Pediatric Baseball Pitchers Exhibit Scapular Position Changes on the Pitching Side After a Single Game

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Background

Pediatric pitchers have immature musculoskeletal systems and are vulnerable to overuse injuries.

Increased pitch counts are associated with shoulder and elbow injuries. Abnormal scapular positioning may contribute to throwing injuries.

The purpose of this study is to clarify the effect of increased pitch count during a single game on scapular position in pediatric pitchers.

Posner M. Am J Sports Med. 2011
Conte S. Am J Orthop. 2016
Burkhart SS. Arthroscopy. 2003

Methods

【Study design】

Descriptive laboratory study

【Study period】

January to December 2023

【Inclusion criteria】

1）Belonging to a youth baseball team
2）5th and 6th graders
3）Boys
4）Parents provided consent for participation in this study

【Exclusion criteria】

1）Stopped practicing due to injury within the past 3 months
2）History of surgery on the throwing shoulder or elbow

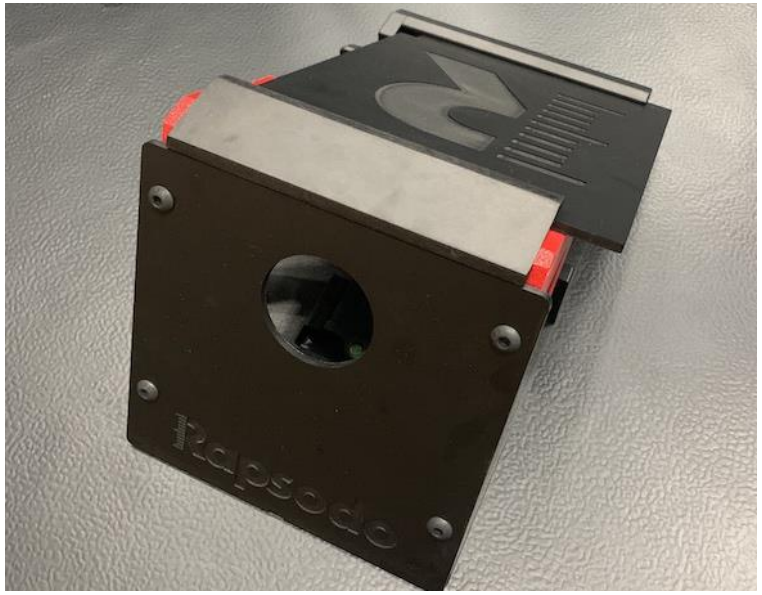
【Pitching requirements】

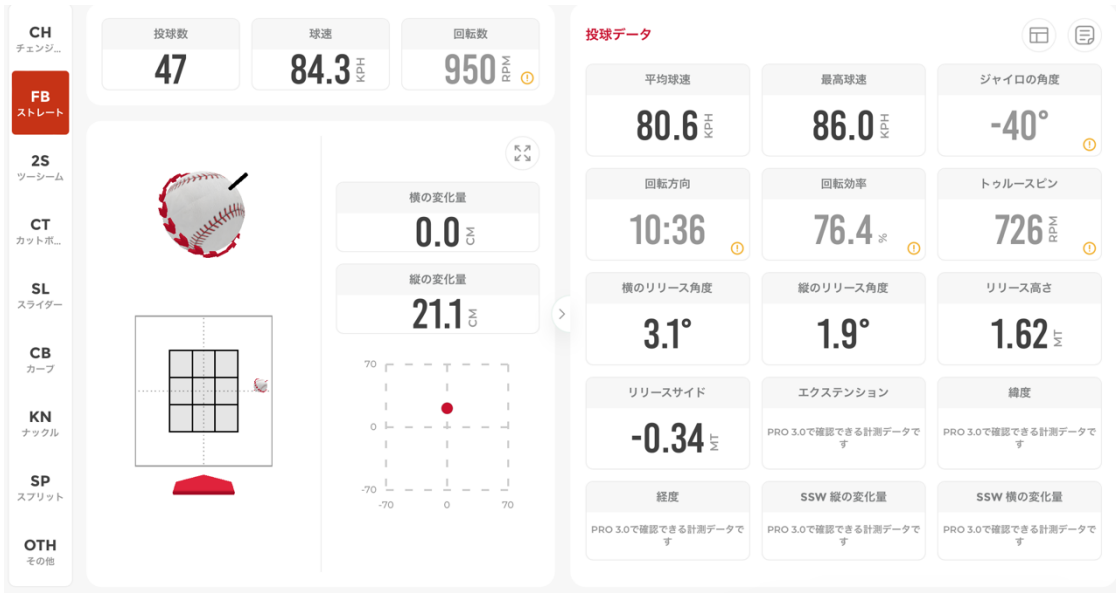
Pitch type : Fast ball
Pitch count : 70 pitches
Ball : Kenko J/ 4.55oz,$8^{1/2}$
Mound : Portable mound
Pitching distance : 16m

【Evaluation Criteria 1】

- Velocity （km/h）
- Spin rate （rpm）
- Gyro angle （°）

Collected data on all pitching





Using Rapsodo PITCHING（Rapsodo Japan）

【Evaluation Criteria 2】

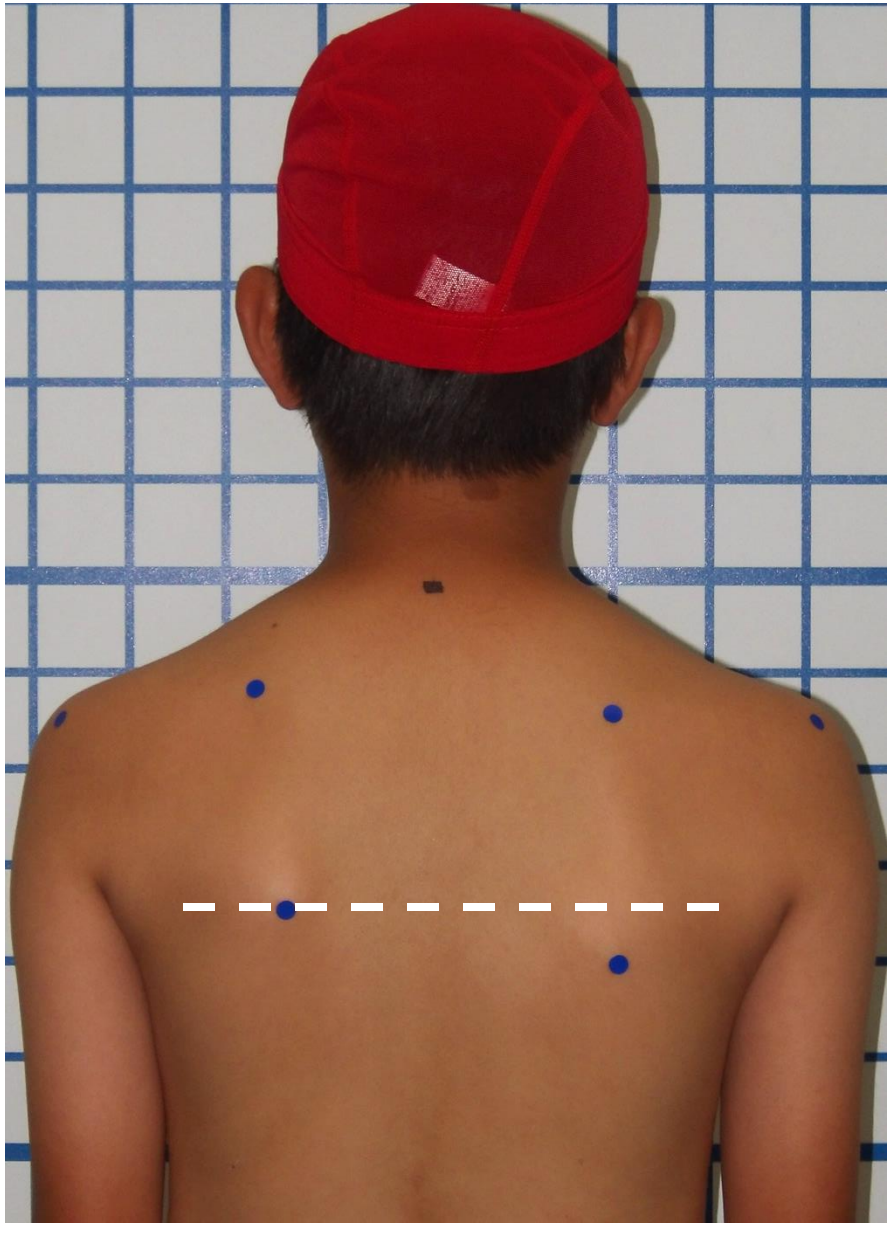
Measured before pitching and every 10 pitches

Scapular position

Marked 3 points:

- Inferior angle
- Trigonum spinae
- Acromial angle

Recorded the asymmetry through palpation
(measured in finger widths)



【Evaluation Criteria 3】

Measured before pitching and every 10 pitches

ⅰ）Throwing arm fatigue（Visual Analogue Scale : VAS）

ⅱ）Throwing arm tightness（Visual Analogue Scale: VAS）

ⅲ）Rating of perceived exertion（Borg scale）

ⅳ）Range of motion（shoulder, elbow, hip）

【Statistical analysis】

- Velocity
- Spin rate
- Gyro angle

} Average value for every 10 pitches

- Scapular position
- Throwing arm fatigue and tightness
- Rating of perceived exertion
- Range of motion

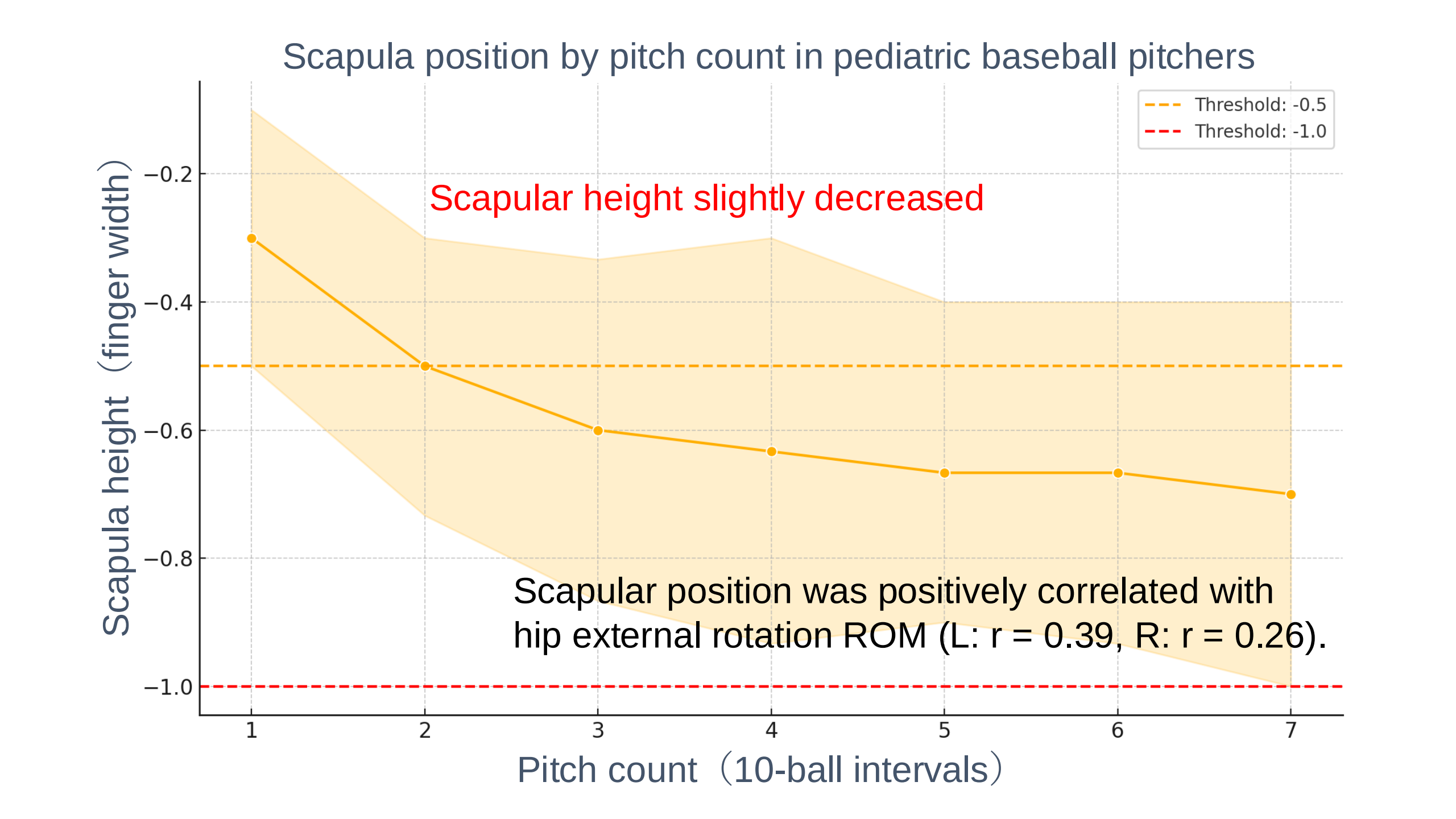
} Actual value for every 10 balls

Scapular position changes were analyzed using linear regression and correlation analysis in R (v4.3.0).

Results

Participating pitcher data

n=15	mean ± sd	range
Age（years）	11.6 ± 0.6	10 - 12
Height（cm）	151.3 ± 9.9	140 - 173
Weight（kg）	42.9 ± 10.9	29 - 61
BMI	18.5 ± 3.2	14.3 - 25.6
Baseball experience (years)	5 ± 1.9	2 - 9
Pitching experience（years）	2.4 ± 0.9	1 - 4


Scapula position by pitch count in pediatric baseball pitchers
Threshold: -0.5
Threshold: -1.0
Scapular height slightly decreased
Scapular position was positively correlated with
hip external rotation ROM (L: r = 0.39, R: r = 0.26).
Scapula height（finger width）
−0.2
−0.4
−0.6
−0.8
−1.0
1
2
3
4
5
6
7
Pitch count（10-ball intervals）

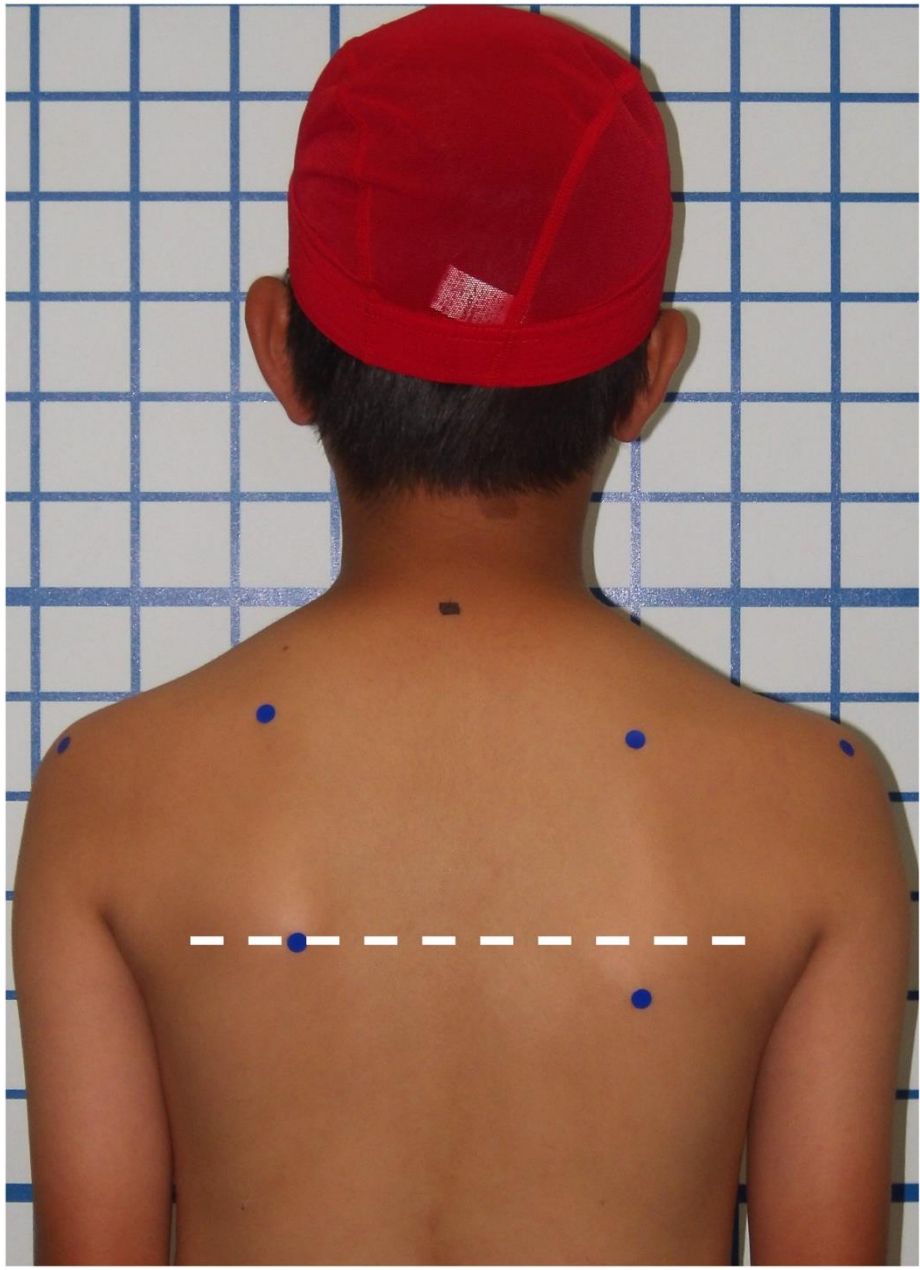
Discussions

Scapular malposition

- ✓ 5.04 times higher risk of throwing injuries

Tsuruike M. Int J Sports Phys Ther. 2022

Even if within 70 pitch counts, scapular position should be checked



Conclusions

The scapular position decreased after a single game in pediatric pitchers.

In pediatric pitchers, bilateral hip range of motion was associated with decreased scapular position.

Monitoring scapular position during games may provide an alternative indicator for throwing injury prevention.