REVISTA BRASILEIRA DE REUMATOLOGIA

www.reumatologia.com.br

SOCIEDADE BRASILEIRA DE REUMATOLOGIA

Original article

Osteoporosis in primary care: an opportunity to approach risk factors

Angra Larissa Durans Costa[a], *Marcos Antonio Custódio Neto da Silva*[a], *Luciane Maria Oliveira Brito*[a], *Anna Cyntia Brandão Nascimento*[a], *Maria do Carmo Lacerda Barbosa*[a], *José Eduardo Batista*[a], *Geusa Felipa de Barros Bezerra*[a], *Graça Maria De Castro Viana*[a], *Walbert Edson Muniz Filho*[a], *Flávia Castello Branco Vidal*[a], *Maria do Desterro Soares Brandão Nascimento*[a,b,*]

[a] *Universidade Federal do Maranhão (UFMA), São Luís, MA, Brazil*
[b] *Centro de Estudos Superiores de Caxias (CESC), Caxias, MA, Brazil*

ARTICLE INFO

Article history:
Received 28 March 2014
Accepted 24 March 2015
Available online 17 November 2015

Keywords:
Climacteric
Osteoporosis
Risk factors

ABSTRACT

Introduction: Climacteric women are susceptible to a number of changes, among them osteoporosis. Osteoporosis is a disease characterized by low bone mass and susceptibility to fracture. Currently, this disease is a public health issue, being necessary to recognize its risk factors.

Objectives: Identify risk factors related to osteoporosis in women attending PROPIS/PROEX/UFMA, tracing a socio-demographic characterization and considering community lifestyles.

Material and methods: This is a transversal retrospective clinical with a quantitative approach study conducted between March and June 2013 in São Luís-MA with 107 women treated at the Programa de Práticas de Integralidade em Saúde (PROPIS – Integrality Health Practice Program). The study was approved by the University Hospital Ethics Committee of UFMA under opinion no. 362/07. Data were tabulated and analyzed in the epidemiological Epi-Info® software, version 3.4.1.

Results: The brown color was predominant, consensual relationships proved to be a protective factor and low education was a risk factor. The average age of the group with menopause was 54.1 years and without menopause was 31.3 years ($p < 0.0001$). The average age of menopause was 43.7 years. The irregular menstrual cycle was a protective factor. The average number of pregnancies was 4.56 for the group with menopause and 2.45 for the group without menopause, with most births occurring normally ($p < 0.0001$). Smoking, physical inactivity and caffeine intake were risk factors, while the absence of alcoholism and of soda intake were protective factors for the disease.

* *Corresponding author.*
E-mail: cnsd_ma@uol.com.br (M.D.S.B. Nascimento).
http://dx.doi.org/10.1016/j.rbre.2015.07.014

Conclusion: The patients followed the socioeconomic and demographic profile of Maranhão. Most had menarche and menopause in appropriate periods, showed no positive family history of osteoporosis, did not usually drink alcohol, were sedentary and the caffeine intake was high.

Palavras-chave:
Climatério
Osteoporose
Fatores de risco

Osteoporose na atenção primária: uma oportunidade para abordaros fatores de risco

RESUMO

Introdução: A mulher climatérica, está susceptível a uma série de alterações, dentre elas, a osteoporose. A osteoporose é uma doença caracterizada pela diminuição da massa óssea e susceptibilidade a fraturas. Atualmente, a doença é um problema de saúde pública, sendo necessário reconhecer seus fatores de risco.
Objetivos: Identificar fatores de risco relacionados à osteoporose em mulheres atendidas pelo PROPIS/PROEX/UFMA, caracterizando sócio-demograficamente e os hábitos de vida da comunidade.
Material e métodos: Trata-se de um estudo clínico transversal retrospectivo com abordagem quantitativa, realizado entre março e junho de 2013 em São Luís-MA com 107 mulheres atendidas no Programa de Práticas de Integralidade em Saúde (PROPIS). A pesquisa foi aprovada pelo Comitê de Ética do Hospital Universitário da UFMA sob parecer 362/07. Os dados foram tabulados e analisados no programa epidemiológico Epi-Info® versão 3.4.1.
Resultados: A cor parda foi predominante, a união consensual mostrou-se como fator de proteção e a baixa escolaridade foi um fator de risco. A média de idade do grupo com menopausa foi de 54,1 anos e do grupo sem menopausa, 31,3 anos, com $p < 0{,}0001$. A idade média da menopausa foi de 43,7 anos. O ciclo menstrual irregular foi um fator de proteção. O número médio de gestações foi de 4,56 para o grupo com menopausa e de 2,45 para o grupo sem menopausa, tendo a maioria dos partos ocorrido de forma natural, com $p < 0{,}0001$. O tabagismo, sedentarismo e a ingestão de cafeína foram fatores de risco, enquanto que a ausência de etilismo e a ingestão de refrigerantes constituíram fatores de proteção para a doença.
Conclusão: As pacientes seguiram o perfil socioeconômico e demográfico do Maranhão. A maioria teve menarca e menopausa em período adequado, não apresentou história familiar positiva para osteoporose, não costumava ingerir bebidas alcoólicas, era sedentária e ingeria cafeína demasiadamente.

Introduction

Osteoporosis is a metabolic bone disease characterized by reduced bone mineral density (BMD), with deterioration of bone microarchitecture, leading to an increase in skeletal fragility and risk of fracture.[1] The diagnosis of osteoporosis is made by evaluating the lumbar spine in AP, proximal femoral neck and/or total femur and forearm, according to the criteria proposed by the World Health Organization (WHO).[2]

In the United States, osteoporosis affects about 25 million people, involving more than 1.3 million fractures annually.[3] In Brazil, the estimated projections for the next 10 years reveal that the number of hip fractures due to osteoporosis (currently 121,700 annual fractures) will reach 140,000 hip fractures per year by 2020.[4,5]

In Brazil, studies in Recife showed a prevalence of 28.8% according to the WHO criteria.[6] A recent study in São Paulo, using WHO diagnostic criteria, revealed that 33% of postmenopausal women had osteoporosis in lumbar spine and femur.[7]

The clinical presentation of the disease is often associated with fractures of the spine, hip and wrist; even without any significant reduction in bone mineral density or bone symptom, it is also considered as osteoporosis.[8,9] Fractures caused by osteoporosis contribute to back pain, reduce quality of life, and interfere with activities of daily living.[9]

Several factors are involved in the development of osteoporosis; some of them cannot be changed, while many others can be modified, reducing the incidence of osteoporosis.[8,10] Among other factors that increase the chance of developing osteoporosis that cannot be changed, the most relevant are gender (especially female), increasing age, short stature, white and Asian races and heredity.[11] Among modifiable factors, the most relevant are hormones related to gender, anorexia, lack of calcium, vitamin D intake, use of medication (such as

glucocorticoids and anticonvulsants), sedentarism, smoking and alcohol abuse.[10]

Climacteric has a strong influence on bone loss in women due to the imbalance between bone formation and resorption as well as it being determined by a decrease in estrogen production.[12,13]

Due to this huge concern for women's health, it is necessary to recognize the risk factors related to osteoporosis, characterizing it socio-demographically and taking into account community lifestyles.

Material and methods

This is a transversal retrospective clinical with a quantitative approach study conducted between March and June 2013 in São Luís-MA. This work represents an analysis of secondary data collected from a project database entitled "Family Aggregation of Breast Cancer in São Luís-Maranhão", integrated with the Program of Practices of Completeness and Health (PROPIS)/PROEX/UFMA, which supported the development of this scientific research.

The study was conducted by interviewing using a questionnaire, in a sample consisting of 107 women (between 17 and 75 years), healthy, some with clinical signs of climacteric (neurovegetative, neuropsychiatric or genital), in which risk factors related to osteoporosis were observed.

The selection of these patients occurred by spontaneous demand among people assisted by the Program of Practices of Completeness and Health (PROPIS) of the Federal University of Maranhão (UFMA).

The criterion for the inclusion of patients in the study was women living in São Luís-MA assisted by the program and the criterion used for non-inclusion was women who do not live in São Luís-MA but had been assisted by PROPIS/UFMA.

Women who met the inclusion criteria were informed about the research and, after consenting to take part in it, signed the Free Informed Consent previously approved by the Ethics Committee of the University Hospital of the Federal University of Maranhão (UFMA) under the opinion no. 362/07.

Data were tabulated and analyzed in the epidemiological Epi-Info® software, version 3.4.1. To investigate the association among variables, the ratio of proportions was used. In continuous variables, the ANOVA test was used and the results were expressed as means and standard deviation. The results were expressed with whole numbers and percentages. The variables that were considered significant presented value of $p < 0.05$.

Results

The analysis of socioeconomic and demographic profiles of the groups with and without menopause showed no significant difference. The groups were homogeneous, with a predominance of brown skin color, consensual relationship proved to be a protective factor and the average monthly income was of 2–3 minimum wages (Table 1).

The low level of education proved to be a risk factor; most patients lived in brick houses, whose water supply was provided by the state water supply and the water was filtered (Table 1).

Considering average age, the people of the group with menopause had 54.1 years and without menopause had 31.3 years as average, proving it to be a significant datum, with $p < 0.0001$ (Table 1).

Regarding sample's premenopausal characteristics, menarche in the group with menopause was 13.6 years and 13.2 years in the group without menopause, a difference not statistically significant (Table 2).

The average age of menopause in the group with menopause was 43.7 years, and the majority (62.5%) occurred naturally and without hormone replacement therapy (93.8%). As to menstrual cycle, the irregular type proved to be a protective factor (Table 2).

In both study groups, with and without menopause, family history of osteoporosis was not a significant factor. The majority had a negative family history of osteoporosis (Table 2).

Considering gestational sample characterization, the average number of pregnancies was 4.56 for the group with menopause and 2.45 for the group without menopause, and most births occurred naturally. This is a significant datum, with $p < 0.0001$ (Table 3).

The analysis of lifestyle and nutritional status of the sample showed that smoking, lack of physical exercise and intake of caffeine are risk factors for osteoporosis, while the absence of alcohol abuse, as well as the intake of soft drinks and canned food are protective factors for the disease (Table 4).

Discussion

According to epidemiological data of Europe Union member states, there will be changes in age structure, with a more acute concentration in the group with 80 years or more. In this group, there will be a higher incidence of osteoporotic fractures. This population group will increase from 8.9 million women and 4.5 million men in 1995 to 26.4 million women and 17.4 million men in 2050.[14]

Literature data state that osteoporosis is a bone-metabolic disease that especially affects women after menopause. According to the World Health Organization, one-third of white women above the age of 65 have osteoporosis.[15]

In Brazil, it is noticed that there are few studies in the literature that analyze the epidemiology profile of osteoporosis. A study conducted in Recife by Bandeira et al. [6], with a sample of 627 women, found an average age of 63.9 years and a menopause period of 16.2 years. Martini et al. [16], analyzing premenopausal women, found a prevalence of 6% of osteoporosis and 33% of postmenopausal women. Clark et al. [4] found a prevalence of 33.8% of osteoporosis in postmenopausal women. The prevalence of osteoporosis is higher in women with a family income lower than 10 minimum wages.[17]

In this study, the prevalence of osteoporosis was 40%, a similar result to the data of a study with 600 patients evaluated in Detroit, USA, in which a prevalence of osteoporosis of 52% was observed.[17] This shows that the problem of osteoporosis assumes the same importance in our country, with a high prevalence, and therefore there is the need for more data on

Table 1 – Socioeconomic and demographic characterization of the sample. São Luís, 2013.

Variables	Menopaused		Non-menopaused		RP (CI 95%)[a]
	Presence	Absence	Presence	Absence	
Age[b]	54.18 ± 8.18		31.34 ± 8.14		<0.0001 (*p*-Value)
Skin color					
White	5	27	6	69	2.13 (0.51–8.81)
Black	9	23	20	55	1.08 (0.39–2.97)
Brown	18	14	49	26	0.68 (0.27–1.73)
Marital status					
Single	14	18	30	45	1.17 (0.54–2.92)
Married	11	21	17	58	1.79 (0.66–4.86)
Consensual union	4	28	28	47	0.24 (0.06–0.82)
Widow	3	29	0	75	Undefined
Family income					
Up to ½ MW[c]	1	31	2	73	1.18 (0.00–17.51)
½–1 MW[c]	17	15	42	33	0.89 (0.36–2.22)
>1–2 S MW[c]	10	22	16	59	1.68 (0.60–4.67)
>2–3 MW[c]	1	31	12	63	0.17 (0.01–1.36)
>3–4 MW[c]	0	32	1	74	0.00 (0.00–41.67)
Do not know inform	3	29	2	73	3.78 (0.48–34.43)
Education					
No education	2	30	0	75	Undefined
Sign the name	1	32	0	75	Undefined
Vocational	0	32	2	73	0.00 (0.00–9.82)
Incomplete elementary education	18	14	23	52	2.91 (1.14–7.47)
Elementary education	3	29	9	66	0.76 (0.15–3.39)
Incomplete high school	2	30	15	60	0.27 (0.04–1.35)
High school	6	26	23	52	0.52 (0.17–1.57)
Incomplete higher education	0	32	3	72	0.00 (0.00–5.37)
Type of dwelling					
Masonry	28	4	72	3	0.29 (0.05–1.68)
Pug	4	28	2	73	5.21 (0.76–43.83)
Wood	0	32	1	74	0.00 (0.00–41.67)
Source of water					
Statewide network	27	5	63	12	1.03 (0.30–3.74)
Simple well	1	31	9	66	0.24 (0.01–1.98)
Artesian well	4	28	2	73	5.21 (0.76–43.83)
Water treatment					
Filtered	29	3	66	9	1.32 (0.29–6.67)
Boiled	3	29	1	74	7.66 (0.66–199. 38)
Strained	0	32	7	68	0.00 (0.00–1.79)
Untreated	0	32	1	74	0.00 (0.00–41.67)
Total of patients	32		75		

[a] Prevalence ratio (95% confidence interval).
[b] Mean ± standard deviation.
[c] Minimum wage.

risk factors in our population. In Asian countries, the prevalence was 39.1%, also similar to that found in this study.[18,19]

As to skin color, most studies have reported that the prevalence of osteoporosis and fracture incidence varies according to gender and race. White women after menopause have a higher incidence of fractures.[1,8,15] However, a study conducted in Baltimore, USA, found a prevalence of 22% of osteoporosis in African-Americans, a value higher than expected for this population.[20]

In relation to marital status, this study found a higher prevalence of women in stable relationships. Most of the patients had low education and its direct relation to the prevalence of osteoporosis was not defined in papers. The reason probably is the effect of education on lifestyle, nutrition and economic status.[21]

The influence of hypoestrogenism in the development of osteoporosis is well documented. Thus, studies show that early menopause and delayed menarche have a deleterious effect on the development of this disease, leading to decreased bone mass in early life, when bone mineral content would be expected to be increased or stabilized. This early loss, if sustained for future years and not diagnosed and treated, may lead to osteoporosis and then to an increase of the risk of fractures, which would add greater morbidity and mortality to the underlying disease.[22,23]

This study showed that the presence of irregular menstrual cycles is a protective factor for osteoporosis, fact that finds no correlation in the literature. According to a systematic review, it was shown that the main causes of low bone mass in

Table 2 – Characterization of reproductive age of the sample. São Luís, 2013.

Variables	Menopaused		Non-menopaused		RP (CI 95%)[a]
	Presence	Absence	Presence	Absence	
Menarche[b]	13.61 ± 1.45		13.28 ± 1.50		0.2974 (*p*-Value)
Menopause[b]	43.71 ± 7.64		–		Undefined
Menstrual cycle					
Regular	22	10	36	39	2.38 (0.92–6.28)
Irregular	9	23	39	36	0.36 (0.13–0.96)
Type of menopause					
Natural	20 (62.5%)		–		Undefined
Surgical	12 (37.5%)		–		Undefined
TRH					
Yes	2 (6.3%)		–		Undefined
Not	30 (93.8%)		–		Undefined
Family history of osteoporosis	5	27	21	54	0.48 (0.14–1.54)
Total de pacients	32		75		

TRH, thyrotropin-releasing hormone.
[a] Prevalence ratio (95% confidence interval).
[b] Mean ± Standard Deviation.

Table 3 – Sample's gestational characterization. São Luís, 2013.

Variables	Menopaused[a]	Non-menopaused[a]	*p*-Value
Pregnancies	4.56 ± 3.25	2.45 ± 2.12	0.0001
Standard deliveries	3.62 ± 3.03	1.53 ± 1.79	<0.0001
Cesarean births	0.25 ± 0.67	0.36 ± 0.76	0.4820
Spontaneous abortions	0.59 ± 1.10	0.28 ± 0.72	0.0850
Triggered abortions	0.09 ± 0.39	0.21 ± 0.57	0.2862
Stillbirths	0.06 ± 0.35	0.10 ± 0.45	0.6241
Total of patients	32	75	

[a] Prevalence ratio (95% confidence interval).

premenopausal women consist of menstrual disorders and low body weight.[20]

Regarding family history of fractures and osteoporosis, most of the studies report a positive association between the two, although this study did not show significant data.[8,15,17]

Interestingly, there are no convincing data in the literature establishing a direct relation between parity or years of breastfeeding and osteoporosis.[24] In a study conducted in Saudi Arabia they found a significant correlation between having osteoporosis and increasing age, fertility period, parity, menopausal duration and gynecological age (time since menarche in years).[25]

With regard to lifestyle, studies are emphatic when stating that a diet low in calcium and vitamin D is harmful to

Table 4 – Characterization of life habits and nutritional status of the sample. São Luís, 2013.

Variables	Menopaused		Non-menopaused		RP (CI 95%)[a]
	Presence	Absence	Presence	Absence	
Smoking	2	30	4	71	1.18 (0.14–8.14)
Alcoholism	4	28	32	43	0.19 (0.05–0.66)
Exercise	9	23	14	61	1.70 (0.58–4.95)
Intake of:					
Milk and dairy products	29	3	69	6	0.84 (0.17–4.60)
Refrigerant and canned	18	14	63	12	0.24 (0.09–0.68)
Caffeine	21	11	40	35	1.67 (0.65–4.32)
Greens	31	1	72	3	1.29 (0.11–33.56)
Green leaves	30	2	68	7	1.54 (0.27–11.48)
Meats	31	1	73	2	0.85 (0.06–24.62)
Total of patients	32		75		

[a] Prevalence ratio (95% confidence interval).

the bones, as well as protein excess, fiber (especially oats and spinach) and sodium, as well as excessive intake of caffeine and carbonated beverages, which may reduce calcium absorption or even increase renal excretion.[8,12,14] On analyzing the soda intake as a protector, these results may be explained by the fact that the post-menopausal group consumed less refrigerant than without menopause group.

Furthermore, consumption of alcohol and smoking are risk factors for osteoporosis to the extent that they lower estrogen levels and favor bone loss.[8,15,17]

As for physical exercise, most studies indicate that it is beneficial in that it increases the strength and bone density.[8,15,17,23]

Although the data in this study were not statistically significant, they follow the same pattern presented by larger studies in scientific literature.

The patients analyzed in this study followed the social, economic and demographic profile of the state of Maranhão, that is, the pattern shown in other national and international studies was not observed in this particular study. This shows that osteoporosis is a multifactorial disease with an increasing prevalence. It has a great importance to public health and studies with a larger sample are necessary so that more significant comparisons are made.

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgements

To the Program of Practices of Completeness and Health of the Federal University of Maranhão – PROPIS/UFMA for their support and partnership necessary for the implementation of this project.

REFERENCES

1. Pinto Neto AM, Soares A, Urbanetz AA, Souza ACA, Ferrari AEM, Amaral B, et al. Consenso Brasileiro de Osteoporose. Rev Bras Reumatol. 2002;42:343–54.
2. Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. WHO technical report series 843, Geneva; 1994.
3. Fernandes CE, Baracat EC, Lima GR. Climatério Manual de Orientação da Federação Brasileira das Associações de Ginecologia e Obstetrícia – FEBRASGO. 1st ed. São Paulo: Ponto; 2004.
4. Clark P, Cons-Molina F, Delezé M, Ragi-Eis S, Haddock L, Zanchetta JR, et al. The prevalence of vertebral fractures in Latin American countries: the Latin-American Vertebral Osteoporosis Study (LAVOS). Osteoporos Int. 2009;20:275–82.
5. Komatsu RS, Ramos LR, Szejnfeld VL. Incidence of proximal femur fractures in Marilia, Brazil. J Nutr Health Aging. 2004;8:362–7.
6. Bandeira F, Carvalho EF. Prevalência de osteoporose e fraturas vertebrais em mulheres na pós-menopausa atendidas em serviços de referência. Rev Bras Epidemiol. 2007;10:86–98.
7. Pinheiro MM, dos Reis Neto ET, Machado FS, Omura F, Yang JHK, Szejnfeld J, et al. Risk factors for osteoporotic fractures and low bone density in pre and postmenopausal women. Rev Saúde Pública. 2010;44:479–85.
8. Fernandes CE. Menopausa: diagnóstico e tratamento. 1st ed. São Paulo: Segmento; 2003.
9. Sato M, Vietri J, Flynn JA, Fujiwara S. Bone fractures and feeling at risk for osteoporosis among women in Japan: patient characteristics and outcomes in the National Health and Wellness Survey. Arch Osteoporos. 2014;9:199.
10. Montilla RNG, Marucci MFN, Aldrighi JM. Avaliação do estado nutricional e do consumo alimentar de mulheres no climatério. Rev Assoc Med Bras. 2003;49:91–5.
11. National consensus, proposal. Osteoporosis 1995 – basic diagnosis and therapeutic, elements. São Paulo Med J. 1995;113:7–18.
12. Montilla RNG, Aldrighi JM, Marucci MFN. Relação cálcio/proteína da dieta de mulheres no climatério. Rev Assoc Med Bras. 2004;50:52–4.
13. Riggs BL, Melton LJ III. Involutional osteoporosis. N Engl J Med. 1986;314:1676–86.
14. Lanzilotti HS, Lanzilotti RS, Trotte APR, Dias AS, Bornand B, Costa EAMM. Osteoporose em mulheres na pós-menopausa, cálcio dietético e outros fatores de risco. Rev Nutr Campinas. 2003;16:181–93.
15. Gali JC. Osteoporose. Acta Ortop Bras. 2001;9:53–62.
16. Martini LA, Moura EC, Santos LC, Malta DC, Pinheiro MM. Prevalência de diagnóstico autorreferido de osteoporose, Brasil, 2006. Rev Saude Publica. 2009;43 Suppl. 2:107–16.
17. Farias FAB. Prevalência de osteoporose, fraturas vertebrais, ingestão de cálcio e deficiência de vitamina D em mulheres na pós-menopausa, vol. 189. Rio de Janeiro: Escola Nacional de Saúde Pública/Centro de Pesquisas Aggeu Magalhães/Fundação Instituto Oswaldo Cruz (Fiocruz); 2003. p. 6–7 [Tese de doutorado].
18. Kim KH, Lee K, Ko YJ, Kim SJ, Oh SI, Durrance DY, et al. Prevalence, awareness, and treatment of osteoporosis among Korean women: the Fourth Korea National Health and Nutrition Examination Survey. Bone. 2012;50:1039–44.
19. Sungjoon L, Chun KC, So HO, Sung Bae P. Correlation between bone mineral density measured by dual-energy X-ray absorptiometry and hounsfield units measured by diagnostic CT in lumbar spine. J Korean Neurosurg Soc. 2013;54: 384–9.
20. Khan A. Management of low bone mineral density in premenopausal women. J Obstet Gynaecol. 2005;27:345–9.
21. Keramat A, Patwardhan B, Larijani B, Chopra A, Mithal A, Chakravarty D, et al. The assessment of osteoporosis risk factors in Iranian women compared with Indian women. BMC Musculoskelet Disord. 2008;9:28.
22. Paiva LC, Horovitz AP, Santos AV, Carvasan GAF, Pinto Neto AM. Prevalência de osteoporose em mulheres na pós-menopausa e associação com fatores clínicos e reprodutivos. Rev Bras Ginecol Obstet. 2003;25:507–12.
23. Lopes IBF. Redução da densidade mineral óssea em mulheres na menarca com prolactinoma, vol. 80. Rio de Janeiro: Faculdade de Medicina/Programa de Pós-Graduação em Endocrinologia/Universidade Federal do Rio de Janeiro; 2007. p. 1–6 [Dissertação].
24. Rocha FAC, Júnior FSS. Osteoporose e gravidez. Rev Bras Reumatol. 2005;45:141–5.
25. Mahboub SM, Al-Muammar MN, Elareefy AA. Evaluation of the prevalence and correlated factors for decreased bone mass sensity among pre- and post-menopausal educated working women in Saudi Arabia. J Health Popul Nutr. 2014;32:513–9.