TACSM Abstract

Relationships Between Anthropometric and Performance Variables in Youth: Predictors of Lower-Body Vertical Jump Peak Power

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ABSTRACT

Anthropometric and physical performance measurements are commonly used for identifying specific physical traits in youth. Laboratory-based tests (e.g., linear velocity transducers), while accurate, provide practical limitations due to high costs and technical necessities. Thus, commonly used field tests may be useful alternatives for assessing fitness/performance characteristics of youth. The purpose of this study was to examine the relationships between anthropometric measures and lower-and upper-body power and strength measures; and to assess the predictive ability of these measures for lower-body vertical jump peak power (PP) output in youth. Thirty-nine pre-adolescent (mean±SD, range: age=7.8±1.7, 5-12 years) children volunteered to participate in this investigation. Subjects were measured for body mass and stature on a calibrated physicians scale. Lower-body PP was assessed using a linear velocity transducer, which was attached to the posterior side of a belt that was securely fastened to the subjects' waistline. Subjects performed countermovement jumps, starting in a standing position, with hands placed on hips and feet firmly on the ground. Following the descent to the midpoint position and without pause, the subjects exploded upward as hard and fast as possible. Broad jump testing involved subjects performing a countermovement jump in the horizontal direction, on a scaled mat. Maximum isometric hand grip strength of the dominant hand was assessed using a dynamometer. For all testing, 1-2 practice trials were performed, followed by testing consisting of 2-3 trials. The highest trial was used for analyses. Peak power values were normalized to body mass using allometric scaling procedures (PP· body mass$^{-0.67}$). Pearson correlation (r) and stepwise linear regression analyses were performed to examine the relationships. Results indicated all variables (age, stature, body mass, broad jump and grip strength) were significantly correlated (r=0.38-0.64) to PP. Age was correlated to all variables (r=0.39-0.82) and stature and body mass were correlated to all variables (r=0.37-0.77) except broad jump. Broad jump was correlated only to age (r=0.39) and PP (r=0.38). Linear regression for all variables revealed that stature was the only variable entered into the model (R=0.64; R^2=0.41). With the anthropometric variables removed, grip strength was the only variable entered into the model (R=0.57; R^2=0.32). These findings suggest that while all the anthropometric and performance variables may be correlated to PP, only stature and grip strength were effective, and thus, necessary to predict PP abilities. Interestingly, broad jump performance was not a good predictor of lower body vertical PP.