

## Isokinetic Knee and Hip Torque in NCAA Division I Female Soccer Athletes

K.A. Brooks, S.L. Clark

**PURPOSE:** The purpose of this study was to determine the relationship of isokinetic knee and hip torque to various physiological characteristics and soccer-specific variables, such as kick velocity (KV) and body fat percentage (BF%) specifically in female collegiate soccer players.

**METHODS:** Anthropometric data was collected on 22 division I female soccer players. Maximum strength, explosive lower body power, agility, acceleration, speed, and aerobic power were tested. Anthropometric data was collected on age, height, weight, and body composition. Body composition was assessed using the Jackson-Pollock 3- Site Skinfold Formula procedure using the Lange skinfold calipers. A one repetition max (1-RM) squat parallel test was used to determine the maximum lower body strength of the athlete. Lower body explosive power (VJ) was measured using a Vertec vertical jump device. A 40 yard dash was measured to evaluate acceleration and 100 meter sprint was used to determine speed. VO2Max was estimated with a 2 mile test and agility was tested using the Illinois Agility Test. Kicking Velocity (KV) was determined using the Speed Trac radar gun. The isokinetic peak torque during knee extension/flexion in the sitting position at 60, 180, and 240 degrees/second, and torque during hip flexion and extension in the standing position at 60, 180, and 240 degrees/second were measured with the Biodex isokinetic dynamometer.

**RESULTS:** Correlation coefficients were calculated for all variables by utilizing a correlation matrix from raw scores for both the pre and post season data. Statistical analysis indicated significant relationships exist. Knee torque during extension was highly correlated with hip flexion ( $r=.81$ ) and hip extension ( $r=.87$ ). A correlation was found between knee torque during extension and KV ( $r=0.89$ ), as well as vertical jump and KV ( $r=0.91$ ).

**CONCLUSIONS:** These data suggest that significant relationships do exist between isokinetic hip and knee torque and soccer-specific variables, and that hip and knee torque is correlated in soccer athletes, which is similar to previous research (1,2,3). However, one cannot interpret this to mean a cause and effect relationship. Additionally, this research demonstrates a need for further research regarding hamstring to quadriceps strength ratio. Our Biodex data suggests hamstring strength is half that of quadriceps strength. This has an important implication for strength coaches in conditioning athletes for injury prevention.