

## Association between anthropometrics, vertical jump and broad jump to pure and transitional acceleration in junior college baseball players

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### ABSTRACT

Sprint acceleration is a key physical attribute in baseball players that can be characterized by two phases: pure (PURE) and transitional (TRANS) acceleration. In a linear sprint, PURE occurs from the initiation of movement to approximately 15-meters; TRANS acceleration occurs from approximately 15-meters until an athlete reaches top velocity. Since baseball fields are clearly marked at 13.7m (foul-line) and 27.4m (1<sup>st</sup> base), acceleration can be determined in a sports-specific environment and these data may be helpful in characterizing player success. **Purpose** The purpose of this study was to determine the relationship between anthropometrics, vertical, and broad jump ability to PURE and TRANS acceleration of junior college baseball players sprinting to first-base. **Methods:** Nineteen male junior college baseball players ( $19.6 \pm 2.2$ y;  $181.2 \pm 6.9$ cm;  $80.6 \pm 11.7$ kg) volunteered as subjects. They performed tests of physical performance on three days, separated by one week. Initially, subject height and body mass (BM) were determined using a standard equipment. Percent fat (%Fat) was measured using skinfold calipers and a three-site equation. On a separate day, countermovement vertical jumps were performed on a force plate set to sample at 400 Hz. Vertical jump height (VJ), peak force (PF), peak power (PP), and relative power (PP rel) were determined from these data. Broad jump (BJ) distance was measured using a marked court and tape measure. During a third testing day, subjects performed linear sprints from the batter's box to first-base. Time was recorded at the foul-line and first-base using hand-held stop watches. Acceleration was computed between the two 13.7 meter intervals to first-base: home-plate to the foul-line (PURE) and foul-line to first-base (TRANS). Pearson's  $r$  were calculated between PURE and TRANS and the anthropometric and performance data. Alpha was set a  $p \leq 0.05$  which equated to  $r = 0.44$  for  $df = 18$ . **Results:** Of the tested variables, PURE was only associated with %Fat ( $r = -0.50$ ), TRANS was significantly correlated with %Fat ( $r = -0.61$ ), VJ ( $r = -0.50$ ), and PP rel ( $r = -0.51$ ). **Conclusion:** These preliminary data indicate a primary determinant of pure acceleration to first-base is %Fat. VJ and PP relative to body mass are also associated with acceleration from the foul-line to first-base. Interesting, body mass was not related to acceleration in either phase. Therefore, strength and conditioning programs that reduce body fat and develop increased peak vertical power capabilities may be helpful in improving overall acceleration to first-base.