

Risk factors for osteoporosis among postmenopausal women in a Nigerian teaching hospital

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ABSTRACT

Background: Osteoporosis is a progressive bone disease characterized by a reduction in bone mass and density, leading to bone fragility and an increased risk of sustaining fractures. Several studies have shown that the risk for osteoporosis increases with age and after menopause. **Methods:** A cross-sectional study was undertaken of 422 postmenopausal women at the Family Medicine Clinic of the Lagos State University Teaching Hospital (LASUTH). Variables such as socio-demographic characteristics, anthropometric indices, and lifestyle habits of participants were assessed. In addition, bone mineral density was measured using a validated portable dual-energy X-ray absorptiometry scanner. The results of the bone mineral density were analyzed based on T-scores. **Results:** The mean age of the study subjects was 59.8 ± 6.4 years, while the mean age at menopause was 50.15 ± 4.1 years. The majority of the subjects were obese (41.5%), while the prevalence of osteoporosis and osteopenia was 15.1% and 30.6%, respectively. The use of oral steroids was associated with osteoporosis ($P < 0.05$). **Conclusion:** We recommend regular bone mineral density screening of postmenopausal women at the primary care level for early diagnosis and treatment of osteoporosis to prevent fragility fractures.

Keywords: DEXA scan, osteoporosis, postmenopausal women

Introduction

Osteoporosis is a progressive bone disease characterized by a reduction in bone mass and density, leading to bone fragility and an increased risk of sustaining fractures.^[1] During childhood and adulthood, bone formation exceeds resorption such that bone density increases until around age 30–40 years when resorption exceeds formation.^[2] Osteoporosis results from an interplay of genetic and environmental factors as well as other pathological entities that can lead to rapid bone loss.^[3,4]

Osteoporosis is more common in women because they have a 30% lower bone mass compared to men and there is a rapid loss of bone mass after entering menopause and the occurrence of ovarian insufficiency.^[4]

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Osteoporosis can be divided into primary as seen in postmenopausal women, the elderly, and idiopathic osteoporosis or secondary osteoporosis.^[5] The causes of secondary osteoporosis include but are not limited to endocrine disorders (Hypogonadism, Diabetes Mellitus, Cushing syndrome), chronic illnesses (some gastrointestinal disorders, malignancies), medications like steroids, cigarette smoking, chronic alcohol abuse, and stress.^[5]

Osteoporosis is defined using the World Health Organization (WHO) criteria as a bone mineral density that lies 2.5 standard deviations or more below the average value for young healthy women (a T-score < -2.5 SD).^[6] The prevalence and impact of osteoporosis among different nations vary due to population variations and differences in the availability of resources.^[7] The single most important manifestation of postmenopausal osteoporosis is a fracture, usually of the hip.^[8] There is increased mortality of 12–20% during the two years following a hip fracture and more than 50% of survivors are unable to return to independent living.^[8] Postmenopausal osteoporosis is preventable and treatable, but very

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few women at risk for fractures are evaluated and treated.^[8] The management of osteoporotic fractures in the USA costs about 18 billion dollars annually.^[9]

Several scientific studies have shown that many factors related to lifestyle affect bone mineral density and osteoporosis in postmenopausal women.^[3] These risk factors include a family history of osteoporosis, history of anorexia or bulimia, prolonged amenorrhea, low dietary calcium, lack of exercise, vitamin D deficiency, coffee consumption, alcohol use, cigarette smoking, and use of glucocorticoids.^[2,3,10]

Osteoporosis is an underdiagnosed and undertreated medical condition in primary care practice.^[11,12] It is perceived by primary care physicians as a silent disease that is overshadowed by other medical ailments and is difficult to manage.^[11]

Osteoporosis screening by healthcare providers, especially in the primary care setting, is important to identify patients at risk for fractures which can lead to its prevention.^[13] The rate of screening for osteoporosis in clinical practice, however, is suboptimal.^[14]

The gold standard for the measurement of bone mineral density is the dual-energy X-ray absorptiometry (DXA) at the hip or lumbar spine.^[15] Another screening tool that can be used by primary care physicians is the FRAX (fracture risk assessment tool) which assesses risk factors such as age, sex, race, and smoking history.^[15] A study comparing the central and peripheral measurements of bone mineral density reported that peripheral sites may be more representative of osteoporosis than central sites.^[16] To our knowledge, there are limited data on postmenopausal osteoporosis in Nigeria using dual-energy X-ray absorptiometry (DXA) measurement, as postmenopausal osteoporosis has been sparingly studied.

In a case-control study on osteoporosis conducted at an orthopedic center in Lagos, Nigeria involving 31 patients with a femoral neck fracture, all the females in the study group were postmenopausal.^[17] In a study assessing the bone status of 218 Nigerian women using ultrasound and biochemical markers by Vanderjagt *et al.*, 110 of the women were postmenopausal.^[18] A cross-sectional study by Alonge *et al.*, at the University College Hospital (UCH), Ibadan involved 2401 geriatric patients above 60 years of age.^[19] In the study, the prevalence of osteoporosis was 56.9% (male 43.7%, female 65.8%).^[19]

The first-line drugs used in the treatment of osteoporosis are oral bisphosphonates,^[20] and early detection of osteoporosis in primary care can lead to treatment. A multi-country, cross-sectional observational study showed that there is a large osteoporosis treatment gap in women above 70 years at an increased risk of fragility fracture in routine primary care across Europe.^[21]

This study was undertaken for the assessment of osteoporosis and risk factors in a cross section of Nigerian postmenopausal women attending a primary care clinic.

Methods

Study area

This study was carried out at the general outpatient clinic of the Family Medicine Department of Lagos State University Hospital, Ikeja, Lagos. The hospital is located in the southwestern part of Nigeria. Lagos is estimated to have a population of 21 million people.^[22] The annual general outpatient clinic attendance is about 78,000 with a monthly average of 6,500 and daily attendance of 300–350 clients. About 35–40 postmenopausal women visit the clinic daily.

Study population

Postmenopausal women between the ages of 45–75 years were included in the study. Those who did not consent to the study, or had recent fractures, or were too ill were excluded.

Study design

This was a cross-sectional study of 422 postmenopausal women aged 45–75 years who were selected using the systematic sampling method. An assumed prevalence of 50% was used because there were no local data on the prevalence of postmenopausal osteoporosis in Nigeria and a precision of 10% was used in calculating the sample size to arrive at 422 subjects.

Procedure

A semi-structured pretested interviewer-administered questionnaire which contained information related to demographics, lifestyle habits, menopausal history, and risk factors for osteoporosis was used. The bone mineral density was measured in the right wrist (distal radius) using a portable dual-energy X-ray absorptiometry (DXA) machine (Sunlight MiniOmni™).^[23] The Sunlight MiniOmni™ is noninvasive, radiation-free with excellent precision and WHO-compliant T-score results.^[23] Subjects with T-scores less than –2.5 were classified as having osteoporosis, while those with T-scores of –1 to –2.5 had osteopenia.^[6] A comprehensive physical examination and anthropometric measurement of height and weight were carried out by the researchers. Body mass index (BMI) was calculated by dividing weight in kilograms by height in meters squared and this was graded using the WHO anthropometric classification.^[24] A BMI of less than 18.4 kg/m² (underweight), 18.5 to 24.9 kg/m² (normal), 25 to 29.9 kg/m² (overweight) and greater than or equal to 30 kg/m² (obesity).^[24]

Ethical consideration

Approval for the study was obtained from the Health Research and Ethics committee of the Lagos State University Teaching Hospital. Written informed consent was obtained from each subject after offering a detailed explanation of the study.

Data analysis

Data were entered and analyzed using SPSS® version 20 (SPSS Inc. Rochester, MN, USA). Measures of central tendency

and dispersion were computed for numeric variables, while frequencies and percentages were computed for categorical variables. Chi-square was used to test for association between categorical variables.

Results

There were 422 subjects in the study between the ages of 45 and 75 years. The mean \pm SD age of the subjects was 59.8 ± 6.4 years. The majority of subjects were married (54.7%), while 20.4% had no formal education. The majority of subjects (41.5%) were obese. The mean age at menopause was 50.15 ± 4.1 , while a majority of subjects (64%) had a gradual pattern of menstrual cessation as shown in Table 1.

The prevalence of osteoporosis and osteopenia was 15.1% and 30.6%, respectively, while 54.3% had normal bone mineral density as seen in Figure 1.

Table 2 shows the comparison of risk factors involved in our study. None of the participants smoked. Among the identified risk factors, oral steroid use was associated with osteoporosis among the participants ($X^2=6.6$, $p=0.036$).

Discussion

Postmenopausal osteoporosis is a common public health issue, though often neglected that is characterized by low bone mass, leading to amplified bone fragility among the postmenopausal population.^[25] Several scientific studies have shown that many factors associated with lifestyle affect the reduction in bone mineral density and osteoporosis in postmenopausal women.^[3] Postmenopausal osteoporosis risk factors vary from region to region and are well documented in Caucasians and Asian women.^[3,7,26-31] The risk factors in African-American women are similar to those of their white counterparts.^[28] However, there is a paucity of data on risk factors for postmenopausal osteoporosis in African women whose lifestyle and environmental factors are different from western subjects.

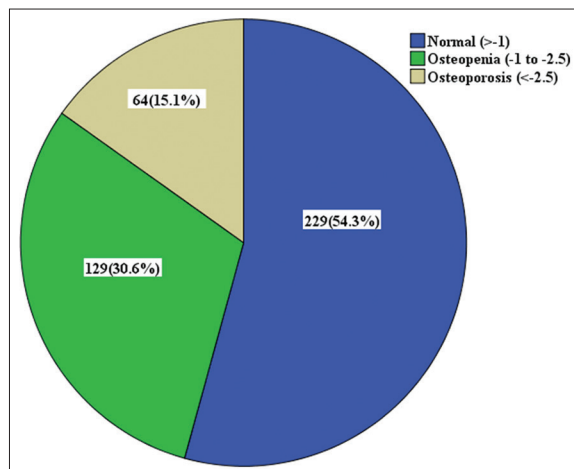


Figure 1: Bone mineral density pattern of the subjects

In a study conducted by Bener *et al.*, among Qatari postmenopausal women, 15.9% and 29.3% had osteoporosis and osteopenia, respectively.^[32] In another study by Gupta *et al.* involving 2296 Kuwaiti postmenopausal women, the prevalence of osteoporosis was 19.3% while osteopenia was 45.6%.^[33] In a cross-sectional study involving 3359 postmenopausal Chinese women, 9.65% and 27.09% had osteoporosis and osteopenia, respectively.^[34] The prevalence rate of osteoporosis in Canadian women aged 50 and above is 15.8%.^[35] In our study, the prevalence rate of osteoporosis and osteopenia was 15.1% and 30.6%, respectively. A similar study in Lagos, Nigeria, had an osteoporosis prevalence of 20.2%.^[36]

According to a 2011 multinational population-based study, about 4.6% of postmenopausal women were on oral steroids for medical conditions, most commonly musculoskeletal disorders.^[37] Steroids can enhance bone resorption and suppress bone formation through several mechanisms.^[38] Steroids are associated with several adverse effects including osteoporosis, with fractures occurring in up to 50% of long-term users.^[39] Data from the General Practice Research Database in the UK showed that the risk of fracture is increased even with relatively low daily doses of prednisolone or its equivalent and rises further with increasing daily dose.^[40] The risk of developing osteoporosis after steroid therapy is higher in postmenopausal women compared to men and children.^[38] In our study, there was a significant relationship between oral steroid use and bone mineral density. In a retrospective study involving 90 postmenopausal women by

Table 1: Socio-demographic characteristics of subjects

Variable	Frequency (n=422)	Percentage
Age group (years)		
45-54	103	24.4
55-64	211	50.0
65-75	108	25.6
Mean \pm SD	59.80 \pm 6.4	
Marital status		
Single	7	1.7
Married	231	54.7
Divorced	35	8.3
Widow	149	35.3
Educational level		
None	86	20.4
Primary	116	27.5
Secondary	107	25.3
Post-secondary	113	26.8
Religion		
Christianity	350	82.9
Islam	72	17.1
Employment status		
Employed	292	69.2
Unemployed	21	5.0
Retired	109	25.8
Body mass index (kg/m ²)		
Underweight	17	4.0
Normal	93	22.0
Overweight	137	32.5
Obesity	175	41.5

SD=Standard deviation

Table 2: Association between risk factors for osteoporosis and bone mineral density pattern

	Bone Mineral density class			χ^2	P
	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)		
Alcohol consumption					
Yes	15 (6.6)	10 (7.8)	1 (1.6)	2.227 [#]	0.227
No	214 (93.4)	119 (92.2)	63 (98.4)		
Exercise >2 times weekly					
Yes	65 (28.4)	45 (34.9)	26 (40.6)	4.032	0.133
No	164 (71.6)	84 (65.1)	38 (59.4)		
Fractures in adult life					
Yes	14 (6.1)	5 (3.9)	4 (6.2)	0.895 [#]	0.639
No	215 (93.9)	125 (96.1)	60 (93.8)		
Ever taken steroids for >3 months					
Yes	8 (3.5)	1 (0.8)	5 (7.8)	6.653 [#]	0.036*
No	221 (96.5)	128 (99.2)	59 (92.2)		
Dairy product consumption					
Yes	193 (84.3)	117 (90.7)	55 (85.9)	2.292	0.231
No	36 (15.7)	12 (9.3)	9 (14.1)		
Calcium supplement					
Yes	87 (38.0)	41 (31.8)	18 (28.1)	2.802	0.246
No	142 (62.0)	88 (68.2)	46 (71.9)		

*Significant, χ^2 =Chi-square, [#]Fisher's exact test

Kang *et al.*, the use of an epidural steroid for low back pain was associated with a significant decrease in bone mineral density.^[40] Thompson *et al.* reported that not all postmenopausal women on chronic steroid use were osteoporotic, but more years on steroid therapy was a significant predictor of osteoporosis.^[41] There is therefore a need to screen for risk factors for osteoporosis including the use of steroids at the level of primary care to start treatment early and prevent complications such as fractures.

Conclusion

The results of the study showed that 45.7% of the postmenopausal women had subnormal T-scores. The role of primary care physicians as coordinators and facilitators in the screening and management of postmenopausal osteoporosis is crucial.^[42] We recommend routine screening of postmenopausal women in primary care settings to identify osteoporosis or osteopenia and provide appropriate treatment to reduce the risk of fracture and potential morbidity and mortality.

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Conflicts of interest

There are no conflicts of interest.

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