Effectiveness of Strength Training Programs at Decreasing Upper Extremity Injury Rates in Youth Baseball Players: A Critically Appraised Topic

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CLINICAL SCENARIO

- Incidence of both youth sport specialization and overuse injuries continue to rise.[1,2] Baseball is a common sport where sport specialization begins in young adolescents.
- Youth baseball players are subject to increased risk of overuse injuries due to a combination of factors including skeletal immaturity, lack of proper biomechanics, and the heavy workloads in youth elite-level sports.[3,4]
- Injury prevention guidelines exist,[2] including recommendations for pitch counts and inning limits for youth baseball pitchers,[5] as a means to reduce injury risk. However, current guidelines fail to address the need for prevention programs focusing on a variety of aspects including balance, flexibility, and strength.

FOCUSED CLINICAL QUESTION

Does implementing a strength training program in youth baseball players decrease their risk of sustaining an upper extremity injury compared to players who don't complete a strengthening program?

SEARCH STRATEGY

- The literature was searched in September 2019 for studies of level 2 evidence or higher that investigated the relationship between a strength training program and rate of upper extremity injuries in youth baseball players.
- The literature search returned 14 possible studies for inclusion.
- Three studies[6-8] met the inclusion criteria and were critically appraised using the PEDro scale.
- Prevention programs that utilize strengthening exercises, as well as stretching and mobility exercises were shown to significantly decrease shoulder and elbow injury risk in youth baseball players.[7,8]
- One study investigating the effects of a weighted ball throwing program found that this program led to an increase in injury risk in youth baseball players.[6]

SUMMARY OF SEARCH, "BEST EVIDENCE" APPRAISED, AND KEY FINDINGS

Search Strategy:
- **P**atient: Youth Baseball players (18 & Under)
- **I**ntervention: Training Program OR Strength Program
- **C**omparison: No training program
- **O**utcome: Decreased Injury Risk (Upper extremity; Shoulder/Elbow)

Search terms:
- (youth baseball) AND (strength training program) OR (throwing program) AND (Injury prevention).

Sources of evidence searched:
CINAHL, SPORTDiscus, MEDLINE, hand search.

Inclusion criteria:
- Investigated the relationship between a strength training program and upper extremity injury rates
- English language
- Study designs with ≥ level 2 evidence
- Published in the past 5 years.

Exclusion criteria:
- Meta-analyses and reviews
- Patients ≥ 18 years old

RESULTS OF SEARCH

Table 1. Summary of Study Designs of Articles Reviewed.

Author	Study Design	Level of Evidence*	PEDro Score
REINOLD ET.[6]	Randomized Control Trial	1	10/11
SAKATA ET AL.[7]	Cohort	2	9/11
SAKATA ET AL.[8]	Randomized Control Trial	1	11/11

***Level of evidence assessed using the Oxford Centre for Evidence-Based Medicine 2011 criteria.**

CLINICAL BOTTOM LINE

There is consistent good-quality evidence to support the implementation of strength training programs as a successful step towards injury prevention in youth baseball players.

Strength of Recommendation: The Strength of Recommendation of Taxonomy (SORT) recommends a grade of A for the findings of this appraisal.

IMPLICATIONS FOR PRACTICE, EDUCATION, AND FUTURE RESEARCH

- The shoulder is a ball and socket joint that relies on local musculature and other soft tissue for stabilization. In overhead athletes the shoulder is put through extensive ranges of motion, placing high amounts of shearing force on the joint.[4]
- All three studies[6-8] implemented off-season strength training programs with the intent to reduce injury risk in youth baseball players. Statistically significant differences were found across all investigations in favor of the strength training group,[6-8] emphasizing the importance of encouraging youth overhead sport athletes to participate in shoulder strengthening training programs as a means to reduce injury risk.
- Reinold et al.[6] utilized weighted ball throwing exercises and found that this method lead to an increased risk of injury in youth baseball players. As a result, coaches and athletic trainers should be aware of the dangers of weighted ball programs in this population and elect strengthening programs that use exercises focused on improving general shoulder muscle stability and strength.

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