

Abstract Submission No.: A-0938

Utility of Calcaneal Quantitative Ultrasound in Evaluating Bone Mineral Density in Patients on Peritoneal Dialysis

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Objectives : To evaluate a new radiation-free method, calcaneal quantitative ultrasound, for determining bone mineral density and diagnosing osteoporosis in patients on peritoneal dialysis.

Methods : This is a single-center, cross-sectional study. Prevalent patients on peritoneal dialysis were recruited. We measured bone mineral density (BMD) at 3 sites: the neck of femur, lumbar spine, and distal radius by dual-energy X-ray absorptiometry (DEXA) (Hologic Horizon® machine). Osteoporosis was diagnosed based on WHO criteria (i.e., T score of less than -2.5). We performed calcaneal quantitative ultrasound (QUS), which determines parameters including broadband ultrasound attenuation (BUA, in dB/MHz), speed of sound (SOS, in m/s) and stiffness index (SI).

Results : We recruited a total of 273 patients, 131 (48.0%) of whom were male with an average age of 59.9 ± 11.1 . Out of these, 102 patients had osteoporosis at at least one site. We observed strong and significant correlations between BUA, SOS, SI and the BMD at all three sites (refer to Figure 1). The areas under the ROC curves for BUA, SOS and SI in diagnosing osteoporosis were 0.82, 0.73 and 0.81 respectively (refer to Figure 2). With cut-off values for BUA, SOS and SI at 99.4 dB/MHz, 1529 m/s and 73.3 respectively, we achieved sensitivities of 82.8%, 51.5% and 70.0% and specificities of 67.2%, 79.1%, 80.0% respectively, for diagnosing osteoporosis. The positive predictive values for BUA, SOS and SI were 71.6%, 71.1% and 77.8%, while the negative predictive values were 79.6%, 62.0% and 72.7% respectively.

Conclusions : QUS and DEXA parameters were closely related. Thus, QUS could potentially serve as a supplement to predict BMD and diagnose osteoporosis in patients undergoing peritoneal dialysis. The utility of QUS in predicting bone fractures and related outcomes in dialysis patients warrants further investigation.

Figure 1.png

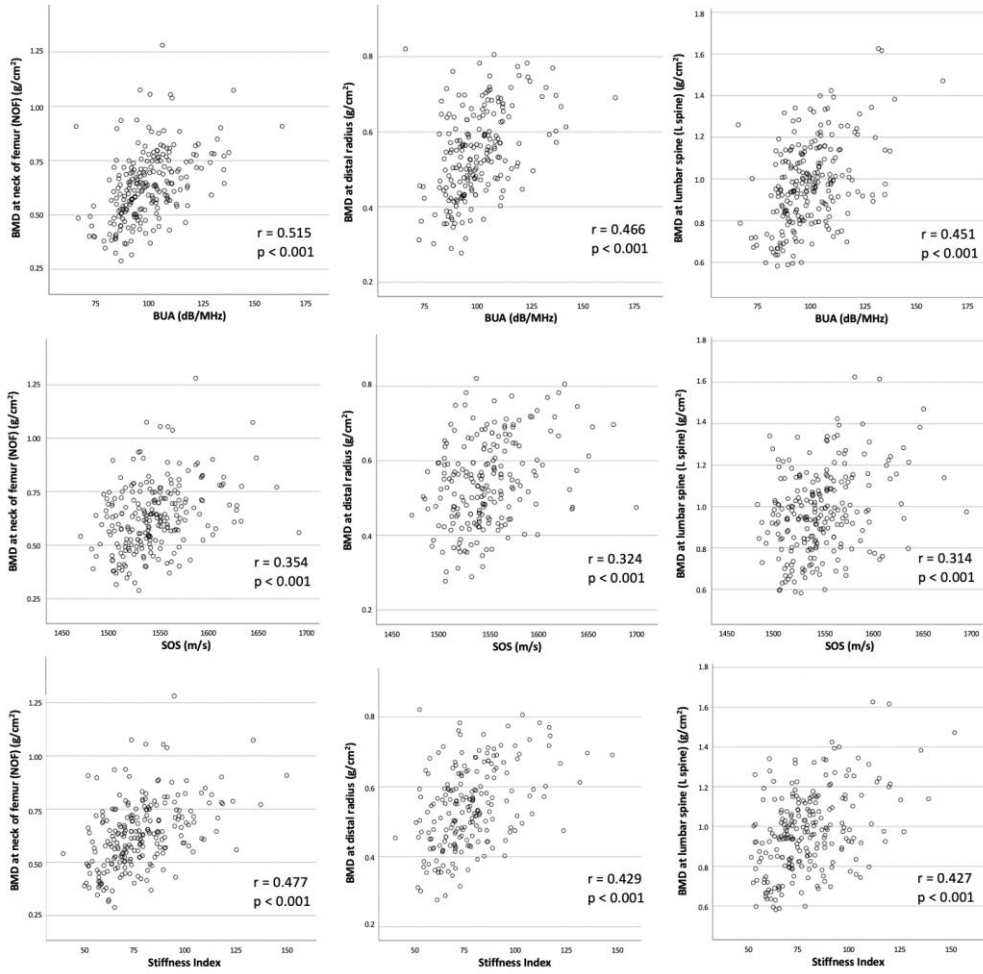


Figure 1.png

