



Distribution of Male Osteoporosis Patients According to Age, Classification, and Fracture

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Abstract

Objective: For years, osteoporosis has been recognized as a disease affecting women. However, in recent years, it has been found that male osteoporosis is not as rare as it was thought to be, and fractures in men are an important public health problem. Therefore, we aimed to present the distribution of male osteoporosis patients according to their ages and diagnosis.

Methods: We retrospectively reviewed the data of male osteoporosis patients who were admitted to physical medicine and rehabilitation clinics within a duration of one year. According to the World Health Organization (WHO) aging criteria, patients were divided into middle-aged (45–59 years), old (60–74 years), elderly (75–89 years), and senile (>90 year) groups. Male osteoporosis was classified as primary and secondary, and the history of fractures was divided as with or without fractures. Patients were analyzed according to these classifications and age groups.

Results: Among the osteoporosis patients, 1,146 (88%) were females and 157 (12%) were males. The mean age of male osteoporosis patients (n=117) was 60.15±17.7 years. Twelve (10.3%) patients were with a history of fractures and 105 (89.7%) were without; 48 (41%) patients were classified as having primary osteoporosis, and the remaining 69 (59%) patients were classified as having secondary osteoporosis. In addition, there was no significant relationship between fracture history and advanced age and primary or secondary osteoporosis (p>0.05).

Conclusion: Although osteoporosis is less common in males than in females, complications are not uncommon in male osteoporosis patients. Despite the high risk of osteoporotic fractures in males, these fractures were not associated with age or etiology. In addition, it was found that more than half of the men with osteoporosis have secondary risk factors; this highlights the importance of questioning these risk factors in male patients.

Keywords: Male osteoporosis, fracture, diagnosis, classification, age

Introduction

Osteoporosis (OP) is a systemic skeletal disorder that increases the risk of fractures due to reduced bone mass and microarchitectural deterioration of bone (1, 2). It is primarily known to affect women because of their increased risk of developing OP (due to menopause, low bone mass, and longer lifetime). However, the occurrence of fractures in men with recently increasing life expectancy has demonstrated that OP is an important public health concern for both genders. Although there are insufficient data on male OP in our country, OP was identified in 2 million men in America according to 2001–2002 data (3). In developed countries, OP prevalence is 13% among men older than 50 years, but it increases to about 70% among men aged more than 80 years (4). Despite the lower prevalence of OP among men than among women, the mortality associated with osteoporotic fractures is higher in advanced-aged men (5, 6). On the other hand, the incidence of hip fractures and prevalence of vertebral fractures in elderly men are half of those in women (7, 8).

Male OP is divided into two groups. Age-related or idiopathic OP is classified as primary OP, while an underlying cause-induced OP is classified as secondary OP (7). Although primary or idiopathic OP is reported very often in the literature, secondary etiological factors are also frequently encountered as a cause of male OP.

Recently, the importance of male OP in terms of morbidity and mortality has been recognized, and thus, studies on this issue are increasing. Therefore, we aimed to investigate the frequency of the diagnosis of male OP among patients who attended our outpatient clinic and the relationship between their ages, diagnoses, and OP classifications of male OP patients and the occurrence of osteoporotic fractures.

Methods

The files of male OP patients who attended the OP outpatient clinics of the Department of Physical Medicine and Rehabilitation (PMR), İstanbul University Cerrahpaşa School of Medicine, Tur-

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key were examined retrospectively. Written informed consent was obtained from the patients, and ethical approval was received from the Clinical Research Ethics Committee of our hospital. The diagnosis of male OP was established based on bone mineral density (BMD) measured via dual-energy X-ray absorptiometry (DXA) method, which is currently used more frequently. As in women, the standard references for the diagnosis of male OP included total hip, femur neck, and lumbar vertebra BMD T-scores with <-2.5 standard deviation (SD). These male OP patients were categorized based on age groups into middle-aged (45–59 years), old (60–74 years), elderly (75–89 years), and senile (>90 years) in accordance with the criteria of the World Health Organization (WHO) for aging (9). Their medical histories of previous fractures were investigated. Moreover, male OP patients were etiologically categorized into two groups as primary (idiopathic or age-related) and secondary (associated with an underlying disease). This classification was performed by evaluating patients' demographic features, complaints, symptoms and examination findings, biochemical test results, known chronic diseases, habits (alcohol use, smoking), and drug use. Patients for whom the causes of secondary OP were ruled out were accepted to have age-related or idiopathic OP and were included in the primary OP group. The primary causes of secondary OP include excessive use of alcohol and cigarettes, glucocorticoid excess (endogenous or exogenous), and hypogonadism. Moreover, patients having impaired hepatic and renal functions, serum calcium, phosphorus, 25-hydroxyvitamin D, and parathormone levels and having known chronic inflammatory, endocrine, or neoplastic diseases (rheumatoid arthritis, ankylosing spondylitis, Cushing syndrome, diabetes mellitus, hyperthyroidism, renal failure, multiple myeloma, and bone metastases) were evaluated to have secondary OP. Patients were distributed according to this classification and age groups and analyzed in terms of their relationship with fracture.

Statistical analysis

Statistical analyses were performed using SPSS (version 22.0; SPSS Inc.; Chicago, IL, USA) software. Descriptive statistics were presented as arithmetic mean \pm SD. In the comparison of normally distributed continuous variables, independent samples *t*-test was used. On the other hand, non-normally distributed variables were compared using Mann–Whitney U test. Cramer V-Phi was employed

as a correlation coefficient in the examination of the relationship among nominal variables. A correlation coefficient of 1 showed a perfectly positive correlation, -1 showed a perfectly negative correlation, and 0 showed no correlation. The statistical significance level was accepted to be $p < 0.05$.

Results

Of 22,030 patients who attended our outpatient clinics in a year, 14,618 (66.4%) were females and 7,412 (33.6%) were males. A total of 1,303 (5.9%) patients were diagnosed with OP, of whom 1,146 were females (88%) and 157 were males (12%). Forty male OP patients were excluded from the study because their data on BMD and causes of secondary OP were missing in their files. Study analyses were performed with the remaining 117 patients (Figure 1). Among the male OP patients, 12 (10.3%) had fractures and 105 (89.7%) had no fractures. Eight of these OP fractures were hip fractures and four were vertebral compression fractures. Of the 117 male OP patients, 48 (41%) were found to have primary OP (age-related and idiopathic) and 69 (59%) were found to have secondary OP (Table 1).

The causes of secondary OP in our patients are shown in detail in Figure 2. The mean age of the male OP patients was 60.15 ± 17.74 years. The mean ages of the OP patients with and without fractures were 63.70 ± 13.09 and 59.76 ± 18.19 years, respectively ($p = 0.66$) (Table 1). Moreover, the mean ages of the primary and secondary OP patients were 76.44 ± 6.97 and 49.2 ± 13.93 years, respectively ($p = 0.00$) (Table 1). The distributions of male OP patients according to age groups were as follows: 50 middle-aged patients at the age group of 45–59 years (42.7%), 35 old patients at the age group of 60–74 years (29.9%), 32 elderly patients at the age group of 75–89 years (27.4%), and 0 senile patient at the age group of ≥ 90 years (Figure 3). Considering the relationship between age groups and fractures, no statistically significant correlation was found between advanced age and occurrence of fracture ($\phi = 0.129$, $p = 0.637$) (Table 2). Similarly, no significant relationship was observed between primary or secondary OP and fracture ($\phi = 0.066$, $p = 0.506$) (Table 2). Total hip, femur neck, and lumbar vertebra (L1–4) BMD T-score mean values were -2.9, -3.0, and -2.5, respectively (Table 2).

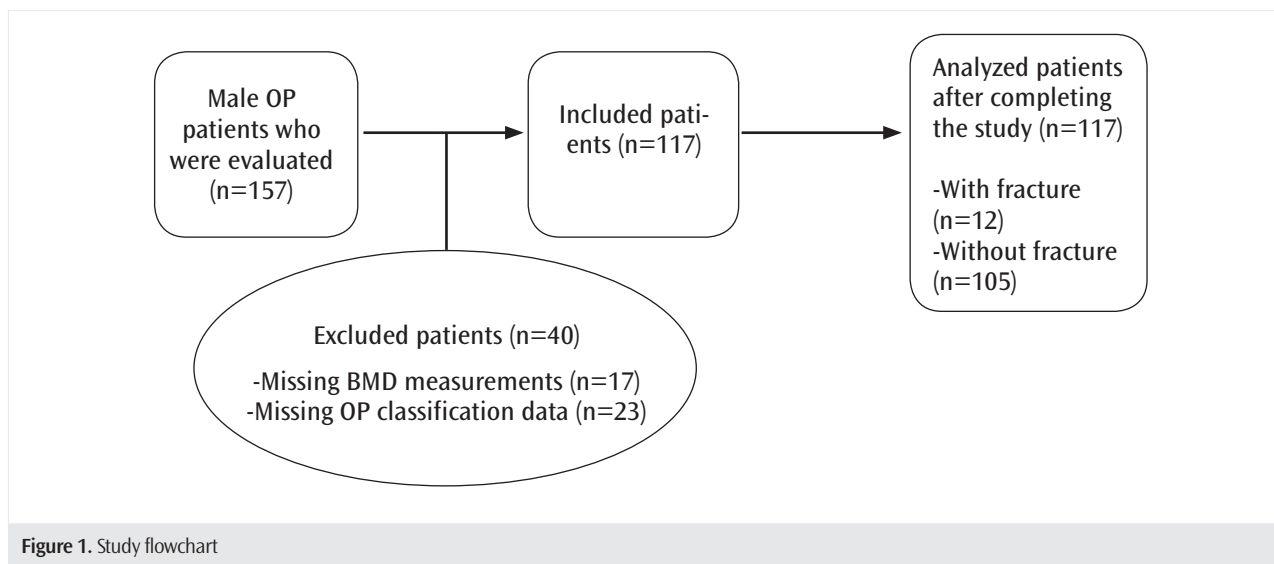


Figure 1. Study flowchart

Table 1. Comparative values of patients in terms of number and age distributions

Male Osteoporosis	Overall	With fracture	Without fracture	Primary	Secondary
Number (n, %)	117	12, 10.3%	105, 89.7%	48, 41%	69, 59%
Age (m \pm SD)	60.15 \pm 17.74	63.70 \pm 13.09	59.76 \pm 18.19	76.44 \pm 6.97	49.2 \pm 13.93
p		0.665		0.000	

OP: osteoporosis; m: mean; SD: standard deviation; p: statistical p value; n: patient number, %: percentage

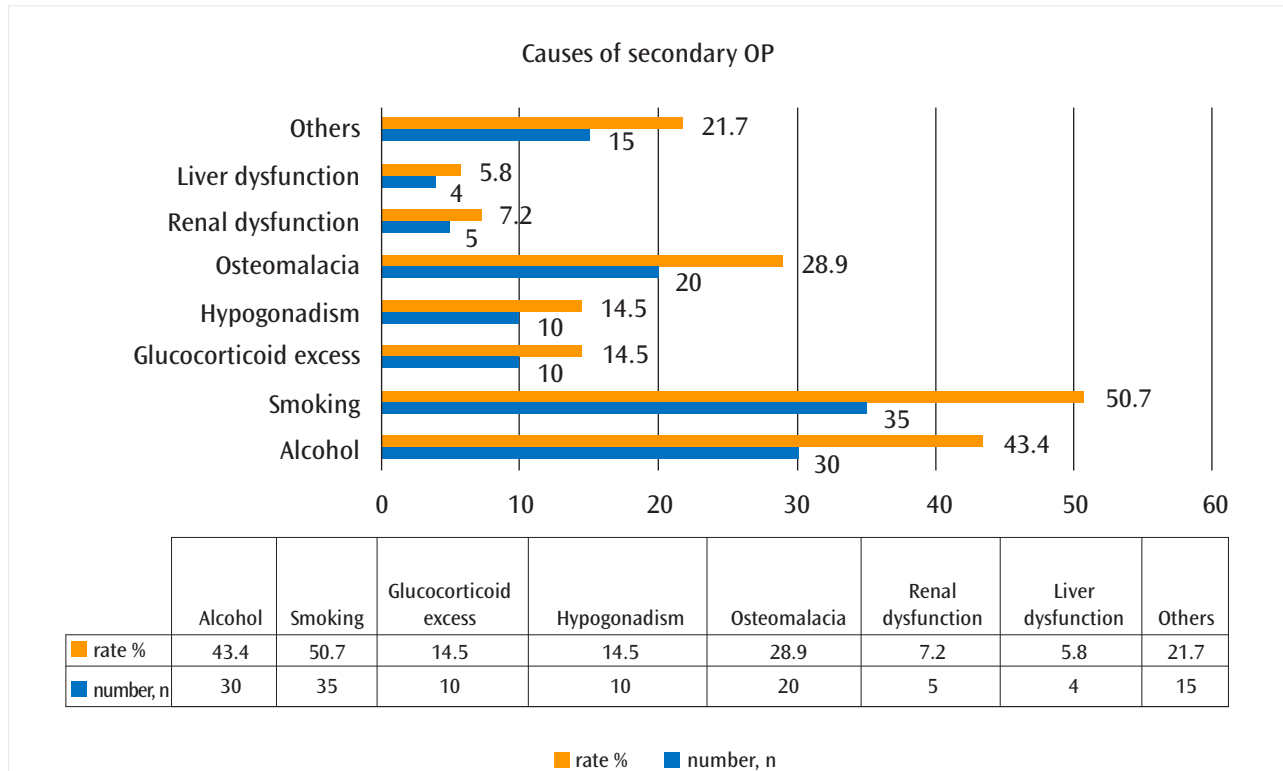
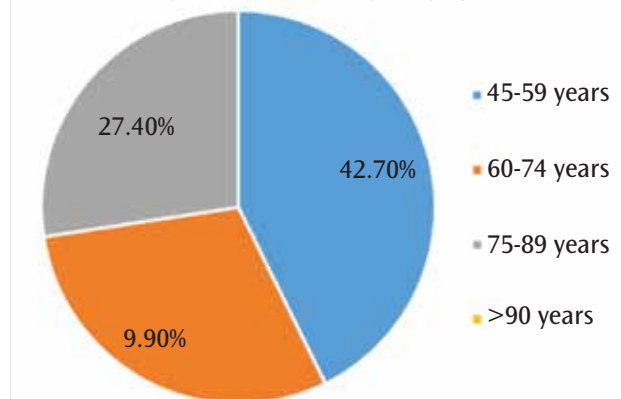

Figure 2. Numbers and rates of the causes of secondary osteoporosis

Table 2. The correlation between patients' mean BMD values and the presence of fracture

BMD T-scores (m)	Total hip = .9	
	Femur neck = 3	
	Lumbar vertebra (L1–4) = 2.5	
Correlation between age and fracture	Phi: 0.129	0.637
Correlation between etiological classification (primary and secondary) and fracture	Phi: 0.066	0.506
MBD: bone mineral density; m: mean; phi: correlation coefficient phi value; p: statistical p value		

Discussion

OP, which is generally recognized as a woman's disease, is also an important health problem for men. It is seen less frequently among men than among women. Although this disease is caused by several factors, it is primarily caused due to menopause (7). Moreover, the lower rate of osteoporotic fractures in men compared to that in women is associated with some factors such as high bone mass and cortical bone thickness and low trabecular

Percentages of OP according to age groups

Figure 3. Percentages of male osteoporosis patients according to age groups
OP: osteoporosis

bone loss in men (2). However, shorter life expectancy causes OP complications to occur at more advanced ages in men (5, 10). The prevalence of OP is 13%–18% in women older than 50 years and 3%–6% in men older than 50 years. It has been reported that mor-

bidity and mortality rates particularly after a hip fracture can be higher in men (11-13). The lifelong risk of osteoporotic fracture has been reported to be 13% in men, and one-third of all hip fractures are osteoporotic fractures (14, 15). In America, the risk of mortality has been reported as 6% in women aged above 50 years and 17.5% in men aged above 50 years. On the other hand, for those aged above 75 years, the mortality rates increase to 30% in men and 9% in women (2, 16, 17). Vertebral fractures are not so common in men and they generally occur as anterior compression in lower thoracic vertebrae (2). In our study, the rates of male OP and fractures were found to be consistent with those reported in the literature. Furthermore, more than half of our patients were older than 60 years and most of the fractures occurred in the hip.

For diagnosing idiopathic OP, hepatic, adrenal, gonadal, thyroid, and parathyroid functions and the levels of serum calcium, phosphorus, and vitamin D must be normal. Otherwise, OP developing in association with these disorders is classified as secondary (7). In addition, immobilization, neoplastic or inflammatory rheumatoid diseases, and chronic drug use (anticonvulsants, immunosuppressants) are also among the causes of secondary OP (2, 7). The most common causes were cigarette and alcohol use, osteomalacia, glucocorticoid excess, and hypogonadism in our patients. Although the rate of secondary OP is reported to be 20%–40% in women, the rates of primary and secondary OP vary in men (18). There are studies reporting that the rate of secondary OP in men can increase up to 65%. On the other hand, some studies report the rate of idiopathic (primary) OP as 60% (2, 18). Furthermore, secondary causes in male OP facilitate the development of fractures (19). It has been reported that >65% of fractures are caused due to secondary OP in men (18). Despite the differences in the literature, the rate of secondary OP was found to be higher in our study. This rate was attributed to the facts that we were the final health care center that a patient could attend and we could investigate the secondary etiological factors of OP more comprehensively. Moreover, no significant difference was found between primary or secondary OP and occurrence of fracture in our study. While etiological factors are not certain in idiopathic OP, in particular, “insulin-like growth factor (IGF)-1” has been reported to be a cause. Although some studies have reported that IGF-1 levels naturally decrease with aging, this situation is seen more in men with idiopathic OP (20-22). In our study, IGF-1 levels were not evaluated because the study was not aimed at investigating the causes of idiopathic OP.

Although testosterone is responsible for larger and stronger bones in men, the pathophysiology of male OP remains unclear. The role of estrogen in bone metabolism is well known in women, but the role of sex steroids (testosterone and estrogen) in bone turnover is unclear in men (2, 7). In this study, we aimed to obtain data on the etiopathophysiology of OP.

Today, the diagnosis of OP is established based on BMD that is measured via the DXA method. According to the WHO, lumbar spine and proximal femur BMD T-score of <-2.5 SD is accepted as OP in men older than 50 years (23) and Z score of <-2 SD is accepted as “low BMD” in men younger than 50 years (24, 25). Moreover, the causes of secondary OP should be evaluated in detail in these patients. Biochemical (calcium, vitamin D, phosphorus, etc.) and hormonal (estrogen, testosterone, parathormone, thyroxine, cortisol, prolactin, etc.) measurement values should be taken into consideration (26). In our study, all the patients were older than

45 years and the diagnosis of OP was established by taking BMD T-scores (<-2.5 SD) as references. Moreover, while investigating the causes of secondary OP, risk factors and biochemical and hormonal test results were evaluated. Patients with insufficient data were excluded from the study and not analyzed.

Another point in diagnosing OP is to select the patients who will undergo bone density scanning. It is recommended that BMD measurement be performed in men above 50 years old, who have a familial history of OP, weight loss, fragility fracture, and any disease that can lead to bone loss, and who use a drug. Furthermore, because the risk of hip fracture is high in men older than 70 years, BMD should be performed for them regardless of the risk factors (7). In our study, patients with risk factors that may be causes of secondary OP or with a history of fracture and those above 70 years old underwent BMD measurement.

In conclusion, although OP is seen less frequently in men than in women, OP-related complications are encountered in a considerable number. The risk of osteoporotic fracture is high among men, but this was not found to be associated with aging and etiological causes in our study. In addition, secondary factors were detected to have an effect on fractures in more than half of male OP patients, which suggests that risk factors should be investigated in male patients. Another point to be considered is that approximately half of male OP patients are younger than 60 years.

Ethics Committee Approval: Ethics committee approval was received for this study from local ethics committee..

Informed Consent: Informed consent was obtained from patients who participated in this study.

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