

Knee Biomechanics in Air Assault Soldiers Performing Two-Legged Drop Landings with and without Visual Input

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Landing tasks commonly result in non-contact knee ligament injuries and are widely performed in military training and operations. Previous civilian research has demonstrated mixed results on the effects of visual input availability on landing performance. Soldiers are frequently required to perform landings without sufficient visual input and although data are not available for tactical exercises specifically performed by air assault soldiers, night time tactical maneuvers increase the risk of injury two fold. **PURPOSE:** To determine the differences in knee landing kinematics and vertical ground reaction forces (VGRF) of air assault soldiers with and without visual input. **METHODS:** A total of 110 male air assault soldiers (28.7±7.1 yrs, 177.2±7.2 cm, 83.6±12.8 kg) participated. Subjects performed a two-legged drop landing task from a 50 cm platform onto two force plates. Six high-speed infrared cameras tracked the trajectories of the reflective markers attached to subjects' lower extremities. Subjects performed three trials each with visual input and blindfolded. Knee flexion angle, knee valgus angle, and VGRFs (normalized to body weight) were compared between conditions with dependent t-tests. **RESULTS:** No significant differences in knee flexion and valgus angles were detected at initial foot contact. When blindfolded, maximum knee flexion was less (right: 89±20° vs. 85±20°, p<0.001; left: 89±19° vs. 86±20°, p<0.001), maximum VGRF of the left foot was greater (333.9±88.9%BW vs. 351.5±83.3%BW, p=0.001), and time elapsed from initial foot contact to maximum VGRF of the left foot was longer (0.374±0.10 vs. 0.394±0.09 s, p=0.022). **CONCLUSION:** Diminished visual acuity caused the subjects to alter their landing strategy for the two-legged drop landing task. While the greater VGRF of the left foot may pose greater risk of injury, soldiers are able to dissipate the force by prolonging the time from initial foot contact to peak VGRF. Significant differences found only with the left leg raises the question whether landing strategies change based on the availability of visual input, perhaps increasing asymmetrical or preferable joint loads.

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