

JUMP TRAINING WITH NEGATIVE LOADING: A NEW TRAINING METHOD FOR ENHANCING ATHLETIC PERFORMANCE

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Introduction

Vertical jumping (VJ) is a common training exercise in physical conditioning of both athletes and non-athletes. Traditionally, this explosive exercise is performed under two loading conditions: no-load condition (subject's body weight (BW) only), and positive external loading condition (BW + external load). Both loading conditions proved to be effective in eliciting positive neuromuscular adaptations and enhancing athletic performance (1). To our best knowledge, application of negative loading (unloading) during jump training has never been applied. In our recent study, we have introduced the pulley system that allows the subjects to jump vertically during both loaded and unloaded conditions (2). Our results have shown that the maximum of peak power during VJ is produced with negative loading. In that regard, we tested the hypothesis that VJ training with negative loading could elicit positive changes in muscle function and performance during VJ.

Methods

Thirty-one young and physically highly active men volunteered in the study. They were randomly assigned to either 1) negative loading group (NG; n=9), in which the subjects performed jump training with negative loading corresponding to their 0.7x BW; 2) positive loading group (PG; n=13), in which the subjects performed jump training with positive loading corresponding to their 1.3x BW; or 3) a control group (CG; n=9). The subjects in the experimental groups trained for 6 wk, 3 x wk. Peak power (PP), mean power (MP), jump height (JH) and relative lowering of the center of mass (HC) during VJ with no load were determined at baseline and after 6 wk from the vertical ground reaction force measured on a force plate.

Results

No differences in the dependent variables were observed between the groups at the beginning of the experiment. NG increased JH and HC by 7.5% and 20.6%, respectively, and these effects were significantly higher ($p < 0.05$ - 0.01) than those observed in CG. PG also increased JH and HC (3% and 13%), but these changes were not significantly different compared with the changes observed in CG. PP and MP during VJ did not change in any group during the 6 wk period.

Discussion

The main and novel finding of this study is a marked increase in JH as a result of jump training with negative loading. Since this training program also increased HC, but did not change PP and MP production during VJ, we may speculate that the observed increase in JH is the result of training-induced changes in inter-muscular coordination during VJ. Further studies should examine this conjecture. We conclude that jump training with negative loading has the potential for enhancing athletic performance.

References

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