TACSM Abstract

Technical and Biological Error of Skeletal Muscle Mass Estimation from Dual-energy X-ray Absorptiometry

CHRISTIAN RODRIGUEZ, MADELIN R. SIEDLER, CHRISTINE M. FLOREZ, GRANT M. TINSLEY

Energy Balance & Body Composition Laboratory; Department of Kinesiology & Sports Management; Texas Tech University; Lubbock, TX

Category: Doctoral

Advisor / Mentor: Tinsley, Grant (grant.tinsley@ttu.edu)

ABSTRACT

The increasing prevalence of conditions like sarcopenia, sarcopenic obesity, frailty, and cachexia emphasizes the need for reliable methods to estimate skeletal muscle mass (SMM). Data obtained from dual-energy X-ray absorptiometry (DXA) can be used within prediction equations to estimate whole-body SMM. However, limited data are available to inform the reliability of SMM estimates from prediction equations. **PURPOSE:** The purpose of this study was to determine the technical and biological error of SMM estimation across two DXA devices. **METHODS:** A sample of 18 generally healthy adults (11 F, 7 M; [mean ± SD] age 24.4 ± 8.7 y, body mass index 24.9 ± 5.7 kg/m^2) completed three total DXA assessments across consecutive mornings. Half of the participants (6 F, 3 M) were assessed on an iDXA scanner while the other half (5 F, 4 M) were evaluated on a Prodigy scanner. DXA total SMM was estimated from appendicular lean mass using a validated equation. Visit 1 consisted of duplicate assessments in which the participant moved off the table completely between scans, while visit 2 consisted of a single scan the following morning. The error observed from back-to-back scans at visit 1 was considered technical error, while the error observed between scans at visit 1 and visit 2 was considered technical plus biological error. For both comparisons, the reliability of each scanner was quantified as precision error (PE), root mean square coefficient of variation (RMSCV), and least significant change (LSC). **RESULTS:** The mean ± SD SMM estimates for iDXA and Prodigy were 22.7 ± 4.3 kg and 26.1 ± 8.1 kg, respectively. For consecutive scans at visit 1 (technical error), PE, RMSCV, and LSC for iDXA were 0.2 kg, 0.9%, and 0.6 kg. For Prodigy, they were 0.4 kg, 1.4%, and 1.0 kg. When comparing scans from visits 1 and 2 (technical plus biological error), PE, RMSCV, and LSC for iDXA and Prodigy were 0.2 kg, 0.9%, and 0.5 kg and 0.3 kg, 1.3%, and 0.9 kg, respectively. **CONCLUSION:** In the present analysis, between-day biological error was negligible as compared to technical error. While noteworthy, this aligns with previous research reporting a relative robustness of DXA to some sources of biological error. Furthermore, these data demonstrate greater precision with iDXA compared to the Prodigy, which might be attributable to iDXA's higher scanning resolution.