Torso Movement Strategies for Low Back Pain and Spinal Cord Injury Patients in Manual Transfer Tasks

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People with spinal cord injury (SCI) are known to have adapted electromyographic activities and slow hand movement velocity, while those with low back pain (LBP) have reduced range of motion and lumbar joint contribution. However their resultant outcome in torso movements has not been systematically quantified. The objective of this study was to characterize functional limitation and adaptive strategies in seated manual transport tasks for (SCI), (LBP), and control participants. Seated participants performed either two- or one-handed loaded transports to one of six targets 49cm above the hip-point, at 0, 45, and 90° azimuths, at close and far distance. Three-dimensional torso movements were modeled by combinations of B-spline base functions. The SCI and LBP participants exhibit smaller torso flexion and axial rotation than control participants. The SCI participants tend to move the torso away from the target to maintain upper body balance. These differences among groups are significantly reduced in the one-handed transport condition and/or transports to the frontal target. The movement patterns suggest that SCI participants may have adapted torso movement strategies to compensate for the limited control of upper body balance, while LBP participants may limit torso motion to avoid pain.

abs2010_04