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Maximizing Physical Performance with Strength Training During the Competitive Season for Ice Hockey Players: Favorable Effects of 40% Velocity Loss

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INTRODUCTION:

Recent studies have explored the impact of velocity-based strength training (VBST) on athletes and have indicated that applying velocity losses of 10-20% can result in neuromuscular adaptations while minimizing neuromuscular fatigue (1). However, during the in-season period, athletes typically engage in a greater volume of high-velocity, power-based movements as part of their sport-specific training regime. This raises the question of whether a different, more fatiguing training stimulus would be advantageous. To the best of our knowledge, the effects of VBST during the competitive season have not yet been investigated. The aim of this study was therefore to compare the effect of 20% vs. 40% velocity loss protocols during the back squat exercise in semi-professional ice hockey players during the in-season period.

METHODS:

A total of 24 ice hockey players were randomly assigned to either a 20% velocity loss (VL20: 8 male and 4 female, 17.1±1.5 yrs, 176.6±10.4 cm, 77.8±14.7 kg) or a 40% velocity loss group (VL40: 7 male and 5 female, 16.9±0.9 yrs, 173.3±10.3 cm, 70.0±11.4 kg). Participants underwent a biweekly VBST program with three sets of back squats per session during their competitive season, for a duration of 5 weeks (female team) or 8 weeks (male team). Physical performance, including 1-repetition maximum [1RM] back squat, leg press maximal strength and -power, 30-m on and off ice sprint, and countermovement jump (CMJ), as well as muscle thickness of vastus lateralis (ultrasonography) were assessed at pre- and post-intervention periods.

RESULTS:

The VL40 group performed an average of 11±2, 10±2 and 9±2 repetitions in sets 1-3 per session of back squat, compared to 8±2, 7±2, and 7±2 repetitions in VL20 (all p<0.01).

The VL40 group showed significantly greater improvements in leg press maximal strength (2.2±5.7% vs. -4.1±4.4% for VL20, p<0.001) and -power (2.6±5.3% vs. -1.5±4.3% for VL20, p=0.05) than the VL20 group. No other significant group differences were observed, but both VL40 and VL20 protocols led to increases in back squat 1RM (11.1±7.9% and 6.3±6.0%, respectively) and muscle thickness (3.6±3.7% for VL40 and 2.0±1.8% for VL20, both p<0.001). Only the VL40 group exhibited a significant improvement in CMJ compared to baseline (2.8±3.0%, p=0.046), whereas the VL20 group did not show a significant change (0.1±4.7%, p=0.688).

CONCLUSION:

Both VBST protocols proved effective in preserving or enhancing muscle size, -strength, and -power among semi-professional ice hockey players during the competitive season. Nonetheless, our results suggest that the 40% velocity loss protocol may be more favorable for achieving strength and power gains than the 20% protocol in-season. Further studies are needed to explore in-season velocity loss protocols that employ equal training volume, to discern whether the results are attributed to velocity loss per se or training volume.

1. Włodarczyk et al. (2021). Int. J. Environ. Res. Public Health.

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