Psychological factors may impact postmenopausal women fracture risk.

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Abstract
Anxiety and osteoporosis are common diseases and major public health problems. The association between anxiety levels and bone loss was poorly investigated, thus we aimed to explore whether anxiety severity could be considered as an independent fracture risk. In a setting of postmenopausal women we measured anxiety levels by Hamilton Anxiety Rating Scale (HAMA), depressive symptoms by Beck Depression Inventory and evaluated quality of life by the 36-Item Short Form Health Survey (SF-36) questionnaire. Women with higher anxiety levels showed lower BMD at lumbar spine and femoral neck, and exhibited a poorer quality of life after grouping our population in tertiles of HAMA score. Anxiety levels were predictive of reduced BMD after correcting for other known clinical risk of fractures.

KEYWORDS: postmenopausal; osteoporosis; anxiety; depression; quality of life.

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Introduction
Postmenopausal osteoporosis is the most common metabolic bone disease affecting aging women and a major public health problem due to its main consequences represented by fractures [1,2]. It is estimated that one in three women and one in five men worldwide will sustain an osteoporotic related bone fracture over the life course. Women with osteoporosis were shown to experiment a weakened quality of life and an increased incidence of anxiety and depressive symptoms. It was also observed that major depression may worsen bone health, but little is known as for the impact of anxiety levels on fracture risk [3]. Anxiety is one of the most common mental disorders with a current global prevalence of 7.3 % [4].

Because anxiety and osteoporosis are highly prevalent in postmenopausal women and because anxiety was previously shown to be associated with an increased risk of developing osteoporosis, we aimed to investigate whether anxiety levels were predictive of bone mineral density and fracture risk in a setting of postmenopausal women.
Material and Methods

Postmenopausal women (n=192) referred for the assessment of bone health were consecutively enrolled and signed a written informed consent. Patients with a known neurologic or psychiatric condition, kidney or liver or hearth or respiratory failure, cancer, endocrine disorders, or if taking psychotropic drugs or active bone agents were not considered for this research. Based on clinical risk factors (CRFs), fracture risk was evaluated by FRAX® tool [5]. BMD was assessed by the gold-standard dual-energy X-ray absorptiometry (DXA) densitometer (Hologic Discovery) at the lumbar spine (L1-L4) and at femoral site.

The Hamilton Anxiety Rating Scale (HAMA) was used to measure the severity of perceived anxiety symptoms [6], the Beck Depression Inventory-second edition (BDI-II) to evaluate levels of depression [7], the Short Form-36 (SF-36) questionnaire to measure the perception of patient health by exploring physical functioning, social functioning, role limitations due to physical problems, role limitations because of emotional problems, mental health, vitality, pain, and general health perception [8]. Student’s t-test for unpaired observations or Mann-Whitney test were used. The degree of association between two variables was obtained by Pearson correlation coefficient, and the relationship between a dependent variable and one or more explanatory variables was calculated by multiple regression analysis. Values of p<0.05 indicated statistical significance.

Results

The 192 recruited postmenopausal women were considered all together and after grouping in tertiles of HAMA score. Their main anthropometric, clinical and instrumental features are shown in table 1. Women in the lower tertile of HAMA score (HAMA-1) exhibited lower ten years probability of major osteoporotic fractures, and women in HAMA-3 showed significantly lower T-score values at both lumbar spine and femoral sites in comparison with women in HAMA-1 (Figure 1).
Data on SF-36 survey are reported in Figure 2. HAMA score was also positively related with BDI-II score (p=0.609, p=<0.001), age (r=0.242, p=0.003), menopausal age (r=0.246, p=0.003), years since menopause (r=-0.182, p=0.031) and, at a multiple regression analysis, it was predictive of reduced BMD, after correcting for the other CRFs, including depression levels (β =-0.03407, p=0.012, SE=0.012).

Fig 2. Short Form Health Survey (SF-36) scores in accordance with HAMA tertiles of recruited postmenopausal women. Data are expressed as means ± SD. *p<0.001 vs. HAMA-1; #p<0.001 vs. HAMA-2.
Discussion

Postmenopausal anxiety levels were significantly associated with fracture risk and DXA measurement of BMD. As known, anxiety has implications in some of the major human pathologies such as cardiovascular or cancer diseases may lead to reduced quality of life and possibly increased premature mortality [9,10].

Anxiety symptoms have been previously found in subjects with lower BMD and lower quantitative bone ultrasound measurements, the latter suggesting also a poor bone quality [3,11-14]. We suppose that the pathophysiological mechanism linking anxiety and bone loss may be due to immunological (e.g. increase of certain cytokines), endocrinological aspects (e.g. increase of cortisol), or via oxidative stress [15-20]. However, our aim was not the evaluation of molecular pathophysiology, thus it should be considered only a speculation.

As self-reported life satisfaction has been longitudinally associated with reduced bone loss, we further suppose that poor perceived quality of life could affect bone health [21-23] and, in accordance with these data, our women falling in HAMA-3 showed a reduced quality of life as highlighted by SF-36 survey.

Our preliminary results suggest a significant relationship between anxiety levels with BMD. Because osteoporosis represents a major public health problem, and because anxiety levels may be easily recognized, possibly enhancing fracture risk evaluation, physicians should evaluate also psychological aspects of women especially in postmenopausal age.

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References