TACSM Abstract

Bilateral Broad Jump as a Better Predictor of Acceleration Split Times than Unilateral Broad Jump

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ABSTRACT

Previous studies have shown that the broad jump is a good predictor of sprint performance. The bilateral and unilateral broad jump have been used to monitor jumping abilities in a wide variety of sports. However, it is unknown which of these two broad jump modalities would have a better prediction ability on sprint completion times. **METHODS**: A convenience sample of 27 (n=27, male=18, female=9) collegiate track athletes participated in this observational study. Subjects performed three trials of the bilateral and unilateral broad jumps while standing on two dual-axis force platforms, with data collected at a 1,000 Hz. Thereafter, subjects performed two 30-meter sprint trials from a standing start with split times being recorded every five meters via video recording at 240 Hz. Force platform data were processed and filtered using a Butterworth low-pass digital filter with cutoff at 50 Hz. A custom-built script was utilized to obtain kinetic (i.e. peak and mean concentric force and power, and, rate of force and power development) and kinematic variables (peak, mean, and take-off velocity, and concentric time) of both jumping modalities; broad jump performance was measured as the distance achieved during jumps. The trial with the greatest distance was used for statistical analysis; data were exported into Rstudio integrative development environment for statistical analysis using a custom-built script. Multiple stepwise regressions via forward-backward elimination was utilized to find the best prediction model for sprint split times with broad jump variables used as predictors. **RESULTS**: The bilateral broad jump distance had the following prediction variances for sprint distances: 65% at 5m, 66% at 10m, 61% at 15m, 66% at 20m, 65% at 25m, and 65% at 30m acceleration checkpoints. In contrast, jump distance for the unilateral broad jumps had the following prediction variances: 35% at 5m, 32% at 10m, 28% at 15m, 32% at 20m, 32% at 25m, and 31% at 30m of the acceleration checkpoints. An improved prediction model using forward selection, resulted in that jump distance, PV (peak velocity), PF (peak force), and Concentric time (s) of the unilateral broad jump predicted 35% of the variance at 5m and 65% of the variance at 10m. Additionally, a model using only distance and PV of the unilateral broad jump had the following prediction variances: 65% at 15m, 55% at 20m, 54% at 25m, and 53% at 30m checkpoints. **CONCLUSION**: The unilateral broad jump prediction model improves when PV is included in the prediction model. However, bilateral broad bump with distance was the best predictor of acceleration sprint times from a standing start to the 5m through 30m checkpoints.