

Effects Of Two Ankle Fatigue Models On The Duration Of Postural Stability Dysfunction

Objective: Previous research has used various protocols and methods to quantify fatigue. Yet, determination of force output as an indicator of fatigue is often arbitrarily set at a point equal to 50% of maximum. The purpose of this study was to compare the effects of two ankle fatigue protocols (30% and 50%) on the duration of postural stability dysfunction.

Design and Setting: A one between factor (subjects) and two within factor (fatigue, test) repeated measures ANOVA was performed to assess if differences existed between the 30% and 50% fatigue protocols. The dependent variable was sway velocity (deg/sec). The .05 probability level was considered significant. Peak torque measurements, postural stability testing, and fatigue protocols were all performed in EJ Nutter Training Facility.

Subjects: Twenty, healthy subjects (age= 21.15 +/- 2.23 yr, ht= 172.97 +/- 9.86 cm, wt= 70.62 +/- 14.60 kg) volunteered for this study. Subjects denied any history of recent lower extremity injury, vestibular or balance disorders, functional ankle instability, and any head injury in the past six months.

Measurements: The NeuroCom SMART Balance Master (Neurocom Inc. Clackamas, OR) was used to determine baseline and post-fatigue postural stability scores before and after isokinetic fatiguing contractions of the plantar flexors and dorsiflexors. Plantar flexion peak torque measurements and two fatigue protocols were performed using a Kin-Com isokinetic dynamometer (Chattanooga Corp, Hixson, TN). Three pre-test and twelve post-test postural stability trials were recorded. Each trial was 10 seconds in duration, with 10 seconds rest between trials. Post-fatigue trials were initiated within 15 seconds after termination of each fatigue protocol. Velocities for testing and the fatigue protocols were 60 deg/sec for plantar flexion and 120 deg/sec for dorsiflexion.

Results: There was a significant main effect for fatigue. Sway velocity was significantly greater in the 30% condition (1.564 deg/sec) versus the 50% condition (1.355 deg/sec). There was a significant main effect for trial. For the 30% protocol, sway was significantly impaired when pre-test condition (1.1905 deg/sec) was compared to post-test trial 1 (2.335 deg/sec), trial 2 (2.37 deg/sec), and trial 3 (1.710 deg/sec). For the 50% protocol, sway was significantly impaired when pre-test condition (1.2725 deg/sec) was compared to post-test trial 1 (2.015 deg/sec).

Conclusions: In conclusion use of a 30% fatigue protocol resulted in significantly longer impairment of postural sway than compared to a 50% protocol. Because the 30% fatigue resulted in greater attenuation of effect, it does provide greater use for research purposes yet is still relatively short lived (~90sec).