Re-Evaluation of Patients Treated for Osteoporosis: Approaches Vary with Respect to Need and Physicians' Specialties

Osteoporoz Tedavisi Altındaki Hastaların Yeniden Değerlendirilmesi: Tedavi Yaklaşımları Farklı Branşlara Göre Değişebilir

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ABSTRACT Objective: To assess how Turkish physicians of different specialties manage osteoporosis and to estimate the economic costs of testing and treatment choices. **Material and Methods:** Two-hundred Turkish women completed a questionnaire on risk factors for osteoporosis and the number of bone mineral densitometry (BMD) evaluations performed up to date. The indications for BMD were re-evaluated according to the clinical practice guidelines of the National Osteoporosis Foundation (NOF) and the Osteoporosis Society of Canada (OSC), and the Osteoporosis Risk Assessment Instrument (ORAI) scoring system. **Results:** For 65 (32.5%) out of 200 patients, the results from all 3 assessment modes indicated BMD was necessary. In 54 (27%) participants, all 3 guidelines indicated that BMD was unnecessary. Postmenopausal status was the primary indication for ordering BMD. When the different reasons for recommending BMD were analyzed according to clinicians' specialties, a very large proportion of gynecologists, as well as many internists and physiatrists were found to order BMD only because the patient was postmenopausal. However, rheumatologists and endocrinologists considered additional risk factors. The patients had undergo a total of 579 BMD procedures. One hundred-one (50.5%) had been prescribed anti-resorptive therapy, however 32 (31.7%) of those individuals did not actually need the treatment. The cost of unnecessary BMD was 19 900 New Turkish Lira (YTL) (approximately $US 14 700). Furthermore, the annual cost of unnecessary treatment was 65 400 YTL (approximately $US 48 300). **Conclusion:** Reasons for recommending BMD and the treatment choices for osteoporosis vary among different medical specialties. The cost of unnecessary BMD testing and treatment is very high.

Key Words: Osteoporosis, postmenopausal; bone density; cost of illness

ÖZET Amaç: Farklı branştaki Türk Hekimleri'nin osteoporoz tanısı ve tedavisindeki yaklaşımlarını, osteoporoz tanı ve tedavisiyle ilişkili ekonomik sonuçları değerlendirmek. **Gereç ve Yöntemler:** İki yüz kadın hastaya, osteoporoz için risk faktörleri ve daha önceden yapılmış kemik mineral dansitometri (KMD) sonuçlarını sorgulayan bir anket uygulandı. Hastalar, National Osteoporosis Foundation (NOF), Osteoporosis Society of Canada (OSC) ve Osteoporosis Risk Assessment Instrument (ORAI) kılavuzlarına göre KMD yapılma endikasyonları ve tedavi yönünden tekrar değerlendirildi. **Bulgular:** Hastaların 65 (32.5%)'inde her 3 kılavuza göre KMD yapılma endikasyonu varken, hastaların 54 (%27)'ünde endikasyon yoktu. Farklı branşlara göre değerlendirme yapıldığında, jinekologlar, dahiliye uzmanları, fizik tedavi uzmanlarının menopoza girme nedeniyle KMD istedikleri görüldü. Romatoloji uzmanları ve endokrinoloji uzmanlarının ise KMD isterken osteoporoz için risk faktörlerini gözönünde bulundurdukları dikkati çekti. Hastaların tümüne toplamda 579 KMD yapılmıştı. Antirezorbtif tedavi verilen 101 hastadan 32'sinin aslında tedaviye ihtiyacı olmadığı gözlendi. Gereksiz yapılan KMD'lerin maliyeti 19 900 Yeni Türk Lirası (YTL) (14 700 dolar), endikasyonsuz verilen tedavilerin maliyeti ise 65 400 YTL (48 300 dolar) idi. **Sonuç:** KMD isteme nedenleri ve tedavi yaklaşımları farklı branş hekimleri arasında değişebilir. Gereksiz KMD istemleri ve endikasyonsuz tedavi maliyetleri oldukça yüksektir.

Anahtar Kelimeler: Osteoporoz, postmenopozal; kemik yoğunluğu; hastalık maliyeti

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Osteoporosis and related fractures affect an enormous number of people around the globe, and their prevalence seem to rise as the world population ages.[1] Kanis et al, reported that the incidence of hip fracture varied up to 10 fold in different areas of the world.[2] Among women, fracture incidence at the age of eighty was highest in Singapore and lowest in Turkey (1896 vs. 91/100.000, respectively).[2]

Most of the fractures are seen in elderly people, however they tend to occur at earlier ages in Turkey. Reports suggest that as the duration of life gets shorter, fractures occur earlier.[2,3]

The operating definition of osteoporosis according to the World Health Organization (WHO) is bone density 2.5 standard deviations below the mean for young white adult women, based on T-scores.[1] Dual energy X-ray absorptiometry (DXA) is still the gold standard method for the assessment of BMD, and it is used to determine the fracture risk.[4-9] It is recommended for all women aged 65 years and older.[4,6-13] This procedure is also recommended for women younger than 65 years if they have one or more additional risk factors for osteoporotic fractures accompanying menopause.[4,6-13] It is also performed in all postmenopausal women with fractures, as well.[4,6,7,9]

Cost-effectiveness of detection, prevention and the treatment of osteoporosis should be considered. Osteoporotic fractures cause a heavy economic burden as well as diagnostic procedures and pharmacological interventions.[1-4] DXA should only be performed in patients who have risk factors for osteoporotic fracture and only if medical treatment is likely to be beneficial.[4,8] Countries have different strategies for diagnosing and treating osteoporosis, and opinions on how such expenses can be covered by health insurances differ as well. The main goals of evaluating a patient for osteoporosis, are to assess bone mass, determine fracture risk, and identify who should be treated. Many clinical practice guidelines and scoring systems have been developed for this purpose. The guidelines of the NOF in the United States and the OSC, and the ORAI scoring system are the most popular examples.[4,6,9]

The aim of this study was to assess how Turkish clinicians (gynecologists, internists, physiatrists, rheumatologists, endocrinologists, orthopedists and family physicians) diagnose and manage osteoporosis and to estimate the economic burden of osteoporosis.

MATERIAL AND METHODS

Two hundred Turkish women, attending the outpatient clinics of rheumatology and internal medicine departments for different reasons and who had previously undergone DXA at either in our hospital or at other hospitals were asked to participate in the study.

The study was approved by our institutional review board. All individuals signed informed-consent documents before entering the project.

Each case completed a questionnaire inquiring the risk factors for osteoporosis, the number of DXA evaluations performed up to date, the age at each DXA session, the hospitals where DXA was performed, the specialty of the physician who ordered DXA, and the indication for each test.

Demographic information and complete health history were obtained at inclusion. The participants were inquired for their menopausal status; any fragility fracture history and maternal fracture after age 40; accompanying diseases that cause secondary osteoporosis such as thyrotoxicosis, rheumatoid arthritis, systemic lupus erythematosis, Cushing's syndrome, hypogonadism, hyperparathyroidism, renal disease, cirrhosis and malignancy; the medications known to affect bone metabolism including sex steroids, warfarin, heparin, vitamin K, anti-convulsants, and corticosteroids.[4,6,9]

The questionnaire also inquired the lifestyle characteristics such as the amount of dietary or medical calcium consumption, alcohol and smoking habits, caffeine intake, and exercise.

If a fracture was reported to occur spontaneously or after minimal trauma, it was denoted fragility fracture.[6]

Either dietary or medically, calcium consumption lower than 1500 mg/day was assessed as

a risk factor (assuming the amount of calcium in one glass of milk 300 mg, in one bowl of yoghurt 400 mg and in 30 mg cheese 200 mg).[4]

Current smokers and those who had smoked during DXA measurements were accepted as having a risk factor.[4,6] Patients consuming or had consumed alcohol more than 70 grams at least twice a week, drinking or had drunk more than two cups of coffee a day were also accepted to have a risk factor.[4,6,10-12] History of falls and propensity to falling were evaluated; the factors increasing the risk of falling such as inability to rise from a chair without assistance, impaired balance, reduced visual acuity were asked.[13] Weight and height were measured; the patients were asked if they had height loss overall more than 4 cm or 2 cm loss in one year.[6] Weight less than 57 kg and age more than 65 years were also considered risk factors.[4,6,9] The characteristics of patients were given in Table 1.

T-scores of each subject for the lumbar spine, entire femur, and the femoral neck were obtained from medical charts. Participants were asked to list any osteoporosis medication they had received after each DXA evaluation. Each subject was also clinically examined for reduction of bone mass using the NOF clinical practice guidelines, OSC clinical practice guidelines and ORAI scores.[4,6,9,14] All available DXA measurements for each individual were re-evaluated. Osteoporosis was diagnosed using the WHO definition based on T-scores.[5] Patients with one or more fragility fractures were also considered to be osteoporotic regardless of their T-score.[4]

TABLE 1: Characteristics of the participants (n= 200).

Age (years)	59.9 ± 9.3
Weight (kg)	66.9 ± 10.8
Height (cm)	157.2 ± 4.9
Age of menopause	46.9 ± 4.9
Personal fracture history (n, %)	23 (11.5)
Maternal fracture history (n, %)	20 (10)
Presence of height loss (n, %)	91 (45.5)
Smokers (n, %)	50 (25)
Alcohol consumption (n, %)	3 (1.5)
Caffeine intake (n, %)	0
Regular physical activity (n, %)	126 (63)
Propensity to fall (n, %)	26 (13)
Insufficient calcium intake (n, %)	54 (27)
History of thyrotoxicosis (n, %)	10 (5)
History of systemic lupus erythematosus (n, %)	1 (0.5)
History of glucocorticoid therapy (n, %)	2 (1)
History of cirrhosis (n, %)	1 (0.5)
History of rheumatoid arthritis (n, %)	9 (4.5)

TABLE 2: Patient groups based on the need for BMD according to the methods (NOF, OARI and OSC) used in the study.

		n (%)
Group 1	DXA was necessary according to all 3 methods	65 (32.5)
Group 2	DXA was necessary according to 1 or 2 but not 3 methods	81 (40.5)
Group 3	DXA was unnecessary according to all 3 methods	54 (27)

TABLE 3: Frequency of osteoporosis and osteopenia depending on DXA findings.

n= 200	n (%)
Normal	48 (24)
Osteopenia	70 (35)
Osteoporosis	82 (41)

RESULTS

The subjects of this study were separated into three groups depending on NOF, OSC and ORAI criteria, applied to each case (Table 2). In group 1 (65 patients; 32.5%), both sets of clinical practice guidelines as well as the scoring system indicated that DXA was required. In group 2 (81 patients; 40.5%), only 1 or 2 of the methods indicated DXA was necessary. In group 3 (54 patients; 27%), all three methods indicated that DXA was unnecessary.

Keeping in accordance with WHO criteria, the frequency of osteoporosis and osteopenia among all patients were given in Table 3. Considering the groups, 42 (64.6%) out of 65 patients in group 1, 28 (34.6%) in group 2, and 12 (22.2%) in group 3 were detected to have osteoporosis.

Different specialists who ordered DXA and indications for DXA measurements were summarized in Table 4.

Overall, the subjects had undergone 579 DXA procedures. One hundred women underwent more than one DXA procedure. DXA was performed at least twice among all, three times in 53 cases, four

TABLE 4: Specialties of the physicians who ordered BMD and the indications noted by each specialist category.

	Menopause n (%)	Age n (%)	Risk factors n (%)	Patient's request n (%)	Pain n (%)	Routine control n (%)	Total n (%)
Gynecologists (n= 75)	60 (80)	4 (5.2)	1 (1.3)	5 (6.7)	2 (2.7)	3 (4)	75 (100)
Internists (n= 41)	20 (48.8)	10 (24.4)	2 (4.9)	4 (9.8)	1 (2.4)	4 (9.8)	41 (100)
Physiatrists (n= 37)	16 (43.29)	8 (21.6)	2 (5.4)	3 (8.1)	8 (21.6)	0	37 (100)
Endocrinologists (n= 20)	8 (40)	2 (10)	9 (45)	1 (5)	0	0	20 (100)
Rheumatologists (n= 13)	1 (7.7)	3 (23)	6 (46.2)	1 (7.7)	1 (7.7)	1 (7.7)	13 (100)
Orthopedists (n= 6)	3 (50)	2 (33.3)	0	0	1 (16.7)	0	6 (100)
Family physicians (n= 5)	2 (40)	1 (20)	0	1 (20)	0	1 (20)	5 (100)
Radiologists (n= 3)	1 (33.3)	0	1 (33.3)	0	0	1 (33.3)	3 (100)
Total (n= 200)	111 (55.5)	30 (15)	21 (10.5)	15 (7.5)	13 (6.5)	10 (5)	200 (100)

times in 24 cases, five times in 15 cases, six times in 7 cases, and seven times in one case. Of 100 patients who had at least two DXA procedures, 57% had both tests done at the same center. Among 53 patients who had three DXA procedures, 37.7% had the first and third tests done at the same center. The mean interval between first and second tests was 23.8 months (6-84 months), between second and third tests was 21.8 months (6-72 months), and between third and fourth tests was 16 months (12-36 months).

The cost of unnecessary DXA in 200 cases was 19 900 New Turkish Lira (YTL) (approximately $US 14 700).

Of the 200 women, 101 (50.5%) had been prescribed anti-resorptive therapy; however, 32 (31.7%) of those did not actually need treatment according to BMD results or the presence of additional risk factors. Among the 32 women, 16 (50%) was evaluated by gynecologists, 9 (28.1%) by physiatrists, 3 (9.4%) by endocrinologists, 2 (6.3%) by internists, 1 (3.1%) by a rheumatologist, and 1 (3.1%) by an orthopedist. The cost of unnecessary treatment in these cases was 65 400 YTL (approximately $US 48 300).

Among 200 women, 26 (13%) had not been prescribed anti-resorptive therapy even though they actually needed. Eight (30.8%) was evaluated by gynecologists, 7 (26.9%) by endocrinologists, 4 (15.4%) by rheumatologists, 3 (11.5%) by internists, 3 (11.5%) by physiatrists, and 1 (3.8%) by a radiologist.

Forty-eight (47.5%) of the 101 patients who were prescribed therapy stopped treatment due to incompliance, side effects, doctor's recommendation, high cost of the drugs or self decision. The main reason for quitting therapy was adverse effects (22.9%).

The number of patients who were advised to take calcium and vitamin D alone or combined with other agents was given in Table 5.

DISCUSSION

A definite consensus was not reached on the factors that indicate further testing for patients who are thought to suffer from osteoporosis.[4-9,15,16] In addition, a new system is required to ensure the cost-effectiveness of interventions and testing of the patients who are likely to have normal bone mass. Health providers are expected to evaluate the clinical factors which determine increased risk for osteoporotic fractures.[4,6-9,14-18]

In this study, we selected the NOF guidelines and the ORAI scoring system, as both have high sensitivity and specificity for detecting osteoporosis and both are convenient to use.[4,9] Moreover, we

TABLE 5: Subgroups of patients regarding advices to take calcium and/or vitamin D alone and/or in combination with other agents.

	Patients (n %)
Calcium	131 (65.5)
Vitamin D	16 (58)
Calcium plus vitamin D	84 (42)
Calcium plus bisphosphonate	77 (93.8)
Vitamin D plus bisphosphonate	49 (59)
Calcium and calcitonin	16 (80)
Vitamin D and calcitonin	12 (60)

used the recent OSC guidelines in which every decision was established depending on evidence-based medicine in a stepwise fashion.[6]

According to clinical practice guidelines and the scoring system, DXA is not currently recommended for postmenopausal women who have no additional risk factor for osteoporosis.[4,6-8] However, considering the 200 women we studied, postmenopausal status was the primary indication for ordering DXA. When the different reasons for recommending DXA were analyzed according to clinicians' specialties, a very large proportion of the gynecologists, as well as many internists and physiatrists were found to order DXA only because the patient was postmenopausal. Besides, eight physiatrists had performed the procedure only because the patient had back pain. However, rheumatologists and endocrinologists considered additional risk factors.

A Canadian study among family physicians revealed that decisions to order DXA depended mostly on the presence of risk factors; postmenopausal status was the least frequent indication.[19] The results of a study from China indicated that most Chinese physicians referred their patients for DXA depending on the presence of fracture, radiological evidence of osteopenia, screening purposes for postmenopausal osteoporosis, height loss and kyphosis.[20] In a study performed in Cleveland, a total of 2789 DXA tests were performed on women aged between 51 and 75 years during a four-year period; 1743 (62.5%) were ordered by general internists, endocrinologists, rheumatologists, and a metabolic bone disease specialist, 725 (26%) by gynecologists, 61 (2.2%) by nephrologists, 61 (2.2%) by orthopedists and the remainder by other specialties.[21] In our study, we noted fewer referrals by orthopedists, family physicians and radiologists. This finding may be attributed to the random selection of the patients, recent establishment of the department of family physicians as a designated specialty in our country, and the fact that radiologists do not usually encounter patients in clinics.

BMD is not recommended for 2 to 3 years after initial testing unless a patient is taking corticosteroids.[6-8] However, in our study, repetitive testing with short intervals was common, and was recommended in spite of normal T-scores at initial assessment.

Saadi and colleagues reported that endocrinologists and rheumatologists were more accurate in their evaluations of treating patients than internists or metabolic bone disease specialists.[21] Unfortunately, the majority of our inadequately treated patients had been evaluated by gynecologists, followed by endocrinologists and rheumatologists.

In our study, patient compliance to therapy was almost excellent. The main reason for discontinuing anti-resorptive therapy was side effects. This is in line with the findings of Tosteson et al.[22]

Calcium and vitamin D supplements should be recommended for all postmenopausal women and elderly people whatever their T-scores are.[4,7] Some of our physicians did not prescribe calcium and vitamin D even as a part of anti-resorptive therapy. This is another notable finding of the present study and there is no doubt that physicians should be more aware of the necessity of calcium and vitamin D supplementation when preventing and treating osteoporosis.[4,7]

The calculated costs of unnecessary DXA measurements and osteoporosis-related treatments were considerable in this study. A total of 103 300 YTL (approximately $US 76 300) was wasted. These large sums reflect the cost of only 200 cases. The Turkish Retirement Fund currently pays for the osteoporosis therapy of 72 969 patients. If we apply the results of our study to 72 969 patients, the cost of unnecessary investigation and treatment adds up to 375 844 000 YTL (approximately $US 27 758 000).

As the risk of fracture varies among countries, it seems wise to improve suitable diagnostic and therapeutic strategies for individual populations.[2] Lifetime risk of hip fracture among women at the age of 50 years in USA versus Turkey is 15.8% and 1%, respectively.[2] In developing countries like Turkey, the risk of fracture and the financial aspects should be considered when evaluating and treating the patients.

This study has a number of limitations. The women enrolled in this study may not represent the majority of the Turkish population. Besides, the physicians who were surveyed are not a selected group. This makes further evaluation of attitudes to osteoporosis necessary among populations on a large scale.

In conclusion, physicians should be more stringent in recommending DXA measurements, and should make their decisions depending on evidence-based indications and clinical risk factors. Targeting high-risk populations is important for achieving cost-effective interventions. This is the first report, which demonstrates the attitude of Turkish physicians of different specialties to osteoporosis. Further studies on cost-effective diagnostic strategies for osteoporosis are required.

REFERENCES

1. Cummings SR, Melton LJ. Epidemiology and outcomes of osteoporotic fractures. Lancet 2002;359:1761-7.
2. Kanis JA, Johnell O, De Laet C, Jonsson B, Oden A, Ogelsby AK. International variations in hip fracture probabilities: implications for risk assessment. J Bone Miner Res 2002;17:1237-44.
3. Dilşen G. Osteoporotik kırıkların epidemiyolojisi ve ül-kemizin Avrupa ülkeleriyle karşılaştırılması. Göksoy T, editör. Osteoporozda Tanı ve Tedavi. 1. Baskı. İstanbul, MA: Bilmedya Grup; 2000.p. 107-36.
4. Kanis JA, Black D, Cooper C, Dargent P, Dawson-Hughes B, De-Laet C, Delmas P, Eisman J, Johnell O, Johnsson B, Melton L, Oden A, Papapoulos S, Pols H, Rizzoli R, Silman A, Tenenhouse A, on behalf of the International Osteoporosis Foundation and the National Osteoporosis Foundation. A new approach to the development of assessment guidelines for osteoporosis. Osteoporosis Int 2002;13;527-36.
5. World Health Organisation Technical Report Series. Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. Report of a WHO Study Group. 1994;843:1-129.
6. Brown JP, Josse RG; Scientific Advisory Council of the Osteoporosis Society of Canada. 2002 clinical practice guidelines for the diagnosis and management of osteoporosis in Canada. CMAJ 2002;167(10 Suppl):S1-34.
7. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy Osteoporosis Prevention, Diagnosis, and Therapy. JAMA 2001;285:785-95.
8. U.S. Preventive Services Task Force. Screening for osteoporosis in postmenopausal women: Recommendations and rationale. Ann Intern Med 2002;137:526-8.
9. Cadarette SM, Jaglal SB, Kreiger N, McIsaac WJ, Darlington GA, Tu JV. Development and validation of the Osteoporosis Risk Assessment Instrument to facilitate selection of women for bone densitometry. CMAJ 2000;162:1289-94.
10. Holbrook TL, Barrett-Connor E. A prospective study of alcohol consumption and bone mineral density. BMJ 1993;306:1506-9.
11. Feskanich D, Korrick SA, Greenspan SL, Rosen HN, Colditz GA. Moderate alcohol consumption and bone density among postmenopausal women. J Womens Health 1999;8:65-73.
12. Tudor-Locke C, McColl RS. Factors related to variation in premenopausal bone mineral status: a health promotion approach. Osteoporos Int 2000;11:1-24.
13. Cummings SR, Nevitt MC, Browner WS, Stone K, Fox KM, Ensrud KE, et al. Risk factors for hip fracture in white women. Study of Osteoporotic Fractures Research Group. N Engl J Med 1995;332:767-73.
14. Cadarette SM, Jaglal SB, Murray TM, McIsaac WJ, Joseph L, Brown JP, et al. Evaluation of decision rules for referring women for bone densitometry by dual-energy x-ray absorptiometry. JAMA 2001;286:57-63.
15. Hodgson SF, Watts NB, Bilezikian JP, Clarke BL, Gray TK, Harris DW, et al. American Association of Clinical Endocrinologists medical guidelines for clinical practice for the prevention and treatment of postmenopausal osteoporosis: 2001 edition, with selected updates for 2003. Endocr Pract 2003;9:544-64.
16. Nguyen TV, Center JR, Pocock NA, Eisman JA. Limited utility of clinical indices for the prediction of symptomatic fracture risk in postmenopausal women. Osteoporos Int 2004;15:49-55.
17. Kanis JA, Borgstrom F, De Laet C, Johansson H, Johnell O, Jonsson B, et al Assessment of fracture risk. Osteoporos Int 2005;16:581-9.
18. Weinstein L, Ullery B. Identification of at-risk women for osteoporosis screening. Am J Obstet Gynecol 2000;183:547-9.
19. Jaglal SB, McIsaac WJ, Hawker G, Carroll J, Jaakkimainen L, Cadarette SM, et al. Information needs in the management of osteoporosis in family practice: An illustration of the failure of the current guideline implementation process. Osteoporos Int 2003;14:672-6.
20. Ip TP, Lam CL, Kung AW. Awareness of osteoporosis among physicians in China. Osteoporos Int 2004;15:329-34.
21. Saadi H, Litaker D, Mills W, Kippes C, Richmond B, Licata A. Practice variation in the diagnosis and treatment of osteoporosis: a case for more effective physician education in primary care. J Womens Health Gend Based Med 1999;8:767-71.
22. Tosteson AN, Grove MR, Hammond CS, Moncur MM, Ray GT, Hebert GM, et al. Early discontinuation of treatment for osteoporosis. Am J Med 2003;115:209-16.