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Physiological and functional responses to low-moderate versus high-intensity progressive resistance training in frail elders.

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Abstract

BACKGROUND: The purpose of this efficacy study was to measure the dose-response effect of a free weight-based resistance training program by comparing the effects of two training intensities (low-moderate and high) of the knee extensor (KE) muscles on muscle function, functional limitations, and self-reported disability.

METHODS: The authors conducted a single-blinded, randomized, placebo-controlled trial. Twenty-two institutionalized elders (mean age, 81.5 years) were assigned to either high-intensity strength training (HI; n = 8), low-moderate intensity strength training (LI; n = 6), or weight-free placebo-control training (PC; n = 8). The HI group trained at 80% of their 1-repetition maximum and the LI group trained at 40%. All groups performed 3 sets of 8 repetitions, 3 times per week for 10 weeks. Outcome measures included KE maximal strength, KE endurance, and functional performance as assessed by 6-minute walking, chair-rising, and stair-climbing tests, and by self-reported disability.

RESULTS: KE strength and endurance, stair-climbing power, and chair-rising time improved significantly in the HI and LI groups compared with the PC group. Six-minute walking distance improved significantly in the HI group but not in the LI group compared with the PC group. Changes observed in HI were significantly different from those observed in the LI group for KE strength and endurance and the 6-minute walking test, with a trend in the same direction for chair-rising and stair-climbing. Changes in strength were significantly related to changes in functional outcomes, explaining 37% to 61% of the variance.

CONCLUSIONS: These results show strong dose-response relationships between resistance training intensity and strength gains, and between strength gains and functional improvements after resistance training. Low-moderate intensity resistance training of the KE muscles may not be sufficiently robust from a physiologic perspective to achieve optimal improvement of functional performance. Supervised HI, free weight-based training for frail elders appears to be as safe as lower intensity training but is more effective physiologically and functionally.

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