Comparison of Plethysmography and BMI-Based Equations for Estimating Body Fat in Female Collegiate Gymnasts

Exercise Science
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Purpose
The purpose of this study was to determine the agreement between three BMI-based equations (BEQ) and BODPOD (BP) for estimating BF% in female collegiate gymnasts.

Methods
Twenty-two female, collegiate gymnasts (age = 18.9 ± 1.0 yr, height = 158.2 ± 1.9 cm, weight = 57. ± 5.6 kg, BMI = 22.9 ± 1.8 kg.m-2) participated in this study. At each visit, BF% was assessed with a calibrated BP, body weight with a calibrated digital scale, and height with a stadiometer. BF% was predicted by using three previously developed BEQ as follows: Jackson et al (2002) (JBMI) = (4.35 x BMI) – (0.05 x BMI2) – 46.24; Deurenberg et al (1991) (DBMI) = (1.20 x BMI) + (0.23 x age) – 5.4; Womersley & Durnin (1977) (WBMI) = (1.37 x BMI) – 3.47.

Results
The measures of BF% produced the following results: 20.3 ± 3.6%, BP; 26.9 ± 3.9%, JBMI; 26.4 ± 2.2%, DBMI; and 27.9 ± 2.5%, WBMI. BF% estimated via BP was significantly lower (p < 0.05) than each BEQ. Weak correlations were found between BP and the BEQs (r = 0.12, JBMI; r = 0.07, DBMI; r = 0.12, WBMI). The 95% limits of agreement for each BEQ compared to BP were 9.5%, JBMI; 7.8%, DBMI; and 8.0%, WBMI.

Conclusion
Inaccurate predictions of BF% in athletes may exacerbate pre-existing psychological issues. BP demonstrated a statistically significant lower prediction of BF% than any of the BEQ with weak correlations and large limits of agreement. Therefore, practitioners may need to consider methods other than BEQ as a means of predicting BF% in female collegiate gymnasts.

Link: https://s3.us-east-2.amazonaws.com/lagrangecollegecitations/PorterSEACSM.pdf

Citations Journal of Undergraduate Research
© May 2018, Vol. 15