A Comparison of Multiple Body Composition Measurement Methods to the Department of Defense's Physical Fitness and Body Fat Program Procedures

DESMOND J. MILLENDER, HOLLY M. HALL, JEREMY B. DUCHARME, AVADNEY F. GERARD-OSBOURNE, & ANN L. GIBSON, FACSM

Exercise Physiology Laboratory; Department of Health, Exercise, and Sports Sciences; University of New Mexico; Albuquerque, NM

Category: Doctoral

Advisor / Mentor: Gibson, Ann (alg@unm.edu)

ABSTRACT

INTROUDCTION: The Department of Defense (DoD) developed body composition standards that require service personnel to meet sex- and branch-specific body mass index criteria. Failing to meet these criteria leads to body fat percentage (%BF) estimation via the DoD's circumference method. Service members exceeding these standards face administrative action and a possible premature discharge, thus emphasizing the importance of accurately estimating %BF with this method. **PURPOSE**: To compare the predictive accuracy of the DoD's circumference-based equation to estimate %BF compared to hydrostatic weighting (HW); segmental and whole-body bioelectrical impedance analyses (BIA), and sex-specific skinfold thickness assessments. **METHODS**: Physically active men (n = 35, 25 ± 4.7 yrs, 79.6 ± 21 kg, 176.3 ± 6.7 cm) and women (n = 34, 24.7 ± 5.1 yrs, 63.6 ± 8.6 kg, 166.0 ± 7.3 cm) participated. Population-specific equations were used to compute body density (Db) from ΣSKF and HW and to convert Db to %BF. Sex-specific repeated measures ANOVAs with Bonferroni's multiple comparisons tests were applied. Agreement between the DoD and the other %BF results were quantified via Bland-Altman 95% limits-of-agreement plots. Statistical significance was set at $p<.05$. **RESULTS**: The DoD method predicted a significantly ($p<.05$) higher %BF (27.1 ± 6.3%) compared to upper body BIA (23.1 ± 4.9%) and SKF (21.9 ± 4.8%) for the women only. For men, the DoD method estimated a significantly lower ($p<.05$) %BF (12.9 ± 5.5%) compared to lower body BIA (17.5 ± 5.7%). Wide limits-of-agreement (> ±3.5 %BF) for mean differences in %BF were observed between the DoD method and all assessments for both men and women. **CONCLUSION**: Our findings suggest that at the group level, the DoD's current method of assessing %BF produces similar values compared to whole-body vertical BIA and HW. However, DoD estimates of %BF at the individual level lack predictive accuracy given the wide limits-of-agreement. Since the DoD method is applied at the individual level, caution is needed when determining if administrative action is necessary.