

Effects of Two Scapula Strengthening Programs on High School Baseball Players

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ABSTRACT

Scapular dyskinesis occurs in baseball players at all levels, which may result in functional abnormalities and throwing injuries throughout a career. Strengthening the musculature that supports the position of the scapula is necessary for improving longevity in baseball. **Purpose:** The purpose of this study is to determine if improvements in scapular strength and stability in high school baseball players are facilitated more from a traditional strength training program (TRAD) or a combination of traditional strength training plus resistance band training (COMBO). The importance of this study is to establish the most effective training program for high school baseball players. **Methods:** Twenty-two high school baseball players (age range: 15-18 years) were selected for the traditional and combination training groups. During the six week program, the TRAD group completed a resistance program three days per week. The COMBO group completed nine band exercises, three times per week in addition to the traditional resistance training program. Measurements of scapular mobility, strength, and functional movement was tested pre-and post-program. **Conclusion:** The COMBO group did not increase either scapular strength or stability significantly over the TRAD group.

BACKGROUND

- The scapula plays an important role in shoulder function.
- Scapular Dyskinesis, which is defined as a noticeable alteration in the motion and position of the scapula relative to the torso, is often a complication seen in baseball players.
- Scapular Dyskinesis can lead to shoulder impingement syndrome in throwing athletes causing uncomfortable pain and weakness.
- Scapular stabilizing exercise programs have been implemented by coaches to prevent Scapular Dyskinesis and other shoulder injuries.
- There is limited research showing the effects of a functional resistance band program combined with a traditional resistance training program.
- Scapular strength and mobility can be assessed by having technicians administer the following tests: Lateral Scapular Slide Test (LSST), Functional Side-to-Side test, Reverse Fly Strength Test, Row Strength Test.

EXPERIMENTAL AIM and HYPOTHESIS

The purpose of this study was to determine if a combination of traditional and resistance band training will show improvements to scapular strength and stability compared to only a traditional resistance training program

We hypothesize that both COMBO and TRAD training groups will improve scapular mobility, strength, and functional movement significantly. However, the COMBO group will improve more than the TRAD group.

METHODS

Subjects

- 22 volunteer high school baseball players (16.5 +/- 1.1 years)
- Testing included: LSST, Functional Side-to-Side Test, Reverse Fly and Row Strength Test
- All subjects provided written informed consent according to IRB guidelines at the University of Wisconsin – Eau Claire.



Figure 1. (left to right) Internal Rotation, External Rotation, Incline Press Plus, and Victory

Figure 2. Scaption



Figure 3. Incline Press Plus

Table 2. Resistance Band Exercises

90/90 External Rotation
90/90 Internal Rotation
Row
Reverse Fly
Chest Press Plus
Incline Press Plus
Victory
Scaption

Table 3. Combination training group protocol

Progression	Sets	Repetitions
Week 1: Red Band	2	10
Week 2: Red Band	3	10
Week 3: Red Band	5	12
Week 4: Red Band	3	6 regular, 6 oscillations
Week 5: Blue Band	2	10
Week 6: Blue Band	3	10

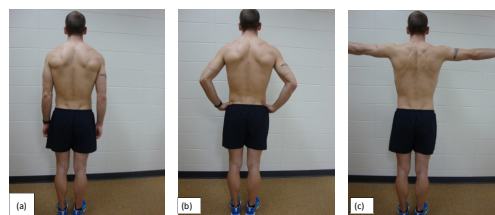


Figure 4a-c. (a) LSST resting position (b) LSST hands on hips position (c) LSST arms spread position

STATISTICAL ANALYSIS

A one-way ANOVA test was used to validate that our two groups were not significantly different from one another following pre-testing. A Pearson Correlation was used to show intratester reliability within all tests. Following post-testing we analyzed our data via a 2-way ANOVA test with repeated measures. This showed if significant differences or interactions were present between groups, within groups, and between groups over time. Statistical significance was set at $P < 0.05$. Software used was SPSS version 19.0.0; SPSS Inc, Chicago, IL.

RESULTS

- No significant interactions between groups.
- Significant changes were found from pre- to post-testing in the LSST at the hips-inferior angle, functional side-to-side test, and row test for both groups.

Testing Variables	Pre-Testing		Post-Testing	
	Band / Traditional	Band / Traditional	Band / Traditional	Band / Traditional
REST:				
Inferior Angle	9.94 / 10.17		10.28 / 10.36	
Supraspinatus Fossa	7.28 / 7.44		6.94 / 6.67	
Superior Angle	7.88 / 8.06		7.69 / 8.42	
HIPS:				
Inferior Angle	10.13 / 9.64		10.63* / 10.06*	
Supraspinatus Fossa	7.0 / 6.33		6.34 / 6.36	
Superior Angle	7.97 / 7.78		7.28 / 7.86	
SPREAD:				
Inferior Angle	9.5 / 9.78		10.22 / 9.53	
Supraspinatus Fossa	4.31 / 4.44		3.97 / 3.86	
Superior Angle	6.19 / 6.69		5.5 / 6.39	
FUNCTIONAL/STRENGTH:				
Functional Side-to-Side	28 / 26.4		31.1* / 28.9*	
Row	13.6 / 14.6		15.6* / 15.8*	
Fly	10.4 / 11.4		11.6 / 11.8	

*indicates a significant change ($P < 0.05$)

DISCUSSION, LIMITATIONS, and FUTURE RESEARCH

Discussion

- The COMBO group did not increase either scapular strength or stability significantly over the TRAD group.

Limitations

- Small sample size (N=22).
- Lack of time to elicit a full training response.
- Unable to monitor the traditional exercise program.
- The accuracy of the measuring devices (0.5 cm).

Future Research

- Measure improvements in rotator cuff musculature.
- Consider both throwing and non-throwing arms.

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