THE EFFECTS OF WEARING SPANDEX PANTS ON IMPACT FORCES AND MUSCLE ACTIVITY DURING DROP LANDING

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INTRODUCTION: Nigg and Wakeling (2001) proposed that repetitive impact force are not an important form an injury perspective but are the reason for change in muscle activity to minimize soft tissue vibrations. Doan et al. (2003) found that wearing compressive shorts reduced muscle oscillation on landing and concluded that this may have benefit in terms of reduced tissue injury. If wearing spandex pants may tune the muscle to minimize vibration, there is specific adjustment made to reduce joint loading because subsequent changes in muscle activity would change joint stiffness. Since actual effect of wearing spandex pants on muscle activity and impact force are not established, the purpose of this study were to determine how spandex pants affect impact force and muscle activities in the lower extremity.

METHODS: Ten male university students (age: 20.7±1.2 yrs, height: 176.5±3.5 cm, weight: 659.2±45.5 N) were recruited as the subjects. Seven pairs of surface electrodes (QEMG8, Laxtha Korea, gain = 1,000, input impedance $>10^{12}\,\Omega$, CMMR >100 dB) were attached to the right-hand side of the body to monitor the rectus femoris (RF), vastus medialis (VM), vastus lateralis (VL), biceps femoris (BF), tibialis anterior (TA), and medial (GM) and lateral gastrocnemius (GL). Kinematic data from two digital camcorders (Sony DCR-HC48, 60 fields/s) and GRF data from two force platforms (AMTI OR6-5) were collected while subjects landed from a drop height of 0.5 m wearing spandex pants (Capsrok Inc, Korea) and regular pants in random order. Average and peak EMG values, GRFs, and loading rates were determined for each trial. For each dependent variable, paired *t*-test was performed to test if significant difference existed between two conditions ($p \leq .05$).

RESULTS AND DISCUSSION: The average EMG activities in the TA, BF, and GM during the landing phase reduced significantly when going from wearing spandex pants to wearing regular pants. All peak EMG activities except the RF in wearing spandex pants group were significantly greater than the corresponding values in wearing regular pants one. The greater muscle activity recorded in wearing spandex pants can be attributed to the greater motor unit recruitment needed to decelerate and stabilized their bodies. Wearing spandex pants may enhance joint proprioception, which in turn may affect muscle activity in the lower limb during landing. Impact force and loading rate were not significantly decreased with wearing spandex pants. The timing and patterns of the GRFs were fairly consistent between two conditions. Since the spandex pants used in this study were not custom-fit based on girth of each participant's thigh and shank, compression and elasticity for the pants were not optimized. If the pants are made to be very compressive, the results of this study may be different.
The greater EMG activity with wearing spandex pants may be due to either assuring continued stable and controlled landing movement or improved proprioception. Future studies should examine joint kinetics and kinematics during landing with wearing custom-fit spandex pants.

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