A Comparison of Stress Placed on the Ulnar Collateral Ligament in High School Baseball Pitchers versus Softball Pitchers

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ABSTRACT
Stress placed on the Ulnar Collateral Ligament (UCL) is known to be a common mechanism of injury for baseball pitchers, and many studies have been conducted observing the reasoning behind this. However, there have been minimal studies looking into stress placed on the UCL during a windmill softball pitch. The purpose of this study was to examine the differences in various aspects of the upper extremity during a pitch (e.g. arm stress, arm slot, arm speed, pitch speed and shoulder rotation) using the motusThrow™ device to collect data during live pitching sessions. It also compared the results found in baseball versus softball pitchers. It was hypothesized that the reason increased stress is seen in the UCLs of baseball pitchers when compared to softball pitchers is due to the angle of the elbow in relation to the shoulder at the time of ball release during the two different types of pitches. This study explored the upper extremity variables seen during baseball and softball pitches and collected data that was examining comparing these aspects and hypothesized why increased UCL stress may be more common in baseball pitchers than softball pitchers.

INTRODUCTION

BACKGROUND
- Upper extremity injuries among youth and adolescent baseball players have increased over the past decade, especially injuries to the UCL (Atanda Jr, et al., 2016).
- According to Oliver (2010), softball and baseball as a sport are very similar; however, higher injury rates have been reported with athletes in softball than with athletes in baseball, but the amount of softball overuse injuries in the elbow only account for 1.6% of all injuries among collegiate softball players (Rosen, Barrett & Tripp, 2013).

METHODS

PARTICIPANTS
- Participants were 14 high school baseball pitchers and 5 high school softball pitchers.
- Age ranged from 15-18 years in the participant sample.

INSTRUMENTATION & TESTING
For this study, the motusThrow™ device was used to measure multiple variables that are present during the baseball and softball pitch. Measured variables include:
- Arm stress
- Arm slot
- Arm speed
- Shoulder rotation

RESULTS
Based off of previous research and raw data collected, we hypothesize there will be a direct correlation between arm stress and arm slot as well as arm stress and arm speed (Hurd, Kaufman & Murthy, 2011).
- We also hypothesize that baseball pitchers will have greater arm stress and arm speed when compared to softball pitchers.
- Softball pitchers had negative arm slot values because the windmill pitch is released underhand versus a baseball pitch being released overhand
- Arm slot is measured in degrees
- Averages found based on data collection (shown in Graph 1) show that average arm stress for both baseball and softball were under 100 N·m⁻² of torque
- Although baseball had a higher average arm stress in N·m⁻², arm speed in RPMs, and arm slot in degrees than the average softball pitch
- Softball pitchers had a higher average for shoulder rotation during a pitch than baseball

DISCUSSION & CONCLUSION
During data collection with the baseball pitchers, the pitching coach was present. He was able to use the live data from each pitch to help correct biomechanical errors. With each biomechanical correction, a decrease in arm stress was seen, while the other values remained similar. This could also be done with softball players. The hope for future research is to have coaches use this device for such corrections during practices and games. Instead of a subjective response that a player is feeling fatigued, a coach will hopefully be able to look at

SOURCES

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