Leg Up or Letdown? Exploring the Link Between Lower-Body Injury and Upper Extremity Injury in MLB Pitchers

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INTRODUCTION: The kinetic chain is critical for efficient energy transfer and coordinated force generation during pitching. Lower extremity (LE) injury can disrupt this sequence, increasing upper extremity (UE) stress and injury risk. While biomechanical studies suggest this link in overhead athletes, large-scale epidemiologic evidence in professional pitchers is lacking. This study investigated the association between prior LE injury and subsequent UE injury in Major League Baseball (MLB) pitchers using one of the largest datasets to date.

METHODS: We conducted a retrospective cohort study of MLB pitchers from 2017–2024 using publicly available injury data and Statcast performance metrics. The exposure was an LE injury occurring in the same season (before a UE injury) or within the two preceding seasons; the outcome was a same-season UE injury. Multivariable logistic regression was performed to estimate odds ratios (ORs) and 95% confidence intervals (CIs), adjusting for age, innings pitched, fastball velocity, year, and pitch-mix entropy (a novel single-number metric we developed to quantify pitch mix diversity). This analysis used public, de-identified data and did not constitute human subjects' research; IRB approval and consent were not required per institutional policy. Sex/sample size: MLB pitchers are male by league composition (one-sex sample, justified by the population); N = 4,878 pitcher-seasons.

RESULTS SECTION: Among 4,878 MLB pitcher-seasons, 20.0% sustained a UE injury. UE injury rates were higher among pitchers with a prior LE injury (26.1%) versus those without (19.4%). Specifically, prior LE injury was significantly associated with increased odds of UE injury (OR: 1.37, 95% CI: 1.10–1.70, $p = 0.0048$), even after adjusting for several covariates. Older age was also independently associated with greater UE injury risk (OR: 1.06, 95% CI: 1.04–1.08, $p < 0.001$).

DISCUSSION: MLB pitchers with recent LE injury were significantly more likely to sustain a subsequent UE injury. These findings reinforce the kinetic chain's role in pitching biomechanics and suggest that LE dysfunction may drive compensatory upper-body mechanics, elevating injury risk. Limitations include retrospective design, use of publicly reported injury lists (potential misclassification and incomplete severity data), and residual confounding; generalizability beyond professional male pitchers may be limited.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): The results of this study highlight the need to integrate lower-body assessment and targeted rehabilitation into UE injury prevention and return-to-play protocols. Successful application may change current practice by shifting injury care toward a more holistic, chain-based approach, ultimately improving performance and reducing reinjury risk in overhead athletes.

IMAGES AND TABLES:

***Figure 1**. Percentage of MLB pitcher-seasons with upper extremity (UE) injury, stratified by prior lower extremity (LE) injury status.*

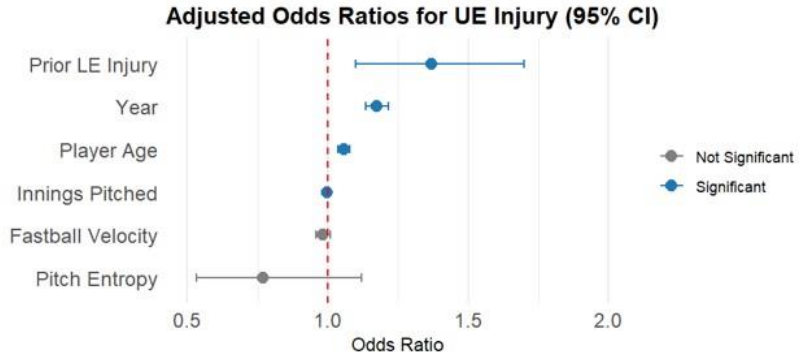

***Figure 2.** Adjusted odds ratios for upper extremity (UE) injury by risk factor, including prior lower extremity (LE) injury, age, workload, pitch velocity, year, and pitch-mix entropy.*