The accuracy of bone mineral density at distal radius on non-forearm osteoporosis identification

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Abstract

The accuracy of BMD at distal radius was evaluated in terms of sensitivity, specificity, false negative, false positive, predictive value of a positive (osteoporosis) and a negative (normal) test for non-forearm osteoporosis. 278 women (150 osteoporotic and 128 normal) were measured for both distal radius bone mineral density (BMD) using Panasonic (DXA-70) dual energy X-ray absorptiometry (DEXA) and non-forearm BMD using Hologic (QDR-4500) DEXA on the same day. The results showed that mean age, menopause age, height and weight in the osteoporotic group were not different from the healthy group (p=0.168, 0.091, 0.274 and 0.097, respectively). Mean BMD of both distal radius and lumbar spine in the normal women was significantly higher than that in the osteoporotic group (p<0.001, = 0.002, <0.001, respectively). While mean BMD of the hip, femoral neck and Ward's triangle in both groups was not different (p = 0.330, 0.874, 0.847, respectively). The sensitivity of BMD of the right radius was very high (90.00-95.45%) and specificity was moderately high (53.85-73.68%). While false negative (4.55-10.00%) was less than false positive (26.32-46.15%). The accuracy of right radius BMD when compared with spine, hip, femoral neck and Ward's triangle had the same trend as right radius BMD. Accuracy of the left radius when compared with non-forearm BMD was 88.24, 66.67, 75.71 and 86.49 per cent, respectively. The predictive value of right radius osteoporosis was 73.68, 47.37, 77.78 and 89.66 per cent for detecting osteoporosis at spine, hip, femoral neck and Ward's triangle, respectively. The predictive value of normal right radius BMD had the same trend as right radius BMD. Accuracy of the left radius when compared with non-forearm BMD was 82.35, 66.66, 80.00 and 86.49 per cent, respectively. The sensitivity (85.00-96.67%), specificity (57.69-81.58%), false negative (3.33-15.00%) and false positive (18.42-42.31%) of left radius BMD had the same trend as right radius BMD. Moreover, the predictive value of left radius osteoporosis for identifying spinal, hip, femoral neck and Ward's triangle osteoporosis was (80.56, 47.22, 77.55 and 91.07%, respectively) and the predictive value of normal left radius BMD for identifying normal BMD at non-forearm sites (96.88, 90.00, 71.43 and 72.22%, respectively) was revealed. It indicated that forearm DEXA provides adequate accuracy for in vivo determination of spinal, femoral neck and Ward's triangle osteoporosis. However, there was inadequate accuracy and very low predictive ability for identifying hip osteoporosis.

Keywords: Accuracy; Bone Density

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