

DIFFERENCES IN VISCERAL ADIPOSE TISSUE AND TOTAL BODY FAT BASED ON BMI IN FEMALE COLLEGE STUDENTS

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ABSTRACT

Body mass index (BMI) is a widely used method to determine obesity status using a weight-to-height ratio. There are many criticisms of the use of BMI due to misclassification of obesity status and lack of regard for visceral adipose tissue (VAT) and total body fat (%BF). **Purpose:** To determine if a difference exists in VAT mass, VAT volume, and BF% between healthy-weight (HW) and overweight/obese women (OO). **Methods:** Forty-six traditional-aged (18-25y) college students participated in this study. Height and weight were recorded and BMI was calculated for each participant. VAT mass, VAT volume, and BF% were measured using an iDXA. A multivariate analysis of variance (MANOVA) was used to determine whether the differences between groups existed in VAT mass, VAT volume, and BF%. **Results:** There was a statistically significant difference in VAT and BF% based on BMI, Pillai's Trace = .47, $F = 12.24$, $df = (3, 42)$, $p < .001$. BMI effected VAT mass ($F(1, 44) = 25.07$; $p < .001$), VAT volume ($F(1, 44) = 25.05$; $p < .001$), BF% ($F(1, 44) = 36.69$; $p < .001$). **Discussion:** There were significant differences in VAT mass, VAT volume, and BF% based on BMI categories. The mean BF% in the HW group was at the top of the healthy category. This indicates that many of the participants classified within the healthy BMI category had BF% outside the healthy range. Therefore, the results supported criticisms that the singular use of BMI can misclassify obesity status due to the lack of regard for VAT and BF%.

PURPOSE

- Body Mass Index (BMI) is a universal measurement used in health care for determining health and obesity status.
- Previous reports have argued that BMI is not an accurate measurement of obesity status because it does not account for body fat.
- Studies have stated that BMI alone is likely failing to capture important changes in subcutaneous and visceral adipose tissues. Therefore it does not accurately assess risks associated with metabolic syndromes, diabetes, cardiovascular disease, and hypertension.
- The purpose of this study was to evaluate differences in adipose tissue between groups of women in "normal weight" and "overweight/obese" BMI categories.

METHODS

Participants

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

Height

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

Weight

- Weight (kg) was measured in light clothing using a standard physician's scale



Body Mass Index

- Body Mass Index (BMI) was calculated using the subject's height and weight
- $BMI = \frac{weight (kg)}{height (m^2)}$
- Participants with BMIs between 18.5-24.9 kg/m^2 were categorized into the healthy-weight group (HW)
- Participants with BMIs ≥ 25 kg/m^2 were categorized into the overweight/obese (OO) group



DXA Scan

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

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Data Analysis

- A multivariate analysis of variance (MANOVA) was used to determine the differences between groups in VAT mass, VAT volume, and BF%

RESULTS

Table 1. Demographic data

	HW group (n = 25)	OO group (n = 21)
Age (yr)	19.28 \pm 1.46	19.43 \pm 1.43
Weight (kg)	60.72 \pm 6.79	81.23 \pm 12.98
Height (cm)	164.72 \pm 6.65	164.65 \pm 2.74
BMI (kg/m²)	22.35 \pm 1.73	29.94 \pm 4.53
DXA Total Body Fat (%)	31.70 \pm 4.10	39.85 \pm 5.03*
VAT mass (kg)	.36 \pm .27	1.12 \pm .70*
VAT volume (cm³)	10.47 \pm 8.03	32.76 \pm 20.50*

* $p < 0.05$

- Significant differences were found in VAT mass, VAT volume, and BF% based on BMI categories

DISCUSSION

- As expected, the OO group had higher total body fat % and visceral fat mass and volume.
- These data show that the HW group (based on BMI) had an mean total body fat % at the top of the normal range (20-32% in women). Furthermore, the maximum body fat percentage in HW group was 40.40%. This is above the healthy range for BF%.
- The minimum body fat percentage for OO group was 30.20. This is within the healthy range for BF%.
- Similar to previous studies, these results demonstrate a misclassification of obesity status when using solely BMI.

REFERENCES

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