Full Text

Wolters Kluwer Health | Lippincott Williams & Wilkins

MEDICINE & SCIENCE IN SPORTS & EXERCISE®

Off Am

Effects of Muscle Group and Visual Feedback on Force Control Abilities

Author(s): Schiffman, Jeffrey M.[1]; Luchies, Carl W.[2]; Hasselquist, Leif[1]; Norton, Karen P.[1]

ISSN: 0195-9131
Accession: 00005768-200405001-01651

Issue: Volume 36(5) Supplement, May 2004, p S345

Publication Type: [Annual Meeting Abstracts: H-22 - Free Communication/Poster: Musculoskeletal Mechanics and Landing Mechanics]

Institution(s): [1]U.S. Army Natick Soldier Center, Natick, MA. [2]Department of Mechanical Engineering, University of Kansas, Lawrence, KS.

2351

Study differences in the force variability of force control tasks may be due to differences in the feedback provided and the muscle group being tested. **PURPOSE:** To investigate the effects of visual feedback type and muscle group being tested on the variability produced during a force control task. **METHODS:** Twelve volunteers (21 ± 3.04 yrs, all right arm and leg dominant) participated in this study. Isometric force control task data was collected at two force levels (20% and 60% of maximal voluntary contraction (MVC)), for three muscle groups (elbow flexors, knee extensors, trunk extensors), using three types of visual feedback (continuous line matching, continuous bandwidth, discrete bandwidth). The bandwidth was set to ± 4% MVC. Data collected included 15 seconds of force output. Data was filtered with a low-pass Butterworth filter (10 Hz cut-off), eliminating phase shift using forward and backward passes. Force variability was calculated as the standard deviation of the torque over a 12 second window of each trial. **RESULTS:** Interaction effects were found for feedback × muscle group ($p < 0.05$) and for force level × muscle group ($p < 0.05$). Follow-up testing for the feedback × muscle group interaction yielded significant effects of feedback for the elbow ($p < 0.05$), knee ($p < 0.05$) and trunk ($p < 0.05$) muscle groups. As an illustrative example, at the knee extensors, force variability increased when discrete bandwidth feedback was presented versus continuous bandwidth or line matching types of feedback (3.05 ± 2.42 vs. 1.43 ± 0.97 or 1.33 ± 1.08 Nm). Consistent muscle group effects were found across feedback conditions ($p < .05$). The trunk extensors yielded the greatest variability followed by the knee and then the elbow. For example, with the discrete bandwidth condition, force variability for the trunk, knee, and elbow was 4.58 ± 3.15, 3.05 ± 2.43, and 1.32 ± 0.78 Nm respectively. **CONCLUSION:** This study demonstrated that continuous feedback reduces the variability of a force control task. Employing continuous feedback in a force control task may mask true impairment when assessing motor control. Further, force variability in muscle groups differs and therefore comparing findings across studies with different muscle groups should be done so with caution.