LAGRANGE
C O L L E G E

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

Exercise Science

Faculty Sponsor: Dr. Jason Casey

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 = $57. \pm 5.6$ 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) = $(4.35 \times BMI) - (0.05 \times BMI2) - 46.24$; Deurenberg et al (1991) (DBMI) = $(1.20 \times BMI) + (0.23 \times age) - 5.4$; Womersley & Durnin (1977) (WBMI) = $(1.37 \times BMI) - 3.47$.

Results

The measures of BF% produced the following results: $20.3 \pm 3.6\%$, BP; $26.9 \pm 3.9\%$, JBMI; $26.4 \pm 2.2\%$, DBMI; and $27.9 \pm 2.5\%$, 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