RESEARCH ARTICLE

Is it possible to use the fracture risk assessment tool (FRAX™) when densitometry is not available?

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Abstract

Objective: To calculate the percentage of women treated at the Climaterium Outpatient Clinic of Hospital Electro Bonini who had a high risk of fracture calculated by FRAX to offer empirical treatment for osteoporosis. Methods: A FRAX ™ questionnaire was applied during consultations at the Climacteric Ambulatory in September 2018. Women under 40 and over 90 years of age and cancer from anywhere were excluded. Results: Of the 74 questionnaires answered, 24 (32.43%) had an increased risk of fracture, and patients were considered to start treatment for osteoporosis. Conclusion: Despite its limitations, the FRAX™ tool is an easy method to apply and estimates the risk of bone fracture on an outpatient basis, helping with early therapeutic management, especially when there is a lack of access to bone densitometry.

Keywords: FRAX™, climacteric, fracture, osteoporosis

Summary for index

Given the lack of access of certain populations to bone densitometry, the FRAX™ questionnaire made treatment possible for women without diagnosis.

Introduction

Osteoporosis is an osteometabolic and multifactorial disease characterized by porous bones and reduced bone mass, which can evolve over many years without symptoms.[1-3] In women, estrogen is the most important hormone in the process of normal bone remodeling.[4-6] In post-menopause, the bone resorption process overcomes formation, favoring the reduction of bone mass.[4,7] The main complication associated with osteoporosis is atraumatic or low-impact fractures, which occur more frequently in the vertebrae, the distal radius and the proximal femur.[8,9] Being the leading cause of fractures in the population over 50, it affects more than 200 million people worldwide, especially females, which leads to increased morbidity and mortality, leading to high costs for health services and government.[8,10] The diagnosis may be clinical in patients with risk factors associated with fractures, but in women without a previous fracture, bone densitometry (DXA) is required for this.[11-14] Using DXA, the diagnosis is based on the T-score classification: normal (T-score ≥ -1), osteopenia (T-score <-1 and> -2.5), and osteoporosis (T-score ≤ - 2.5).[8,11] However, in some Brazilian cities, it could be difficult to perform DXA in the public health system (SUS) due to the long wait for the exam, which can reach 4 years.

In 2008, the World Health Organization (WHO), in partnership with the University of Sheffield, developed a tool called FRAX™ (Fracture Risk Assessment) that determines the risk of bone fractures in 10 years from clinical factors obtained from the anamnesis.[1,2,8,15] The following data were used: age (40-90 years), gender, body mass index (BMI), history of

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fractures due to bone fragility, family history of femoral fracture, smoking, prolonged use of corticoids (dose ≥5, 0 mg / day of prednisone for more than three months), rheumatoid arthritis, other causes of secondary osteoporosis and high alcohol consumption (≥ 3 units per day).[2,8,16] Bone mineral density determined by bone densitometry of the femoral neck can be entered to improve the predictive value of fracture risk. The purpose of our study was to demonstrate the importance of the FRAX™ tool for health professionals, especially in areas where bone densitometry is difficult to obtain.

In poor regions that lack public services that offer bone densitometry, there are no other low-cost alternative tests to assess the risk of fracture in menopausal patients.

In our service, the lack of bone densitometry limits the approach of the medical team with regard to assessing bone health and preventing fractures due to osteoporosis. No patient received treatment for osteoporosis with bisphonates, for example. Only calcium and vitamin D were prescribed for all menopausal patients. Patients with risk factors also received guidance on the prevention of fractures and physical exercise.

The lack of a protocol that could identify patients at higher risk without bone densitometry, and that consequently could indicate the beginning of more effective treatment, made us look for alternatives.

FRAX™ emerged as a simple alternative, free of charge and easily accepted by doctors and patients. We know that we are not dealing with an ideal scenario and that DEXA is the gold standard exam.

In this way, we started to apply the FRAX™ questionnaire to all patients seen at the Climaterio Ambulatory of the University of Ribeirão Preto (UNAERP) as part of the care protocol for menopausal patients. From that moment on, we started a more aggressive approach for patients who are at high risk of fracture calculated by FRAX™, including the possible prescription of bisphophonates.

The aim of this study was to portray the population served at our service from the point of view of the risk of bone fracture calculated by FRAX™.

Methods

This is a descriptive cross-sectional study in which women between ages 40 and 90 were interviewed in the Ambulatory of Climaterium of the Electro Bonini Hospital, located in Ribeirão Preto, in September 2018. Women under 40 years and over 90 were excluded, as well as women with any type of cancer.

All other patients seen at the Climacteric Ambulatory who agreed to participate in the study and who signed the free and informed consent form were included, regardless of whether they still had menstrual cycles. In September, 152 patients were treated, 17 of whom were excluded for cancer, 1 for those over 90 years of age and 7 for those under 40 years of age. 53 patients did not accept to participate or did not sign the consent form. Thus, we obtained 74 participants.

The following data were recorded: age, gender, weight and height, history of previous fracture, family history of hip fracture, smoking and alcoholism ≥ 3 units (1 unit = 8 -10g of alcohol) per day, glucocorticoid treatment (dose ≥5.0 mg / day prednisone for more than three months), rheumatoid arthritis and other diseases associated with secondary osteoporosis and included in the FRAX™ questionnaire. The information collected was registered into the FRAX™ Brazil online tool, accessed through the website http://www.shef.ac.uk/FRAX. The individual risk of fracture was directly obtained from the tool.

Results

From the 74 women interviewed, the major risk factors were: previous fracture and current smoking (Table 1). The age of the study population ranged from 40 to 81 years, with a mean of 63 years. Patients were grouped in age groups: from 40 to 49 years, from 50 to 59 years, from 60 to 69 years, from 70 to 79 years and from 80 to 89 years (Figure 1). As expected, there was an increased risk of fractures with age.

The BMI ranged from 20.9 to 39.81 kg / m². They were also grouped according to the World Health Organization[17] classification: normal (between 18.5 and 24.9 kg / m²), overweight (between 25 and 29.9 kg / m2), obesity grade 1 (between 30 and 34.9 kg / m2) and obesity grade 2 (between 35 and 39.9kg / m²). There was no patient with low weight (BMI <18.5kg / m²) and obesity grade 3 (BMI ≥ 40kg / m²) Figure 2.

The risk of major fractures due to osteoporosis calculated using the FRAX™ tool ranged from 1.7% to 24%, with a mean of 7.81%, and of hip fracture ranged from 0.1 to 13%, with average risk of 2.96%. A risk of hip fracture greater than 3% and of major fracture greater than 20% were considered high.[18-20] We observed that 24 women (32.43%) were at high risk of fractures and were, therefore, considered for osteoporosis treatment. From these patients, only 6 had a DXA-confirmed diagnosis of osteoporosis and were undergoing treatment. On the other hand, surprisingly, 8 women did not present an increased risk of fractures assessed by the FRAX ™ tool, even though they had a diagnosis of osteoporosis. Finally, only 16 women (21.6%) performed DXA prior to the study, and 18 (24.3%) did not even know the test.

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Table 1. Risk factors

Risk Factor	Number of Patients (%)
Previous fracture	30 (40,54%)
Parents with Hip fracture	6 (8,10%)
Current smoking	14 (18,91%)
Use of Corticosteroids	10 (13,51%)
Rheumatoid arthritis	10 (13,51%)
Secondary Osteoporosis	12 (16,21%)
Alcohol	10 (13,51%)
No Risk Factors	12 (16,21%)

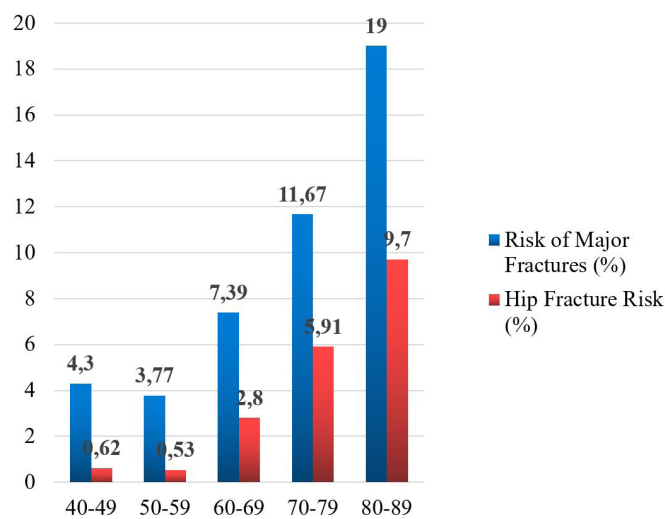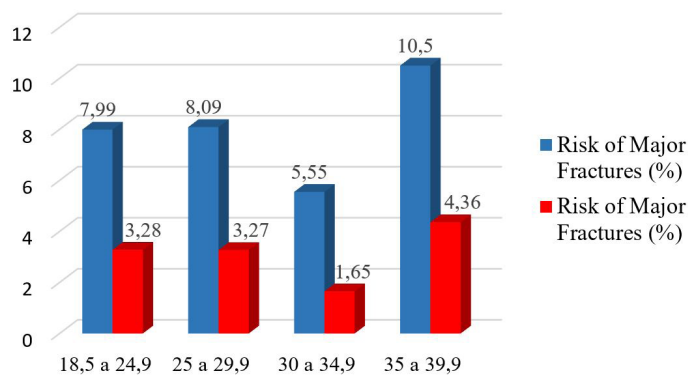**Figure 1.** Mean risk of fractures by age group

Figure 2. Mean risk of fractures by BMI

Discussion

   Age is a determinant factor, which increases the risk of fractures. It is believed, however, that this increase is due, in addition to the decrease in bone mineral density, to a set of factors, such as a higher risk of falls. In this study, we can observe a proportional increase to the advancement of the age group, mainly in the range of 70-89 years. Low BMI is also cited as an important risk factor for low-impact fractures, but there were no patients with BMI <18.5 kg / m^2.

Among the limitations of the present study, is the small sample size and the fact that we performed it in only one center. Although we had a much larger interviewed population, only 74 patients agreed to sign the informed consent form. This limits the conclusions and demonstrates the need for further studies on the FRAX™ tool, not only in Gynecology, but also in Endocrinology, Rheumatology and others, since it is a multifactorial osteometabolic disease.

Another limitation refers to the tool itself that was not developed for Brazilians. There are some studies on FRAX™ in Brazil,[21,22] but the real risk value for Brazilians has not yet been established.[25] We use the standard value of 3% in our service as a cut. Values greater than or equal to 3% were considered high.

Despite its limitations, FRAX™ is an easy-to-apply method that provides the risk of bone fracture at the outpatient level, aiding in early therapeutic management.

In our population, we would not treat a third of the cases, since, without the available bone densitometry, our population was simply without any assessment of the risk of osteoporosis and fracture and consequently without any treatment. The centers that have bone densitometry must perform it, since this exam is the gold standard for diagnosing osteoporosis. FRAX™ is not, in fact, an alternative to densitometry. It calculates the risk of fracture in 10 years, not being able to identify cases of rapid loss of BMD in the post-menopause. In our service, we do not have bone densitometry, which is why we started using only FRAX™ to start treatment. FRAX™, however, can also be used to identify the population that is most likely to perform bone densitometry and thus assist in the allocation of health resources.[23,24] The impact of non-treatment on the general population is financial and culminates with increased morbidity and mortality.

The strong point of our study was the demonstration that we would stop treating a third of the patients seen just because they did not perform a simple and quick questionnaire during the consultation.

The article did not aim to highlight the FRAX™ tool and choose it as an alternative to bone densitometry. FRAX™, however, can be an aid where the ideal is not possible.

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G. O. Watanabe contributed in all stages of the process: writing, reading, discussing and reviewing the article.

I. M. Dias wrote the manuscript at first.

L. R. R. de Maris and M. C. M Ferreira collected and recorded all data.

N. L. Vieira and V. F. R. Colasso did the statistical analyzes and figures.

A. K. Bartmann reviewed and guided the authors throughout the study.