

A Bilateral Comparison of Overuse Shoulder Rotation in Overhead Throwing Athletes

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ABSTRACT

Repetition of an unnatural movement may lead to skeletal muscle and/or connective tissue injury resulting in bilateral deficits. These discrepancies can be identified via the assessment of electromyographic activation and peak torque (PT) values during concentric internal and external rotation. **PURPOSE:** The purpose of this study was to examine the bilateral differences in PT output and root mean squared (RMS) values during isokinetic internal and external shoulder rotation with association to overuse injuries. **METHODS:** Six overhead throwing athletes ($n=6$, age= 19 ± 1 year; height= 181.8 ± 7.5 cm; weight= 85.1 ± 7.9 kg) completed bilateral isokinetic internal and external rotation of the shoulder using an isokinetic dynamometer (Biodex System 4) while seated in an upright position. Subjects completed three contractions on command through 90 degrees of external rotation and 30 degrees of internal rotation at 60°/sec, 120°/sec, and 180°/sec. Two separate four-pin surface electromyography (EMG) sensors were used to record activation in the anterior and posterior deltoids. The PT and RMS values were averaged across contractions of the three separate velocities and used for statistical comparisons. Three separate two-way mixed factorial analysis of variance (ANOVAs) (rotation [internal v external] x arm [dominant v non-dominant]) were used to compare PT at the chosen velocities. Two separate two-way mixed factorial ANOVAs (velocity [60°/sec v 120°/sec v 180°/sec] x arm [dominant v non-dominant]) were used to compare RMS values at the chosen velocities for each muscle. **RESULTS:** For PT, there were no significant rotation x arm interaction ($p>0.01$). However, when collapsed by arm there was a significant main effect for rotation ($p<0.01$) at 60°/sec, 120°/sec, and 180°/sec. For RMS values, there were no significant interactions or main effects ($p>0.05$). **CONCLUSION:** Greater internal PT production during low velocity contractions is expected as torque and angular velocity are inversely proportional. Comparisons between internal and external PT is significant as overhead throwing mechanics require more proficiency in internal rotation than external rotation. Additionally, non-significant bilateral comparison may suggest that the subjects have been well trained to overcome expected deficiencies with overuse in sports specific tasks.