Original Study   OS1(1-5)

Psychological factors may impacton postmenopausal women fracture risk.

Federica Bellone[1], Antonino Catalano[1], Gabriella Martino[2], Carmen Lasco[2], Annamaria Pugliese[1], Nunziata Morabito[1]

[1] Department of Clinical and Experimental Medicine, University Hospital of Messina, Messina, Italy
[2] Department of Cognitive Sciences, Psychology, Education and Cultural Studies, University of Messina, Messina, Italy

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.

IntroducingMember: Gabriella Martino
Corresponding Author: Federica Bellone, federicabellone@hotmail.it

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).

Fig 1 - T-score (SD) values according to tertiles of HAMA scores.
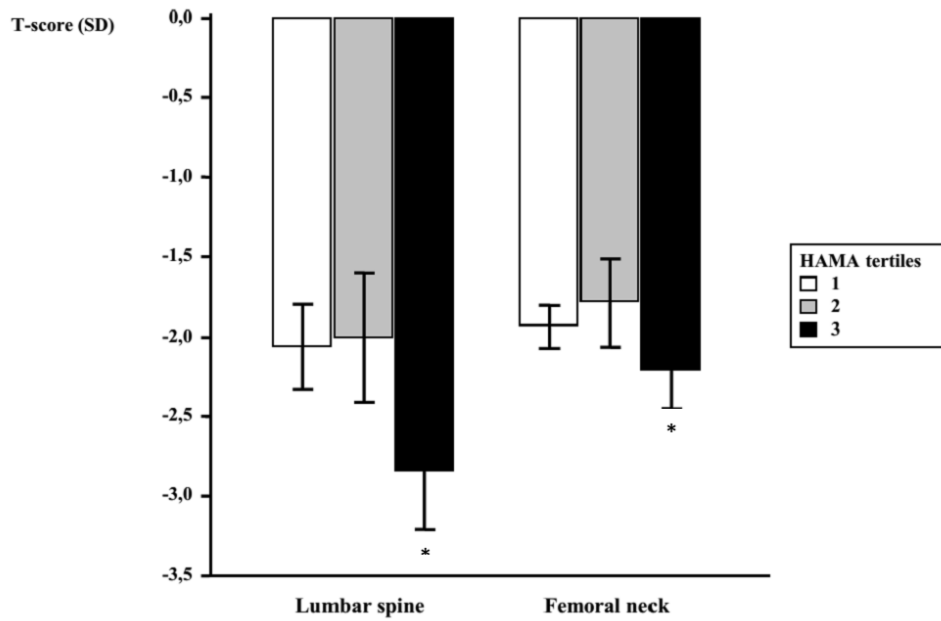
Data on SF-36 survey are reported in Figure 2. HAMA score was also positively related with BDI-II score (p=0.609, p=<0.001), age (r=0.242, p=0.003), menopausal age (r=0.246, p=0.003), years since menopause (r=-0.182, p=0.031) and, at a multiple regression analysis, it was predictive of reduced BMD, after 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.
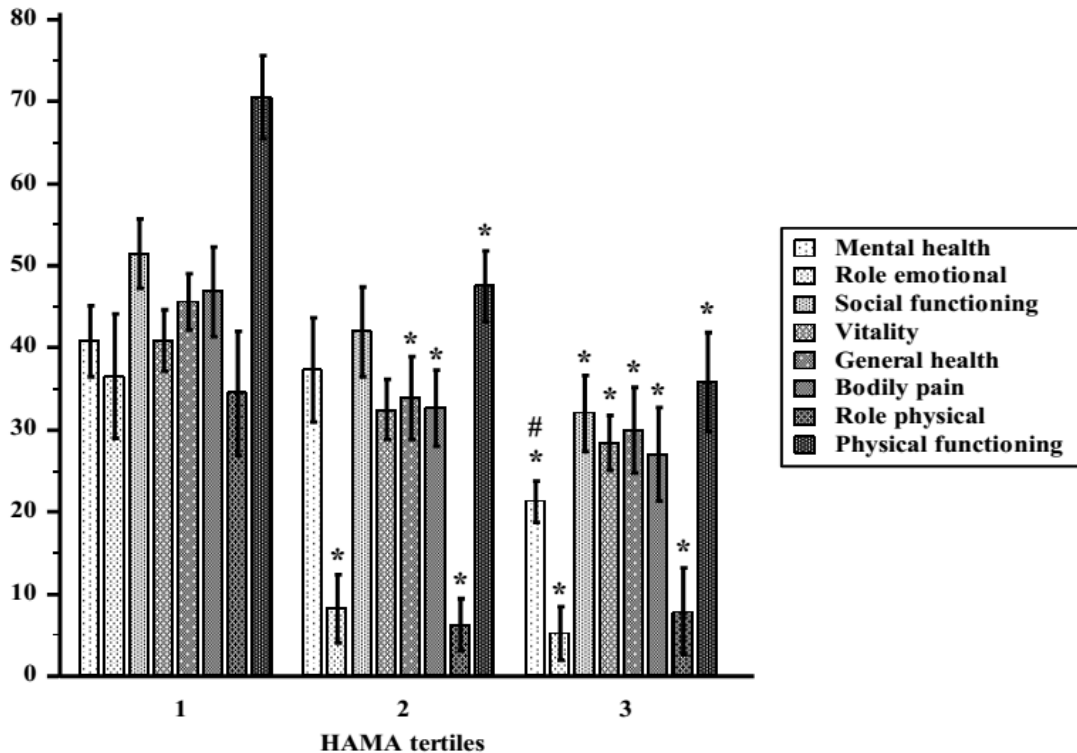
Discussion

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.

References

1. Svedbom, A., Hernlund, E., Ivergård, M., Compston, J., Cooper, C., Stenmark, J., McCloskey, E.V., Jönsson, B., Kanis, J.A.,EU Review Panel of IOF (2013) Osteoporosis in the European Union: a compendium of country-specific reports. Arch Osteoporos 8:137.
2. Catalano, A., Morabito, N., Basile, G., Fusco, S., Castagna, G., Reitano, F., Albanese, R.C., Lasco, A. (2013) Fracture risk assessment in postmenopausal women referred to an Italian center for osteoporosis: a single day experience in Messina. Clin Cases Miner Bone Metab 10(3):191-194.
3. Williams, L.J., Bjerkeset, O., Langhammer, A., Berk, M., Pasco, J.A., Henry, M.J., Schei, B., Forsmo, S. (2011) The association between depressive and anxiety symptoms and bone mineral density in the general population: the HUNT Study. J Affect Disord 131(1-3):164-171.
4. Baxter, A.J., Scott, K.M., Vos, T., Whiteford, H.A. (2013) Global prevalence of anxiety disorders: a systematic review and meta-regression. Psychol Med 43(5):897-910
5. Kanis, J.A., Johnell, O., Oden, A., Johansson, H., McCloskey, E. (2008) FRAX and the assessment of fracture probability in men and women from the UK. Osteoporos Int. 19(4):385-397.
6. Hamilton, M. (1959) The assessment of anxiety states by rating. Br J Med Psychol 32(1):50-55.
7. Beck, A.T., Steer, R.A., Brown, G.K. (1996) Manual for the Beck Depression Inventory–II. San Antonio, TX: Psychological Corporation.
8. Ware, J.E. Jr, Sherbourne, C.D.(1992) The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care 30(6):473-483.

9. Celano, C.M., Millstein, R.A., Bedoya, C.A., Healy, B.C., Roest, A.M., Huffman, J.C. (2015) Association between anxiety and mortality in patients with coronary artery disease: A meta-analysis. Am Heart J.; 170(6):1105-15. doi: 10.1016/j.ahj.2015.09.013.

10. Messina, G., Lissoni, P., Rovelli, F. (2012) Psychoimmunological analysis of cancer patients: correlation with the prognosis. Curr Aging Sci.;5(3):263-272.

11. Catalano, A., Morabito, N., Agostino, R.M., Basile, G., Gaudio, A., Atteritano, M., Natale, G., Xourafa, A., Morini, E., Adamo, V., Lasco, A. (2017) Bone health assessment by quantitative ultrasound and dual-energy x-ray absorptiometry in postmenopausal women with breast cancer receiving aromatase inhibitors. Menopause 24(1):85-91.

12. Atteritano, M., Lasco, A., Mazzaferro, S., Macrì, I., Catalano, A., Santangelo, A., Bagnato, G., Bagnato, G., Frisina, N. (2013) Bone mineraldensity, quantitative ultrasoundparameters and bone metabolism in postmenopausalwomen with depression. Intern Emerg Med 8(6):485-491.

13. Williams, L.J., Pasco, J.A., Jacka, F.N., Hodge, J.M., Kotowicz, M.A., Berk, M. (2013) Quantitative Heel Ultrasound (QUS) measures of bone quality in association with mood and anxiety disorders. J Affect Disord 146(3):395-400.

14. Catalano, A., Morabito, N., Di Vieste, G., Pintaudi, B., Cucinotta, D., Lasco, A., Di Benedetto, A. (2013) Phalangeal quantitative ultrasound and metabolic control in pre-menopausalwomen with type 1 diabetesmellitus. J EndocrinolInvest 36(5):347-251.

15. Hou, R., Garner, M., Holmes, C., Osmond, C., Teeling, J., Lau, L., Baldwin, D.S. (2017) Peripheral inflammatory cytokines and immune balance in Generalised Anxiety Disorder: Case-controlled study. Brain BehavImmun 62:212-218.

16. Minciullo, P.L., Catalano, A., Mandraffino, G., Casciaro, M., Crucitti, A., Maltese, G., Morabito, N., Lasco, A., Gangemi, S., Basile, G. (2016) Inflammaging and Anti-Inflammaging: The Role of Cytokines in Extreme Longevity. Arch ImmunolTherExp (Warsz). 64(2):111-126.

17. Chaudieu, I., Beluche, I., Norton, J., Boulenger, J.P., Ritchie, K., Ancelin, M.L. (2008) Abnormal reactions to environmental stress in elderly persons with anxiety disorders: evidence from a population study of diurnal cortisol changes. J Affect Disord 106(3):307-313.

18. Lasco, A., Catalano, A., Pilato, A., Basile, G., Mallamace, A., Atteritano, M. (2014) Subclinical hypercortisol-assessment of bone fragility: experience of single osteoporosis center in Sicily. Eur Rev Med Pharmacol Sci. 18(3):352-358.

19. Salim, S. (2017) Oxidative Stress and the Central Nervous System. J PharmacolExpTher 360(1):201-205.

20. Gennero, I., Laurencin-Dalicieux, S., Conte-Auriol, F. et al (2011) Absence of the lysophosphatidic acid receptor LPA1 results in abnormal bone development and decreased bone mass. Bone 49(3):395-403.

21. Rauma, P.H., Koivumaa-Honkanen, H., Williams, L.J., Tuppurainen, M.T., Kröger, H.P., Honkanen, R.J. (2014) Life satisfaction and bone mineral density among postmenopausal women: cross-sectional and longitudinal associations. Psychosom Med 76(9):709-715.

22. Catalano, A., Vita, G.L., Russo, M., Vita, G., Lasco, A., Morabito, N., Messina, S. (2016) Effects of teriparatide on bone mineral density and quality of life in Duchenne muscular dystrophy related osteoporosis: a case report. OsteoporosInt 27(12):3655-3659.

23. Catalano, A., Martino, G., Morabito, N., Scarcella, C., Gaudio, A., Basile, G., Lasco, A. (2017) Pain in osteoporosis: from pathophysiology to therapeutic approach. Drugs Aging. doi: 10.1007/s40266-017-0492-4.