Association between Knee Strength and Landing Biomechanics in Marine Corps Forces Special Operations Command Operators

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Marine Corps Forces Special Operations Command (MARSOC) Operators are required to perform a multitude of complex tactical movements. Understanding the strategies used to attenuate shock during different dynamic tasks may provide insight into mechanisms associated with an increased risk of injury. **PURPOSE:** Examine landing mechanics and the association between knee strength and specific landing strategies. **METHODS:** Knee strength and sagittal plane knee kinematics were collected on 41 Operators (Age: 28.4 ± 6.1 years, Height: 178.8 ± 6.7 cm, Mass: 85.4 ± 7.9 kg). Knee extension strength (KES) was collected using an isokinetic dynamometer. Knee angle at initial contact (K@IC), peak knee flexion (pkKF), and peak vertical ground reaction forces (VGRF) were collected during a Forward Jump Single-Leg Landing task (FJSL) and a Double-Leg Drop Landing (DLDL) using a 3-D motion capture system. Pearson correlation coefficients examined the relationships between strength and landing mechanics. Paired samples t-tests examined asymmetries in strength and landing mechanics. Significance was set at p≤0.05. **RESULTS:** Increased K@IC and pkKF correlated to decreased VGRF during the DLDL (r=-0.327, p=0.037 and r=-0.643, p<0.001 for the right and r=-0.375, p=0.016 and r=-0.638, p<0.001 for the left), but these correlations were not significant during FJSL. KES did not correlate to any knee kinematic measures for their respective sides. Operators demonstrated asymmetrical KES (p=0.023) but not asymmetrical K@IC, pkKF, or VGRF during either the FJSL (p=0.825, p=0.097, p=0.998 respectively) or DLDL (p=0.703, p=0.246, p=0.380 respectively). **CONCLUSION:** During DLDL, minimizing VGRF involved the knee, but these strategies were not associated with KES, indicating factors other than KES play a role. During FJSL, which is a complex movement that incorporates balance, the relationship between knee kinematics and VGRF diminished, indicating that different landing strategies were required. Tactical movements are often complex, incorporating a combination of factors such as shock absorption and balance. Understanding how landing strategies change with increased complexity will provide insight into specific mechanisms associated with injury allowing for the design of effective injury prevention training strategies.