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Association of age, injury incidence and the provision of self-directed exercise programs among high school and collegiate softball pitchers

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ABSTRACT (4480)

Association of age, injury, and the provision of self-directed exercise programs among competitive softball pitchers

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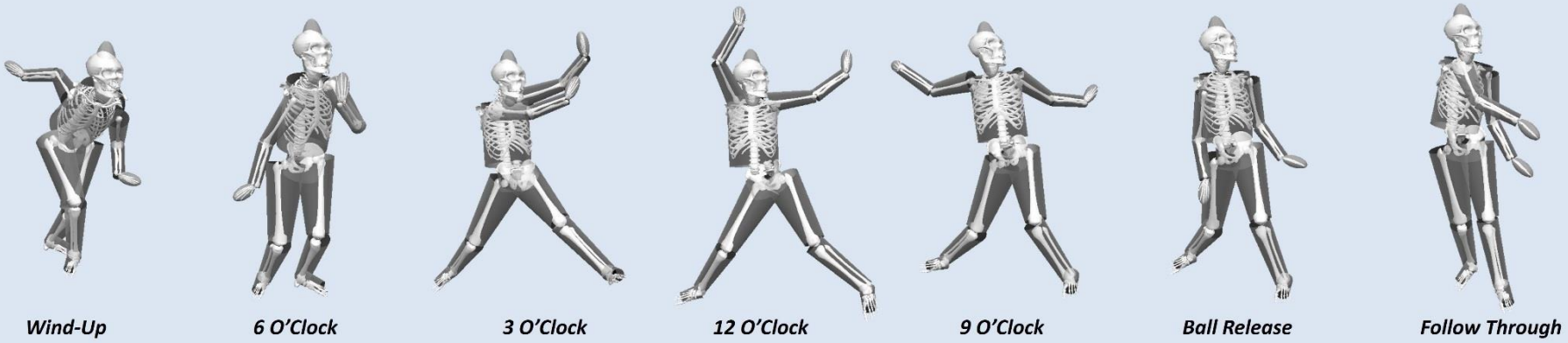
It is believed, but not well studied, that off-season and pre-season conditioning regimens result in reduced in-season pitching injuries. Age and off-season training are possible factors in determining in-season injury risk. **PURPOSE**: To investigate injury incidence and explore the relationships between 1) age, 2) provision of in-season and off-season training regimens, 3) pain during in-season game play and 4) reported injury history among female softball pitchers. **METHODS:** An online questionnaire for athlete demographics, sport participation, training regimens, and injury history was completed by 38 softball pitchers [21 female high school (HS) and 17 collegiate softball pitchers] with average age of 17 ± 2.23 yrs. **Summary of RESULTS:** 21 of the 38 pitchers (55.26%) reported a softball related injury. Across all aged pitchers, the most common injuries occurred at the shoulder and low back. Compared to HS pitchers, collegiate pitchers reported greater: number of injuries, incidence of pain during in game play, and provision of in-season skill focused and general exercise regimens, $p < 0.05$. There was no association of injury and receipt of an arm care program ($p = 0.342$), or exercise regimen ($p = 0.342$) from players' schools. Pitchers with a history of injury were more likely to have received an off-season exercise regimen from their school compared to those without report of injury, $p = 0.012$. **CONCLUSION:** Preliminary questionnaire findings reveal greater report of injury and incidence of pain during in game play among collegiate players than HS players. The provision of off-season and arm care regimens did not influence the occurrence of injuries. Findings of limited provision of in-season skill and general exercise regimens and arm care information to HS pitchers may foreshadow resultant cumulative overuse injuries at the collegiate level. Lack of trainer oversight with off-season exercise regimens may influence the intended efficacy of injury prevention.

Introduction



The joints of fastpitch softball pitchers experience repetitive demands, contributing to the high occurrence of injury. Overuse injuries in softball pitchers are more prevalent compared to in-game acute injuries. It has been found that lower preseason functional status of overhead throwing athletes is significantly related to in-season injury risk (Holtz KA et al, 2018).

One study reported that the average age of youth softball players without injury was 13, and the average age of injured players was 14, $p<0.02$, (Smith MV et al, 2015). It is believed that offseason and pre-season conditioning programs result in reduced in-season pitching injuries.

The purpose of this study was to investigate injury incidence and explore the relationships between 1) player age, 2) provision of in-season and offseason training regimens, 3) pain during in-season game play and 4) reported injury history among female softball pitchers.

Materials and Methods

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Subjects:

- 38 female pitchers (14 collegiate, 24 high school (HS), mean age = 17.0 ± 2.23 yrs.)

Test Protocol:

- Online questionnaire capturing athlete demographics, sport participation, types of at home training regimens provided to players, and injury history was administered via a secure web-based application, REDCap.
- The questionnaire contained a minimum of 43 and maximum of 105 items dependent on how each participant answered the questions.
- This study was a subset of 7 questions including self-report of: receiving in-season and off-season exercise programs, receiving a softball skills training program, receiving an arm care program, pitching in games with reported pain, history of injury related to softball (non-contact related), and type of injury (if reported).
- Analyses included age and injury group comparisons using Fisher's Exact Test for non-parametric 2x2 analyses. Statistical significance was set at $p < 0.05$.

Results

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Table 1 Questionnaire responses for all pitchers

	High School pitchers	Collegiate pitchers	Total
Reported injury related to softball	39%	82%	58%
Reported pitching during games in pain	17%	59%	35%
Received arm care program	48%	35%	43%
Received off season exercise program	78%	100%	88%
Received skill exercise program	17%	82%	45%

- 21 of the 38 pitchers (55.26%) report a history of softball related injuries. **Most reported injury location** was **shoulder** (53.85%) and **low back** (38.46%).
- There were **greater numbers of injury reported among collegiate pitchers** than HS pitchers, p= 0.020, and a **greater incidence of collegiate pitchers reporting playing with pain during games** compared to HS level pitchers, p = 0.013.
- There was a **greater provision of in-season softball skill exercise and general exercise programs at the college level** than at high school level, $p < 0.001$.
- Across all pitchers, the relationship of history of injury and report of pitching with pain during games almost reached statistical significance, p = .054.
- Across all pitchers, there was no association of injury history with receipt of an arm care plan (p = 0.342), or exercise program (p = 0.342).
- Pitchers with a history of injury were more likely to have received an offseason exercise plan from their school compared to those who did not report history of injury, p = 0.012.

Summary & Conclusions

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Although a small sample size, initial findings from this ongoing study sample revealed:

- Collegiate players report higher injury incidence and pain during game play than HS players.
- Shoulder tendinopathy and low back pain are the most frequently reported overuse injuries
- Provision of offseason and arm care programs did not influence the occurrence of injuries.

The provision of off-season and arm care regimens did not influence the occurrence of injuries. Findings of limited provision of in-season skill and general exercise regimens and arm care information to HS pitchers may foreshadow resultant cumulative overuse injuries at the collegiate level. Lack of trainer oversight with off-season exercise regimens may influence the intended efficacy of injury prevention.