

Kinematics of Youth Baseball Pitching and Football Passing

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The overhead throwing motion in youth baseball pitching is associated with overuse injury. In an attempt to prevent this, physicians have recommended that youth athletes play multiple sports, deterring sport specialization at an early age. When youth baseball pitchers are encouraged to participate in additional sports, they tend to take an interest in football, specifically the position of quarterback. Both the baseball pitcher and the football quarterback use an overhead throwing motion. Additionally, when conditioning, it is common for professional baseball pitchers to throw a football to improve arm strength and for football quarterbacks to throw a baseball to improve on arm speed [1,2,3]. Because participating in dual sports is common practice and has training implications, we aimed this study at comparing the kinematics of the baseball pitch and football pass. We hypothesized that significant differences in kinematics would be observed between these different types of throws.

Fifteen male quarterbacks (13.63 ± 1.25 years; 169.32 ± 8.01 cm; 62.33 ± 10.17 kg) and eighteen male pitchers (14.33 ± 1.58 years; 174.94 ± 7.93 cm; 69.05 ± 13.99 kg) participated. The participants came into the lab for data collection in the spring and summer of 2016. Kinematic data were collected with The MotionMonitor™ synchronized with an electromagnetic tracking system at 100 Hz. Quarterbacks threw three passes to a receiver 13.7 m away and pitchers threw three overhand pitches to a catcher 14 m away. The throwing motion of both pitching and passing were divided into four events: foot contact (FC), maximum shoulder external rotation (MER), ball release (BR), and maximum shoulder internal rotation (MIR) (Figure 1).

All data were analyzed using Mann-Whitney U-tests. Baseball pitchers had greater trunk flexion at MIR and external rotation of the shoulder at BR. Baseball pitchers also exhibited greater trunk rotation opposite the throwing arm side at BR. These differences may have been a result of how the pitchers adjust to keep their center of gravity above the stride leg as they throw down from a mound. Throwing from an inclined surface would result in greater momentum toward the target and be followed with a greater rotation opposite the throwing arm side. Football quarterbacks displayed greater shoulder horizontal adduction at FC, greater shoulder external rotation at BR, and greater elbow flexion at FC and MER. Each of these differences could be attributed to the increase in size and weight of a football versus a baseball.

Results showed kinematic differences that would support the use of different training modalities for the overhand throwing athlete. Therefore, using a football as a weighted ball training technique may increase performance without increasing the occurrence of overuse injury in youth sport. Both baseball pitching and football passing techniques also have biomechanical benefits such as skill acquisition and improved athleticism for young athletes, supporting their long-term athletic development. Participation in both sports could reduce the risk of overuse injuries and burnout because of the differences in the mechanics for the two sports. Future research should investigate sport specialization in larger populations, as well as compare other overhead throwing sports.

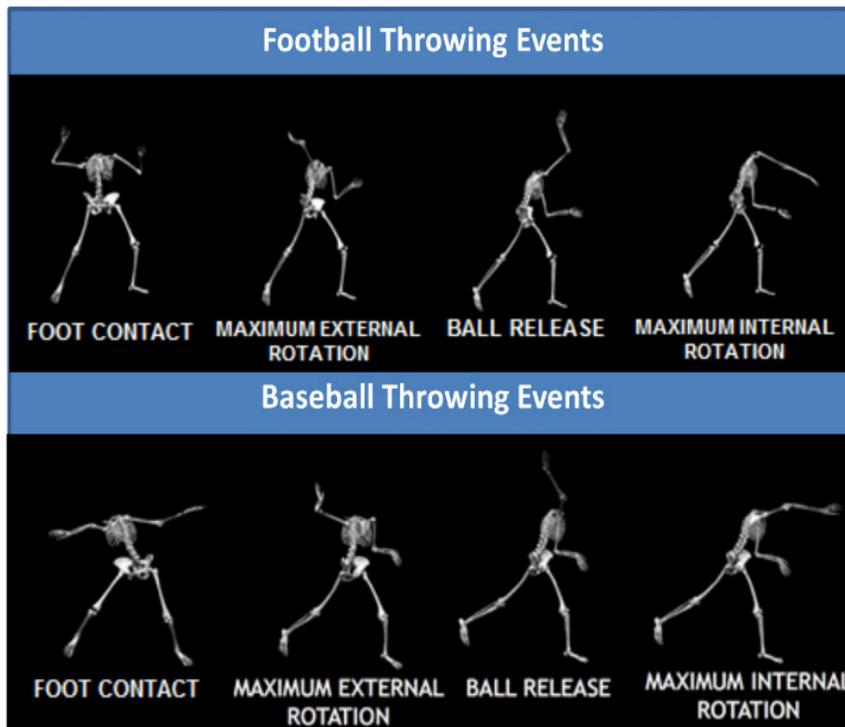


Figure 1. Illustration of football and baseball throwing events.

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Statement of Research Advisor:

Kathryn assisted in data collection, data analysis, and writing of these data.—Gretchen Oliver, Associate Professor School of Kinesiology