A Novel Assessment of Baseball Throwing Mechanics

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A Novel Assessment of Baseball Throwing Mechanics

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To remain competitive, collegiate athletes constantly seek novel methods of performance enhancement. As technological advancements permit more sophisticated assessments, it is important to appraise their utility. **PURPOSE:** To establish a mechanical profile of baseball throwing and to test which kinematic domains associate with on-field performance. **METHODS:** 18 collegiate baseball players (11 fielders, 7 pitchers) were tested using Proteus (Boston Biomotion, USA), which analyzes isotonic force production concurrently in all 3 planes. Players performed 5 consecutive throw motions against 3lb of magnetic resistance. Proteus software calculated power, velocity, explosiveness (rate of force development), endurance (maintenance of force characteristics), consistency (repeatability of movement), and range of motion (ROM). Across the total sample, these values were used to generate throwing profiles; among the subsample of pitchers, the values were used in linear regressions to predict in-season performance. **RESULTS:** Across all players, power was 118.4 ± 80.0, explosiveness was 82.9 ± 29.4, velocity was 6.0 ± 1.2, endurance was 97.2 ± 5.9, consistency was 86.5 ± 9.1, and ROM was 4.0 ± 0.6. Consistency was inversely related to power ($R = -0.639$; $p = 0.004$). Explosiveness was inversely related to endurance ($R = -0.879$; $p < 0.001$). Pitchers exhibited patterns for higher power, velocity, and explosiveness, but none reached significance ($p > 0.10$). ROM differed between groups: the pitchers' ball path traveled 20.6% farther in 3D space ($p = 0.007$). Controlling for height, it remained 18.5% farther ($p = 0.012$). Among pitchers, in-season earned run average (ERA) increased with power ($R = 0.933$; $p=0.002$) and velocity ($R = 0.931$; $p = 0.002$) and decreased with consistency ($R = -0.956$; $p = 0.001$). Each additional point of power predicted an increase of 0.2 strikeouts per nine innings ($p = 0.025$) and a 0.2-point increase in ERA ($p = 0.002$). Each additional point of consistency, predicted 0.2 fewer strikeouts per nine innings ($p = 0.047$) and a 0.2-point decrease in ERA ($p = 0.001$). **CONCLUSIONS:** Novel instruments to assess pitching mechanics enable the generation of new normative data. Preliminary analyses suggest power and explosiveness are inverse to consistency and endurance, and they predict different performances on the field.