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Abdominal Bracing Increases Ground Reaction Forces and Reduces Knee and Hip Flexion During Landing.

Campbell A, et al. J Orthop Sports Phys Ther. 2016.
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Abstract

Study Design Controlled laboratory study. Background Abdominal bracing (AB) is a widely advocated method of increasing spine stability, yet the influence of AB on the execution of sporting movements has not been quantified. Landing is a common task during sporting endeavors; therefore, investigating the effect of performing AB during a drop-landing task is relevant. Objective To quantify the effect of AB on kinematics (ankle, knee, hip, and regional lumbar spine peak flexion angles) and peak vertical ground reaction force (vGRF) during a drop-landing task. Methods Sixteen healthy adults (7 female, 9 male; mean ± SD age, 27 ± 7 years; height, 170.6 ± 8.1 cm; mass, 68.0 ± 11.3 kg) were assessed using 3-D motion analysis, electromyography (EMG), and a force platform while performing a drop-landing task with and without AB. Abdominal bracing was achieved with the assistance of real-time internal oblique EMG feedback. Lower-limb and regional lumbar spine kinematics, peak vGRF, and normalized EMG of the left and right internal obliques and lumbar multifidus were quantified. Paired-samples t tests were used to compare variables between the AB and no-AB conditions. Results Abdominal bracing resulted in significantly reduced knee and hip flexion and increased peak vGRF during landing. No differences in lumbar multifidus EMG or lumbar spine kinematics were observed. Conclusion Abdominal bracing reduces impact attenuation during landing. These altered biomechanics may have implications for lower-limb and spinal injury risk during dynamic tasks. J Orthop Sports Phys Ther 2016;46(4):286-292. Epub 8 Mar 2016. doi:10.2519/jospt.2016.5774.

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