TACSM Abstract

Paraspinal Muscle Fatigue Influences Trunk Kinematics during Single-Leg Drop jump Landings

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ABSTRACT

Neuromuscular fatigue of the paraspinal muscles modifies kinematics responses to perturbations in controlled settings. **PURPOSE:** The purpose of this study was to assess trunk kinematics response during single-leg drop landings before and after induced neuromuscular fatigue of the low back muscles. **METHODS:** 13 male and female volunteers (22.3 ± 2.6 years, 1.66 ± 0.09m, 68.0 ± 14.0 kg) performed single-leg drop landings with their preferred leg from a 30 cm height before and after induced neuromuscular fatigue of the trunk. 3-D analysis of the trunk kinematics was performed using reflective spheres of 14 mm diameter. Maximum voluntary isometric contractions (MVIC) of trunk flexion and extension were performed in an isokinetic dynamometer. Six trials of each pre- and post-fatigue condition were recorded. Univariate ANOVA was used to compare dependent variables between conditions using participants as a co-variable. Dependent variables were trunk angle at contact, time to trunk response, peak trunk flexion angle, time to peak trunk flexion angle, trunk range of motion, and peak torque output during fatigue (PTO). Alpha level was set at $p \leq 0.05$. **RESULTS:** PTO significantly decreased during the fatigue protocol over time (150.6 ± 67.9 to 104.0 ± 43.2 Nm, $p < 0.03$). Trunk angle at contact increased (pre 18.0 ± 10.1 vs. post 22.8 ± 10.7º, $p < 0.05$), time to trunk response was delayed (pre 800 ± 210 vs. post 1000 ± 320 ms, $p < 0.01$), peak trunk flexion angle increased (pre 33.9 ± 14.7 vs. post 40.9 ± 13.8º, $p < 0.05$), time to peak flexion increased (1010 ± 220 vs. 1180 ± 300 ms, $p < 0.02$), but trunk range of motion (pre 19.1 ± 8.8 vs. post 20.8º, $p > 0.1$) did not change. **CONCLUSIONS**: Low back muscle fatigue significantly influences the response of the system to ground contact during a dynamic task. This may have implications for the trunk to attenuate ground reaction forces during landings, which could lead to injury of the lumbar spinal region.