Comparison of Bone Density Measures on the Sahara Bone Sonometer and the DXA

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Background: One commonly used measurement device for bone mineral density (BMD) is the Dual-energy X-ray Absorptiometry (DXA) scan which measures BMD at a variety of sites. However, this procedure can be time consuming and costly for patient monitoring prior to a diagnosis of osteoporosis or osteopenia. As an alternative, a portable bone sonometer uses ultrasound technology and requires less time and cost per patient. The devices measure different anatomical locations and reflect different methods.

Intent: The purpose of this study was to compare the results of the Sahara Bone Sonometer to a GE Lunar iDXA.

Method: Twenty-eight adult male and female self-identified runners participated in this study. Participants completed a survey of running habits prior to measurements. From the survey results, the mean age of participants was 37.0 years with a minimum of 19 and a maximum of 58 years. The average BMI was 22.8 and the mean distance run per week was 44.0 km, ranging from 13.7 to 112.7 km. The mean reported running pace for participants was 5.6±0.13 minutes per km. The calcaneus BMD was measured on the sonometer and the hip and spine bone mineral densities of each participant were measured on the DXA. Data was analyzed using Pearson correlations.

Results: Correlations were generally poor between anatomical sites and methods. The correlation between the calcaneus BMD measured on the sonometer and the mean hip measured on the DXA was weak ($r_{xy} = 0.374$) but significant. The correlation between the Sahara BMD and DXA spine BMD was not significant and was negligible in magnitude ($r_{xy} = 0.073$). Measurements taken from different anatomical sites on the same equipment (DXA) were also not strongly correlated. The DXA spine and DXA mean hip values exhibited a significant relationship with a correlation coefficient of moderate strength ($r_{xy} = 0.526$). The DXA right hip and left hip scans had very strong and significant correlations ($r_{xy} = 0.973$). All correlations indicated positive relationships between BMD measurements.

Conclusion: The calcaneus sonometer results cannot be used alone to accurately predict quantitative hip or spine BMD results on the DXA. Additional study should address whether a significant and strong qualitative correlation exists, evidenced by consistent bone density classifications, which are provided by both devices (i.e. osteopenia, osteoporosis, healthy range).

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