

Relationships between Functional Performance and Quadriceps Muscle Size and Quality in Healthy Older Women

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ABSTRACT

Ultrasound assessments of quadriceps cross-sectional area (CSA) and echo intensity (EI) are commonly used to evaluate lower-body muscle size and quality in older adults. It has been hypothesized that muscle CSA and EI of the quadriceps may be important predictors of functional performances such as gait speed and vertical jump power. However, limited data exist regarding how these parameters associate with performance during a timed up-and-go (TUG) task. **PURPOSE:** The purpose of this study was to examine the relationships between TUG performance and muscle CSA and EI of the quadriceps in older women. **METHODS:** Twenty healthy older women (mean \pm SD; age = 67 ± 4 years; body mass = 68 ± 7 kg; height = 159 ± 6 cm) volunteered to participate in this study. TUG performance was measured as the time (sec) taken to rise from a chair, walk three meters, return, and sit down. Panoramic ultrasound images of the vastus lateralis (VL) and rectus femoris (RF) were obtained on the right thigh to determine CSA and EI for each muscle. The CSAs (cm²) for the VL and RF were added together and normalized to body mass (kg) to provide a relative measure of quadriceps CSA (cm²/kg). Quadriceps EI (AU) was determined as the average of the EIs for the VL and RF. Pearson correlation coefficients (*r*) were used to examine the relationships between TUG performance and quadriceps CSA and EI. **RESULTS:** TUG performance (mean \pm SD) was 8.25 ± 1.39 sec, CSA was 0.22 ± 0.04 cm²/kg, and EI was 137.37 ± 23.43 AU. There was a significant positive relationship between TUG and EI ($r = 0.509$; $P = 0.022$) and a significant negative relationship between TUG and CSA ($r = -0.546$; $P = 0.013$). **CONCLUSION:** The present findings of significant relationships between TUG and CSA and EI suggest that muscle size and quality of the quadriceps may be characteristics relevant to mobility in older adults. Researchers and practitioners may use these findings as ultrasound screening tools to help predict the TUG performance capacities of older populations. Additionally, these findings highlight the importance of developing training programs aimed at increasing quadriceps muscle size and quality, as these changes may be beneficial for improving TUG as well as a multitude of other functional performance abilities in older adults.