

Relationship between Range of Motion, Strength, Upper Quarter Y-balance Test and a history of Shoulder Injury among NCAA Division I Overhead Athletes

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Context: The shoulder is subjected to high levels of force during dynamic movement in overhead athletes making it a common site for injury. Several risk factors have been identified as contributors to the development of shoulder injuries, including glenohumeral internal rotation deficit, rotator cuff weakness, and shoulder instability. Previous investigations assessing the physical characteristics among overhead athletes with a history of a shoulder injury have been inconclusive and require further investigation to identify lasting deficits that may exist in this population. **Objective:** To compare shoulder range of motion (ROM), strength, and upper quarter dynamic balance between collegiate overhead athletes with and without a history of a shoulder injury. **Design:** Case-control. **Setting:** Athletic training clinic. **Patients or Other Participants:** 58 overhead athletes were distributed into a history of shoulder injury (n=25, age:20.0±1.2years, mass:78.6±12.3kg, upper limb length:92.1±5.5cm) and healthy group (n=33, age:20.1±1.1years, mass:79.0±12.0kg, upper limb length:91.7±4.1cm). Participants were recruited if they were fully participating in NCAA division I baseball, softball, volleyball, or tennis and free of any current signs or symptoms of shoulder injuries. Participants in the history of shoulder injury group had a previously resolved shoulder injury that was diagnosed by an athletic trainer or physician and required treatment. **Interventions:** A reliable rater (ICC's=0.81-0.97) measured active ROM for internal rotation (IR), external rotation (ER), and horizontal adduction (HAD) of the dominant shoulder using a digital inclinometer. Isometric strength for dominant shoulder IR and ER at 90° of abduction was standardized and measured using a hand-held dynamometer. The upper quarter dynamic balance was assessed via the Upper Quarter Y Balance Test (UQYBT). **Main Outcome Measures:** One-way analyses of variance (ANOVA, $p \leq 0.05$) and Cohen's d effect sizes were calculated to compare differences in ROM, strength, and UQYBT between the injury and healthy groups. **Results:** The injury group demonstrated a lower UQYBT mean score in the superolateral direction ($p=0.033$, $d=0.56$). However, there were no statistically significant intergroup differences in shoulder IR ROM ($p=0.541$, $d=0.16$), ER ROM ($p=0.921$, $d=0.03$), HAD ROM ($p=0.946$, $d=0.02$), IR strength ($p=0.280$, $d=0.29$), ER strength ($p=0.238$, $d=0.32$), ER/IR strength ratio ($p=0.377$, $d=0.24$), medial direction of UQYBT ($p=0.716$, $d=0.10$), and inferolateral direction of UQYBT ($p=0.493$, $d=0.18$). **Conclusions:** The results of this study showed that while there were no differences in ROM or strength, those with a previous history of shoulder injury had poorer UQYBT in the superolateral direction despite a lack of ongoing symptoms or deficits in function. The diagonal pattern of the superolateral direction in UQYBT is related to overhead motions, such as throwing, serving, and spiking. Therefore, this study suggested that clinicians should examine the diagonal pattern and provide overhead athletes with proper upper quarter dynamic balance and stabilization training to potentially prevent recurrence of the shoulder injury. **Word Count:** 448