 50% 1-RM in both the ASS and RES conditions significantly increased jump performance. The use of EB resistance can reduce the effective load near the sticking point and then allow for greater loading later in the concentric phase as lower-limb joints are extended and more optimal muscle lengths are achieved [2]. Improvements in the ASS condition at 30 s, 4 min, 8 min and 12 min is indicative of potentiation through alteration of the motor control strategy to improve jump performance [1, 3]. The data are indicative of an enhanced warm-up protocol providing short term improvements in performance.

References

1. Mina et al. (2019). *Scand J Med Sci Sports*. 29(3):380-392.
2. Anderson et al. (2008). *J Strength Cond Res*. 22(2):567-574.
3. Blazevich, A. J., & Babault, N. (2019). *Frontiers in physiology*, *10*, 1359.

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