TACSM Abstract

Concurrent Validity of the Sahara Portable Bone Sonometer

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ABSTRACT

Osteoporosis is a contemporary health issue in today's society. Bone mineral density tests have the ability to detect low bone density before a fracture occurs. Presently, dual-energy X-ray absorptiometry (DXA) is a common method used to measure bone mineral density. In recent years, quantitative ultrasonography (ultrasound) has been used as a screening device at health fairs and other venues to estimate bone mineral density. The use of ultrasound offers several advantages: it exposes individuals to no radiation, it is inexpensive, and requires less tester skill and oversight than DXA.

PURPOSE: To assess the accuracy of calcaneal ultrasound as a bone mineral density screening method compared to total body dual-energy X-ray absorptiometry.

METHODS: A total of 44 men between the ages of 18-25 years (21.6 ± 1.41) completed both a total body dual-energy X-ray absorptiometry (DXA) (GE Lunar) scan and an ultrasound (Hologic Sahara) calcaneus scan in a single visit. Correlation coefficients were calculated to determine the relationship between the two devices. Independent sample t-tests were used to determine if the two devices produced significantly different raw values. Bland-Altman plots were used to visually display agreement between devices.

RESULTS: The ultrasound device had a weak relationship to the DXA ($r = 0.514$, $p < 0.01$). Comparing the absolute agreement between the two devices, the ultrasound device was consistently conservative. It provided mean values of 0.689g/cm² less than the DXA. It produced values significantly lower (1.31± 0.13 g/cm² vs. 0.62 ± 0.14 g/cm² , $p < 0.01$).

CONCLUSIONS: In this study, the ultrasound device produced values significantly lower than the values produced by the DXA. Ultrasound should not be used for individuals requiring a high degree of precision in their measurement. It could be useful, however, as a field device in the screening and estimating of bone mineral density.