

氏名	やまうち ともゆき 山内 智之
所属	人間健康科学研究科 人間健康科学専攻
学位の種類	博士 (理学療法学)
学位記番号	健博 第 250 号
学位授与の日付	令和 5 年 3 月 25 日
課程・論文の別	学位規則第 4 条第 1 項該当
学位論文題名	Relationship of phase angle, echo intensity, and muscle thickness with isokinetic knee extensor strength and associated motor functions in young adults (若年成人における位相角、筋輝度、筋厚と等速性膝伸展筋力および運動機能との関連性)
論文審査委員	主査 教授 山田 拓実 委員 准教授 来間 弘展 委員 准教授 儀間 裕貴

### 【論文の内容の要旨】

Background: There are no reports of muscle function assessment with muscle echo intensity, muscle thickness, phase angle and motor function measured in the same participant. The purpose of this study was to examine whether the parameters extracted with ultrasound and bioelectrical impedance analysis can be one of the multifaceted evaluation methods for rehabilitation.

Methods: This cross-sectional study evaluated the associations between phase angle (measured using bioelectrical impedance analysis), muscle echo intensity and muscle thickness (measured using ultrasound) and isokinetic knee extensor strength (measured as maximum torque at 60 degree/s using an isokinetic dynamometer), and motor functions evaluated by gait speed (usual and maximum), five-repetition sit to stand test (5STS), and stand-up score. We recruited from universities to participate.

Results: The study comprised of 33 young healthy adults (12 males and 21 females; mean age, 22.2 years). Both sexes showed a significant correlation between isokinetic knee extensor strength and phase angle (males,  $r = 0.65$ , females,  $r = 0.54$ ), muscle echo intensity (males,  $r = 0.53$ , females,  $r = 0.54$ ), and muscle thickness (males,  $r = 0.34$ , females,  $r = 0.38$ ). In addition, a significant correlation was found between phase angle and maximum gait speed (males,  $r = 0.64$ , females,  $r = 0.44$ ), 5STS (males,  $r = 0.69$ , females,  $r = 0.62$ ), and stand-up score (females,  $r = 0.45$ ). A significant correlation was

also found between muscle echo intensity and maximum gait speed (males,  $r = -0.34$ , females,  $r = -0.42$ ), 5STS (males,  $r = 0.37$ , females,  $r = 0.33$ ), and stand-up score (females,  $r = -0.30$ ).

Conclusions: The study suggests the parameters obtained from ultrasound and bioelectrical impedance analysis in relation to isokinetic knee extensor provide one multifaceted evaluation method approach for rehabilitation assessment.