

Quantitative Assessment and Training of Isometric Cervical Extension Strength

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Abstract

The purpose of this study was to evaluate the reliability and variability of repeated measurements of isometric cervical extension strength and determine the effect of 10 weeks of dynamic variable resistance cervical extension training on isometric cervical extension strength. Seventy-three subjects (age, 29 ± 12 years [mean \pm SD]) completed isometric cervical extension strength tests on 4 separate days (D1, D2, D3, and D4). For each test, isometric cervical strength was measured at 126, 108, 90, 72, 54, 36, 18, and 0 degrees of cervical flexion. Between-day correlation coefficients over the eight angles of cervical flexion were high for D2 versus D3 ($r = 0.90$ to 0.96). Test variability (standard error of estimate) between D2 versus D3 was low (7.4% to 10.2% of mean) through the entire range of motion. Regression analysis showed that the isometric cervical extension strength curve is linear and descending from flexion to extension. In a second study, 14 subjects (age, 25 ± 3 years) trained the cervical extensor muscles for 10 weeks while 10 subjects (age, 23 ± 3 years) served as controls. Training included 8 to 12 repetitions to volitional fatigue, 1 day per week. The training group improved isometric cervical extension strength at six of eight angles before to after training ($P \leq 0.05$). During the same time period the control group did not change. These data indicate that repeated measures of isometric cervical extension strength are highly reliable and can be used for the quantification of isometric cervical extension strength through a 126 degree range of motion. Also, training the cervical extensors 1 day per week can significantly increase isometric cervical extension strength through most of the range of motion.