MONITORING CHANGES IN HANDGRIP STRENGTH IN DIVISION I BASEBALL PITCHERS: A PILOT STUDY

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Purpose

The purpose of this pilot study was to evaluate changes in handgrip prior to and immediately following an outing in Division I collegiate baseball pitchers.

Methods

All data was collected over the course of 5 games for the University of South Alabama Baseball Team's 2024 competitive season. A total of 26 different outings were recorded across 17 different pitchers, with 7 pitchers recording two outings. No pitcher recorded more than 2 outings during this 5-game stretch. A standard handgrip dynamometer was used to collect hand grip strength on the dominant (DOM) and non-dominant (ND) arm of each pitcher before (PRE) and immediately following (POST) each game outing. All hand grips were taken with the arm straight in front of the athlete with the shoulder flexed to 90° while gripping the dynamometer in a pronated position to mimic the release point of a baseball. A single measurement was taken at each time point on each hand and recorded. The total pitch count for each pitcher was recorded to quantify the workload of each outing. A time (PRE/POST) × arm (DOM/ND) repeated measures ANOVA was utilized to examine changes in handgrip strength across. Additionally, linear regression analysis was utilized to examine the relationship between the change in DOM handgrip strength and the total number of pitches thrown during the outing. All analyses were performed in SPSS and the alpha was set a-priori at 0.05.

Results

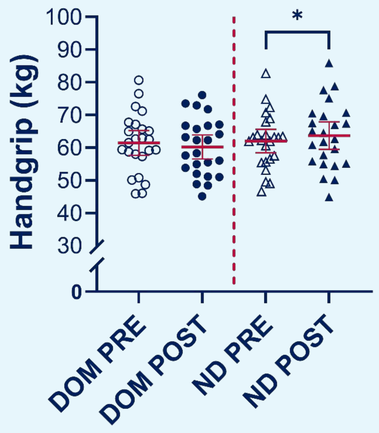

Figure 1. Individual plots and mean ± 95% CIs for handgrip (HG; Y-axis) per arm and time point (X-axis)

* indicates significant difference in HG between timepoints

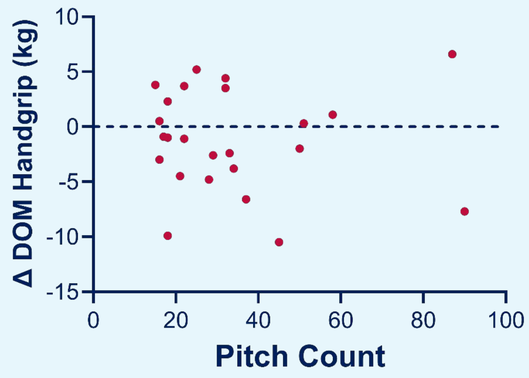

Figure 2. Correlation of pitch count (X-axis) and change in handgrip (Y-axis) after each pitching outing

There was a significant time (PRE/POST) × arm (DOM/ND) interaction effect for handgrip strength ($p = 0.013$). Post-hoc paired samples t-tests analyses indicated no change in DOM handgrip strength (PRE: 61.4 ± 9.0 kg; POST: 60.2 ± 8.8 kg; $p = 0.594$). However, ND handgrip strength significantly increased from PRE (62.0 ± 8.5kg) to POST (63.7 ± 10.0 kg; $p = 0.012$). There were no significant differences in handgrip between DOM and ND at either time point ($p = 0.102$-0.210). Linear regression analysis indicated there was no significant relationship between changes in DOM handgrip strength and total number of pitches thrown during the outing ($r = -0.038$; $p = 0.860$).

Conclusions

The Present data suggests that the handgrip strength of the DOM arm of collegiate pitchers does not change following an in-game outing. Interestingly, our data suggests a slight, significant increase in the handgrip strength of the ND arm following the outing, indicating potential discrepancies between arms following a collegiate baseball game. Furthermore, there was no significant relationship between the DOM handgrip and the number of pitches thrown.

Practical Applications

Handgrip dynamometry has been shown to be a valid and cost-effective way to measure forearm muscular strength; however, when monitoring the fatigue of collegiate Division 1 pitchers, other factors beyond handgrip may be needed to accurately assess how a pitcher fatigues across a pitching outing, especially in relationship to the impact on Ulnar Collateral Ligament loading. Data from this pilot study should be interpreted with caution, as it was limited to a small data pool of 17 starting and relieving pitchers over the course of 5 games. Further, the variability in responses from PRE to POST suggests that fatigue may be multifaceted and require a more individualized approach for assessment. Future research should use more individualized approaches in larger data pools to allow for a more comprehensive representation of how forearm musculature fatigues across the pitch cycle.