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The Correlation Between Self-Reported and Measured Height, Weight, and BMI in Reproductive Age Women

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Abstract

This prospective, cross-sectional study of 60 women compares self-reported height, weight, and BMI with measured values. Self-reported BMI ($29.0 \pm 8.37 \text{ kg/m}^2$) was slightly lower than measured BMI ($29.1 \pm 8.38 \text{ kg/m}^2$) ($p=0.4$). Eighty percent of participants reported a BMI in the same category in which their BMI was measured. Pearson's correlation coefficient for height (0.96, $p<0.001$), weight (0.99, $p<0.001$), and BMI (0.99, $p<0.001$) were high. Reproductive age women accurately reported their height and weight.

Keywords

self-reported weight; self-reported height; reproductive age women

1.0 Introduction

1.1 Background

Only 2 studies investigating self-reported versus measured height and weight in reproductive age women could be identified [1, 2]. Self-reported height and weight recorded by 275 women taking a survey regarding contraception were compared to the height and weight recorded in the medical record [1]. The participants slightly over-reported height and under-reported weight, but there was a good correlation between reported and measured BMI [1]. Perceived weight category was compared with measured height and weight from the

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Jennifer Lesh aided in the statistical analysis and edited the manuscript.

Alex Polotsky and Nanette Santoro both contributed to planning of the analysis and edited the manuscript.

All authors approve the final manuscript.

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medical records of over 2,000 reproductive aged women seeking care at 5 reproductive health clinics [2]. Twenty-three percent of the overweight/obese women perceived themselves to be in a lower weight category than was measured [2].

1.2 Study Aim

To examine this issue further, we compared self-reported height and weight with measured height and weight in reproductive age women seeking participation in clinical research.

2.0 Method

2.1 Study Design

This is a prospective, cross-sectional study of women who underwent screening for 2 clinical research protocols at the University of Colorado, Denver (n=60). The 2 research protocols were investigating body weight and reproductive hormones and had the same inclusion and exclusion criteria and similar recruitment materials. The participants were included in the current analysis if they completed a phone screen and in-person screening visit.

2.2 Data Collection

Self-reported height (inches) and weight (pounds) were collected at the time of the phone screen. The participants were then screened in-person in the clinical research center. Trained clinical research nurses measured height (centimeters) using a stadiometer and weight (kilograms) using 1 of 2 digital scales, calibrated yearly. Body mass index (BMI) was calculated for both self-reported and measured values.

2.3 Ethical approval

Each participant provided informed consent and IRB approval was obtained for all protocols.

2.4 Statistical Analysis

Agreement of calculated BMI categories from self-reported and measured weight and height were compared using McNemar's test. Agreement of each self-reported and measured value was assessed visually with a scatterplot on the agreement line and descriptively with Pearson correlation. Comparison of continuous height, weight and BMI (measured vs. self-reported) was conducted using a paired t-test, and further assessed using Bland-Altman plots. A Bland-Altman plot is a method of data plotting used to graphically depict and analyze the agreement between two assessments of the same measure. It features the average of the pair on the horizontal axis, the difference on the vertical axis, and reference lines for the average (± 2 SD) difference. SAS software (v9.2 $\times$ 64 platform) was used for statistical analysis.

3.0 Results

3.1 Demographics

The mean age of the women studied (n = 60) was 30.1 ± 4.5 years. The participants were mostly white (74.6%) and non-Hispanic (91.7%). The breakdown of BMI categories by measured values was as follows: 1 participant was underweight, 29 were normal weight, 3 were overweight, and 29 were obese.

3.2 Comparison of Self-Reported and Measured Values

The median length of time between the phone screen and in-person screening visit was 7 days with an interquartile range (25%ile to 75%ile) from 5 to 13.3 days.

BMI based on self-reported values ($29.0 \pm 8.37 \text{ kg/m}^2$) was slightly lower than BMI based on measured data ($29.1 \pm 8.38 \text{ kg/m}^2$) ($p=0.4$). Reported weight was $0.25 \pm 3.21 \text{ kg}$ lower than measured ($p=0.6$) and reported height was $0.07 \pm 1.85 \text{ cm}$ taller than measured ($p=0.8$).

3.3 Self-Reported Versus Measured BMI Category

While BMI calculated from self-reported weight and height was slightly lower on average, there was general agreement in categorical BMI (normal weight <25 vs. overweight and obese 25, $p=0.17$) with a misclassification of only two women (3%). Both reported that they were normal weight but were actually overweight.

When analyzing self-reported BMI (calculated from self-reported height and weight) versus measured BMI by 6 BMI categories (underweight, normal weight, overweight, and obese classes I-III), 80% of participants reported a height and weight in the same category in which their BMI was measured (Table 1). Of those who misclassified their BMI based on self-report, 5 overestimated by 1 BMI category and 7 underestimated by 1 BMI category (Table 1).

3.4 Correlations Between Self-Reported and Measured Values

Pearson's correlation coefficient for height (0.96, $p<0.001$), weight (0.99, $p<0.001$), and BMI (0.99, $p<0.001$) were all high, as expected (Figure 1a-c). Significant differences in reporting of weight, height, and BMI were not observed when the data were examined by age, race, or measured BMI. The 2 standard deviation limits on Bland-Altman plots were within a clinically acceptable range for height, weight and BMI, and 95% of all values fell within this range (Figure 1d-f).

4.0 Discussion

4.1 Summary and Comparison with Previous Studies

Reproductive age women seeking participation in clinical research focusing on weight and reproductive hormones accurately report their height and weight. This is consistent with the previous studies in reproductive age women [1, 2]. Our study and prior studies show that subjects slightly over-report their height and slightly under-report their weight thereby slightly underestimating their true BMI but that there is good correlation between reported and measured BMI [1, 2].

4.2 Study Strengths

The strengths of this study are that the data were collected prospectively in a clinical research setting. Additionally, measured height and weight were measured by trained study nurses on a stadiometer and 1 of 2 digital scales. In contrast, previous studies in reproductive age women have relied on height and weight abstracted from the medical record [1, 2]. Values for height and weight in the medical record may not be accurate. A recent study found that only 35% of height and weight values recorded for outpatient visits were obtained appropriately [3].

4.3 Study Limitations

Limitations of the study are the relatively small sample size and the homogenous study population. Previous studies have illustrated that African-American women are more likely to misperceive their weight versus Caucasian women [4]. Additionally, African-American and Hispanic women are disproportionately affected by obesity [5] and are under-represented in our sample. Our study population was largely Caucasian and non-Hispanic.

4.4 Conclusions

Our study of self-reported versus measured values of height, weight, and calculated BMI in reproductive age women adds to the small, existing literature on the subject. We found an acceptable accuracy of our population's self-report of height and weight. Although the expected minor variance was found, in our study of reproductive aged women, the difference between self-reported and clinically-measured values was neither clinically nor statistically significant. Thus, it is reasonable to use self-reported height and weight for clinical trials, especially if in-person resources are difficult to obtain.

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References

1. Brunner Huber LR. Validity of self-reported height and weight in women of reproductive age. *Matern Child Health J.* 2007; 11:137–44. [PubMed: 17066316]
2. Rahman M, Berenson AB. Self-perception of weight and its association with weight-related behaviors in young, reproductive-aged women. *Obstet Gynecol.* 2010; 116:1274–80. [PubMed: 21099591]
3. Greenwood JLJ, Narus SP, Leiser J, Egger MJ. Measuring body mass index according to protocol: how are height and weight obtained? *J Healthc Qual.* 2011; 33:28–36.
4. Hendley Y, Zhao L, Coverson DL, et al. Differences in weight perception among blacks and whites. *J Womens Health.* 2011; 20:1805–11.
5. Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999–2010. *JAMA.* 2012; 307:491–97. [PubMed: 22253363]

Figure 1. Bland Altman Plots of self-reported height and weight and calculated BMI vs. measured height, weight and calculated BMI. Solid line in correlation plot indicates perfect agreement between self-reported and measured values.

Table 1

Self-reported Versus Measured BMI

BMI -Measured	BMI – Self-Reported					
	Underweight	Normal	Overweight	Obese		
	<18.5	18.5 to <25	25 to <30	Class I 30 to <35	Class II 35 to <40	Class III 40
Underweight	<18.5	1				
Normal		27				
Overweight	18.5 to <25	2	0	1		
Obese	25 to <30		1	9	3	
	30 to <35					
	35 to <40			3	9	
	40				1	3

Shaded blocks show agreement between reported and measured BMI category.