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Osteoporosis. Definition. Epidemiology

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Definition

Osteoporosis is a global health problem whose importance is going to increase with the aging of the population. It is defined as a systemic disorder of the skeleton characterised by low bone mass and deterioration of the microarchitecture of the bone tissue, with the consequent increase in bone fragility and the greater susceptibility to fractures[1]. Bone resistance reflects essentially the combination of bone density and bone quality. In turn, the concept of bone quality seeks to integrate all those factors apart from bone mass which determine bone fragility, including the microarchitecture, the degree of turnover, the accumulation of lesions or microfractures, or the degree of mineralisation[1,2].

It is a process which is preventable and treatable, but which lacks warning signs prior to the appearance of fractures, leading to the fact of few patients being diagnosed at early stages and treated effectively. Therefore, in some studies it has been confirmed that 95% of patients who presented with a fracture did not have an earlier diagnosis of osteoporosis[3].

In 1994 the World Health Organisation (WHO) established some definitions based on measurements of bone mass in the lumbar spine, hip or forearm of white postmenopausal women[4]. Thus, normal bone mass is considered to be having a bone mineral density (BMD) value higher than -1 standard deviation (SD) in relation to the average for young adults (T-score >-1); osteopenia, having BMD values between -1 and -2.5 SD (T-score between -1 and -2.5); osteoporosis, having BMD values lower than -2.5 SD (T-score lower than -2.5), and osteoporosis is established when, along with the above conditions, are associated one or more fragility fractures (Table 1). It is also possible to consider the Z-score in groups of patients such as children and young adults, which expresses the bone mass in comparison with that expected in those of equal age and sex[5].

Epidemiology

In 1995 Melton et al estimated the prevalence of osteoporosis according to the WHO criteria in white women over 50 years of age, which was 15% when measured in the three usual places (spine, hip or wrist) and 30% when measured in all of them[6]. The prevalence increases with age from 15% for the ages between 50 and 59 years, up to a prevalence greater than 80% for women aged over 80 years of age[7]. According to data from the NHANES III study, in men over 50 years of age, the prevalence of osteoporosis is 8%[8].

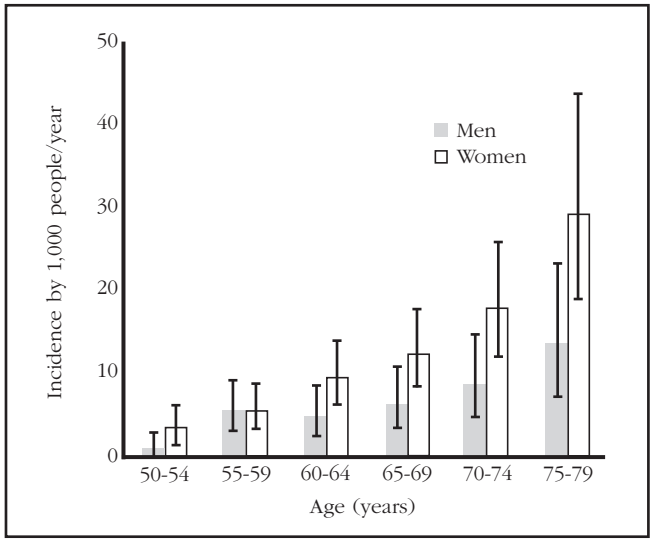
In Spain, it is calculated that 2 million women and 800,000 men have oseteoporosis, and a study of Díaz Curial et al., in which DXAs were carried

Table 1. Diagnostic criteria for osteoporosis of the WHO

Assessment	Value of BMD
Normal	T-score >-1 SD
Osteopenia	T-score between -1 and -2.5 SD
Osteoporosis	T-score < -2.5 SD

T-score: value of BMD compared with average value for young adults expressed in terms of standard deviation (SD)

Figure 1. Incidence of vertebral fracture as a function of age: EPOS study (adapted from Roy DK et al., 2003)



out on 1,305 Spanish women between 20 and 80 years of age found a prevalence of osteoporosis in women over 50 years of age of 26.07% (95% CI, 22.57-29.57%)[9]. Studies in men indicate that the prevalence is 8.1% in those older than 50 years of age[10], increasing with age to 11.3% in those over 70 years of age[11].

The most direct consequence of osteoporosis is an increase in fragility fractures. Osteoporotic fractures are those located in zones of low BMD, or those which happen after falling over. The presence of fragility fractures is associated with a higher risk of having new osteoporotic fractures, as well as an increase in mortality and a reduction in the quality of life in men and women[12]. Osteoporotic fractures can be present in multiple locations, but fractures of the proximal extremity of the femur, distal radius and vertebrae are considered to be typically osteoporotic – the last being the most frequent.

In general, osteoporosis has been evaluated by measuring the BMD, which has a direct correlation with bone resistance, and which constitutes a good parameter for the prediction of risk of fracture. However, BMD is not the only parameter which predicts the risk of fracture, since there are also other significant factors such as age (it increases with age), sex (higher in women), race (higher in northern European countries) and concomitant diseases. Nowadays, to decide when to initiate treatment for osteoporosis not only is BMD evaluated, but also the individualised absolute risk of fracture at 5-10 years, incorporating risk factors independent of BMD such as age, sex, weight, previous fractures, family antecedence of fractures, smoking, consumption of glucocorticoids, intake of alcohol, and others[13].

Osteoporosis in men represents a significant and growing health problem which is underdiagnosed in the general population. It is characterised as having a higher morbimortality than in women and a higher prevalence of secondary osteoporosis. Thus, in men younger than 70 years of age with osteoporosis, between 40 and 60% have secondary osteoporosis. The most significant causes, quantitatively, are those associated with excess alcohol, that induced by glucocorticoids and primary or secondary hypogonadism.

For little known reasons, hospital mortality due to fracture of the hip and vertebrae in men is double that in women (10% as opposed to 4.7%) and mortality in the year of fracture is also higher in men compared to women (35-37% compared to 28%). In addition, after a low trauma fracture the relative risk of another fracture is also higher in men (RR: 3.4; CI 95%: 2.68-4.48) in comparison with women (RR: 1.95; CI 95%: 1.7-2.25), and the probability of being studied or treated after a hip fracture is lower in men (4.5%) than in women (49.5%)[14-18]. Some authors postulate that the higher prevalence of comorbidities, and the lower level of therapeutic care observed in men with a fragility fracture could explain, in part, this extra morbimortality.

Vertebral fracture

The prevalence of vertebral fracture is difficult to establish due to there being no consensus regarding the radiological definition of the deformities, and to the fact that its presence is usually asymptomatic. Between 20 and 25% of women over 50 years of age will have a secondary vertebral fracture due to osteoporosis, according to data from European studies. Vertebral fractures are rarely present in those younger than 50 year of age but increase exponentially with age[19-21]. The annual incidence is considered to be 1% in women of 65 years, 2% in those of 75 years, and 3% in those over 80 years. In men over 50 years of age it is from 5.7 to 6.8/1,000 people per year, which equates to approximately half of that observed in women[22]. Vertebral deformities in lumbar and dorsal spinal X-rays are three time more frequent than hip fractures, and only a third of vertebral fractures require medical attention.

In European population studies such as the European Prospective Osteoporotic Study (EPOS) and the European Vertebral Osteoporotic Study (EVOS), at 75-79 years of age the incidence of vertebral fractures is 13.6/1,000 people per year for men and 29.3/1,000 people per year for women, and the global incidence by age is 10.7/1,000 people per year in women and 5.7/1,000 people per year in men[23-24]. After a vertebral deformity there is a 7- to 10-fold increase in new vertebral deformities, and the presence of a previous vertebral deformity predicts an incidence of hip fracture with a risk quotient of 2.8-4.5, and this increases with the number of vertebral deformities[25-27]. (Figure 1).

Proximal femoral fracture

Hip fractures are considered the most significant osteoporotic fractures due to their associated high morbimortality. In patients with this type of fracture fewer than 50% have complete recuperation, 25% go on to require home care and 20% will require continuing support after the fracture.

Hip fractures are more frequent in women, with a female/male ratio of 3 to 1. The most frequent age for their occurrence is between 75 and 80 years. The incidence of hip fracture increases with age, increasing exponentially from 50 years, their incidence in people younger than 35 years being 2/100,000 and 3,000/100,000 in those over 85 years of age[28].

Distal radius fracture

Fracture of the distal third of the radius is more frequent in women, with a female-male ratio of 4 to 1. In women, these fractures are more frequent in the perimenopause, and their incidence increases rapidly through menopause before stabilising at 65 years. In males the incidence remains practically constant with age.

This type of fracture only requires hospitalisation in less than 20% of cases, but increases by 50% the risk of hip fracture[29,30].

Conclusions

Osteoporosis should be considered as a real public health problem which justifies the implementation of preventative measures and efficacious therapies. Hence, the primary objective should be to prevent the first fracture and to preserve the integrity of the bone, increasing bone mass and improving bone quality.

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