

Does scapula stabilizing t-shirt help over-head athletes in shoulder discomfort? A randomized control study

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Summary. Scapular dyskinesis in pitchers can potentially lead to impairments in the optimal performance of muscles of the shoulder complex. The purpose of this prospective study was to evaluate whether the use of a scapula stabilizing t-shirt can decrease stress and discomfort in over-head baseball pitchers. Thirty-two semi-professional baseball pitchers were divided into 2 groups. Group A dressed the scapula stabilizing t-shirt during the weekly practice while group B (control group) continued to follow their training program without the t-shirt. All pitchers underwent a clinical examination at the beginning of the study (T0), 4 weeks (T1) and 8 weeks after (T2). Data collected showed a better clinical outcome at T1 which increased in T2 for pitchers in Group A, while in Group B athletes these positive results were not observed. This study underlines that scapula-stabilizing t-shirt can have positive effects on shoulder discomfort in over-head athletes. (www.actabiomedica.it)

Key words: over-head athletes, pitchers, shoulder discomfort, scapula stabilizing t-shirt

Introduction

Shoulder discomfort in overhead athletes can be defined as an unspecific pain located in the throwing upper quadrant which is associated to positive clinical tests (p.e. Jobs and O'Brien tests) in absence of observable musculoskeletal lesions.

The overhead throw, is one of the most traumatic movements in sport for the shoulder joint. The rotational speed of the overhead throw is 7000 grad/sec in baseball, while in tennis it is 1500 grad/sec (1) (Fig. 1).

In baseball, all players do throwing but the frequency depends on the position on the field. The pitcher is the player with the most throws reaching as many as 100 per game, some with non-linear trajectory (effect pitch such as the curve ball, slider, change-up, etc.).

Throwing is one of the most complex movements and requires simultaneously coordination, balance, power and precision.



Figure 1. Pitcher during arm acceleration phase with the arm positioned at 90° of abduction and maximal external rotation

It is thus understandable why the shoulder, especially in pitchers during the off-season, is particularly stressed and can present frequent discomfort.

Throwing has been accurately analysed and is subdivided in 6 phase: wind-up, early and late coking, acceleration, deceleration and follow-through phase.

During the Cocking phase, which is considered the most dangerous for the shoulder motion, scapular elevation, upward rotation, and posterior tilting are coordinated with humeral elevation to maintain sufficient space in the subacromial area (2-5). This coordinated motion between the scapula and humerus during arm elevation is commonly referred to as scapulohumeral rhythm. Alterations in scapulohumeral rhythm are known as scapular dyskinesis (6). Bony, joint, and neurologic factors can all contribute to dyskinesis, but alterations in soft tissue flexibility and muscle performance are the most common (6).

Scapular dyskinesis in pitchers can potentially lead to impairments in the optimal performance of muscles of the shoulder complex. This may result in pathological conditions such as rotator cuff impingement or tendinitis, rotator cuff tears, glenohumeral instability, and labral tears (2-4, 6, 7).

The purpose of this prospective study was to evaluate whether the use of a scapula stabilizing t-shirt can have an influence on scapulohumeral rhythm in over-head baseball pitchers, thus decreasing stresses and discomfort of their shoulder.

Materials and methods

From January to March 2015, a clinical trial with a randomized control group was performed for clinical evaluation of scapula stabilizing t-shirt ACTIVE TENSE® (Erreà® Sport S.p.A. San Polo di Torrile, Parma, Italy) (Fig. 2) on overhead pitchers shoulders. The study was previously approved by our institutional review board (University of Parma). All athletes provided informed consent before participating in the study.

Thirty-two semi-professional baseball pitchers, aged between 18 and 25 years, were enrolled. None had history of previous shoulder documented pathologies and surgery, but all had a positive history of shoulder



Figure 2. Left-handed pitcher who wears scapula stabilizing t-shirt; wind-up and late cocking phase

discomfort in the past seasons. All athletes were similar for type and number of practice, number of pitches and friendly game played in the period of the study.

All pitchers underwent a clinical examination, which included specific shoulder tests (Jobe and O'Brien) and a validated discomfort scale (VAS: visual analog scale) (8). The evaluation was performed by the same orthopedic surgeon (A.P.) (Fig. 3) at the beginning of the study (T0), after 4 weeks (T1) and again after 8 weeks (T2).

Athletes were randomly divided into 2 groups: Group A (16 subjects) used the scapula stabilizing t-shirt during the weekly practice while group B (control group of other 16 subjects) continued to follow their training program without using the t-shirt.

Participants of both groups trained three days per week; they followed this throwing program and increased the working load getting close to the season (number and intensity of pitching):

First training: starting from 15-20 meters (mt) of 10 minute pitching increasing to 30 mt lately in the off-season period using the off-speed pitch.



Figure 3. Pitcher and orthopaedic surgeon (AP) during clinical evaluation; Jobe test

Second training: starting on the distance of 30-40 mt for the most part of the practice increasing the intensity of the power to the 70% in the bullpen mixing all the off-speed pitch to the fastball.

Third training: one time a week practice the long toss in order to relax the arm.

Results

In general at T0 examination 14 athletes resulted positive for Jobe test (44% of the total). At T1 this number decreased (12 positive Jobe test – 38%); this datum was also confirmed at T3 evaluation. O'Brien test was instead positive at T0 in 24 pitchers (75% of

the total). At T1 and T3 this number decreased (16 positive test (50%) and 14 (43%) respectively).

The 2 randomized groups showed a completely different behavior during this off-season practice period, as demonstrated in figure 4 and table 1 and 2:

In particular the results were the following:

Group A (Tab. 1)

- T0: O'Brien positive for 14 athletes (87%), Jobe test positive for 8 (50%) and a mean VAS of 4;
- T1: O'Brien positive for 4 athletes (25%), Jobe test positive for 6 (38%) and a mean VAS of 2;
- T2: O'Brien positive for 2 athletes (13%), Jobe test positive for 3 (19%) with a mean VAS of 2;

Group B (Tab. 2)

- T0: O'Brien positive for 10 athletes (63%), Jobe test positive for 6 (38%) and a mean VAS of 3;
- T1: O'Brien positive for 12 athletes (75%), Jobe test positive for 6 (38%) and a mean VAS of 3;
- T2: O'Brien positive for 12 athletes (75%), Jobe test positive for 8 (50%) with a mean VAS of 3;

Discussion

Baseball is generally a safe sport played by about 5.7 million youths throughout the United States (9) (10). Overhead throwing is particularly stressful for the shoulder. However, as with other sporting activities, participation does include a risk of injury. For this

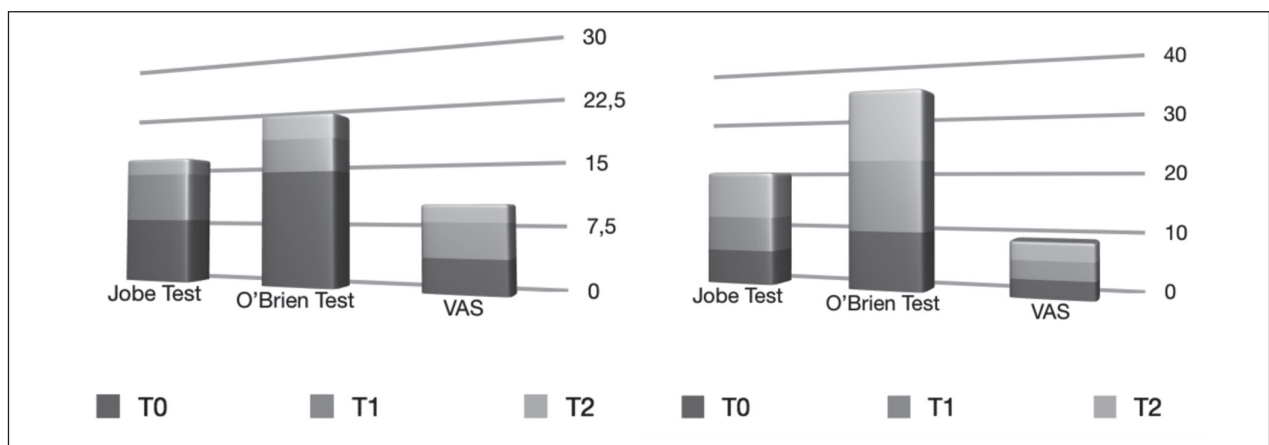


Figure 4. Distribution of clinical test positivity and VAS score in pitchers at the 3 different time of follow up (left Group A and right Group B)

Table 1. Data collected from Group A

Group A	T0			T1			T2		
	Jobe Test	O'Brien Test	VAS	Jobe Test	O'Brien Test	VAS	Jobe Test	O'Brien Test	VAS
Pitchers									
1	0	1	2	0	0	1	0	0	1
2	0	1	2	0	0	1	0	0	1
3	1	1	6	1	1	4	0	0	4
4	1	1	5	1	0	2	0	0	2
5	1	1	4	0	0	2	0	0	2
6	0	0	1	0	0	1	0	0	1
7	1	1	4	0	0	2	0	0	2
8	0	1	5	0	0	2	0	0	2
9	1	1	6	1	1	5	1	1	5
10	0	1	3	0	0	1	0	0	1
11	1	1	6	1	1	4	1	1	4
12	1	1	6	1	1	4	0	1	4
13	0	0	2	0	0	2	0	0	2
14	0	1	4	0	0	2	0	0	2
15	0	1	3	0	0	1	0	0	1
16	1	1	5	1	0	1	0	0	1
	8	14	4	6	4	2	2	3	2

Table 2. Data collected from Group B

Group B	T0			T1			T2		
	Jobe Test	O'Brien Test	VAS	Jobe Test	O'Brien Test	VAS	Jobe Test	O'Brien Test	VAS
Pitchers									
1	1	0	3	1	1	4	1	1	4
2	0	0	1	0	0	1	0	0	1
3	1	1	5	1	1	5	1	1	5
4	0	1	2	0	1	2	0	1	2
5	0	1	2	0	1	2	0	1	2
6	0	1	2	0	1	2	0	1	2
7	0	1	3	0	1	4	1	1	4
8	0	0	1	0	0	1	0	0	1
9	1	1	6	1	1	6	1	1	6
10	1	1	4	1	1	4	1	1	4
11	0	0	1	0	0	1	0	0	1
12	1	1	5	1	1	5	1	1	5
13	0	0	2	0	0	2	0	0	2
14	0	0	2	0	1	3	0	1	3
15	1	1	5	1	1	5	1	1	5
16	0	1	3	0	1	4	1	1	4
	6	10	3	6	12	3	8	12	3

reason pitchers are particularly susceptible to shoulder discomfort which may hesitate in invalidating lesions. Lyman et al reported 47% of youth baseball pitchers experienced pain in the shoulder over the course of 2 seasons (10). Furthermore, Fleisig et al. reported 5% of youth pitchers had serious shoulder injuries (resulting in surgery or retirement) over a 10 year period (11). Most of these injuries are consequent to overuse, the result of cumulative microtraumas rather than a single traumatic accident, that modify the physiological scapulohumeral rhythm, thus facilitating the development of scapular dyskinesia (9-12).

Scapular dyskinesia in pitchers can potentially lead to impairments in the optimal performance of muscles of the shoulder complex. This loss of muscular balance may result in pathological conditions such as rotator cuff impingement or tendinitis, rotator cuff tears, glenohumeral instability, and labral tears (2-4, 13, 15, 16).

To prevent these inconveniences it is important to follow a specific training program during the season and especially during training camp which maintains muscle tone in the scapulohumeral complex, keeping the humeral head well centred in the glenoid cavity.

McClure and Laudner reported good outcome for pitchers who underwent rehabilitation protocol for scapula and rotator cuff muscle balance and exercises for posterior capsule stretching (17, 18).

Furthermore, Hsu YH showed the effectiveness of elasting taping in muscle performance and scapula position in over-head athletes. Based on these results reported in the literature, the authors decided to study the scapula stabilizing t-shirt proposed by Erreà® in order to evaluate if this support could influence the scapulohumeral rhythm of these pitchers, thus improving and preventing their shoulder discomfort (19).

Data collected in this study showed a decrease in clinical test positivity and VAS score for pitchers who used this t-shirt.

The authors believe that, similarly to the elastic taping, this scapula stabilizing t-shirt acts with a retroposition of the scapula thus opposing the scapular dyskinesia typical of the pitchers. In comparison to the elastic taping the authors want to stress the advantages of this support, which is easy and fast to don, is reusable and does not require the help of a physiotherapist.

Even if authors did not observe any injuries during the study period, a bigger number of athletes is required to confirm the potential benefits of this scapula stabilizing t-shirt.

Conclusions

The results of this study suggest that this scapula stabilizing t-shirt can have positive benefits on scapulohumeral rhythm of baseball pitchers, thus diminishing the frequency of shoulder discomfort in these athletes.

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