

Study finds pitching mound height affects throwing motion, injury risk

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A study involving several Major League Baseball pitchers indicates that the height of the pitcher's mound can affect the athlete's throwing arm motion, which may lead to potential injuries because of stress on the shoulder and elbow.

The study was led by William Raasch, M.D., associate professor of orthopaedic surgery at the Medical College of Wisconsin in Milwaukee, who also is the head team physician for the Milwaukee Brewers. Major League Baseball funded the study in an effort to help prevent injuries among professional baseball players.

The results of the study were presented at the 2007 MLB Winter Meetings at the joint session of the Major League Baseball Team Physicians Association and Professional Baseball Athletic Trainers Society.

The researchers recruited 20 top-level, elite pitchers from Major League Baseball organizations and Milwaukee-area NCAA Division I-A college pitchers for the study, which was conducted both during 2007 spring training in Arizona and at the Froedtert & Medical College Sports Medicine Center in Milwaukee.

“Our researchers employed a motion analysis system using eight digital cameras that recorded the three-dimensional positions of 43 reflective markers placed on the athletes' bodies. Then we analyzed the pitching motion at mound heights of the regulation 10-inches, along with eight-

inch and six-inch mounds, as well as having the athletes throw from flat ground,” Dr. Raasch explains.

The study focused on determining if there is increased stress on the shoulder or the elbow based on the height from which the pitcher has thrown. A kinematic analysis provided information regarding pitching motion (position and velocity), while the kinetic analysis determined the forces and torques generated at the shoulder and elbow.

“We found that compared to flat ground, pitchers using a 10-inch mound experience an increase in superior shear and adduction torque in the shoulder – meaning there’s a greater amount of stress on the joint surface and surrounding structures. That greater stress may result in injury to the shoulder including tearing of the rotator cuff or labrum which may result in surgery and long-term rehabilitation. It also can make it difficult for the athlete to replicate the same throw and develop a consistent strike,” Dr. Raasch says.

“The most notable kinematic difference was the increase in shoulder external rotation at foot contact. This probably represents a change in the timing of the foot contact relative to arm position, because the foot lands earlier in the pitch delivery during flat ground throwing than with a slope,” he says.

While the study did not result in enough data to recommend reducing the 10-inch mound height, which became standard in 1968 and also used in college and high school baseball, Dr. Raasch says the findings give trainers information that can help them determine if pitchers would be better off practicing on flat ground especially after an injury.

“Nolan Ryan, who played major league baseball for 27 years, often threw pitches more than 100 mph, even past the age of 40, and he liked to throw on flat ground in his waning years. I think others might follow

his lead,” Dr. Raasch says. He adds that he hopes subsequent research during spring training in 2008 will provide even more valuable findings for baseball players and trainers.

Source: Medical College of Wisconsin

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