

The Effects Of Acute Resistance Exercise On Dual-Energy X-Ray Absorptiometry Measures Of Body Composition

JOHN BARKER¹, TIMOTHY BERRETH¹, ROBERT FOX¹, MEGAN MALDONADO¹, CHASE VAN CLEAVE¹, RACHEL WONG¹, JAVIER ZARAGOZA², MATHIAS TINNIN², GRANT TINSLEY³, LEM TAYLOR² and KINDYLE L. BRENNAN¹

Doctor of Physical Therapy Program; Mayborn College of Health Sciences; University of Mary Hardin-Baylor; Belton, TX¹

Human Performance Lab; School of Exercise and Sport Science; University of Mary Hardin-Baylor; Belton, TX²

Department of Kinesiology & Sport Management, Texas Tech University, Lubbock, TX³

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Advisor / Mentor: Brennan, Kindyle; (kbrennan@umhb.edu)

ABSTRACT

Dual Energy X-Ray Absorptiometry (DXA) is a reference laboratory method for estimating body composition but there are questions concerning the pre-testing guidelines that should be followed to increase validity and reliability of this methodology. **PURPOSE:** The purpose of this study was to determine if acute, localized resistance exercise disrupts the validity of DXA total body composition estimates. **METHODS:** In a crossover design, 18 healthy, resistance-trained, college-aged adults, including 7 females (age: 22.7 ± 1.9 y; height: 165.4 ± 8.4 cm; body mass: 62.1 ± 10.9 kg; body fat: $25.9 \pm 7.3\%$) and 11 males (age: 24.2 ± 4.1 y; height: 180.0 ± 5.1 cm; body mass: 90.2 ± 9.5 kg; body fat: $18.7 \pm 7.2\%$) completed three conditions in a randomized order: lower-body resistance exercise (RE_{LOWER}), upper-body resistance exercise (RE_{UPPER}), and rest (REST). The resistance exercise (RE) protocol consisted of a RE warm-up consisting of 2 sets of 12-15 repetitions of 3 upper-body exercises (upper), or 3 lower-body exercises (lower) or nothing (rest). The RE circuit consisted of 5 sets of 10 repetitions per exercise, with 1-minute rest intervals between circuits. A DXA scan was performed immediately before exercise and at 60 minutes post exercise. DXA estimates of fat mass (FM) and fat-free mass (FFM; calculated as lean soft tissue plus bone mineral content) were analyzed using 3×2 (condition \times time) analysis of variance with repeated measures, follow-up pairwise comparisons, and evaluation of the partial eta-squared (η_p^2) effect sizes. **RESULTS:** Pre-exercise FM and FFM did not differ between conditions (0.2 to 0.4 kg; $p > 0.14$ for all). For FM, no statistically significant interaction or main effects were present (interaction: $p=0.80$, $\eta_p^2=0.01$; time main effect: $p=0.14$, $\eta_p^2=0.12$; condition main effect: $p=0.92$, $\eta_p^2=0.01$). For FFM, no statistically significant interaction ($p=0.13$, $\eta_p^2=0.12$) or condition main effect ($p=0.56$, $\eta_p^2=0.03$) was present. However, a statistically significant time main effect was present ($p=0.009$, $\eta_p^2=0.34$). Pairwise comparisons indicated that post-condition FFM estimates were 0.20 ± 0.07 kg lower than pre-condition values in all conditions combined. **CONCLUSION:** No differences were seen among conditions, indicating that DXA total body composition estimates may be relatively robust to the effects of acute, localized RE. However, investigation of segmental estimates is warranted due to RE-induced blood flow redistribution.