

Pitching in Youth Baseball: Is Overuse Leading to Elbow Injuries?

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The popularity of youth baseball is increasing worldwide. In the United States alone, it is estimated that approximately 9 million children between the ages of 6 to 17 participate in the sport. An unfortunate byproduct of this popularity is the growing incidence of overuse injuries to the throwing elbow in the adolescent pitcher, including osteochondritis dissecans, traction apophysitis, medial epicondylar avulsion and injuries to the ulnar collateral ligament (UCL).

The incidence of injuries to the UCL of the elbow in high school pitchers is particularly disturbing, since these injuries have rarely been seen below the college or professional levels of baseball.

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Yet, according to James Andrews, MD, of the Alabama Sports Medicine and Orthopaedic Center and the American Sports Medicine Institute in Birmingham, the rate of UCL reconstructions performed on high school-aged athletes is growing.¹ From 1995 to 1997, he performed this surgery on an average of only four high school-aged athletes (18 and under) each year. Over the next three years, this average increased to 17. By 2002, that number had grown to 26. And, as of last September, Dr. Andrews had already performed 43 UCL reconstructions in 2003.

Why is the frequency of these injuries increasing? Although improved recognition and diagnosis may account for some of this trend, overuse and misuse account for the majority. Pitching volume can be quantified by estimating pitches per game, innings per week and weeks of play per year, and overuse of the adolescent

pitcher's elbow appears to be on the rise. The current emphasis on the breaking ball (the curve ball or the slider, which are both generally considered to produce more stress on the arm than the fastball, with the slider the worse of the two), along with poor technique and pitching mechanics, are also to blame.



The rate of UCL reconstructions performed on athletes 18 and under is increasing by record amounts.

This article will examine a recent study used to evaluate these and other trends toward increased pitching volume with a greater emphasis on the breaking ball in youth baseball.

Study Design and Results

Little League Coaches

Surveys were sent by the author to 100 little league coaches in metropolitan Atlanta to characterize current coaching practices in youth baseball. Results from 41 respondents showed that they:

- Felt the appropriate age to teach and allow pitchers to throw the curveball is 13.5 years old (average), although they admitted the actual age the pitcher begins to throw the pitch is 11.6.

Research shows a marked increase in overall pitch counts and breaking balls thrown by youth pitchers over the past 15 years.

- Believed the slider should be allowed at age 14.5.
- Agreed with current little league restrictions that cap the number of innings per week a player may pitch at 6.

Although they also felt there should be a restriction on the number of pitches thrown per game, only 63 percent of them actually counted pitches.

Little League World Series (LLWS)

In an attempt to further understand current pitching trends, we then asked a professional baseball player to review and analyze tapes of LLWS games (athletes 12 and under) in 1991, 1996 and 2001. We found that:

- The percentage of breaking balls (curveballs and sliders) thrown increased from 23 percent in 1991, to 31 percent in 1996 and to 37 percent in 2001.
- More successful teams threw more breaking balls.
- High pitch counts were common.
- The percentage of starting pitchers who exceeded 75 pitches per game grew from 25 percent in 1991 to 58 percent in 2001.

Professional Adult Pitchers

To compare these modern trends with earlier practices, we also conducted interviews with professional baseball pitchers (30 major and 71 minor leaguers) to determine pitching volume and other practices when they were at the little league level.

Results show:

- Professionals first threw a curveball at 14.0 years, as opposed to the 11.6 seen today.
- They first threw a slider at 17.8 years compared with 14.5.
- High pitch counts (greater than 75 pitches per game) and reports of arm injuries were rare.
- Year-round baseball was uncommon, and most participated in other sports.
- They would not allow their sons in youth baseball to throw a curveball until they were 14.8 years old (average) and a slider until they were at least 17.

Recommendations

Information from these surveys allows for the identification of risk factors and recommendations as follows.

Risk factors for injury in youth baseball:

- Throwing the breaking ball at too early an age.
- Throwing too many pitches per game or innings per week.
- Participation in more than one youth baseball league simultaneously or in year-round baseball.
- Poor pitching mechanics as a result of faulty coaching or instruction.
- Inadequate practice and conditioning habits because of substandard coaching practices.
- Genetic makeup not optimal for baseball participation.

Recommendations regarding youth baseball pitching:

- Begin throwing the curveball at 14.5 years of age.
- The slider should not be thrown before the pitcher is 18 years old.
- A changeup (not considered any more stressful on the arm than the fastball) can be thrown at 11 years of age, or when sufficient velocity and control are developed with the fastball.
- Maximum pitches per game*
 - Ages 8 to 10: 50 pitches.
 - Ages 11 to 14: 75 pitches.
 - Ages 15 to 18: 90 to 100 pitches.
- Maximum innings per week
 - Ages 14 and under: 6 innings.
 - Through high school: 10 innings.



It is estimated that approximately 9 million athletes between the ages of 6 to 17 participate in the sport of baseball.

Conclusion

Many are concerned about the increasing incidence of elbow injuries in adolescent pitchers. Research shows a marked increase in overall pitch counts and breaking balls thrown by youth pitchers over the past 15 years. Data also suggests that pitchers do not need to throw a breaking ball before the age of 12 in order to have a successful career. In fact, delaying the use of the breaking ball until a later age may help protect the young arm against future injury and may promote optimal development of pitching skill and strength.

With that in mind, it is incumbent upon youth baseball governing bodies to focus on prevention by formulating and enforcing sensible youth pitching and playing guidelines. They must also take the lead in educating coaches, parents and participants on the importance of these guidelines and in sacrificing short-term success for the long-term health and development of young athletes.

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Note

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*The little league baseball governing body restricts the number of innings per week a player may pitch. However, they have neither defined the maximum pitches per game nor the ages at which breaking balls may be thrown or made other recommendations regarding coaching practices to protect the health of young athletes.