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Commentary

# Diagnosis of Osteoporosis: Bone Mineral Density, Risk Factors, or Both?

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## Abstract

Osteoporosis is a disease of high prevalence in developed countries and especially among Caucasian populations. Osteoporotic fractures are the most serious expression of this disease, where several studies have shown that the incidence of hip fractures has increased in several countries. Even in those where the incidence appears to be low to moderate but has very young populations, the prospect of aging will greatly increase this situation. And for prevention and appropriate treatment it is necessary to know the problem both by the lay population and by the health professionals, thus generating public policies that are aimed at this purpose. And knowledge of diagnostic tools that may be inexpensive is very important in most developing countries.

***Keywords:*** *Osteoporosis; Bone Mineral Density*

Osteoporosis is a disease that has its worst manifestations in fractures. The risk of a major osteoporotic fracture (vertebra, femoral neck, humerus, radius) for the age of 50 years or more is 50% for women and 20 - 25% for men [1]. According to the United Nations in a recently released population projections based on data until 2012 and to Bayesian probabilistic methodology, developing countries with younger populations but lower fertility (e.g. China, Brazil and India), are likely to face the problems of aging societies before the end of the century [2]. It is estimated that in 2050 half of the frailty hip fractures will occur in Asian countries, and 25% in Latin America [3]. In the 1990s half of hip fractures occurred in North America and Europe. When we look at the numbers of incidence of hip fracture due to fragility in the countries of these continents, the data are generally low or moderate when compared to Caucasians in the Northern Hemisphere [4-9]. However, the elderly population in these countries is still very low. When we look at the raw data of incidence after 75 years [6,7], it ends up resembling the Scandinavian and North American countries.

The decision of treat or not the patient depends upon de correct diagnosis. The gold standard diagnosis is bone densitometry which uses dual-energy x-ray absorptiometry (DEXA). It's a good predictor of fractures. For each standard deviation less, the risk of fracture by osteoporosis doubles [10]. But bone mineral density does not explain everything. If we take as an example a 60-year-old woman with T-score = -1.8, without previous fracture, the absolute risk of fracture is approximately 12%. In turn, if this same woman has a previous fracture, her absolute risk increases to 22%. Thus, the risk of fracture based on bone mineral density doubles from 50 to 90 years, but the risk observed during these years is 30 times more [11].

The NORA study, which evaluated approximately 150,000 postmenopausal women with fractures, showed that in the group with densitometric diagnosis of osteoporosis the fracture rate was higher than in those without a diagnosis. But the highest absolute number occurred between women who had low bone mass and normal bone mineral density [12]. In this way Kanis., *et al.* in a WHO task force in 2008 created another tool for the diagnosis of osteoporosis, which, in addition to being based on the risk factors for frailty fractures, included the risk of mortality (2008 http://www.shef.ac.uk/FRAX) [13] and may or may not use bone mineral density of the hip. FRAX models are currently available for 63 countries (68 models) in 28 languages, considering the differences in epidemiology of fracture in each country [14].

The risk of fractures is a gradient and not a threshold. Thus, the risk of fractures is similar for a T-score of -2.4 and T-score of -2.5, despite being in different diagnostic classifications (WHO, 1994). And the diagnosis is the same although the risk of fracture is very different between T-score -2.5 and T-score -5.0.

The risk factors found in FRAX, validated in several population studies, are: history of fragility fracture, paternal or maternal history of fragility fractures, present smoking, daily alcohol intake of 3 or more drinks/day, use of oral glucocorticoid and rheumatoid arthritis, where the Body Mass Index (BMI) is a continuous variable. But it also considers secondary risk factors such as hypogonadism, osteogenesis imperfecta, malnutrition or absorption, chronic liver disease, diabetes mellitus and hyperthyroidism [13-15].

Each country must find its threshold for indication of treatment. In North America, the model was based on a fixed cut-off point using the National Osteoporosis Foundation's recommendation [16], (http://nof.org/files/nof/public/content/file/2791/upload/919.pdf, 2014), where the intervention thresholds comprised a 10-year fracture probability> 3% for hip fracture, and > 20% for major osteoporotic fracture (MOF). While in the UK, the model was based on age-dependent intervention thresholds devised by the National Osteoporosis Guideline Group (NOGG) [17] and recommended by the Brazilian FRAX [6]. NOGG considers the 10-year probability of a major osteoporotic fracture for women without clinical risk factors according to age and T-score. At any given age, fracture probability increased with decreasing T-score [17].

When we tested the two models above in a Caucasian population in southern Brazil, we saw that the British model, already used in the country, is a bit more appropriate for our population, but there was no statistical difference [18].

In this way, the risk of fracture due to fragility is determined by the evaluation of risk factors, with or without bone densitometry, and complement each other. And so, guide the population at risk not only to make prevention, but to choose the best treatment option.

## Conclusion

In addition to bone densitometry, diagnostic tools that are based on osteoporotic fracture risk factors such as FRAX are inexpensive and easy means to identify a large portion of the population for proper treatment. It would be prudent for each population to have its own cut-off point, and to adopt the best way to identify patients at risk of fracture. In the possibility of having risk factor analysis plus bone mineral density, when indicated, will facilitate the more accurate diagnosis.

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