

Body composition assessment methods: A systematic review and recommendations

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BACKGROUND: Obesity is linked to health-compromising conditions and disproportionately affects African American women. Accurate assessment of body composition is essential and may vary by method and ethnicity. Body mass index (BMI), bioelectrical impedance analysis (BIA), and dual energy x-ray absorptiometry (DXA) are common methods of body composition assessment used in previous studies. BMI is inexpensive, non-invasive, and requires little training but is not a direct measure of body fat percentage (BF%), which has led to under- and over-estimation of adiposity based on ethnicity[1]. BIA is also non-invasive and requires little training and measures BF% but requires generalizable and population specific equations, which limit the ability to cross-validate findings for populations of interest, such as African Americans. DXA provides a direct measure of BF%, which can specify adiposity in regions of interest, and is often identified as a “reference method,” to which other methods of body composition are compared. However, DXA equipment is expensive, requires trained personnel to operate it and may underestimate BF%, allowing for continued use of BMI and BIA as acceptable measures of body composition. Previous studies have compared body composition methods, but none have critically reviewed methods used among African American women participants.

PURPOSE: The purpose of this critical review is to analyze methods of body composition assessment in previous literature and to determine whether African American women are included as participants.

METHODS: A literature search on PubMed was conducted for studies published between 2002 and September 2009 in English in all nations. Inclusion criteria included studies that used at least two of three body composition assessment methods of interest (BMI, BIA, or DXA). Focus was placed on sample size, population, and study outcome.

RESULTS: Eighteen studies met the inclusion criteria and were included in this review. Only two studies used all three methods, BMI, BIA and DXA, to measure body composition. Fourteen studies included DXA as one of two measurements, and nine used it as the “reference method,” despite noted limitations of accessibility. Five studies used BMI and BIA. In those studies, BIA was used as the “reference method” 11% of the time, and BMI was used as the reference method 6% of the time. Fifteen studies (84%) included African American participants, but only one study (6%) focused on African American women[2].

CONCLUSION: Reviewed findings indicate inconsistency in the literature regarding body composition method of choice in obesity studies [3]. Few studies included African American women despite being acknowledged as most vulnerable to obesity. Underrepresentation of African American women in studies assessing body composition or small sample sizes may affect reliability and bias outcomes. Many studies included in

the review consider DXA as the best method of body composition assessment based on accuracy in comparison to other methods[4]; however, cost limitations may mean BIA is more appropriate for body composition assessment in community based and large epidemiological studies[5]. Future studies should compare measures of BMI, BIA and DXA in a large sample of African American women, and evaluate whether BIA can be reliably used rather than BMI or DXA.

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