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Moderate-Load Muscular Endurance Descending Resistance Training did not Improve 1RM in Resistance-Trained Men

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ABSTRACT

Introduction: We previously reported that a heavier 1 repetition maximum (RM) and a greater training volume response were attained using the descending resistance (DR) training method compared to a constant resistance (CR) training method in both males and females after a 4-week hypertrophy training program.

Purpose: When a resistance-trained individual performs multiple sets with a short rest period, such as 1 minute and 30 seconds between sets, the resistance must be reduced to maintain the same number of repetitions until fatigue. Otherwise, the number of repetitions will be reduced if the constant resistance is used. There is no standard method for optimizing load to maximize training volume when using multiple sets with short rest periods. In this study, we hypothesized that a heavier 1RM would be produced using a 4-week moderate-load endurance training method where resistance is decreased with each set (DR) compared to a 4-week moderate-load CR method. To develop DR sets, we used the subject's fatigue ratio (using an individualized regression equation) from a CR protocol where the number of repetitions declines with each set.

Methods: Twelve resistance-trained male subjects (mean ± SD, age = 28±6 yr., height = 175±4 cm, body mass = 74±7 kg, 1RM = 121±9 kg, weight training experience = 6±2 yr., and strength ratio (1RM/body mass) = 1.63±0.1) completed pre and post 1RM tests. During these pre and post 1RM tests, moderate muscular endurance intensities equivalent to 65% 1RM CR and DR bench press exercise trainings were performed in counterbalanced order. Data were analyzed using a one-way repeated-measures ANOVA.

Results: There was a significant increase with 1 RM ($p < 0.05$) when subjects trained with CR (Pre: 121.2±9.5; Post: 122.3±9.0) sets compared to training with DR (Pre: 122.0±9.4; Post: 120.6±9.2) sets after a 4-week endurance training period for each condition.

Conclusion: In resistance-trained men, a lighter 1RM was attained using a 4-week moderate-load muscular endurance training on a DR training method than a CR training method. This suggests that CR training may be more effective than DR training for maintaining strength after a 4-week endurance training program.

Discussion: We obtained a greater 1RM after a 4-week hypertrophy training program at 80% and 75% of 1RM using a DR training method than a CR training method in resistance-trained men in the previous study. However, we found a lighter 1RM after a 4-week endurance training program using a 65% 1RM DR training method than a 65% 1RM CR training method in this study. The effects of the training method might be depending on which % of 1RM load of the training program was used. A 4-week 65% of 1RM load endurance training program using a DR training method was not sufficient to elicit improvement in strength. Therefore, further studies are needed to find an optimal load muscular endurance DR training method on muscle strength in resistance-trained men.

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