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## Biceps and Triceps Contribute to Pitching Performance in College Baseball

Marie R. Acosta<sup>1</sup>, J. Mark Van Ness<sup>1</sup>, William P. Lydon<sup>1</sup>, Brian G. Graham<sup>1</sup>, Alexis C. King<sup>2</sup>, Courtney D. Jensen<sup>1</sup>. <sup>1</sup>University of The Pacific, Stockton, CA. <sup>2</sup>University of Illinois at Urbana-Champaign, Champaign, IL.

Training for pitching traditionally focuses on core and leg work, but there may be justification for isolated arm muscle training to enhance performance. **PURPOSE:** To evaluate the influence of biceps and triceps function during pitching. **METHODS:** Pitchers (n=10) from a Division-1 collegiate team were recruited. Throwing mechanics and isolated arm movements were assessed using Proteus technology (Boston Biomotion Inc). A single set of biceps and triceps movements (with 12 and 10 lbs respective resistance) and biomechanical assessment of a throwing movement were collected. All movements completed on Proteus result in seven variables: power, explosiveness, braking, consistency, endurance, velocity, and range of motion (ROM). Pearson correlation coefficients were employed to analyze relationships between the Proteus variables for biceps curls and triceps extensions, throw mechanics, and statistics from in-game performances from the 2017 season. **RESULTS:** The strongest relationship among all comparisons was biceps curl endurance and ERA ( $r=-0.959$ ;  $p=0.001$ ). The biceps curl ROM was also weakly related to throw power ( $r=0.429$ ;  $p=0.076$ ). Throw endurance corresponded with positive trends for biceps curl power ( $r=0.419$ ;  $p=0.089$ ), explosiveness ( $r=0.452$ ;  $p=0.060$ ), velocity ( $r=0.417$ ;  $p=0.085$ ), and ROM ( $r=0.429$ ;  $p=0.075$ ). A strong positive relationship was observed between throw endurance and biceps curl braking ( $r=0.535$ ;  $p=0.022$ ) and a positive trend between biceps curl ROM and throw velocity ( $r=0.429$ ;  $p=0.075$ ). Triceps extensions corresponded closely with throwing mechanics and in-game statistics; trends were found between triceps explosiveness and strikeouts per nine innings ( $r=0.728$ ;  $p=0.064$ ) and Proteus throw velocity ( $r=0.462$ ;  $p=0.053$ ). Throw endurance was related to triceps extension braking ( $r=0.496$ ;  $p=0.037$ ) and it displayed a trend with triceps extension endurance ( $r=0.435$ ;  $p=0.071$ ). **CONCLUSIONS:** New technology permits advanced biomechanical analysis of baseball pitching. Preliminary testing reveals the importance of arm conditioning for a pitcher's ability to maintain power output. As more players are tested, we may further our understanding of the role of biceps and triceps function in throwing mechanics.