Bangladesh Journal of Medicine (BJM)
ISSN : 1023 - 1986
eISSN : 2408 - 8366

ORIGINAL ARTICLE

PATTERN OF BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN IN A TERTIARY CARE CENTRE OF BANGLADESH

DURBA HALDER [1], MD. YOUSUF ALI[2], JANESAR RAHAT FAYSAL[3], FARHANA NAYEEM[4], ABDUR ROUF[4], NABEELA TASNIM[4]

Abstract:

Background: *Incidences of osteoporosis and diabetes have dramatically increased in recent decades and they have become one of the major health problems.Osteoporosis is a skeletal condition characterized by decreased density (mass/volume) of normally mineralized bone. The reduced bone density leads to decreased mechanical strength, thus making the skeleton more likely to fracture. This study aimed to assess the pattern of bone mineral density in Bangladeshi postmenopausal women.* ***Methods:*** *This descriptive cross-sectional study was conducted at the Department of medicine, Sir Salimullah Medical College, Mitford, Dhaka, Bangladesh. The study duration was 1 year; from January 2021 to January 2022. A total of 100 women attending the Outpatient Department of Medicine were included in this study as per inclusion criteria. A convenience sampling technique was applied for this study.A pre-formed questionnaire was used for necessary data collection containing general characteristics, presence or absence of risk factors, BMI status, and BMD. Qualitative data were analyzed by Chi-square test & quantitative data were analyzed by student's t-test. All statistical analyses were performed by using SPSS Software version 20. Informed written consent was obtained from all subjects.* ***Results:*** *In this study, a maximum (of 36, 36.0%) patients belonged to the age group of 50-59 years, followed by (33, 33.0%) 60-69 years age group. Regarding education, most patients (70, 70.0%) had a secondary school certificate or below that level, followed by higher secondary level (25, 25.0%). Concerning years since menopause, 27.0% of patients had menopause since 20-29 years, followed by 25.0% of subjects had menopause since 10-19 years.Regarding BMI, 20.0% of patients had <23 kg/m^2, 24.0% 23.1-25.99 kg/m^2, 25.0% 26-29.99 kg/m^2, and 31.0% ≥30 kg/m^2.Concerning risk factors, 45.0% of patients had a history of taking medication containing estrogen, 40.0% of patients had DM, and 18.0% of patients had a history of taking thyroid hormone.Prevalence of osteopenia and osteoporosis was seen in 33.0% and 8.0% of patients respectively concerning BMD proximal femur and spine DXA. Moreover, concerning DXA at the lumbar spine, hip, and total body osteopenia and osteoporosis were 50.0% and 30.0% respectively.* ***Conclusion:*** *This study suggests that advancing age and menopausal condition are an important risk factor for the occurrence of low BMD.*

Keywords: *Osteopenia, Osteoporosis, BMD, BMI*

Received: 15.03.2023 *Accepted: 10.04.2023*
DOI: https://doi.org/10.3329/bjm.v34i2.65685

Citation: *Halder D, Ali MY, Faysal JR, Nayeem F, Rouf A, Tasnim N. Pattern of Bone Mineral Density in Postmenopausal Women in a Tertiary Care Centre of Bangladesh. Bangladesh J Medicine 2023; 34: 121-125.*

1. Associate Professor, Department of Medicine, Sir Salimullah Medical College, Dhaka-1100, Bangladesh
2. Registrar, Department of Medicine, Sir Salimullah Medical College, Dhaka-1100, Bangladesh
3. Assistant Registrar, Department of Medicine, Sir Salimullah Medical College, Dhaka-1100, Bangladesh
4. Indoor Medical Officer, Department of Medicine, Sir Salimullah Medical College, Dhaka-1100, Bangladesh

Address of Correspondence: Dr. Md Yousuf Ali, Registrar, Department of Medicine, Sir Salimullah Medical College, Dhaka-1100, Bangladesh, E-mail ID: yousufssmc@gmail.com

Introduction:

Osteoporosis is the most prevalent disease in menopausal women, and is strongly associated with low quality of life. [1] Osteopenia is a term to define bone density that is not normal but also not as low as osteoporosis. By definition from the World Health Organization osteopenia is defined by bone densitometry as a T score of "1 to "2.5.[2] Osteoporosis is a skeletal condition characterized by decreased density (mass/volume) of normally mineralized bone. The reduced bone density leads to decreased mechanical strength, thus making the skeleton more likely to fracture. Postmenopausal osteoporosis (Type I) and age-related osteoporosis (Type II) are the most common primary forms of bone loss seen in clinical practice. Secondary causes of osteoporosis include hypercortisolism, hyperthyroidism, hyperparathyroidism, alcohol abuse, and immobilization. [3] Osteoporosis and its related complications are one of the major healthcare problems around the globe. It is estimated that osteoporosis affects about 200 million women worldwide and is a substantial cause of morbidity and mortality. Fifty-four percent of postmenopausal white women are osteopenic and 30% are osteoporotic, and by the age of 80, 27% of women are osteopenic and 70% are osteoporotic.[4] Atherosclerotic vascular disease (AVD) and osteoporosis or osteopenia are common conditions among postmenopausal women and appear to be linked in a manner that is not fully understood. [5] Osteoarthritis (OA) and osteoporosis (OP) are two age-related degenerative diseases, both common in middle-aged and older women. The generally held opinion is that the incidence of OP is inversely associated with the incidence of OA. However, during total hip arthroplasty (THA) it is not uncommon to encounter postmenopausal female patients who have fragile cancellous bone both in the proximal femur and in the acetabulum.[6]Osteoporosis is a condition in which the ratio of bone mass to its volume is decreased. When bone tissue is reduced, the likelihood of fracture increases. Low bone mass with an increased risk of subsequent fracture is one of the most prevalent community health problems.The amount of bone mineral present in the skeleton of adult women is primarily a function of the amount gained during the phase of skeletal development and maturation. Although skeletal development begins before birth (particularly during the last trimester), many factors influence a woman's peak bone mass: these include genetics, nutritional status, exercise, and hormonal factors. In adulthood, skeletal mass is 10–15% higher in men than in women .[7] There are several factors affecting the prevalence of osteoporosis in postmenopausal women, such as age, age at menarche, duration of menopause, dietary or nutritional intakes, lifestyle and level formal education.[8]Although the risk of fracture is higher in patients with a low bone mass, the best predictor of an osteoporotic fracture is a previous fracture either in the vertebrae or in the hips. Hence, 20% of women who have had a recent vertebral fracture will have a new fracture within a year. Having had one or more vertebral fractures has been related to poorer quality of life, and higher long-term mortality. [9] Osteoporosis is a major public health problem through its association with age-related fractures. Although fracture risk at any skeletal site depends upon a complex interaction between bone strength and trauma, recent epidemiologic studies confirm that bone density is currently the best single predictor of future fracture.[10,11] This study aimed to assess thepattern of bone mineral density in Bangladeshi postmenopausal women.

Methods:

This descriptive cross-sectional study was conducted at the Department of medicine, Sir Salimullah Medical College, Mitford, Dhaka, Bangladesh. The study duration was 1 year; from January 2021 to January 2022. A total of 100 women attending the Outpatient Department (OPD) of Medicine were included in this study as per inclusion criteria. A convenience sampling technique was applied for this study. Healthy PMW aged above 50 years of age and above with a history of complete cessation of menstruation over more than 1 year and bone density in women who consulted a participating physician when a densitometer was available in their practice (usually 1+wk) and who were able to give a detailed fall history were included for the study. The patients below 50 years of age and Menstruating women are excluded from the study. All data were kept confidential and used only for the study purpose.

A pre-formed questionnaire was used for necessary data collection containing general characteristics, presence or absence of risk factors, BMI status, and BMD. Qualitative data were analyzed by Chi-square test & quantitative data were analyzed by student's t-test. All statistical analyses were performed by using SPSS Software version 22. Informed written consent was obtained from all subjects.

Results:

Table I

General characteristics of the study patients (N=100)

Characteristics	N	%
Age (years)		
50-59	36	36.0
60-69	33	33.0
70-79	24	24.0
≥80	07	7.0
Education		
Secondary school and below	70	70.0
Higher Secondary	25	25.0
Graduate	05	5.0
Years since menopause		
0-9	22	22.0
10-19	25	25.0
20-29	27	27.0
≥30	26	26.0

In this study, a maximum (of 36, 36.0%) patients belonged to the age group of 50-59 years, followed by (33, 33.0%) and 60-69 years age group. Regarding education, most patients (70, 70.0%) had a secondary school certificate or below that level, followed by higher secondary level (25, 25.0%). Concerning years since menopause, 27.0% of patients had menopause since 20-29 years, followed by 25.0% of subjects had menopause since 10-19 years. [Table 1]

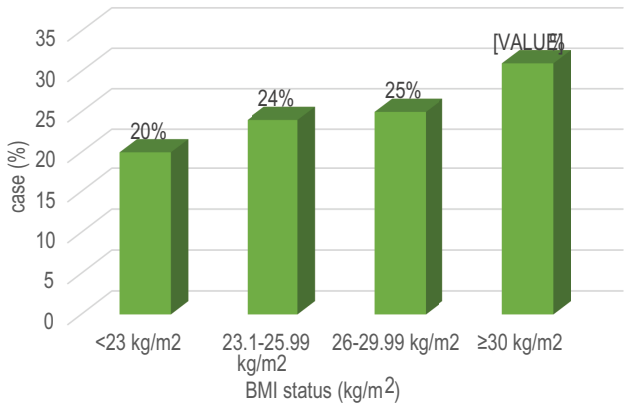

Figure 1: *Distribution of subjects according to BMI (N=100).*

Regarding BMI, 20.0% of patients had <23 kg/m^2, 24.0% 23.1-25.99 kg/m^2, 25.0% 26-29.99 kg/m^2, and 31.0% e"30 kg/m^2. [Figure 1]

Table II

Distribution of subjects according to risk factors of osteoporosis & osteopenia (N=100).

Characteristics	N	%
Maternal H/O osteopenia	11	11.0
Medication use		
Thyroid hormone	18	18.0
Cortisone	03	3.0
Diuretics	17	17.0
Estrogen	45	45.0
Cigarette smoking	00	0.0
Alcohol consumption	00	0.0
Diabetes mellitus	40	40.0

Concerning risk factors, 45.0% of patients had a history of taking medication containing estrogen, 40.0% of patients had DM, 18.0% of patients had a history of taking a thyroid hormone, and in 11.0% of patients there was a positive maternal history of osteopenia. [Table 2]

Table III

Prevalence of osteopenia & osteoporosis among the study subjects (N=100).

Method of diagnosis	Osteopenia	Osteoporosis
BMD proximal femur and spine-DXA	33.0%	8.0%
DXA at the lumbar spine, hip, and total body	50.0%	30.0%

In this study, the prevalence of osteopenia and osteoporosis was seen in 33.0% and 8.0% of patients respectively concerning BMD proximal femur and spine DXA. Moreover, concerning DXA at the lumbar spine, hip, and total body osteopenia and osteoporosis were 50.0% and 30.0% respectively. [Table 3]

Discussion:

This study showed a maximum (of 36, 36.0%) patients belonged to the age group of 50-59 years, followed by (33, 33.0%) 60-69 years age group. Regarding education, most patients (70, 70.0%) had a secondary school certificate or below that level, followed by higher secondary level (25, 25.0%). Concerning years since menopause, 27.0% of patients had menopause since 20-29 years, followed by 25.0% of subjects had menopause since 10-19 years.The average age of the women was 64 years (range 50–87 years) according to

a study by Sanfélix-Genovés J, Reig-Molla B. et al. [12]In another study,Siris ES, Miller PD et al observed that,the mean (SD) age was 64.5 (9.3) years (range, 50-104 years) which was quite relatable to the present study. [13] Osteoporosis was determined in 10.6% and 16.2% of women with menopause duration of 0–3 years and 4–7 years, respectively, whereas this rate was 31.9% in women with menopause duration of over 7 years (p = 0.001). The percentages for osteopenia remained constant among the three different menopause durations (0–3 years: 37.2%, 4-7 years: 42.1%, and >7 years: 40.9%) in a study conducted byDemir B, Haberal A et al. [14] Another study done by Bijelic R, Milicevic S et alfound that the prevalence of osteoporosis was significantly greater among women with low educational levels than women with high educational status (18.0% vs 3.8% P < 0.0001). [15] Concerning risk factors, 45.0% of patients had a history of taking medication containing estrogen, 40.0% of patients had DM, 18.0% of patients had a history of taking a thyroid hormone, and 11.0% of patients there was a positive maternal history of osteopenia in this study. Maternal history of a diagnosis of osteoporosis was reported by 11.7%, although 22.2% reported that their mothers had experienced at least 1 fracture after the age of 45 years and 24.0% reported that another close female relative had done so. Current or past use of estrogen was reported by 63.2% and current or past cigarette smoking by 45.7%; 72.4% denied any recent alcohol consumption according to another study by Siris ES, Miller PD et al [13] No patient had H/O smoking or alcohol consumption in this study. Testing the significance of differences in terms of smokingBijelic R, Milicevic S et al showed that the studied groups were statistically significantly different in terms of smoking ($\div^2$=24.025, p=0.000). In terms of consumption of coffee, a statistically significant difference was found between the group of cases and the control group ($\div^2$=0.615, p=0.735). [15] Another study byViégas M, Costa C et alfound a high prevalence of osteoporosis and vertebral fractures in postmenopausal women with type 2 diabetes mellitus, irrespective of blood glucose control which was quite similar to this study.[16] Regarding BMI, 20.0% of patients had <23 kg/m^2, 24.0% 23.1-25.99 kg/m^2, 25.0% 26-29.99 kg/m^2, and 31.0% e”30 kg/m^2. According to a study by Salamat MR, Salamat AH, obesity was associated with BMD of the hip and lumbar spine and overweight and obese individuals had similar degrees of osteoporosis. [17] With the increase in obesity and osteoporosis worldwide, an important discussion has developed and focused on whether being overweight and obese can have a detrimental or protective effect on skeletal health. Both fat and bone cells originate from the same bone marrow stem cellsand physical inactivity and aging induce both obesity and osteoporosis. [18-21] In this study, the prevalence of osteopenia and osteoporosis was seen in 33.0% and 8.0% of patients respectively concerning BMD proximal femur and spine DXA. Moreover, concerning DXA at the lumbar spine, hip, and total body osteopenia and osteoporosis were 50.0% and 30.0% respectively and this result was quite relatable to another study conducted by Siris ES, Miller PD et al.[13]

Conclusion:

This study concluded that osteoporosis has become more prevalent in postmenopausal women and an important risk factor for the occurrence of low BMD.

Limitation of the study:

Although sample size was calculated statistically, this was small in relation to the huge number of population of our country. It was a single-center study done in tertiary care hospital.

Data Availability:

The datasets analysed during the current study are not publicly available due to the continuation of analyses but are available from the corresponding author on reasonable request.

Conflict of Interest:

The authors stated that there is no conflict of interest in this study

Funding:

No specific funding was received for this study**.**

Ethical consideration:

The study was conducted after approval from the ethical review committee of Sir Salimullah Medical College. The confidentiality and anonymity of the study participants were maintained.

Acknowledgments:

The authors were grateful to the staffs of the Outpatient Department (OPD) of Medicine in Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh.

References:

1. Ji MX, Yu Q. Primary osteoporosis in postmenopausal women. Chronic diseases and translational medicine. 2015 Mar 1;1(01):9-13.

https://doi.org/10.1016/j.cdtm.2015.02.006 PMid:29062981 PMCid:PMC5643776

2. Karaguzel G, Holick MF. Diagnosis and treatment of osteopenia. Reviews in endocrine and metabolic disorders. 2010 Dec;11(4):237-51. https://doi.org/10.1007/s11154-010-9154-0 PMid:21234807

3. Glaser DL, Kaplan FS. Osteoporosis: definition and clinical presentation. Spine. 1997 Dec 15;22(24):12S-6S. https://doi.org/10.1097/00007632-199712151-00003 PMid:9431639

4. Sadat-Ali M, Al-Habdan IM, Al-Turki HA, Azam MQ. An epidemiological analysis of the incidence of osteoporosis and osteoporosis-related fractures among the Saudi Arabian population. Annals of Saudi medicine. 2012 Nov;32(6):637-41. https://doi.org/10.5144/0256-4947.2012.637 PMid:23396029 PMCid:PMC6081105

5. Ness J, Aronow WS. Comparison of prevalence of atherosclerotic vascular disease in postmenopausal women with osteoporosis or osteopenia versus without osteoporosis or osteopenia. The American journal of cardiology. 2006 May 15;97(10):1427-8. https://doi.org/10.1016/j.amjcard.2005.12.033 PMid:16679077

6. Mäkinen TJ, Alm JJ, Laine H, Svedström E, Aro HT. The incidence of osteopenia and osteoporosis in women with hip osteoarthritis scheduled for cementless total joint replacement. Bone. 2007 Apr 1;40(4):1041-7. https://doi.org/10.1016/j.bone.2006.11.013 PMid:17239668

7. Limpaphayom KK, Taechakraichana N, Jaisamrarn U, Bunyavejchevin S, Chaikittisilpa S, Poshyachinda M, Taechamahachai C, Havanond P, Onthuam Y, Lumbiganon P, Kamolratanakul P. Prevalence of osteopenia and osteoporosis in Thai women. Menopause. 2001 Jan 1;8(1):65-9. https://doi.org/10.1097/00042192-200101000-00011 PMid:11201518

8. Meiyanti M. Epidemiology of osteoporosis in postmenopausal women aged 47 to 60 years. UniversaMedicina. 2010;29(3):169-76.

9. Sanfélix-Genovés J, Reig-Molla B, Sanfélix-Gimeno G, Peiró S, Graells-Ferrer M, Vega-Martínez M, Giner V. The population-based prevalence of osteoporotic vertebral fracture and densitometric osteoporosis in postmenopausal women over 50 in Valencia, Spain (the FRAVO study). Bone. 2010 Sep 1;47(3):610-6. https://doi.org/10.1016/j.bone.2010.06.015 PMid:20601286

10. Cooper C, Melton III LJ. Epidemiology of osteoporosis. Trends in Endocrinology & Metabolism. 1992 Aug 1;3(6):224-9. https://doi.org/10.1016/1043-2760(92)90032-V PMid:18407104

11. Jordan KM, Cooper C. Epidemiology of osteoporosis. Best practice & research Clinical rheumatology. 2002 Dec 1;16(5):795-806. https://doi.org/10.1053/berh.2002.0264 PMid:12473274

12. Sanfélix-Genovés J, Reig-Molla B, Sanfélix-Gimeno G, Peiró S, Graells-Ferrer M, Vega-Martínez M, Giner V. The population-based prevalence of osteoporotic vertebral fracture and densitometric osteoporosis in postmenopausal women over 50 in Valencia, Spain (the FRAVO study). Bone. 2010 Sep 1;47(3):610-6. https://doi.org/10.1016/j.bone.2010.06.015 PMid:20601286

13. Siris ES, Miller PD, Barrett-Connor E, Faulkner KG, Wehren LE, Abbott TA, Berger ML, Santora AC, Sherwood LM. Identification and fracture outcomes of undiagnosed low bone mineral density in postmenopausal women: results from the National Osteoporosis Risk Assessment. Jama. 2001 Dec 12;286(22):2815-22. https://doi.org/10.1001/jama.286.22.2815 PMid:11735756