THE RELATIONSHIP BETWEEN SHOULDER PAIN AND SCAPULAR MOBILITY IN TEENAGE BASEBALL PLAYERS

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The purpose of this study was to identify the relationship between shoulder pain and scapular mobility for teenage baseball players. Thirty-five teenage baseball players (shoulder pain, n=11; healthy, n=24) were recruited in this study. The lateral scapula slide test (LSST), which represented as scapular mobility, was used to measure the scapular position and symmetry under varying loads. The result of this study showed that there was a difference in distance from the superior angle of the scapula to the spinous process of T2 between the two groups at shoulder 90˚ abduction.

KEY WORDS: baseball, shoulder pain, scapular mobility.

INTRODUCTION: Repetitive throwing with exertion has been commonly seen in baseball players and may bring negative impact to the shoulder and scapular complex. Most researchers have focused upon anatomical changes in the glenohumeral joint for shoulder injuries in baseball players. However, the stability of the scapula in the entire throwing sequence may be the key during throwing motion (Kibler, 1991; Kibler, 1998).The position and stability of the scapula may be related to the shoulder pain resulting from impingement syndrome and rotator cuff injuries in athletes involved with overhead movements, such as volleyball and baseball (Park, Loebenberg, Rokito, & Zuckerman, 2002a; Park, Loebenberg, Rokito, & Zuckerman, 2002b; Oyama, Myers, Wassinger, Ricci, & Lephart, 2008; Ozunlu, Tekeli, & Baltaci, 2011).
In the throwing motion, the trapezius muscles and rhomboid muscles both contract to stabilize the scapula in order to provide protraction and upward rotation of the scapula during the deceleration phase of baseball pitching (Glousman, Jobe, Tibone, Moynes, Antonelli, & Perry,1988; Escamilla & Andrews, 2009). The scapula moves with appropriate position and stability to work with the glenohumeral joint in throwing (Kibler, 1991; Kibler, 1998; Ozunlu et al, 2011). Therefore, the position and stability of the scapula, whether loaded or unloaded, is an important link between the trunk and shoulder motion in sequential movements. The lateral scapular slide test (LSST) was designed to assess scapular asymmetry under varying loads (Kibler, 1991; Kibler, 1998). Muscle tightness or weakness around the scapula may result in muscle imbalance around the scapula and may subsequently result in shoulder injuries. However, limited research has been done to investigate the relationship between shoulder pain and scapular mobility in adolescent athletes. The purpose of this study was to identify the relationship between shoulder pain and scapular mobility using lateral scapula slide test in teenage baseball players.

METHODS: Thirty-five teenage baseball players were divided into a shoulder pain group and healthy group via a physical screening performed by a physiotherapist (shoulder pain group, N=11, average age=13.18 years, average height=160.1cm, average mass=53.8 kg; healthy group, N=24, average age=13.42 years, average height =160.8 cm, average mass =56.0 kg). The LSST was used to assess scapular asymmetry under varying loads (Odom, Taylor, Hurd, & Denegar, 2001; Shadmehr, Bagheri, Ansari, & Sarafraz, 2001; Magee, 2007) and the stability of the scapula during glenohumeral movements. This test was performed with the upper extremity abducted to 0°, 45°, and 90° in the coronal plane, in which we measured

the distance between the inferior or superior angle of the scapula and the corresponding thoracic spinous processes (T2 & T7-T9). These measurements were made on the dominant side (Magee, 2007). Data were analyzed using independent sample t-tests.

RESULTS: The results in dominant side showed a significant difference in the distance between the superior angle of the scapula and the spinous process of T2 between two groups at shoulder 90˚ abduction (p=0.03, Figure 1). No significant differences were found for other comparisons between the two groups.

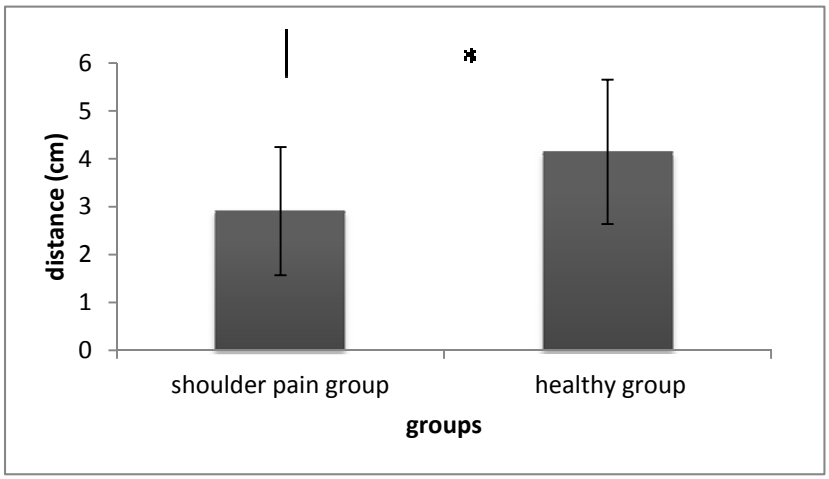

Figure 1: The distance of the superior angle of scapula to the spinous process of T2 in dominant arm at shoulder abduction 90º position during LSST.(* indicates p<0.05).

DISCUSSION: Results showed that the distance between the superior angle of the scapula and the spinous process of T2 was shorter for the shoulder pain group when compared to the healthy group at shoulder abduction90˚. Nijs et al. (2005) found that the LSST provide higher reliability to assess the scapular position in patients with shoulder pain. Also, Nijs et al. (2007) supported previous evidence that abnormal scapular positioning in shoulder impingement syndrome and shoulder instability are increasing. A possible mechanism may be that the surrounding muscles in scapula had over-contraction and exhibited in retracted position in order to against the scapula movement to protraction position in the throwing sequence (Glousman et al., 1988; Escamilla & Andrews, 2009). Based on the results, we realise that the rhomboid muscles of the shoulder pain group may have insufficient muscle endurance than the healthy group, so that the rhomboid and middle trapezium muscles get tightness if subjects perform excessive throwing, especially in teenage players. The middle trapezium and rhomboid muscles tightness would progressively affect the scapulohumeral rhythm and bring negative impact to the throwing sequence (Park et al., 2002a, b). Finally, this situation may result in a motion dysfunction and soft tissue injuries of the shoulder complex. In addition, some authors wondered about the validity and specificity of LSST while used the LSST to recognize the scapular position (Odom et al., 2001; Koslow, Prosser, Strony, Suchecki, & Mattingly, 2003; Ozunlu et al., 2011; Shadmehr et al., 2010), however, some authors had different opinion (Nijs et al., 2005; Curtis & Roush, 2006; Nijs et al., 2007; Struyf, Nijs, De Coninck, Giunta, Mottram, & Meeusen, 2009). In future studies, we may add electromyography and kinematic measurements during the LSST to allow for understanding the position of scapular and neuromuscular control of the scapula.

CONCLUSION: Our results showed that the distance between the superior angle of the scapula and the spinous process of T2 was shorter in the shoulder pain group when compared to the healthy group. This was especially the case at shoulder abduction 90˚. The rhomboid and trapezium muscle tightness may be a potential factor resulting in abnormal scapulo-humeral rhythm and subsequent muscle overuse or shoulder pain.

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