

## Sports Medicine & Movement Laboratory

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# The Relationship of Glove Arm Kinematics with Established Pitching Kinematic and Kinetic Variables among Youth Baseball Pitchers

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### ABSTRACT

**Background:** While the kinematics of the pitching arm, trunk, and pelvis have been described and studied, glove arm kinematics remain an understudied portion of the pitching motion. Baseball pitchers seek to achieve maximum ball velocity in a fashion that does not place the arm at risk of injury.

**Purpose:** The purpose of this paper was to assess the relationship between glove arm shoulder horizontal abduction and elbow flexion with pitching arm kinematics and kinetics in youth pitchers to determine if recommendations can be made toward a safer pitching motion.

**Study Design:** Descriptive Laboratory.

**Methods:** Thirty-three right handed youth male baseball pitchers ( $13.6 \pm 2.0$  yrs.;  $169.4 \pm 14.3$  cm;  $63.5 \pm 13.0$  kg;  $7.3 \pm 3.0$  yrs. of experience) threw three fastballs to a catcher while kinematic data were collected using an electromagnetic tracking system (trakSTAR™, Ascension Technologies, Inc., Burlington, VT, USA) synced with The MotionMonitor™ (Innovative Sports Training, Chicago, IL., USA). Spearman's rank order test was used to identify relationships between glove arm horizontal abduction and glove arm elbow flexion with various kinematics and kinetics found at the events of maximum shoulder external rotation (MER) and ball release (BR) for the fastest fastball delivered by each participant.

**Results:** At MER, there were significant relationships found between a more flexed glove arm elbow and increased pitching arm elbow valgus force ( $r_s(31) = -.52, p = .002$ ), increased pitching arm shoulder anterior force ( $r_s(31) = -.39, p = .024$ ), and decreased hip velocity ( $r_s(31) = -.45, p = .009$ ). Additionally, there were significant relationships between greater glove arm horizontal abduction at MER with increased pitching arm humeral velocity ( $r_s(31) = .52, p = .002$ ) and increased trunk rotational velocity ( $r_s(31) = .40, p = .022$ ) at MER.

**Conclusion:** A more extended glove arm elbow and more horizontally abducted glove arm shoulder at MER could prove to be more advantageous for performance and possibly be a safer motion for the baseball thrower.

***This abstract is a brief overview of a manuscript accepted for publication.***

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