

## **DIFFERENCES IN SHOULDER CHARACTERISTICS BETWEEN BASEBALL PITCHERS AND POSITION PLAYERS**

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**Purpose:** To determine if differences exist in shoulder characteristics between baseball pitchers and position players and the strength of the relationship between these characteristics.

**Subjects:** Twenty baseball pitchers (age=22.6±3.6 years, height=179.5±41.4 cm, mass=93.2±7.9 kg) and 20 position players (age=22.3±2.3 years, height=181.7±5.2 cm, mass=88.0±8.5 kg) with no recent history (past 2 years) of shoulder or elbow injury voluntarily participated in this study.

**Materials/Methods:** Dominant arm scapular protraction and posterior shoulder tightness were measured in all subjects. Scapular protraction was measured as the distance between the anterior acromion to a wall using the double-square method (ICC=.84, SEM=4.6 mm). Posterior shoulder tightness was determined by the amount of glenohumeral (GH) horizontal adduction ROM in a supine position using a digital inclinometer (ICC=.93, SEM=1.7°). Independent t-tests were used to compare differences between groups ( $P<.05$ ). A stepwise regression analysis was used to determine if a relationship existed between GH horizontal adduction ROM (independent variable) and scapular protraction (dependent variable).

**Results:** The pitchers' descriptive statistics for scapular protraction and GH horizontal adduction ROM were 170.7±9.1 mm and -16.7±7.2°, respectively. The position players' descriptive statistics for scapular protraction and GH horizontal adduction ROM were 164.4±8.7 mm and -10.3±8.5°, respectively. The pitchers demonstrated significantly more scapular protraction ( $P=.03$ ) and less GH horizontal adduction ROM ( $P=.01$ ) than the position players. There was a moderate to good negative relationship between GH horizontal adduction ROM and scapular protraction ( $r=-.64$ ,  $P=.001$ ).

**Conclusions:** Our results show that pitchers have significantly more scapular protraction and less GH horizontal adduction ROM compared to position players. Furthermore, increased scapular protraction can be partially explained by decreased GH horizontal adduction ROM.

**Clinical Relevance:** Clinicians have hypothesized that as the arm is brought across the body during the follow through phase of the throwing motion, posterior shoulder tightness may result in the humerus pulling the scapula forward into a more protracted position. Our findings of a moderate to good relationship between scapular protraction and GH horizontal adduction ROM partially support this theory. The increased scapular protraction, as well as the decreased GH horizontal adduction ROM found in pitchers compared to position players may help explain the higher prevalence rate of shoulder injuries among pitchers. As such, clinicians may find it advantageous to examine these characteristics when treating pitchers with shoulder injuries. Furthermore, pitchers may benefit from preventative stretching and strengthening exercises aimed at assisting with these shoulder discrepancies to decrease the prevalence of shoulder injury.