TACSM Abstract

The Impact of Kinetic Energy Factors on Pitching Performance of NCAA Baseball Players

BLAKE GEORGE, ANDREW WOLFE, JOE PRIEST, RANDY MARTIN, MATT LAURENT, and KAYLA PEAK

Kinetic Performance Laboratory; Health & Human Performance; Tarleton State University; Stephenville, TX

Category: Undergraduate

Advisor / Mentor: Wolfe, Andrew (awolfe@tarleton.edu)

ABSTRACT

Kinetic energy is established by a mathematical equation involving the mass of an object and the speed at which the object travels, and is a relevant measure in regards to athletic performance due to frequent transfer of energy during sport (i.e. athlete to athlete (tackling), athlete to object (throwing), object to object (tennis/baseball hitting)). Previous research has utilized the 60-yd run-shuttle to examine kinetic energy factors (k-factor) of difference sports, recognizing significant differences in energy capability between gender, sport teams, and individual sport positions. The utilization of k-factor, pertaining to baseball, has distinguished significant positional (i.e. infielder, outfielder, catcher, pitcher) differences. However, the predictive influence of k-factors on in-game baseball performance necessitates further examination. **PURPOSE**: Analyzing the impact of k-factor on the pitching performance of NCAA baseball pitchers was the purpose of the current investigation. **METHODS**: NCAA pitchers (n=10, age 20.2 ± 1.9 yrs., weight 83.8 ± 10.3 kg, height 1.85 ± 0.48 m) completed a laser timed 60-yd run-shuttle, which yielded average k-factor scores for four contiguous agility segments (K1, K2, K3, and K4 of 10, 10, 20, and 20 yds., respectively), as well as Total Average K-Factor (Kavg). In-game performance was recorded upon the completion of the regular season, and included: Earned Runs Average (ERA), Win (W), Loss (L), Appearances (APP), Games Started (GS), Innings Pitched (IP), Runs (R), Hits (H), Earned Runs (ER), Base-on-Balls (BB), Strikeouts (SO), and Opponent Batting Average (B/AVE), measures normalized for innings pitched were R, H, ER, BB, and SO. To assess the impact of k-factor on pitching performance, backwards stepwise multiple linear regression analyses were employed. **RESULTS**: Results from the multiple linear regressions indicate that k-factor will yield significant prediction models ($P<0.05$) for each of the following dependent variables: W, GS, and SO/I. Average k-factor accounted for 50% of the variance in GS ($R^2 = 0.50$; SEE = 3.1 games), and 41% of the variance in W ($R^2 = 0.41$; SEE = 1.5 wins), while K1, K2, and Kavg yielded a model that accounted for 78% of the variance ($R^2 = 0.78$; SEE = 0.1) in SO/I. K-Factor did not produce a significant prediction model for ERA, L, APP, IP, H/I, R/I, ER/I, BB/I, or B/AVE. **CONCLUSION**: These results suggest elevated k-factor scores, or a pitchers capability to proficiently transfer energy during agility drills, contribute to improvements of in-game baseball pitching performance.