Comparison of Body Composition Assessment Methods in Breast Cancer Survivors

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Purpose/Objectives: To examine and compare the reliability of four body composition methods commonly used in assessing breast cancer survivors.

Design: Cross-sectional.

Setting: A rehabilitation facility at a university-based comprehensive cancer center in the southeastern United States.

Sample: 14 breast cancer survivors aged 40–71 years.

Methods: Body fat (BF) percentage was estimated via bioelectric impedance analysis (BIA), air displacement plethysmography (ADP), and skinfold thickness (SKF) using both three- and seven-site algorithms, where reliability of the methods was evaluated by conducting two tests for each method (test 1 and test 2), one immediately after the other. An analysis of variance was used to compare the results of BF percentage among the four methods. Intraclass correlation coefficient (ICC) was used to test the reliability of each method.

Main Research Variable: BF percentage.

Findings: Significant differences in BF percentage were observed between BIA and all other methods (three-site SKF, $p < 0.001$; seven-site SKF, $p < 0.001$; ADP, $p = 0.002$). No significant differences ($p > 0.05$) in BF percentage between three-site SKF, seven-site SKF, and ADP were observed. ICCs between test 1 and test 2 for each method were BIA = 1, ADP = 0.98, three-site SKF = 0.99, and seven-site SKF = 0.94.

Conclusions: ADP and both SKF methods produce similar estimates of BF percentage in all participants, whereas BIA overestimated BF percentage relative to the other measures. Caution is recommended when using BIA as the body composition method for breast cancer survivors who have completed treatment but are still undergoing adjuvant hormonal therapy.

Implications for Nursing: Measurements of body composition can be implemented very easily as part of usual care and should serve as an objective outcome measure for interventions designed to promote healthy behaviors among breast cancer survivors.

Accurate and reliable assessment of body composition often is an integral component in the identification of clinically high-risk populations and is used in an attempt to prevent and manage certain chronic diseases (Heyward, 2006). Breast cancer survivors are a clinical population who frequently experience extremely altered body composition (e.g., changes in body fat [BF] percentage, muscle mass, bone mineral density) after diagnosis and treatment. Because of these alterations, it can be beneficial and clinically appropriate for body composition monitoring to be conducted during and after treatment in breast cancer survivors.

At-Risk Population

Breast cancer survivors have been reported to experience sarcopenic obesity, defined as increased weight without concomitant gain in lean tissue (Herber et al., 1996). Sarcopenic obesity often is a side effect of adjuvant chemotherapy and is associated with reduced energy and physical activity levels, although controversy remains whether this outcome is in some part related to adjuvant endocrine hormone therapy such as tamoxifen and aromatase inhibitors (Denmark-Wahnefried, Rimer, & Winer, 1997; Denmark-Wahnefried, Winer, & Rimer, 1993; Kroenke, Chen, Rosner, & Holmes, 2002). Such weight gain has important long-term health implications for breast cancer survivors, particularly because it usually occurs with concomitant increases in BF that have been associated with disease recurrence (Rooney & Wald, 2007). A systematic review by Rock and Denmark-Wahnefried (2002) determined that increased body mass index (BMI) was a significant risk factor for breast cancer recurrence and was associated with poorer survival rates. An increased BF percentage in breast cancer survivors is associated with increased risks of other comorbidities, including hypertension, diabetes, osteoarthritis, and cardiovascular disease (Denmark-Wahnefried et al., 1997). Other adverse consequences associated with weight gain include psychological distress, loss of self-esteem, anxiety concerning appearance, body image concerns, and