

Effectiveness of Resistance Band Training on Scapular Stability in High School Baseball Players

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ABSTRACT

Purpose: 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 shoulder joint health and performance. The purpose of this study was to determine if improvements in scapular muscle strength and stability in high school baseball players are facilitated more from a traditional resistance training program (TRT) or a combination of traditional strength training plus resistance band training (TRT+B). **Methods:** Seventeen high school baseball players and nine, age-matched controls (non-players) were recruited for this study (age: 16.5 +/- 1.1 yrs). The baseball players were then randomly assigned to a TRT or TRT+B group. During the 6-wk pre-season program, the TRT group completed a resistance program 3 days/wk. The TRT+B group completed nine resistance band exercises, 3 days/wk in addition to the traditional resistance training program. Participants underwent pre- and posttesting using the following assessments: 1) Lateral Scapular Slide Test (LSST); 2) Functional Stability Test (FST); 3) Dumbbell Row Test; and 4) Dumbbell Reverse Fly Test. **Results:** For each arm position in the LSST, no significant differences were observed for group and time ($p > .05$). Although, data trends suggest that TRT was more effective at improving scapular stability compared to TRT+B. Significant differences were found in the FST ($p < .05$) pre- to posttraining for TRT and TRT+B with the TRT+B demonstrating a greater improvement (11%) compared to TRT. A significant difference ($p < .05$) was found in dumbbell row for TRT+B, but not for reverse fly in either group. TRT+B also showed the most improvement with a 14.7% and 10% increase in dumbbell row and reverse fly repetitions posttraining, respectively. **Conclusion:** According to results, TRT+B and TRT demonstrated similar effects on measures of scapular mobility and shoulder function. TRT+B was superior at improving functional scapular stability as measured through the FST. Thus, the addition of resistance band training to a TRT program may be of benefit to improve scapular function in high school baseball players.

BACKGROUND

- 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.

PURPOSE and HYPOTHESIS

To determine if a combination of traditional and resistance band training (TRT+B) will show improvements in scapular strength and stability compared to only a traditional resistance program (TRT).

We hypothesize that both TRT+B and TRT training groups will improve scapular mobility, strength, and functional movement. However, the TRT+B group will improve more than TRT.

Table 1. TRT+B group protocol

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

METHODS

Subjects

- 17 HS baseball players (16.5 +/- 1.1 years) during the off-season period.
- 6-wk, 3 days/wk training program
- Testing included: LSST, FST, Reverse Fly & Row Strength Test



Fig 1. (L-R) 90/90 IR, 90/90 ER, Incline Press Plus, and Victory



Fig 2. Scaption

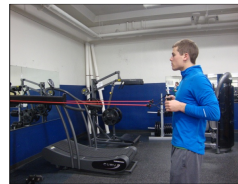


Fig 3. Row



Fig 4. Reverse Fly



Fig 5. Chest Press Plus

Table 2. TRT exercises	Sets	Reps
Cleans	3	8
Pull Ups	2	8
Chest Fly	2	8
Tricep Pushdowns	2	8
Bench Press DB	3	8
Bent Over Row	3	8
Wrist Curls	2	20
Frontal Raise	3	12
Lateral Raise	3	12
Bent Over Fly	3	12
Y Raise and Inverted Y w/ Stability Ball	3	12
Horizontal Chop	2	10
Low to High	2	10
High to Low	2	10

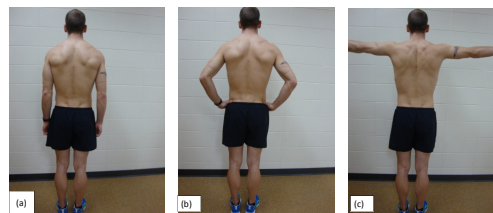


Figure 6a-c. (a) LSST resting position (b) LSST hands on hips position (c) LSST arms spread position

STATISTICAL ANALYSIS

- 1-way ANOVA to determine group differences at pre-testing.
- Pearson r to demonstrate intra-rater reliability for all tests ($r = .78-.97$).
- 2-way ANOVA repeated measures to determine group differences across time and training mode.
- Alpha level set at $p < .05$.
- SPSS version 19.0.0; SPSS Inc, Chicago, IL.

RESULTS

- For each arm position, no significant changes ($p < .05$) were found in the LSST in group vs time.
- Significant differences ($p < .05$) were found from pre- to posttraining for the TRT+B & TRT groups on the FST.

Table 3. LSST & functional measures for TRT+B (n=8) & TRT (n=9) groups.

Variables	TRT+B		TRT	
	Pre	Post	Pre	Post
REST (cm):				
T7-IA	9.94±1.35	10.28±1.34	10.17±1.33	10.36±1.31
T3-SF	7.28±1.62	6.94±1.14	7.44±2.42	6.67±1.93
T2-SA	7.88±1.64	7.69±1.11	8.06±1.0	8.42±1.38
HIPS (cm):				
T7-IA	10.13±1.60	10.63±1.52	9.64±0.87	10.06±0.74
T3-SF	7.0±1.53	6.34±1.26	6.33±2.62	6.36±2.26
T2-SA	7.97±0.80	7.28±1.06	7.78±0.70	7.86±1.38
SPREAD (cm):				
T7-IA	9.5±1.89	10.22±1.73	9.78±1.05	9.53±1.20
T3-SF	4.31±1.99	3.97±1.24	4.44±2.18	3.86±1.56
T2-SA	6.19±1.61	5.5±1.05	6.69±1.09	6.39±1.65
FUNCTIONAL:				
FST (reps)	28.0±4.0	31.1±4.2*	26.4±2.07	28.9±4.6*
Row (reps)	13.6±2.9	15.6±2.8*	14.3±7.3	15.8±6.8
Fly (reps)	10.4±1.5	11.6±2.4	11.4±2.6	11.8±2.4

*Significant difference pre- to posttraining ($p < .05$)

CONCLUSIONS & LIMITATIONS

Conclusions

- Data trends suggest that the addition of resistance bands to TRT are not more effective at improving scapular stability over TRT alone.
- TRT+B showed an overall greater improvement for FST (11% vs 9.5%), Row (14.7% vs 10.5%), and Fly (10% vs 3.5%).
- For improving shoulder strength and endurance, the addition of resistance band training to a traditional resistance program may be of benefit in HS baseball players.

Limitations

- Small sample size in training groups (N=17).
- 6-wk training program prior to season.

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