TITLE: The relationship between performance on the Sensory Organization Test and landing biomechanics during a single- and double-leg stop-jump

SECTION: Sports

PRESENTATION TYPE: Research Report - Platform

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ABSTRACT BODY:
Purpose/Hypothesis: Postural stability and functional joint stability both rely on proper sensorimotor control, including accurate afferent information, efficient central processing, and effective neuromuscular strategies; all resulting in the timely activation of dynamic restraints to perturbation. The Sensory Organization Test (SOT) and the evaluation of landing mechanics are methods by which postural stability and functional joint stability are assessed respectively. The purpose of this analysis was to determine if performance on the SOT is related to favorable landing mechanics during a stop-jump task.

Subjects: 80 Special Forces Operators [Age(yrs)=27(4.8), Height(in)=69.6(2.4), Weight(lb)=183.7(19.6)]. All Operators had been cleared for full duty.

Material/Methods: The SOT was performed using a dynamic posturography system that requires an individual to maintain balance throughout a series of conditions, with varying visual and somatosensory challenges, and provides outcome scores to assess balance performance. Two piezoelectric force plates were used to collect all kinetic data during the stop-jump tasks. Three-dimensional motion analysis was employed using infrared cameras and reflective markers. Subjects completed the SOT using the prescribed procedures by the manufacturer followed by three double-leg (DLSJ) and single-leg (SLSJ) stop-jump tasks. Sensory Organization Test variables included: Composite (COMP), Somatosensory (SOM), Visual (VIS), Vestibular (VES), and Preference (PREF) scores. Variables assessed during the landing tasks included: peak (P-) and initial contact (IC-) angles for the lower extremities (hip, knee, ankle), P- knee abduction moment, P- vertical and posterior ground reaction forces, and P- proximal anterior tibial shear force. Variables were only analyzed for the dominant leg during the stop-jump tasks. Pearson’s and Spearman’s Rank correlation coefficients were calculated to assess the correlation between SOT scores and landing characteristics. Significance was set at α<0.05 for all tests.

Results: For the DLSJ, significant correlations were found between: COMP and P-posterior ground reaction forces (-.257); VES and P- knee abduction moment (-.237); PREF and IC-hip flexion (-.297), P-hip flexion (-.249). For the SLSJ, significant correlations were found between: SOM and P- vertical ground reaction forces (-.246); PREF and IC- hip flexion (-.295), P-hip flexion (-.262).

Conclusions: While some significant correlations were found between the SOT and landing biomechanics these correlations were very low. Overall the data shows a general lack of relationship between the SOT and landing biomechanics.

Clinical Relevance: The lack of a relationship between postural stability and landing biomechanics in the current study demonstrates that training to improve postural stability may not result in concurrent improvements in landing biomechanics.
Keywords: Postural stability, landing biomechanics, knee
Character Count: 2940/3125

Supported by AFMC/AFRL FA86501226271

References: