DIFFERENCES AMONG BODY FAT PERCENTAGE PREDICTION EQUATIONS IN A COLLEGE AGE POPULATION

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ABSTRACT

Body mass index (BMI) is known to misclassify obesity status according to body fat percentage (BF%). **Purpose:** To determine if body adiposity index (BAI) and the Deurenberg equation can predict BF% in traditional aged college students. **Methods:** Anthropometric data were collected on 172 college students (18-25y). BF% was measured using dual energy x-ray absorptiometry (GE Lunar iDXA, Waukesha, WI). Paired t-tests were used to determine group mean differences in BF% between measured and predicted values. In addition, Pearson's correlation and intra-class coefficient correlations (ICC) were used to examine the association and reliability between the values, respectively. **Results:** BAI-predicted BF% (27.35 ± 5.04%) and Deurenberg-predicted BF% (23.48 ± 7.78%) were significantly lower than DXA-measured BF% (28.64 ± 9.10 %), p = .004 and p < .001, respectively. BAI- (r = .817) and Deurenberg- (r = .847) predicted BF% were strongly correlated to DXA-measured BF%, p < .001. ICC demonstrated strong reliability between DXA-measured BF% and the BAI-predicted measured BF% (ICC = .812, p <.001) and Deurenberg-measured BF% (.828, p < .001). **Discussion:** While statistical significance was noted, the difference of 1% between DXA-measured BF% and BAI-predicted BF% lacks clinical significance. However, our study concludes that the use of both equations is warranted in this population. Additional research is suggested to further elucidate our findings.

PURPOSE

- The universal calculation of obesity and health status is Body Mass Index (BMI).

- According to previous studies, BMI alone does not accurately classify a person's obesity status. BMI can not distinguish body fat from fat-free mass such as muscle and bone. It also does not take in consideration a person's sex and age (Burkhauser & Cawley, 2006).

- The purpose of this study was to determine if body adiposity index (BAI) and the Deurenberg equation can accurately predict BF% in traditional aged college students.

METHODS

Table 1. Descriptive Statistics

	Mean ± SD
Height (cm)	169.31 ± 9.15
Weight (kg)	71.88 ± 17.92
Age (yrs)	19.30 ± 1.38
Body Fat (%)	28.64 ± 9.09
BMI (kg/m^2)	24.92 ± 5.14
Avg. Waist Circumference (cm)	77.79 ± 11.93
Avg. Hip Circumference (cm)	99.59 ± 10.13

Participants

- 172 Full-time (≥ 12 credit hours) college students (18-25 years)
- All students were from a small, rural, commuter campus
- Student athletes and pregnant women were excluded from this study

DXA Scan

- Body composition was measured by dual-energy x-ray absorptiometry (DXA) using a GE Lunar iDXA (Waukesha, Wisconsin).

Height

- Height (cm) was measured using a wall mounted stadiometer without shoes

Weight

- Weight (kg) was measured in light clothing using a calibrated digital scale

Body Adiposity Index

- (Hip Circumference in cm/(Height in meters)^1.5) - 18

Deurenberg

- BF% = 1.20 x BMI -10.8 x sex + 0.23 x age - 5.4
- Sex: males = 1, females = 0

Data Analyses

- IBM SPSS Statistics (v. 24) was used to analyze our data.
- T-tests were used to compare means between measured and equation-predicted BF%.
- Pearson's Correlation Coefficient was used to examine the strength of association between measured and predicted BF%.
- ICC was used to determine the reliability of the equation's predicted BF%

RESULTS

Table 2. Measured and Predicted Mean Body Fat Percentages

	Mean ± SD	Statistical Significance (p)
Total fat measured by DXA (BF%)	28.64 ± 9.10	P = .004
BAI Equation(BF%)	27.35 ± 5.04	
Total fat measured by DXA (BF%)	28.64 ± 9.10	P < .001
Deurenberg Equation (BF%)	23.48 ± 7.78	

Table 3. Pearson's Correlation between BAI and Deurenberg Predicted Body Fat and DXA Measured Body Fat Percentage

	BAI (BF%)	Deurenberg (BF%)
DXA (BF%)	r = .817	r = .847
Sig. (2-tailed)	p < .000	p < .000

Table 4. Intra-class Correlation Coefficient of BAI and Deurenberg Predicted Body Fat Percentages

	ICC
BAI (BF%)	.812[c]
Deurenberg (BF%)	.828[c]

- Both BAI and Deurenberg measured BF% were significantly different when compared to DXA measured BF%.
- BAI and Deurenberg predicted BF% were strongly and significantly correlated with DXA measured BF%.

DISCUSSION

- Both the Deurenberg and the BAI equations demonstrated reliability in college age participants when compared to the criterion measure of DXA.
- Although both equations showed a statistical difference, the difference found between BAI and DXA measured body fat was not clinically significant.
- Future studies with an increased sample size are need to corroborate the findings in this population.
- Future studies should include a variety of age groups and obesity status.

REFERENCES

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