



Vertical Jump Ground Reaction Forces Are Related to NCAA D1 Men's Basketball Game Performances – A Pilot Study

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The development of force plate software for rapidly evaluating vertical jump (VJ) ground reaction forces (GRF) permits easy monitoring of off-court measures of high velocity and power. Whether these measures are related to actual game performances is not known. **PURPOSE:** The purpose of this project was to determine if kinetic measures from VJ tests are related to actual game performances for a high level men's college basketball team. **METHODS:** Players (N=16, BW=95.6±13.7 kg; X±SD) from an NCAA D1 men's basketball team were monitored during the 2014-15 competition season. Prior to games, players performed a standardized counter-movement VJ test protocol with arm swing while on a 3-D force plate (Kistler Instrumente AG, Switzerland). Resulting GRF data were analyzed using proprietary software (Sparta Sport Performance, Menlo Park, CA). Kinetic variables measured during the VJ included relative mean vertical concentric force (MVCF), eccentric rate of vertical force development (ERVF), relative concentric vertical impulse (CVI), and center of mass VJ height (COM VJ). Game variables included minutes played (MIN), free throws attempted (FTA), offensive rebounds (OFFR), defensive rebounds (DEFR), blocks (BLK), and steals (STL) for each game. A total of 87 tests were performed as players were tested multiple times throughout the season and mean scores for all variables were calculated. **RESULTS:** The following performances were observed for all test sessions; MVCF = 23.5±2.9 N×kg⁻¹, ERVC = 7456±3487 N×s⁻¹, CVI = 5.83±0.37 [N×s]×kg⁻¹, COM VJ = 0.57±0.07 m, MIN = 17.8±11.3 min, FTA = 2.5±2.8, OFFR = 1.0±1.1, DEFR = 2.1±2.0, BLK = 0.5±0.8, and STL = 0.5±0.6. A canonical correlation was performed to determine relationships between all force plate variables combined and all game variables combined (r=0.634; eigenvalue = 0.4022; p<0.001). Standardized loadings ≥ ±0.3 indicated three force plate variables (AVCF = -1.680, ERVF = 1.061, COM VJ = 0.391), and two game variables (MIN = -1.058, OFFR = 0.725) contributed significantly to the canonical correlation. **CONCLUSIONS:** Basketball game performance measures are related to combinations of vertical jump kinetics. It may be possible to partially account for game performances using a standardized VJ kinetics test, and to monitor training and game performances across a training year.