Correlations Between Vertebral and Femoral Neck T-Scores in Turkish Female Population

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OBJECTIVE: The aim of this study was to evaluate the correlation of dual-energy X-ray absorbtiometry measurements between the spine and femoral neck to predict bone mineral density (BMD) as defined according to the WHO classification in Turkish population.
STUDY DESIGN: Five hundred and ninety-two postmenopausal women aged 39-74 years were investigated. There was significant and strong correlation between BMD measurements, with r:0,69-0,74 p<0,05.
RESULTS: The cut off values of the femoral neck and ward triangle BMD that allow the identification with 95% sensivity of postmenopausal women with either lumbal spines T-score< -1, correspond to a T score -0,4 (femoral neck) and +0,05 (ward triangle).
CONCLUSION: However, this study highlights the difficulties in using a unique T-score that could be applied to different sites to diagnose osteoporosis.

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Key Words: Vertebral and Femoral BMD, Neck, Turkish population, Osteoporosis

Because osteoporosis is a heterogeneous disease, only DEXA testing of the hip and spine can determine where the disease is maximal, and therefore the site that needs to be monitored over time. Clinical consequences of vertebral fractures include increased risk of future vertebral and hip fracture, acute and chronic back pain, decreased quality of life, and increased mortality. Patients with vertebral fractures have functional impairment and increased mortality similar to those with hip fractures.[1-4] Asymptomatic fractures identified on radiograph also affect the quality of life and mortality. A vertebral fracture is a clinical marker for a subsequent fracture and should trigger assessment and diagnosis of osteoporosis. The care of patients with vertebral fractures includes pain management, rehabilitation, and prevention of further fractures. There is evidence from randomized controlled trials that pharmocologic therapy can reduce the risk of future fractures by 40% to 50%.1 Prevention and treatment of osteoporosis will be of increasing importance as the mean age of the world population rapidly increases in the coming decades. Nearly half of postmenopausal women who have not yet been diagnosed with osteoporosis have significantly low bone mineral density and are at increased risk of fracture, yet this risk is often unrecognized and untreated.[5-7] Postmenopausal women who have experienced fractures of the hip, vertebra and wrist and patients using glucocorticoids are at highest risk of fractures but often remain untested and untreated for osteoporosis. Because a rise in the societal costs of osteoporosis is anticipated for the coming years, an improved understanding of the predictors of practice pattern variations is necessary. Interventions designed to improve underutelitization of appropriate care are important to clinicians, health services researchers and policy makers.[2]

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It is widely accepted that bone mineral density (BMD) measurements obtained by dual energy X-ray absorptiomertry (DXA) at the spine and hip predict fracture risk[3] Few studies, published to date, have examined the relationship between DXA measurements at the hip and spine. It has been demonstrated that T-score-based criteria cannot be universally applied to all skeletal sites and measurement technologies. Our goal was to define the T-score threshold equivalent to low bone mass at the hip or spine.

Material and Methods

A total of 590 female patients between the ages of 33 and 76 were recruited at Haydarpasa Numune Education and Resarch Hospital for bone densitometry screening. Bone density measurements were obtained at the hip and spine using the Lunar densitometer.

Results

The mean age of the patients was 54.3± years, 61% of who were postmenopausal, 6.7±3.1 years past menopause. The mean body mass index was found to be 28±3.3 kg/m^2. When the average values of lumbal spines L1 and the hip region are compared, the Wards triangle is found to have the lowest

BMD measurements. If the osteoporosis is taken into consideration, the highest rate found is in the L4 and lowest in the femoral neck sites.

The skelatal sites are grouped in pairs for statistical analysis and their mean T scores and standart deviations are shown in Table 1. Strong correlations were found between pairs. ($p<0.05$) The strongest correlation was estimated between the mean lumbal spine BMD values and femoral Wards triangle (Table 1-2)

Table 1. Paired samples for femoral and vertebral BMD measurements

L1 & FNECK	,692	,000
L1 & WARD	,710	,000
L2 & FNECK	,711	,000
L2 & WARD	,732	,000
L3 & FNECK	,672	,000
L3 & WARD	,708	,000
L4 & FNECK	,664	,000
L4 & WARD	,685	,000
L2-4 & FNECK	,703	,000
L2-4 & WARD	,731	,000
FNECK&LMEAN	,716	,000
WARD&LMEAN	,741	,000

Discussion

Prevention and treatment of osteoporosis will be of increasing importance as the mean age of the world population rapidly increases in the coming decades.[8,9] Nearly half of postmenopausal women who have not yet been diagnosed with osteoporosis have significantly low bone mineral density and are at increased risk of fracture. However, this risk is often unrecognized and untreated. Postmenopausal women who have experienced fractures of the hip, vertebra and wrist and patients using glucocorticoids are at highest risk of fractures but often remain untested and untreated for osteoporosis. Because an anticipated rise of the societal costs of osteoporosis in the coming years is expected, an improved understanding of the predictors of practice pattern variations and interventions designed to improve underutilization of appropriate care are important to clinicians, health services researchers, and policy makers are necessary.[10]

Previous studies have paid much attention to the impact on functional impairment and the quality of life from vertebral fractures secondary to osteoporosis, but little research has addressed the regional relationship of osteoporotic women without fractures. The purposes of this study were[1] to describe spinal and femoral performance in pre and postmenopausal women with osteoporosis and osteopenia without vertebral or

Table 2. Paired samples correlations for femoral and vertebral BMD measurements

		mean	Std.deviation	Std. Error mean
Pair 1	L1	-1,4594	1,5546	,1189
	FNECK	-1,0982	1,1950	9,138E-02
Pair 2	L1	-1,4594	1,5546	,1189
	WARD	-1,4665	1,3369	,1022
Pair 3	L2	-1,4246	1,7033	,1303
	FNECK	-1,0982	1,1950	9,138E-02
Pair 4	L2	-1,4246	1,7033	,1303
	WARD	-1,4665	1,3369	,1022
Pair 5	L3	-1,1512	1,7889	,1368
	FNECK	-1,0982	1,1950	9,138E-02
Pair 6	L3	-1,1512	1,7889	,1368
	WARD	-1,4665	1,3369	,1022
Pair 7	L4	-1,3358	1,8182	,1390
	FNECK	-1,0982	1,1950	9,138E-02
Pair 8	L4	-1,3358	1,8182	,1390
	WARD	-1,4665	1,3369	,1022
Pair 9	L2-4	-1,2920	1,7191	,1315
	FNECK	-1,0982	1,1950	9,138E-02
Pair 10	L2-4	-1,2920	1,7191	,1315
	WARD	-1,4665	1,3369	,1022
Pair 11	FNECK	-1,0982	1,1950	9,138E-02
	LMEAN	-1,3427	1,6405	,1255
Pair 12	WARD	-1,4665	1,3369	,1022
	LMEAN	-1,3427	1,6405	,1255

hip fracture and[2] to investigate the relationship between them. We found strong and statistically significant correlation between lumbal spine and femoral BMD measurements in elderly Turkish female population which may help the diagnosis of osteoporosis in limited measurement facilities.

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