COMPARISON OF A-MODE AND B-MODE ULTRASOUND FOR MEASUREMENT OF SUBCUTANEOUS FAT

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ABSTRACT

Background: With lower cost devices and technological advancements, ultrasound has been undergoing a resurgence as a method to measure subcutaneous adipose tissue. Amplitude (A-mode) ultrasound produces a spike at the interface between subcutaneous fat and muscle, while brightness (B-mode) ultrasound produces an image of the underlying tissues. Purpose: This study aimed to determine if a low-cost, low-resolution A-mode ultrasound designed specifically for body composition assessment could produce subcutaneous fat thickness measurements comparable to an expensive, high-resolution B-mode device. Methods: Subcutaneous fat thickness was measured on 41 participants (21 female, 20 male, 29.6 ± 11.0 y; BMI 25.3 ± 5.1 kg/m²) at 7 different sites (chest, subscapula, mid-axilla, triceps, abdomen, suprailliac, and thigh) with two different devices: a 2.5 MHz A-mode ultrasound (BodyMetrix BX2000), and a 12 MHz B-mode ultrasound (GE NextGen LOGIQ e R7). Results: Pearson correlation coefficients between the two ultrasound devices exceeded 0.80 (P < 0.001) at all measurement sites. Mean differences in fat thickness were not significantly different between the devices (P > 0.05) with the exception of the triceps site (P = 0.021); however, the mean difference at this site (0.53 mm) was not clinically relevant. The variability between devices was greatest at the abdomen, the site with the greatest thickness. However, Bland-Altman plots revealed no systematic bias. No significant mean differences between A-mode and B-mode (P>0.05) with the exception of the triceps site (P=0.021); however, the magnitude of difference was small (-0.53 mm) and not clinically meaningful (Table 1). Variability was greatest at the abdomen, the site with the greatest thickness, however Bland-Altman plots revealed no systematic bias (Figure 1). Individual measurements are shown in Figure 1.

RESULTS

• Pearson correlation coefficients exceeded 0.80 (P<0.001) between A-mode and B-mode at all sites.
• No significant mean differences between A-mode and B-mode (P>0.05) with the exception of the triceps site (P=0.021); however, the magnitude of difference was small (-0.53 mm) and not clinically meaningful (Table 1).
• Variability was greatest at the abdomen, the site with the greatest thickness, however Bland-Altman plots revealed no systematic bias (Figure 1).
• Individual measurements are shown in Figure 1.

SUMMARY and CONCLUSIONS

• Both A-mode and B-mode ultrasound are equally capable of providing measurements of subcutaneous fat thickness with an accuracy of < 1 mm at most sites.
• Limiting factor of the lower resolution A-mode ultrasound is not selecting the correct equation.
• With a strong relationship and insignificant mean differences the lower resolution A-mode ultrasound provides measurements of subcutaneous fat thickness similar to the higher resolution B-mode machine.

REFERENCES