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RESEARCH

RELATIONSHIP BETWEEN BONE DENSITY AND QUALITY OF LIFE IN POSTMENOPAUSAL OSTEOPOROSIS

ABSTRACT

Introduction: The aim of this study was to investigate the relationship between the severity of osteoporosis and the quality of life (QoL) in women with postmenopausal osteoporosis (PMO).

Materials and Method: Two hundred and thirty three women with PMO according to the World Health Organization criteria were included in this study. Lumbar spine and proximal femur bone mineral density (BMD) was measured by Dual Energy X-Ray Absorptiometry (DXA). QoL was assessed with QUALEFFO-41 Turkish version.

Results: The mean age was 65±8 years. The mean QUALEFFO score was 43.5±15.8. A significant negative correlation was found between the BMD of the lumbar spine, femoral neck and total femur and the QoL in women with PMO. The QoL of the women with PMO who had vertebral fractures was worse than that of PMO patients' without vertebral fractures (p<0.05). Women with vertebral fractures had significantly lower BMD values at the lumbar spine and proximal femur regions compared to the patients without vertebral fractures (p<0.05).

Conclusion: As a result, a significant relationship was found between the bone density of the lumbar spine and proximal femur and the QoL in women with PMO.

Key Words: Osteoporotic Fractures; Osteoporosis, Postmenopausal; Quality of Life.



ARAŞTIRMA

POSTMENOPOZAL OSTEOPOROZDA KEMİK YOĞUNLUĞU İLE YAŞAM KALİTESİ ARASINDAKİ İLİŞKİ

Öz

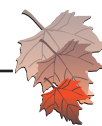
Giriş: Bu çalışmanın amacı postmenopozal osteoporozu (PMO) olan kadınlarda osteoporoz şiddeti ile yaşam kalitesi arasındaki ilişkinin araştırılmasıdır.

Gereç ve Yöntem: Bu çalışmaya Dünya Sağlık Örgütü kriterlerine göre PMO tanısı konulan 233 kadın alınmıştır. Kemik mineral yoğunluğu (KMY) ölçümü Çift Enerji X-Işınlı Absorpsiyometri (DXA) ile lomber omurga ve proksimal femurdan yapılmıştır. Yaşam kalitesinin değerlendirilmesinde QUALEFFO-41 Türkçe sürümü kullanılmıştır.

Bulgular: Ortalama yaş 65±8 yıl, QUALEFFO total skoru 43.5±15.8 olarak bulunmuştur. Yaşam kalitesi ile lomber omurga, femur boyunu ve total femur KMY değerleri arasında anlamlı negatif korelasyon saptanmıştır. Vertebra kırığı olan kadınlardaki QUALEFFO skoru kırığı olmayan kadınlardaki değerlere göre daha düşük bulunmuştur (p<0.05). Kırığı olan kadınlarda lomber omurga ve proksimal femur KMY skorları, kırığı olmayan kadınların kemik yoğunluklarına göre anlamlı olarak daha düşük bulunmuştur (p<0.05).

Sonuç: Bu çalışmanın sonucunda PMO'lu kadınlarda lomber omurga ve proksimal femur kemik yoğunluğu ile yaşam kalitesi arasında anlamlı bir ilişki bulunmuştur.

Anahtar Sözcükler: Osteoporotik Kırık; Postmenopozal Osteoporoz; Yaşam Kalitesi.



INTRODUCTION

Osteoporosis (OP) is a disease characterized by the increased fracture risk especially at the spine, hip and wrist, because of the low bone mass and structural disorder of the bone (1). Currently, T scores are used for the diagnosis of osteoporosis in postmenopausal women (2,3). The lumbar spine and hip bone mineral density (BMD) measurement by DXA facilitates both diagnosis of osteoporosis and determination of the fracture risk. Proximal femur BMD value is useful for determining the fracture risk of both the hip and the other regions (2). Impairment in the quality of life (QoL) of the patients with osteoporosis have been reported in previous studies (4-12). OP with or without vertebral fractures can cause impairment in the QoL.

The purpose of this study was to investigate the correlation between the BMD values of the lumbar spine and proximal femur and QoL in a group of Turkish women with PMO.

MATERIALS AND METHOD

Two hundred and thirty three women with PMO who admitted to the Osteoporosis Outpatient Clinic of our hospital consecutively between 01.01.2003 and 31.12.2006 were evaluated in this cross-sectional study. PMO was diagnosed according to the World Health Organization (WHO) criteria. BMD measurement was performed by Dual Energy X-Ray Absorptiometry (Lunar DPX pro, Madison, Wisconsin) from the lumbar spine and proximal femur regions. T scores ≤ -2.5 at any measurement site was diagnosed as OP. Patients who have metabolic bone disease, kidney, liver or endocrine disorders, malignancy or rheumatic diseases, communication disorders or who are using the drugs that affect bone metabolism were not included in the study. The patients who had a recent onset of back pain (within the last 3 months) were also excluded from the study.

Vertebral fractures were investigated on lateral thoracic and lumbar radiographies between T4 and L4 vertebrae. QoL was evaluated by Turkish version of Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO). QUALEFFO is a disease-specific quality of life query that helps to assess the impact of OP on patients. QUALEFFO consists of pain, physical function, social function, general health perception and mental function domains. It is useful in clinical studies for evaluation of QoL in women with PMO (7). The Turkish version of QUALEFFO was shown to be reliable and valid for the evaluation of the women with vertebral fractures (12).

Table 1— Clinical Characteristics.

	PMO Group	Min-Max
Age (years)	65.48±8.27	48-83
BMI (kg/m ²)	27.6±4.5	17.5-40.4
Menopause age (years)	46.31±5.7	27-58
Lumbar BMD(g/cm ²)	0.830±0.144	0.700±0.095
Femur neck BMD (g/cm ²)	0.760±0.104	0.484-1.7
Femur total BMD (g/cm ²)	0.453-0.939	0.512-0.990

PMO: Postmenopausal osteoporosis.

BMI: Body mass index.

BMD: Bone mineral density.

This study was approved by the hospital ethics committee. SPSS version 15.0 (Chicago, IL) was used for the statistical analysis. Descriptive statistics for means and standard deviations (SD) were used to describe the study population. Student t-test was used for the comparison of the independent variables and quantitative data between groups. Pearson correlation test was used for correlation analysis. $p < 0.05$ was considered significant.

RESULTS

Clinical characteristics and QUALEFFO scores of the patients are summarized in Table 1 and Table 2, respectively.

The correlation between BMD values of the lumbar spine and proximal femur and QUALEFFO scores are shown in Table 3. BMD values at all the measurement sites significantly correlated with QUALEFFO scores ($p < 0.05$).

Seventy-four patients (31.4 %) had vertebral fractures due to OP. The mean number of vertebral fractures was 1.54 (min-max:1-6). Clinical characteristics and QUALEFFO scores of the PMO patients with and without vertebral fractures are summarized in Table 4 and 5, respectively. The patients

Table 2— QUALEFFO-41 Scores.

QUALEFFO-41	PMO Group	Min-Max
Pain	37.9±28.4	0-100
Physical function	36.5±22	0-98
Social function	55.5± 21	2.14-100
General health	59±23.5	8.33-100
Mental function	46.5±17	0-100
Total score	43.5±15.8	4-89

PMO: Postmenopausal osteoporosis.

**Table 3—** Correlation Between Bone Density and QUALEFFO-41.

BMD	Pain	Physical Function	Social Function	General Health	Mental Function	Total Score
Lumbar spine	r=0.195 p=0.001	r=0.264 p<0.0001	r=0.275 p<0.0001	r=0.253 p<0.0001	r=0.270 p<0.0001	r=0.334 p<0.0001
Femur neck	r=0.169 p=0.005	r=0.343 p<0.0001	r=0.323 p<0.0001	r=0.283 p<0.0001	r=0.291 p<0.0001	r=0.393 p<0.0001
Femur total	r=0.184 p=0.002	r=0.347 p<0.0001	r=0.244 p<0.0001	r=0.261 p<0.0001	r=0.215 p<0.0001	r=0.360 p<0.0001

BMD: Bone mineral density.

Table 4— Clinical Characteristics of The Patients With and Without Vertebral Fractures.

BMD	PMO with vfx	PMO without vfx	p
Age (years)	69±6	63.8±8.6	<0.0001*
BMI (kg/m ²)	27.7±4.7	27.6±4.4	0.83
Menopause age (years)	45.5±5.2	46.6±5.8	0.043
Lumbar BMD (g/cm ²)	0.800±0.159	0.850±0.134	0.016*
Femur neck BMD (g/cm ²)	0.660±0.093	0.720±0.091	<0.0001*
Femur total BMD (g/cm ²)	0.710±0.097	0.780±0.099	<0.0001*

PMO: Postmenopausal osteoporosis.

Vfx: Vertebral fracture.

*: statistically significant.

BMI: Body mass index.

BMD: Bone mineral density.

with vertebral fractures were older than those without vertebral fractures ($p=0.00$). L2-L4 vertebrae, femoral neck and femur total BMD values were significantly lower in the PMO group with vertebral fractures when compared to those of the patients without vertebral fractures ($p=0.016$, $p=0.00$, $p=0.00$). QUALEFFO total and physical function scores of the PMO group with vertebral fractures were significantly higher than that of the patients without vertebral fractures

($p=0.041$, $p=0.005$) (Table 5). There was no significant correlation between number of vertebral fractures and QUALEFFO total scores ($r=0.094$, $p=0.4$).

DISCUSSION

The important result of this study is the significant relationship between the bone density of the lumbar spine and proxi-

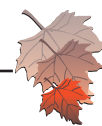
Table 5— QUALEFFO-41 Scores of The Patients With and Without Vertebral Fractures.

QUALEFFO-41	PMO with vfx	PMO without vfx	p value
Pain	40±30.4	36.9±27.5	0.44
Physical function	41.8±20.5	34±22.5	0.005**
Social function	54.7±16.5	55.9±23.2	0.66
General health perception	61.3±23.1	58.4±23.7	0.38
Mental function	47.4±17	46.2±17.3	0.66
Total	46.4±14.2	42±16.4	0.041*

PMO: Postmenopausal osteoporosis.

Vfx: Vertebral fracture.

**: statistically significant ($p<0.01$).*: statistically significant ($p<0.05$).



mal femur and the QoL. Bianchi et al., (4) examined the QoL of 100 women with PMO by QUALEFFO. They showed a significant correlation between the lumbar spine and proximal hip BMD T scores and the physical function, social function and general health perception domains of the QoL.

Tashiro *et al.*, (13) studied the relationship between the bone content and the QoL in 88 post menopausal women with a mean age of 57. They measured calcaneal bone mineral content by quantitative ultrasound and QoL by SF-36. They found that body mass index (BMI), physical function and role-emotional areas of the SF-36 were the factors which affect the bone mineral content with the multiple regression analysis.

In this study, the impairment in the QoL of the PMO patients with vertebral fractures was significantly more than that of the patients without vertebral fractures. Moreover the women with vertebral fractures were older than the patients without vertebral fractures. Jahelka et al., (14) examined the QoL of 222 men and women with low bone density in a geriatric rehabilitation department. QoL was measured by the SF-36 and QUALEFFO-41. They revealed that the QoL of the patients with OP was lower than that of osteopenic subjects. Moreover they suggested that older age might be related with poor QoL in the OP group as a result of the same study.

According to the results of this study the QoL and the physical function area of the QoL were significantly lower in the PMO group with vertebral fractures. Vertebral fractures might have a significant impact on the QoL (15). Vertebral fractures, even if the patient does not have low back pain, can cause impairment in the QoL because of the loss in physical functions (16).

Salaffi et al., in the IMOF study measured the QoL of the PMO patients with vertebral fractures and the patients without fractures by SF-36, mini-OQLO and EuroQuol-5D. The QoL of the healthy controls were measured by SF-36. The QoL scores were lower in the PMO group with vertebral fractures than the women without fractures and the controls. Moreover they concluded that physical function, comorbidities and age were the determinants of the QoL (17).

Incidental vertebral fractures might cause pain, impairment in general health perception and physical function areas of the QoL measured by QUALEFFO according to the results of a previous study (18). In another study, impairment of especially the physical component of the QoL in both young and old postmenopausal women with recent vertebral fractures was found similar to that in other chronic diseases (19).

Adachi et al., (20) concluded that there was a negative relationship between osteoporotic fractures and the QoL measured by Health Utilities Index in a cross sectional study.

In this study, there was no significant correlation between the number of vertebral fractures and the QoL. The results of the previous studies that investigate the effects of vertebral fractures on QoL are contradictory. Some studies found no relationship between the number of vertebral fractures and QoL (9,12,21,22), while others found a strong relationship between the number of vertebral fractures and QoL (4,7,15,23,24).

In conclusion, an inverse relationship was found between the disease severity and the QoL. Lumbar spine and proximal femur bone density might be useful to determine the QoL, in addition to the fracture risk in patients with PMO.

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