TACSM Abstract

Isokinetic Fatigue Characteristics for the Leg Extensors versus Flexors

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ABSTRACT

Maximal isokinetic muscle actions are often used in research studies to examine fatigability and even estimate muscle fiber-type. However, the majority of previous investigations have examined these topics for the leg extensors (i.e., quadriceps), and we are unaware of investigations that have specifically assessed the fatigue characteristics for the flexors (i.e., hamstrings). The purpose of this study was to compare the percent decline values for the leg extensors versus flexors for 50 and 100 repeated, maximal concentric isokinetic muscle actions. Fifteen healthy men (mean ± SD age = 23 ± 3 years; body mass = 94.1 ± 11.9 kg) with previous lower-body strength training experience volunteered to participate in this study. All of the subjects were familiarized with the testing procedures prior to data collection. For data collection, each subject performed 100 repeated, maximal concentric isokinetic muscle actions of the left leg extensors and flexors in a reciprocal manner. Each muscle action was performed at 180 degrees/second through a full 90 degree range of motion. Strong verbal encouragement was provided throughout testing. Percent decline was determined using the mean peak torque values of the initial and final three muscle actions for each muscle group (i.e., extensors versus flexors) and condition (i.e., 50 versus 100 repetitions). A two-way repeated measure analysis of variance was used to examine the data. The mean ± SD percent decline for the leg extensors was 61.8 ± 7.8 and 71.2 ± 6.5% for the 50 and 100 conditions, respectively (Cohen's d = 1.31). For the leg flexors, these corresponding values were 48.0 ± 12.2 and 54.3 ± 11.7 % (Cohen's d = 0.53). There was no significant muscle group × condition interaction (p= .114; partial eta squared = .169) There were, however, main effects for both factors. The bonferroni marginal mean pairwise comparisons indicated that when collapsed across condition, the leg extensors fatigued more so than the flexors (66.5 vs. 51.2%). Similarly, when collapsed across muscle group, the percent decline values were greater following 100 (62.8%) versus 50 (54.9%) repetitions. These finding demonstrated greater isokinetic fatigue characteristics for the leg extensors versus flexors. Furthermore, the additional decline in peak torque from repetitions 50-100 was more pronounced for the extensors. We speculate that these findings could be related to differences in muscle fiber-type, lower absolute strength and mass for the posterior aspect of the thigh, and/or unfamiliarity with single-joint testing of the leg flexors.