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Fracture risk prediction in post-menopausal women with osteopenia and osteoporosis: preliminary findings

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KEYWORDS
Post-menopausal women;
Fracture risk prediction;
FRAX;
Osteopenia;
Osteoporosis

Abstract
Objective: The study aims to identify the risk of obtaining a fracture among post-menopausal women with osteopenia and osteoporosis.
Method: This work was a cross-sectional study involving a purposive sample of 87 post-menopausal women who attended the orthopedic and menopause clinics of Hospital Tengku Ampuan Afzan, Kuantan. The data were entered into the WHO fracture risk assessment tool (FRAX®) to predict major fracture and risk for hip fracture in 10 years' time.
Results: The mean age of the respondents was 61.6 years (SD = 7.9). Among the respondents, 50.6% had osteopenia and nearly half (48.3%) had osteoporosis. The mean number of menopausal years of the respondents was 11.9 (SD = 8.5), ranging between 1 and 44 years. The FRAX findings indicated 9.7% major osteoporotic fracture probability and 3.5% hip fracture probability, which were denoted as high risk. A Pearson correlation coefficient was computed to assess the relationship between menopausal years and the FRAX major osteoporotic fracture probability. A significant positive correlation was found between the two, but the correlation was weak ($r = 0.581$, $n = 87$, $p < 0.001$).
Conclusions: The present findings indicate that menopausal years have a positive correlation with the risk of obtaining a fracture.

Introduction

Osteopenia and osteoporosis are conditions of metabolic bone disorders. According to the World Health Organization (WHO), osteoporosis in post-menopausal women is defined as bone mineral density (BMD) T scores ≤ –2.5 of the young adult mean[1], and osteopenia, or low bone density, is defined as BMD T score between –1.0 SD and –2.5 SD. These conditions are known as primary osteoporosis as they occur among the elderly and post-menopausal women[2,3]. The risk of osteoporosis and osteopenia increases as people age. Recent findings have shown that progressive fracture risk is correlated with advancing age[4].This silent disease is alarming for post-menopausal women because no specific sign or symptom is evident before the occurrence of fracture. Fragility fracture is a nightmare to all post-menopausal women because it leads to serious complications and even death.

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Approximately one in every three women over the age of 50 years will encounter a fragility fracture throughout her life[5]. About 61% of fragility fractures occurs in women, with female to male ratio of 1.6[6]. Hip fractures among Malaysians above the age of 60 between June 2008 and December 2009 predominantly occurred in females. Majority (82.5%) of these women were post-menopausal at the time of the fracture[7]. The high incidence of osteoporotic fractures among elderly suggests that it is a significant cause of morbidity and mortality[8]. Therefore, proper prevention and treatment in approaching this problem is essential. Nowadays, significant developments have occurred in the pharmacotherapy of osteoporosis and efficacious treatments to reduce the risk of fractures. These developments have substantially improved the management of patients with osteoporosis. Unfortunately, the risk of fragility fractures is not yet eliminated because there are still unmet needs requiring a broader range of therapeutic[9] and preventive steps.

The prediction of fracture risk is one of the valuable tools in calculating the 10-year probability of obtaining a major fracture and hip fracture[10]. The incidence of fragility fracture as a major cause of disability, poor quality of life and mortality can be reduced by the proper assessment of fracture risk. FRAX score is a new fracture risk assessment tool (FRAX®) that is widely used in determining a 10-year prediction for possible fractures, and it is recommended by the WHO Collaborating Center for Metabolic Bone Diseases in Sheffield, United Kingdom. This tool includes clinical data and bone mineral density measured by dual-energy X-ray absorptiometry[11]. Aside from providing a 10-year probability of obtaining fracture, this tool can assist in identifying those who are at the greatest risk of fracture, which can be detected early to aid in planning immediate preventive measures. At the same time, it can support clinical decision making in fracture risk management to reduce fracture-related disability, costs, and mortality. This study aims to identify the fracture risk prediction in post-menopausal women with osteopenia and osteoporosis. We present the preliminary findings of an ongoing research on the development of health education package in preventing fracture among post-menopausal women in Kuantan, Malaysia.

Method

This study applied a cross-sectional method involving 87 respondents from the orthopedic and menopause clinics of Hospital Tengku Ampuan Afzan Kuantan, Pahang, Malaysia, between April 2016 and October 2016. A purposive sample of the respondents' age of 50 and above and post-menopausal women was utilized. The criteria in selecting respondents were based on the BMD result of the osteopenic range (T-score of less than −1 and greater than −2.5 SD). Data collection was performed after obtaining approval from the Research Ethics Committee of the International Islamic University and National Medical Research Registry. The respondents were evaluated using a questionnaire on various independent risk factors for osteoporosis, including parental hip fractures, previous fractures, current cigarette smoking habit, glucocorticosteroid usage, alcohol consumption, rheumatoid arthritis, caffeinated drinks, and years of menopause. Physical examinations included weight and height measurement using the BC541 Innerscan Body Composition Scale Tanita and the Body Scale M-400 (Table 1).

Table 1 Questionnaire

Name		
Date of birth		
Age		
Body weight		
Body height		
BMI		
Years of menopause		
Previous fracture	Yes	No
Parental hip fracture	Yes	No
Smoker	Yes	No
Glucocorticosteroid usage	Yes	No
Rheumatoid arthritis	Yes	No
Alcohol consumption (3 or more units/day)	Yes	No
Caffeinated drinks (3 or more cups/day)	Yes	No

The WHO fracture risk assessment tool (FRAX®) was used to calculate the risk for major and hip fracture probability in 10 years' time. The selection of an appropriate country for the FRAX tool was conducted because no FRAX tool was available for the Malaysian population. In the absence of a FRAX® model for a specific country, a surrogate country is chosen based on the likelihood that it is a representative of the index country in terms of life expectancy and fracture incidence[10]. Therefore, the calculation for Singapore was chosen because the population comprised of three major races (Malay, Indian, and Chinese) similar to the ethnic distribution in Malaysia. FRAX® is a computer-based algorithm developed by the WHO Collaborating Center for Metabolic Bone Diseases and was first released in 2008[12].

Descriptive data were generated for all the variables. The Pearson correlation test was conducted to determine the relationship between the independent variables and the FRAX 10-year probability of fracture. Correlation was considered significant at a p value < 0.05. Data management and analysis were performed using SPSS version 20.0 (2011).

Results

Out of the 87 post-menopausal women recruited, 50.6% were osteopenic and nearly half (48.3%) had osteoporosis (Figure 1). The mean age of the respondents was 61.6 years

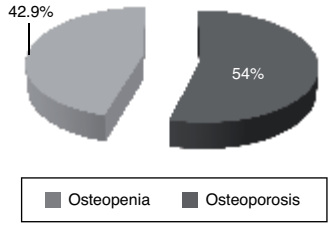

Figure 1 Bone health status of the participants.