DOI: 10.37990/medr.1561239 Med Records 2025;7(1):85-8

MEDICAL RECORDS-International Medical Journal

Research Article

Demographic Characteristics of Patients who Underwent Dual-Energy X-Ray Absorptiometry According to Age and Clinical Department

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Abstract

Aim: The aim of this study was to retrospectively assess the bone dual-energy x-ray absorptiometry (DXA) with the prolongation of human living all over the world results taken over a year along with the demographic characteristics of the patients.
Material and Method: This study was performed at the Department of Radiology, Harran University Hospital between January 1, 2022 and January 1, 2023. Bone DXA examinations requested from all clinical departments within a one-year period were investigated. Osteoporosis (OP) was evaluated considering clinical department-based six groups and age-based four groups.
Results: A total of 1366 patients from all clinical departments such as physical medicine and rehabilitation (PMR), orthopedics, neurology, endocrine, obstetrics and other branches who requested bone DXA were included in the study. Of these, 1166 (85.36%) were women and 200 (14.64%) were men. The PMR was the most frequently prompted clinical department with 721 (52.78%) patients. The OP frequency was highest in the group aged 65 years and older. The lowest OP frequency was seen in the group aged 64 years and younger.
Conclusion: The prevalence of osteoporosis increases with age and the prevalence of OP is higher in women. More than half of DXA requests belong to the PMR department. The PMR department have an important role in the diagnosis and treatment of OP.

Keywords: Osteoporosis, physical medicine and rehabilitation, dual-energy x-ray absorptiometry, age

INTRODUCTION

Osteoporosis (OP) is defined as a systemic bone disease characterized by microarchitectural deterioration in bone tissue, decrease in bone mineral tissue, and consequently increased bone fracture risk (1). It is a common disease in postmenopausal women. It is estimated that one in five men and one in three women over the age of 50 will experience an OP-related fracture, resulting in pain, limitations in quality of life, morbidity, and increased mortality. The clinical manifestation of OP is the fragility fracture, and approximately 80% of all fractures are associated with OP (2,3).

Although fragility fractures cause many problems, OP is still insufficiently diagnosed and untreated. The most common bone measurement test used to scan the OP is dual-energy x-ray absorptiometry (DXA); other screening tests include peripheral DXA and quantitative ultrasound. The central DXA measures bone mineral density (BMD) in the hip and lumbar spine. While the diagnosis of OP with the presence of a fragile fracture is considered universal, BMD measurement by DXA can accurately diagnose OP before the fracture occurs (3-5).

With the increase in life expectancy worldwide and the increase in the elderly population, there is a parallel increase in chronic diseases. Today, it is estimated that more than 200 million people have osteoporotic. In Türkiye, OP stands out as an important health problem due to the aging of the population (6).

The aim of this study was to retrospectively evaluate that how much the bone DXA taken in an university hospital for a year are requested from which departments and how much of their results are compatible with OP, together with the demographic characteristics of the patients.

CITATION
Delen V, Dogan F. Demographic Characteristics of Patients who Underwent Dual-Energy X-Ray Absorptiometry According to Age and Clinical Department. Med Records. 2025;7(1):85-8. DOI:1037990/medr.1561239

Received: 07.10.2024 **Accepted:** 16.11.2024 **Published:** 13.01.2025
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MATERIAL AND METHOD

The study was carried out in the Department of Radiology at Harran University Hospital. In the radiology department, bone DXA examinations requested from all clinical departments during the one-year period between 01-01-2022 and 01-01-2023 were examined. The results of adult patients aged 18 and over were evaluated in the study. Harran University Rectorate Clinical Research Ethics Committee approved the study protocol (decision number: HRÜ/23.11.29, decision date: 19 June 2023). In accordance with the comments of the Declaration of Helsinki, the study was planned, performed and completed.

Interpretation of BMD Results

All anthropometric measurements of the patients were evaluated and recorded. Body mass index (BMI) was calculated by dividing weight (kg) by the square of height in meters. The BMD measurement was performed using the Hologic QDR 4500 DXA scanner device (Bedford, Boston, MA, USA). Measurements included the femoral neck and the lumbar spine regions.

According to the WHO diagnostic classification including DXA results, OP is defined by T-score, which is an indicator of BMD, at the hip or lumbar spine regions equal to or less than -2.5 standard deviations relative to the mean T-score of the young adult reference population. If the BMD value is between -1.0 and -2.5 as a result of bone DXA measurement, it is defined as osteopenia or low bone mass. If the BMD value is -1.0 or higher, it is defined as normal (7).

Statistical Analyses

In the present study, all statistics and measurements were made using IBM SPSS 27 Statistics version. The data were presented as number (persentage) or mean±SD (min.-max.).

RESULTS

A total of 1366 patients from all clinical departments (PMR, orthopedics, neurology, endocrine, obstetrics and other branches) who requested bone DXA were included in this study. Of these, 1166 (85.36%) were women and 200 (14.64%) were men. The PMR was the most frequently prompted department with 721 (52.78%) patients. This was followed by the orthopedics department with a request of 369 (27.01%) patients. Gender distributions in the clinical department-based groups is given in Table 1. In terms of gender distributions, there was a majority of women in all groups.

Table 1. Gender distributions in the clinical department-based groups

	1 (n=721)	2 (n=369)	3 (n=93)	4 (n=70)	5 (n=40)	6 (n=73)	7 (n=1366)
Gender							
Female	621 (86.13%)	329 (89.16%)	75 (80.65%)	70 (100.0%)	21 (52.50%)	50 (68.49%)	1166 (85.36%)
Male	100 (13.87%)	40 (10.84%)	18 (19.35%)	0 (0.0%)	19 (47.50%)	23 (31.51%)	200 (14.64%)
Total	721 (52.78%)	369 (27.01%)	93 (6.80%)	70 (5.12%)	40 (2.94%)	73 (5.35%)	1366 (100%)

1: physical medicine and rehabilitation, 2: orthopedics and traumatology, 3: endocrinology, 4: gynecology and obstetrics, 5: neurology, 6: other departments [gastroenterology (21)+infectious diseases (21)+algology (17)+internal medicine (10)+family medicine (2)+surgical oncology (1)+urology (1)], 7: all cases

The average age of the patients at the time of admission was 59.32±12.8 (distribution between 18-99 years) years. The patients were divided into 4 groups according to age-based groups. When we look at the age-based groups; 896 (65.6%) were in the 18-64 age group, 470 (34.4%) were in the 65-year-old and older group, and 1064 (77.9%) were in the 50-year-old group. The frequency of females in the age-based groups was prominently higher.

The mean BMI values of the patients according to age-based groups were slightly fat. The total BMI values were 31.64±6.3 kg/m² (16.2-54.7). Age, BMI, and gender scores in the age-based groups are given in Table 2.

Table 2. Age, BMI, and gender scores in the age-based groups

	1: ≤64 years (n=896)	2: ≥65 years (n=470)	3: >50 years (n=1064)	4: All years (n=1366)
Age, yrs	72.41±9.63 (18-64)	72.49±6.0 (65-99)	64.35±8.76 (51-99)	59.32±12.81 (18-99)
BMI, kg/m²	31.49±6.23 (16.22-54.67)	31.91±6.31 (16.65-53.83)	32.35±6.07 (16.65-54.67)	31.64±6.26 (16.22-54.67)
Gender				
Female	772 (86.16%)	394 (83.83%)	922 (86.65%)	1166 (85.36%)
Male	124 (13.84%)	76 (6.17%)	142 (13.35%)	200 (14.64%)

According to BMD value, the frequency of OP in the lumbar spine and femoral neck was highest in the group aged 65 years and older. The lowest OP frequency in the lumbar spine and femur neck regions was seen in the group aged 64 years and younger. The lumbar spine and femur neck regions OP frequencies in the age-based groups are shown in Table 3.

Table 3. Lumbar spine and femur neck OP frequency in the age-based groups				
	1: ≤64 years (n=896)	2: ≥65 years (n=470)	3: >50 years (n=1064)	4: All years (n=1366)
Lumbar spine				
Normal	263 (29.35%)	95 (20.22%)	241 (22.65%)	358 (26.21%)
Osteopeni	388 (43.31%)	186 (39.57%)	442 (41.54%)	574 (42.02%)
Osteoporosis	245 (27.34%)	189 (40.21%)	381 (35.81%)	434 (31.77%)
Femur neck				
Normal	700 (78.13%)	229 (48.72%)	684 (64.29%)	929 (68.01%)
Osteopeni	177 (19.75%)	200 (42.55%)	325 (30.54%)	377 (27.60%)
Osteoporosis	19 (2.12%)	41 (8.72%)	55 (5.17%)	60 (4.39%)

DISCUSSION

Despite having a younger population and OP rates compared to European countries, there has been an increase in the incidence of OP disease in the last 20 years in Türkiye. The diagnosis and follow-up of patients with OP is mainly administered by PMR, endocrinology, rheumatology, internal medicine, orthopedics and gynecology specialists (8). In current study, it was seen that the bone DXA was requested by PMR (52.8%), orthopedics (27%), endocrinology (6.8%), gynecology (5.1%) and neurology (2.9%) in order of frequency. Since the rheumatology department was not in the hospital, it did not make any DXA requests.

A recent comprehensive systematic review and meta-analysis presented the prevalence of OP in the world and by continents. According to this study, Asia (16.7%), Europe (18.6%), America (12.4%), Africa (39.5%), Australia (13.5%) between continents. Accordingly, the highest prevalence of OP was reported in Africa with 39.5%. In this study, it was reported that the prevalence of OP in the world was 18.3%. The prevalence of OP in women around the world was 23.1% and the prevalence of OP was reported as 11.7% in men (9). In current study, the prevalence of OP was 33.1%. Again, in our study, the prevalence of OP in women was 33.6% and 30.0% in men. The reason why the OP rate is high in male patients may be the low number of DXA required from male patients.

In another study, the prevalence of OP was evaulated in various industrialized countries (USA, Australia, Canada, Japan and five European countries) with people aged 50 and over. According to the study, the incidence of OP in the spine and hip region was found to be the most common in Japan at 26.3%, in the USA at 21%, in Germany at 14.3% and the least in Australia at 2% (9,10). The present study showed that the frequence of OP in patients over the age of 50 was 35.8% and 5.2% in the in the spine and hip, respectively; the frequence of OP in patients under the age of 65 was 27.3% and 2.1% in the spine and hip, respectively. Finally, the frequence of OP in patients 65 years and older was 40.2% and 8.7% in the spine and hip, respectively. According to the study conducted earlier on 26424 Turkish citizens over the age of 50, the prevalence of femur neck OP was estimated to be 7.5% in men and 33.3% in women. The prevalence of OP is increasing with age, and the general prevalence in men and women aged 50 and over is calculated as 22.2% and 27.2% for Türkiye, respectively. A newly published prevalence study identified 4,253,039 OP patients, corresponding to 4.9% of Türkiye's country's population. In addition, when viewed throughout the country, a prevalence of 0.8% was obtained in Şanlıurfa, 6.1% in the southeast (11-13). The present study was conducted in Şanlıurfa, and in all patients looked at, 32.3% in the lumbar was 4.3% in the lumbar, while in men, 29.0% in the femor neck were 5.0% in the lumbar. According to our findings, while the OP rate was low in the femur neck, the OP rate was found to be high in the lumbar region.

Study Limitations

The results of this study may be misleading regarding the prevalence of OP since it is not known whether the DXA examination was performed for the first time or for follow-up purposes. Because bone DXA scores in patients receiving OP treatment may show lower prevalence of OP due to improvement. Therefore, it would be more realistic to perform prevalence analysis in patients not receiving OP treatment. Another limitation may be that a standard OP cut-off values were used for all age groups. Since the evaluation was retrospective, the demographic data of the patients and secondary causes of OP could not be assessed completely.In addition, since the study was conducted in only one hospital, the results cannot be generalized to the entire region and country. Despite these limitations, this study can be a source for future studies in the literature.

CONCLUSION

Today, due to the aging population, the number of OP patients increases over the years. The prevalence of osteoporosis increases with age and the prevalence of OP is higher in women. The increase in OP causes an increase in both the disability rate and treatment costs due to OP fractures. In this study, more than half of DXA requests belong to the PMR department. The PMR department have an important role in the diagnosis and treatment of OP. In the future, OP should have an important place in the assistant training, especially in PMR department, in terms of health policies.

Financial disclosures: *The authors declared that this study has received no financial support.*

Conflict of interest: *The authors have no conflicts of interest to declare.*

Ethical approval: *Harran University Rectorate Clinical Research Ethics Committee approved the study protocol (Decision number: HRÜ/23.11.29, Decision date: 19 June 2023).*

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