

Abstract

Background Information: Active duty military personnel are expected to maintain a healthy percent body fat (%BF) to present a trim, fit appearance but also to maintain positive health outcomes and physical abilities required of a Service Member. Bioelectrical impedance analysis (BIA) and dual energy x-ray absorptiometry (DEXA) are validated and reliable methods used to assess %BF. The U.S. Army revised the validated circumference based equations used to determine %BF in overweight Soldiers in 2006 to meet standards set forth by Department of Defense Instruction 1308.3.

Objective: To compare estimates of %BF using three methods: BIA, circumference measures, and DEXA.

Design: A convenience sample of 30 active duty Service Members assigned within the National Capitol Region participated in this cross-sectional observational study. Percent body fat was measured using BIA, circumference measures, and DEXA. Agreement among methods was evaluated using Bland-Altman plots and Pearson's correlations. Paired t-tests were used to assess differences in methods, and multiple regression analysis was used to predict the effect independent variables may have had on differences among methods.

Results: Percent body fat from circumference measures, DEXA, and BIA were significantly correlated for participants as a whole and when stratified by gender. There was a statistically significant difference in %BF between circumference measures and BIA, showing that circumference measures significantly underestimated %BF in males when compared to BIA ($p < 0.05$). In females with waist circumferences greater than 88 cm, circumference measurements overestimated %BF compared to DEXA by 3.26% ($p = 0.09$).

Comparison of three different body composition measures in active duty service members
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Conclusions: The new circumference based equations are a good alternative for estimating %BF when compared to BIA and DEXA. More evidence is necessary to determine if these equations overestimate %BF in women with waist circumference greater than 88 cm.

Key Words: Percentage body fat, multifrequency bioelectrical impedance analysis, dual energy x-ray absorptiometry, Army Weight Control Program, body composition.