Prevalence Of Osteoporosis Among Postmenopausal Women

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KEYWORDS

Osteoporosis, Postmenopausal Women, Bone Mineral Density, Calcium Intake, OSTA Index, Fracture Risk, Physical Activity, Dhaka City

ABSTRACT:

Background: Osteoporosis is a significant public health concern, particularly among postmenopausal women, due to the increased risk of bone fractures associated with reduced bone mineral density (BMD). The decline in estrogen levels after menopause accelerates bone loss, making this population highly vulnerable. Understanding the prevalence and associated risk factors is crucial for early intervention and preventive strategies. ***Objective:*** The study aimed to assess the prevalence of osteoporosis among postmenopausal women and examine its association with dietary calcium intake from dairy products. ***Methodology:*** A cross-sectional study was conducted from January 1, 2018, to December 31, 2018, in Dhaka City, Bangladesh, targeting postmenopausal women aged 45–65 years residing in Kalabagan and South Paikpara. A total of 240 respondents were selected using a purposive sampling method. Data were collected through face-to-face interviews using structured questionnaires, anthropometric measurements, and dietary assessments. Statistical analyses were performed using SPSS (Version 23.0), employing descriptive statistics, chi-square tests, ANOVA, and logistic regression ($p<0.05$). ***Results:*** Among the 240 participants, the majority (45.8%) were aged 51-55 years. Educational attainment varied, with 15.8% being illiterate and 14.6% having post-graduate education. The study found that 53.3% of participants had 2-3 pregnancies, and 93.8% had practiced breastfeeding. Regarding osteoporosis risk, 86.7% had a low-risk OSTA index, 12.5% had an intermediate risk, and 0.8% had a high risk. A history of fractures was reported by 27.5% of respondents, and 27.1% had a family history of fractures. Physical activity was sufficient in 81.3% of participants, while 28.8% had rare sunlight exposure, indicating potential vitamin D deficiency. ***Conclusion:*** Osteoporosis prevalence among postmenopausal women in Dhaka City was low, with most participants in the low-risk category on the OSTA index. However, risk indicators such as limited sunlight exposure, previous fractures, and genetics were identified. Physical activity levels were adequate, but many women had insufficient calcium intake. These findings highlight the importance of improving calcium and vitamin D consumption, promoting physical activity, and conducting early screenings to prevent osteoporosis and related complications, particularly for high-risk individuals.

INTRODUCTION

Osteoporosis is a major public health concern, particularly among postmenopausal women, due to its association with increased bone fragility and fracture risk. Characterized by reduced bone mineral density (BMD) and structural deterioration of bone tissue, osteoporosis significantly impacts quality of life and healthcare systems

worldwide. The hormonal changes that occur after menopause, especially the decline in estrogen levels, accelerate bone loss, making postmenopausal women the most vulnerable group.

The prevalence of osteoporosis among postmenopausal women varies globally, influenced by factors such as genetics, nutrition, lifestyle, and healthcare access. Studies indicate that in many countries, a substantial proportion of postmenopausal women experience low BMD, with a significant percentage developing osteoporosis or osteopenia. [1-2] The increasing life expectancy further exacerbates this issue, leading to a higher burden of osteoporosis-related fractures, which contribute to morbidity, disability, and mortality.

Multiple risk factors contribute to osteoporosis in postmenopausal women, including aging, family history, low calcium and vitamin D intake, physical inactivity, smoking, and excessive alcohol consumption. Additionally, certain medical conditions and medications can accelerate bone loss, increasing susceptibility to fractures. Early identification of these risk factors and timely intervention are crucial to preventing osteoporosis and its complications. [3-5]

Objective
To assess the prevalence of osteoporosis among postmenopausal women.

METHODOLOGY

Study Design
This cross-sectional study was designed to assess the dietary calcium intake from dairy products and its association with osteoporosis risk among postmenopausal women. Given the study's time constraints and the need for one-time data collection, this design was chosen to ensure efficient and timely execution. Each participant was interviewed once at a single point, allowing for a snapshot of the dietary and health status of the target population.

Study Period
The study was carried out over a one-year period from January 1, 2018, to December 31, 2018. The initial months were dedicated to an in-depth literature review, followed by the preparation and presentation of the research protocol. Ethical approval was obtained from the Ethical Review Board of NIPSOM. The questionnaire was developed by August 2018, pretested in late August, and subsequently refined. Data collection began in September and concluded by the end of the year. Data cleaning, coding, and analysis took place in October 2018. The research was conducted within Dhaka city, focusing on two specific areas: Kalabagan and South Paikpara in the Kallyanpur region. These locations were selected based on the availability of the target population that fulfilled the study criteria.

The target population included postmenopausal women aged between 45 and 65 years who were permanent residents of the selected areas. The focus was on individuals who had lived in these areas for at least ten years to ensure consistency and eliminate migratory influence on lifestyle and diet patterns.

A purposive sampling method was employed for the selection of both study areas and participants. Although the initially estimated sample size was 269 (including a 10% allowance for non-response), a total of 240 respondents were included in the final analysis due to time and resource constraints.

Participants were eligible if they were postmenopausal women aged between 45 and 65, permanent residents of the study areas, and willing to provide informed written consent. Women who were above 65 years of age, had acute illnesses, psychological disorders, chronic kidney disease, or were already diagnosed with osteoporosis or taking calcium supplements were excluded. Face-to-face interviews were conducted using a structured questionnaire after obtaining informed consent. Anthropometric measurements such as height and weight were taken using standardized tools. Dietary calcium intake from dairy products was evaluated using a 24-hour dietary recall method and a food frequency questionnaire tailored to local dietary habits.

All collected data were entered, cleaned, and analyzed using SPSS software (Version 23.0). Descriptive statistics such as mean, standard deviation, and frequency distributions were calculated to summarize the sample characteristics. Chi-square tests were applied to examine associations between categorical variables, while one-way ANOVA was used to compare mean differences across different intake levels. Logistic regression analysis was conducted to explore the relationship between dairy calcium intake and the risk of osteoporosis, adjusting for potential confounding variables. A p-value less than 0.05 was considered statistically significant. The study protocol was approved by the Ethical Review Committee of NIPSOM. All participants were informed about the objectives, procedures, and potential risks and benefits of the study. Written and verbal consent was obtained

before data collection. Strict confidentiality was maintained throughout the study to protect participant information.

Data Collection and Analysis

Data collection involved conducting face-to-face interviews after obtaining informed consent, along with anthropometric measurements such as height and weight, using standardized measuring tools. Dietary calcium intake was assessed through the 24-hour recall method and frequency questionnaires. All collected data were then processed, coded, and analyzed using SPSS (Version 23.0). Statistical methods applied included descriptive analysis, chi-square tests, ANOVA, and logistic regression, with a p-value of <0.05 considered statistically significant. This comprehensive approach ensured the accuracy and reliability of the findings.

Ethical Considerations

Ethical clearance for the study was obtained from the Ethical Review Committee of NIPSOM, ensuring compliance with ethical guidelines. Participants were thoroughly informed about the study objectives, procedures, potential risks, and benefits to ensure transparency. Both written and verbal informed consent were obtained from participants prior to their involvement in the study. Additionally, strict confidentiality measures were maintained to safeguard the privacy and security of participant data throughout the research process.

RESULTS

In Table 1, the distribution of postmenopausal women by socio-demographic characteristics shows that the majority of women fall in the 51-55 years age group (45.8%), followed by the 56-60 years group (30.4%). A smaller proportion are aged 45-50 years (17.9%) and 61-65 years (5.8%). In terms of educational qualification, the largest group is illiterate (15.8%), followed by those with informal education (7.1%) and primary education (12.1%). Secondary education and S.S.C. each account for 12.1%, with H.S.C. at 11.7%, and graduation representing 13.8% of the participants.

Table 1: Distribution of the postmenopausal women by socio-demographic characteristics

Characteristics	Frequency	Percent
Age in years		
45-50 years	43	17.9
51-55 years	110	45.8
56-60 years	73	30.4
61-65 years	14	5.8
Educational qualification		
Illiterate	38	15.8
Informal education	17	7.1
Primary	29	12.1
Secondary	31	12.9
S.S.C	29	12.1
H.S.C	28	11.7
Graduation	33	13.8
Post-graduation	35	14.6
Christian	1	0.4
Buddha	1	0.4

Table 2 presents the distribution of respondents based on pregnancy frequency, number of children, and duration of breastfeeding. The majority of respondents (53.3%) had 2 to 3 pregnancies, followed by 26.3% with 4 to 5 pregnancies, and smaller percentages for higher frequencies (13.8% with 0 or 1 pregnancy, 3.8% with 6 or 7 pregnancies, and 2.9% with 8 or 9 pregnancies). Regarding the number of children, most women had 2 to 3 children (60%), with 23.3% having 0 or 1 child and 14.2% having 4 to 5 children. The duration of breastfeeding showed that 44.4% of women breastfed for 19 to 24 months, followed by 16.9% breastfeeding for 31 to 36 months and 13.3% for 25 to 30 months. The mean duration of breastfeeding was 22.84 ± 9.249 months, with a range from 3 to 36 months.

Table 2: Category of the respondents by frequency of pregnancy, number of child, duration of breast feeding

Characteristics	Frequency	Percent
Frequency of Pregnancy		
0 and 1	33	13.8
2 and 3	128	53.3
4 and 5	63	26.3
6 and 7	9	3.8
8 and 9	7	2.9
Number of child		
0 and 1	56	23.3
2 and 3	144	60.0
4 and 5	34	14.2
6 to 8	6	2.5
Duration of breast feeding		
Up to 6 months	25	11.1
7-12 months	32	14.2
19-24 months	100	44.4
25-30 months	30	13.3
31-36 months	38	16.9
Statistics	Mean=22.84±9.249 months Minimum=3 months, Maximum=36 months	

Table 3 shows the distribution of respondents by type of menopause, age of onset, and hormone therapy. The vast majority of women experienced natural menopause (98%), while only 2% had non-natural menopause. Regarding the age of onset of menopause, most women entered menopause between 46-50 years (64%), followed by 27.5% in the 41-45 years range, and 8.5% in the 51-55 years range. As for hormone therapy, a small percentage (2.9%) received hormone therapy, while the overwhelming majority (97.1%) did not.

Table 3: Distribution of respondents by type of menopause, age of onset of menopause, hormone therapy. (n=240)

Attributes	Frequency	Percent
Type of menopause		
Natural menopause	235	98
Not Natural menopause	5	2
Age of onset of menopause		
41-45 years	66	27.5
46-50 years	153	64.0
51-55 years	21	8.5
Hormone therapy		
Received	7	2.9
Not received	233	97.1

The majority 66 (28.8%) of the respondents were exposed to sunlight rarely whereas 67 (27.9%) respondents were exposed to sunlight for 20-30 minutes, 47 (19.6%) respondents were exposed to sunlight for more than 60 minutes, 38 (15.8%) respondents were exposed to sunlight for at least30 minutes and 19 (7.9%) respondents were exposed to sunlight never.

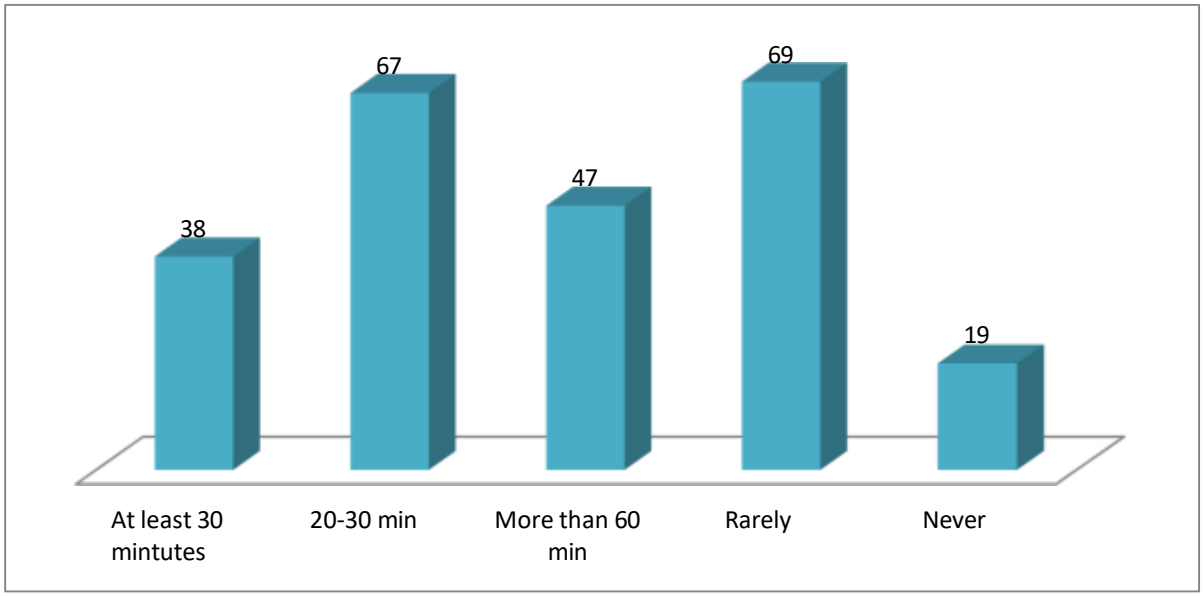

Figure 1: Distribution of the respondents by duration of daily exposure in sunlight.

Table 4 presents the distribution of respondents based on their physical activity levels. A significant majority (81.3%) of the women reported sufficient physical activity, while 18.8% reported insufficient physical activity.

Table 4: Category of the respondents according to the physical activity (n=240)

Physical Activity (MET-minutes/week)	**Frequency**	**Percent (%)**
Sufficient physical activity	195	81.3
Insufficient physical activity	45	18.8
Total	240	100.0%

The majority of respondents (72.5%) had no history of fractures, while 27.5% had experienced fractures.

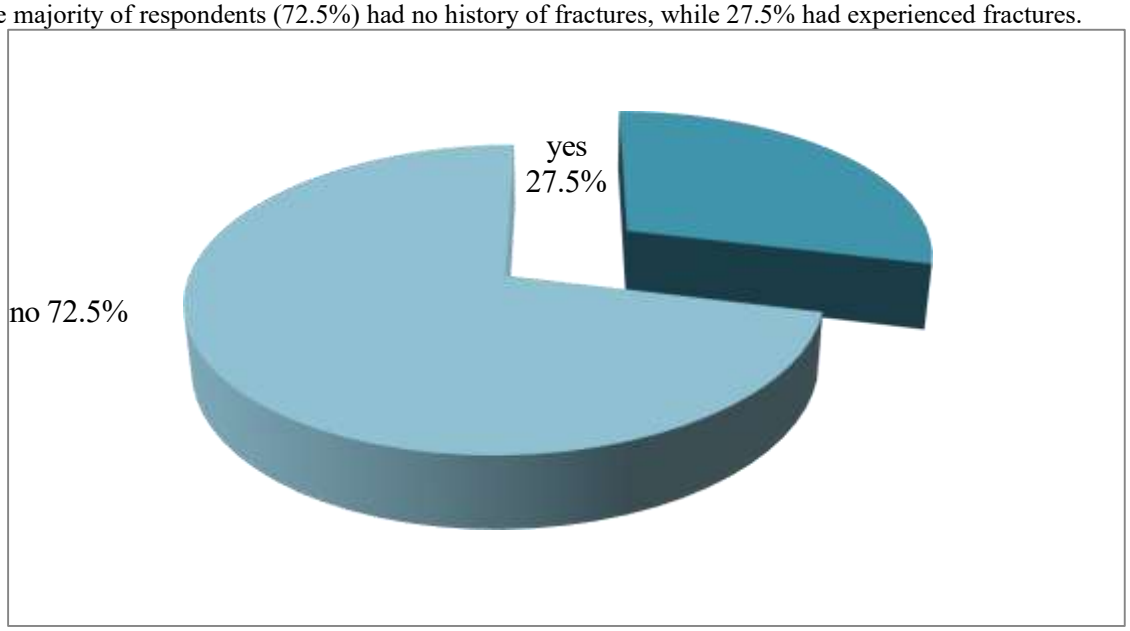

Figure 2: Distribution of the respondents according to history of fracture

Table 5 shows the distribution of respondents based on the frequency of fractures. The majority (69.7%) of respondents experienced one fracture, followed by 25.8% who had two fractures, and 4.5% who had three fractures.

Table 5: Category of the respondents according to frequency of fracture (n=66)

Attribute	Frequency	Percent
Frequency of fracture		
1	46	69.7
2	17	25.8
3	3	4.5
Total	66	100.0

The majority of respondents (72.9%) had no history of fractures in blood relatives, while 27.1% had a family history of fractures.

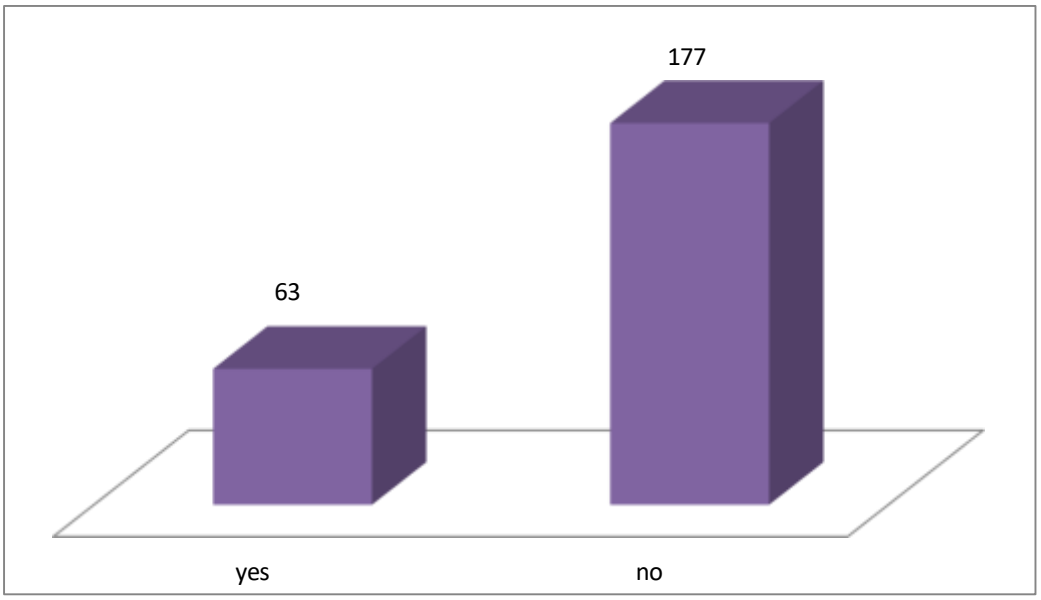

Figure 3: Category of the respondents according to history of fracture in blood relatives

The majority of respondents (72.9%) had no history of fractures in blood relatives, while 27.1% did. Among them, 13.8% had fractures in paternal relatives, and 13.3% in maternal relatives.

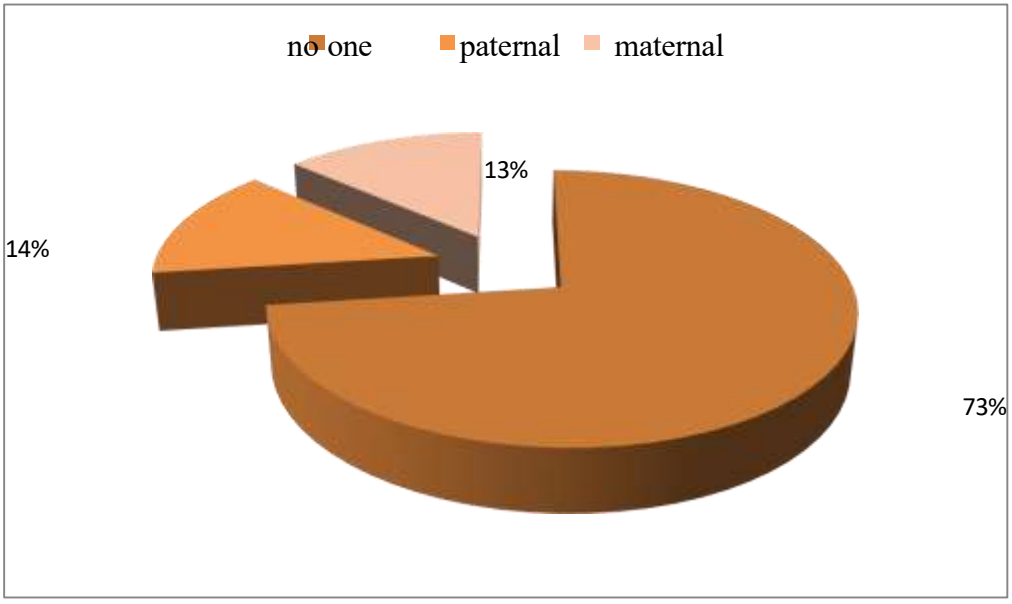

Figure 4: Category of the respondents according to the blood relatives who had history of fracture

The majority 213 (88.8%) of the respondents did not have history of arthritis whereas 27 respondents (11.3%) had history of arthritis.

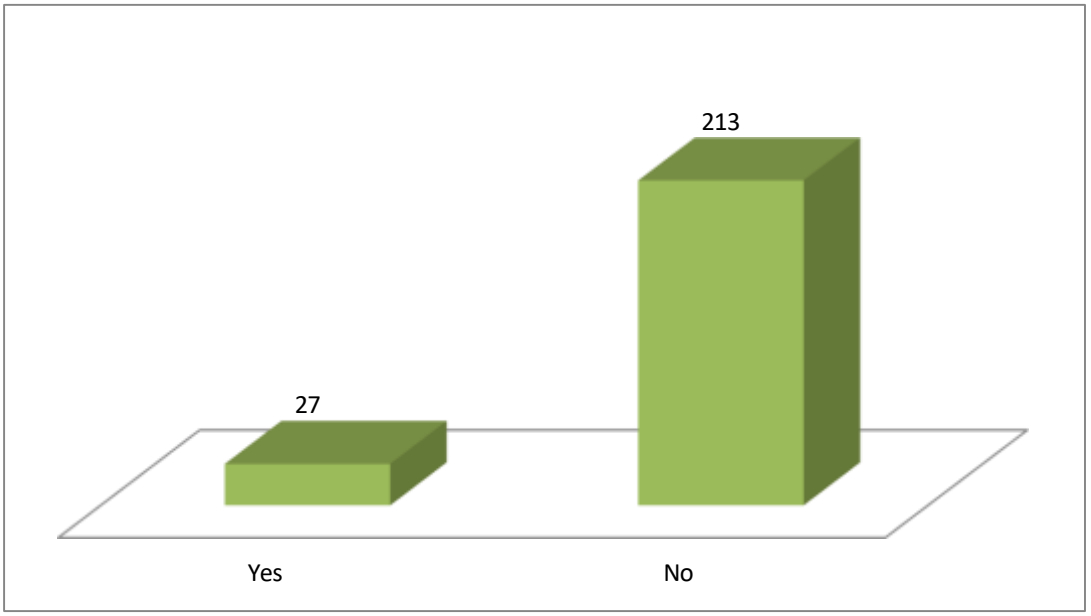

Figure 5: Category of the respondents according to the history of arthritis

Table 6 shows the distribution of participants based on the OSTA index. A large majority of participants were categorized as low risk (86.7%), followed by 12.5% in the intermediate risk category, and a small percentage (0.8%) in the high-risk category. The total number of participants was 240. The mean OSTA index score was 1.32, with a standard deviation of ±2.27372, ranging from -4 to 12.4.

Table 6: Category of the participants according to OSTA index

Attribute	Frequency	Percent
OSTA index		
Low Risk	208	86.7
Intermediate Risk	30	12.5
High Risk	2	0.8
Total	240	100.0
Statistics	Mean=1.32 (±2.27372 SD) Minimum=-4, Maximum=12.4	

DISCUSSION

Our study findings align with previous research on postmenopausal women, particularly regarding the age of menopause onset and osteoporosis risk factors. The mean age of menopause in our study was 47.39±2.31 years, consistent with other findings, who reported similar menopausal trends among South Asianwomen. [7] The majority (98%) of participants in this study experienced natural menopause, comparable to global reports emphasizing natural menopause as the predominant type.

In terms of educational status, our study revealed that 15.8% of participants were illiterate, whereas 14.6% had a post-graduate education. This differs from some studies in Western populations, where a higher percentage of postmenopausal women have completed tertiary education, reflecting socioeconomic and educational disparities between regions.[8-9] The educational status of participants plays a significant role in this study, as it can directly influence postmenopausal women's health outcomes, including their understanding of menopause, healthcare access, and overall well-being. The fact that more than 14% of participants were illiterate suggests that a substantial portion of the sample may have limited access to information about menopause, which could affect their ability to seek timely medical advice or adopt healthy lifestyle practices.

Pregnancy and breastfeeding patterns in our study also showed notable trends. A significant proportion (53.3%) had two or three pregnancies, and 93.8% practiced breastfeeding, with 44.4% breastfeeding for 19–24 months. These findings align with studies from South Asia, where prolonged breastfeeding is common. [10-11] However, compared to Western populations, where shorter breastfeeding durations are observed, our findings highlight cultural and lifestyle differences. [12-13] Breastfeeding was specifically examined in this study due to its potential impact on postmenopausal health, particularly in relation to osteoporosis and menopause. Research suggests that

prolonged breastfeeding may influence bone mineral density (BMD), as the hormonal changes during breastfeeding, particularly the elevated levels of prolactin, can affect calcium metabolism and bone health. Some studies have suggested that extended breastfeeding may result in a temporary decrease in bone mineral density, which could increase the risk of osteoporosis later in life. However, the relationship between breastfeeding duration and osteoporosis remains complex and may vary depending on other factors such as diet, calcium intake, and overall physical activity. In our study, the relatively high percentage of women who breastfed for extended periods could provide insights into how this practice might influence bone health in postmenopausal women, especially in the context of hormone therapy and overall menopausal management.

A total of 21 respondents were classified as OSTA class A (mean index 5.590), 30 as OSTA class B (mean index -2.393), and 49 as OSTA class C (low risk, mean index -0.860). T-score results showed 46 subjects as normal (mean T-score 0.4089), 39 with osteopenia (mean T-score -1.7764), 12 with osteoporosis (mean T-score -2.8792), and 3 with severe osteoporosis (mean T-score -3.1067).When cut off point for the T score is taken as □ -1.0, 95% of the subjects in High risk, 86% of the subjects in intermediate risk and 16% of the subjects in low risk group were identified as having low bone density. Regarding osteoporosis risk, our study found that 86.7% of respondents had a low-risk OSTA index, with only 0.8% at high risk. This contrasts with studies from European populations, where osteoporosis risk tends to be higher, particularly in older age groups. [14] Additionally, a positive family history of fractures was observed in 27.1% of respondents, reinforcing genetic predisposition as a key risk factor. Similar studies have highlighted familial links to osteoporosis, emphasizing genetic susceptibility as a global concern.[11]

Physical activity levels in our study were sufficient for 81.3% of respondents, supporting the protective role of exercise in bone health. Comparatively, research from developed countries often reports lower physical activity rates among postmenopausal women, highlighting regional lifestyle differences. Sunlight exposure was also limited for many respondents in our study, with 28.8% rarely exposed, which aligns with studies suggesting vitamin D deficiency as a growing issue in South Asian populations. [10] Vitamin D deficiency plays a significant role in the development of osteoporosis, as it is crucial for calcium absorption and bone mineralization. Insufficient vitamin D levels can impair calcium metabolism, leading to decreased bone density and an increased risk of fractures. In postmenopausal women, reduced estrogen levels further contribute to bone resorption, and without adequate vitamin D, this process can accelerate, increasing the likelihood of osteoporosis. Given the limited sunlight exposure among our respondents, vitamin D deficiency may exacerbate the risk of bone health issues, highlighting the need for greater awareness and potential supplementation in such populations.

Among the 240 respondents, the maximum proportion 208(86.7%) of the respondents had low risk whereas 30 (12.5%) respondents had intermediate risk and only 2 respondents had high risk.

CONCLUSION

The prevalence of osteoporosis among postmenopausal women in Dhaka City was relatively low, as indicated by the majority of participants falling into the low-risk category on the OSTA index. However, several key risk factors were identified, including limited sunlight exposure, history of fractures, and genetic predisposition. The study also revealed that physical activity levels were generally sufficient in most participants, but a significant portion had inadequate calcium intake, which could contribute to the bone health challenges in this demographic. These findings underscore the need for targeted interventions to improve calcium and vitamin D intake, promote physical activity, and ensure early screening, particularly for women at higher risk, in order to prevent osteoporosis and related complications.

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