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Changes in Glenohumeral Kinematics after a Competitive Season in Collegiate Baseball Pitchers

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Pitching is a highly dynamic movement involving a large range of motion (ROM), high rotational velocities, and substantial loading at the shoulder. Over years, repetitive loading from pitching results in alterations in passive glenohumeral (GH) rotation ROM including increased external rotation (ER) and decreased internal rotation (IR). This adaptation, known as humeral retroversion, is vital to improving performance, but may lead to GH IR deficit and losses in total shoulder ROM, both of which can increase injury risk. It is unknown if these passive ROM adaptations are present during GH kinematics during pitching and if these changes are observable from pre- to post-season. **PURPOSE:** To determine if adaptations in GH rotational kinematics during pitching occur during a competitive season. **METHODS:** Seven Division III collegiate pitchers participated. Pitchers threw six fastballs at pre-season visit and again eight months later at post-season visit. Motion capture recorded all kinematics. An individualized linear model approach was used to estimate scapular kinematics based on measurable humerothoracic motion and GH kinematics were subsequently calculated for each pitch. Data from the five pitches not used for model creation were analyzed for pre-/post-season changes in GH rotational kinematics using simulation modeling analysis, a single-subject approach for time-series data. **RESULTS:** One subject reported less maximum GH ER at post-season ($p=0.002$; mean difference = -17.3°) while all other subjects had similar values (range of post- minus pre-season differences: -7.0° to 6.5°). One subject reported greater maximum GH IR at post-season ($p=0.008$; mean difference = 15.6°) while all other subjects had similar values (range of post- minus pre-season differences: -9.6° to 16.1°). No significant differences were found for maximum GH IR velocity (range of post- minus pre-season differences: $-389.0^\circ/s$ to $392.9^\circ/s$). **CONCLUSION:** Most collegiate pitchers do not experience changes in GH rotational kinematics during a competitive season, however, the few that do so may exhibit changes that do not align with expected adaptations.