

THE ACCURACY OF A METHOD TO PREDICT BODY FAT PERCENTAGE FROM BODY MASS INDEX IN FEMALE WEIGHTLIFTERS

Michael F. Ward, Michael R. Esco & Alyssa L. Parten

Exercise Physiology Laboratory, Department of Kinesiology, The University of Alabama

BACKGROUND

- Body mass index (BMI) is the ratio of body weight to height and is a commonly used body composition metric.
- While BMI does not differentiate between fat mass and fat-free mass, equations have been developed to estimate body fat percentage (BF%) from BMI.
- The accuracy of these equations has been insufficiently studied, particularly in female weightlifters.

PURPOSE STATEMENT

- The purpose of this study was to determine the accuracy of a body mass index (BMI)-based equation for predicting body fat percentage (BF%) in female weightlifters.

METHODS

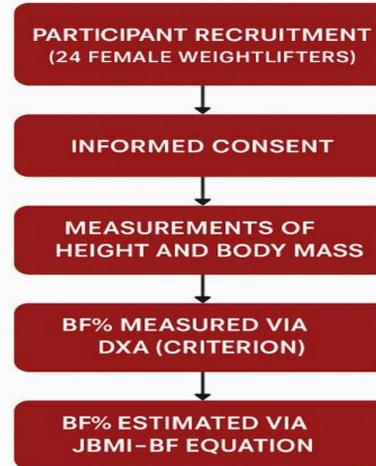


Table 1. Physical and descriptive characteristics of subjects (N = 24; Mean ± SD).

Training Status (NSCA)	Intermediate (n = 2)	Advanced (n = 13)	Highly Advanced (n = 9)	All (N = 24)
Age (y)	25.5 ± 7.8	24.1 ± 5.2	26.6 ± 5.7	25.1 ± 5.4
Height (cm)	167.3 ± 5.7	165.1 ± 5.3	162.2 ± 7.5	164.1 ± 6.5
Body Mass (kg)	66.0 ± 16.1	65.5 ± 5.8	67.4 ± 8.9	66.3 ± 7.9
Body Fat (%)	31.5 ± 6.6	32.7 ± 3.7	30.3 ± 5.3	31.6 ± 4.5
Body Mass Index (kg/m ²)	23.8 ± 7.4	24.0 ± 1.7	25.4 ± 2.5	24.6 ± 2.6

PRIMARY FINDINGS

- The JBMI-BF equation produced mean BF% values like those obtained via DXA. However, the large standard error of the estimate (SEE) and broad limits of agreement indicate substantial individual variability.
- While group means were comparable, the equation lacks precision for individualized assessment of BF%, limiting its clinical utility.
- The prediction accuracy may vary depending on an athlete's training status, body composition, or BMI range, highlighting the need for further validation in more diverse female athletic populations.
- *Note.* These results can only be applied to female weightlifters, as the sample was limited to this population.

RESULTS

- There was no statistically significant difference in mean BF% between the JBMI-BF and DXA methods (30.2 ± 5.1% vs. 31.3 ± 4.4%, $p = 0.28$).
- A significant correlation was found between JBMI-BF and DXA BF% ($r = 0.42$, $p = 0.04$), with a SEE of ±4.1%.
- Bland-Altman analysis indicated limits of agreement ranging from -11.1% to +8.9% (mean bias = -1.1% ± 10.0%) (Figure 1).

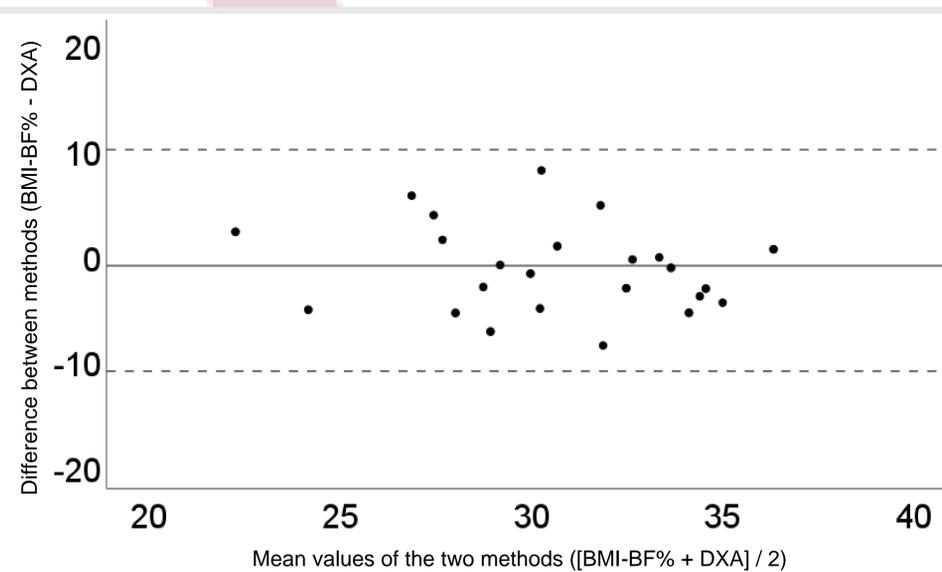


Figure 1. Bland-Altman Plot showing the agreement between BMI-BF% and DXA. The solid horizontal line indicates the constant/mean error. The two dashed horizontal lines indicate the upper and lower limits of agreement.

PRACTICAL APPLICATIONS

- BMI could potentially be utilized within a field setting to predict mean BF% for an entire group of female weightlifters but would not be appropriate for predicting BF% for individuals.
- Caution is advised when using BMI-based equations for clinical or individual athlete monitoring, as they may mask meaningful changes in fat mass over time.
- Strength and conditioning professionals should prioritize direct body composition measures (e.g., skinfolds, BIA, or DXA) when precision is necessary for program evaluation or nutritional planning.