定量式超音波檢查儀篩檢老人不正常骨質密度及骨折之效度

Validation of Quantitative Ultrasound for Screening Abnormal Bone Density and Fractures in Older People

中文摘要

英文摘要

Purpose: This study examined convergent, criterion, and discriminant validity of quantitative ultrasound (QUS), as compared to dual-energy X-ray absorptiometry (DXA), for identifying abnormal bone density and fractures among older people in Taiwan.

Methods: Four hundred and fifty three community-dwelling, healthy older people aged 55 years participated in the study. Additional 31 subjects who visited emergency room due to fragility fractures were also recruited for validating discriminant ability. In addition to personal interviews collecting information on demographic, osteoporosis, and fall-related variables for these subjects, assessment of bone density using both calcaneal QUS and femoral neck DXA methods were conducted. Two parameters of the QUS, speed of sound (SOS) and broadband ultrasound attenuation (BUA), were used to estimate heel bone mineral density (BMD) and T-scores, as compared with the DXA. By the World Health Organization''s criteria for abnormal bone density, thresholds of T-scores of -1.0 and -2.5 were used to define low bone density and osteoporosis.

Results: For convergent validity, Pearson''s correlation coefficients between femoral neck DXA BMD and three calcaneal QUS parameters (BUA, SOS, and estimated heel BMD) ranged from 0.48 to 0.49. Using femoral neck DXA as the criterion, the sensitivity and specificity of calcaneal QUS to screen for abnormal bone density were 67.2% and 56.9%, respectively; the counterparts for osteoporosis were 29.0% and 93.1%. The ability of the BUA and estimated heel BMD of QUS to discriminate between subjects with and without fragility fractures was statistically significant, while the SOS did not; furthermore, unadjusted and adjusted AUC (for age, gender, and falls history) of the estimated heel BMD of QUS to discriminate between the two groups was 0.645 and 0.939, in contrast to 0.641 and 0.945 of the DXA.

Conclusion: Compared with DXA, QUS has acceptable convergent and discriminant validity but poor criterion validity. However, QUS and DXA may measure different dimensions of BMD.