Sports Medicine & Movement Laboratory
School of Kinesiology, Auburn University
May 2018

Functional Differences in Collegiate Softball Pitchers With & Without a History of Upper Extremity Pain

Gretchen D. Oliver, Gabby G. Gilmer, Kenzie B. Friesen, Hillary A. Plummer

ABSTRACT

Background: Previous studies have eluded that strength, range of motion, and pitching velocity are variables that could be associated with increased pain and injury risks in throwing athletes.[1-3] However, a relationship between such functional measures and pain history has not been established. The purpose of this study was to examine bilateral shoulder and hip range of motion (ROM), isometric strength (ISO), and pitch velocity between collegiate softball pitchers classified with upper extremity pain or pain free.

Purpose: The purpose of this study was to examine functional characteristics of shoulder and hip range of motion (ROM), isometric strength (ISO), and pitch velocity in collegiate softball pitchers with and without upper extremity pain.

Study Design: Prospective cohort study.

Methods: Fifty-three NCAA Division I softball pitchers participated. The University's Institutional Review Board approved all testing protocols. Players were classified based on responses provided on a pain history questionnaire. Inclusion criteria for the pain free group (20.0 ± 1.4 yrs.; 173.7 ± 6.7 cm; 80.4 ± 12.3 kg; n = 30) included having no current pain in the upper extremity. Criteria for upper extremity pain group (20.0 ± 1.5 yrs.; 172.8 ± 10.2 cm; 81.6 ± 12.3 kg; n = 23) included having pain in the shoulder, elbow, and forearm. Participants' bilateral passive internal (IR) and external (ER) shoulder and hip ROM and ISO were measured prior to throwing three change-up pitches to a catcher located at 13.1 m (43 ft.). Independent samples t-tests were used to compare differences in ROM, ISO, and pitch velocity between the pain and pain free groups.

Results: Independent samples t-tests revealed significant differences in the throwing side hip (TSH) ER ROM (t (50) = 2.62, p = 0.000) and TSH IR IRO (t (51) = 2.13, p = 0.040). Additionally, there were significant difference in glove side (GS) hip ER ROM (t (51) = 2.31, p = 0.030). At the shoulder differences were in the throwing shoulder ER ISO (t (51) = 3.20, p = 0.000). As well as GS shoulder IR ISO (t (51) = 2.89, p = 0.010); and ER ISO (t (51) = 3.03, p = 0.000).

Previous studies have reported the influence of hip and shoulder ROM deficits and injury susceptibility [4,5]. For optimal throwing, hip ROM and strength are necessary for efficient energy transfer from the lower to the upper extremity.[1] Hip rotational weakness has been associated with throwing pathomechanics and a decrease in kinetic chain efficiency.[4] The current study reveals that those with upper extremity pain had significantly less glove side hip IR and ER ROM and strength deficits.

Conclusions: During the softball pitch, adequate postural control of the lower extremity, lumbopelvic-hip complex, and upper extremity is required for efficient utilization of the kinetic chain.[1] A break in the chain due to ROM restrictions and lack of strength, may increase the loads about the upper extremity and thus increase the susceptibility of pain and injury.[4]

References: 1. Oliver GD et al. Int J Sports Phys Ther 11:738-745,2016. 2. Shanley E et al. Int J Sports Phys Ther 7:548-557,2012. 3. Shanley E et al. Am J Sports Med 39:1997-2006,2011. 4. Burkhart SS et al. Arthroscopy 19:641-661,2003.

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