



PREVALENCE OF OSTEOPOROSIS IN WOMEN AGED 35 TO 65 YEARS IN TEA GARDEN COMMUNITY OF JORHAT DISTRICT

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ABSTRACT **Background:** Osteoporosis poses a huge challenge in India, as it is a developing country due to demographic transition and aging of the population along with limited resource availability in rural India. Osteoporosis predominantly affects postmenopausal women. The mal-nutrition, and smoking, consumption of liquor and tobacco may have an effect on bone mineral density (BMD). Osteoporosis occurs in all populations, but not all populations are at equal risk. According to various studies, Asian women have higher predisposition for osteoporosis than their Caucasian people. Reasons attributed for lower bone mineral density (BMD) in Indians include possible genetic differences, nutritional deficiency and smaller skeletal size. Smoking or tobacco intake, malnourishment, alcohol has a negative effect on bone mineral density [BMD]. Tea garden people are probably more affected than other communities in the surrounding area as evidence by high attendance of patients with osteoporosis & fragility fractures in Orthopaedic OPD of JMCH. Increase prevalence in the community might be wholly or partly due to poor socio-economic status, poor nutrition, lack of calcium and vitamin d in diet, dark skin and addiction to alcohol. Purpose of the study: to study the prevalence of osteoporosis in middle-aged to elderly tea garden women of Jorhat district. **Materials and Methods:** In this community based cross-sectional study, BMD (bone mineral density) of 360 female subjects, aged 35 to 65 years, were calculated using quantitative ultrasound bone densitometry.(QUS) **Results:** In our study 24.7% were osteoporotic, followed by 39.5% were osteopenic and 35.8% had normal BMD. Thus, the prevalence of osteoporosis in our study, in the female population of tea gardens of Jorhat district was 24.7%

KEYWORDS : osteoporosis, QUS, BMD, tea garden, Jorhat

I. Introduction

Osteoporosis is a progressive, systemic, skeletal disease. Low bone mass and micro-architectural deterioration of bone tissues is characteristic feature of osteoporosis which causes increase in bone fragility and susceptibility to fracture (1). Osteoporosis is a disease characterized by decreased in bone strength and increased propensity to fall, as defined by National Institute of Health [NIH].(2)According to World Health Organization (WHO), osteoporosis is defined as a bone mineral density that is 2.5 standard deviations or more below the mean peak bone mass (average of young, healthy adults) as measured by DXA. "Established osteoporosis" means the presence of a fragility fracture. It may be classified as primary type 1, primary type 2, or secondary. Primary type 1 osteoporosis is bone loss that occurs during the normal human aging process. Secondary osteoporosis is defined as bone loss that results from specific, well-defined clinical disorders. (3)Osteoporosis predominantly affects postmenopausal women. The mal-nutrition, and smoking, consumption of liquor and tobacco may have an effect on bone mineral density (BMD). (4) Osteoporosis occurs in all populations, but not all populations are at equal risk. According to various studies, Asian women have higher predisposition for osteoporosis than their Caucasian people. Reasons attributed for lower bone mineral density (BMD) in Indians include possible genetic differences, nutritional deficiency and smaller skeletal size. (5)

II. Materials And Methods

A community based cross sectional study was carried out in tea gardens of Jorhat district from June 2020 to May 2021. Women of 35 to 65 years of age who were permanent resident of study area were included in the study. There are 8 blocks in the tea garden of Jorhat district, of which three tea-estate from titabar block and 2 tea-estate from baghchung were selected. The sample size was calculated and estimated to be 360. Bed-ridden patients and women below 35 years and above 65 years were excluded from the study. The details regarding socio demographic profile were collected and recorded in the proforma. Bone mineral density was determined for all the study subjects using QUANTITATIVE ULTRASOUND DENSITOMETRY (QUS) machine. The procedure is non-invasive and does not use ionizing radiation. Individuals with t-score values less than -2.5 were categorized as osteoporotic. Those with t-score between -2.5 and -1 were considered to be osteopenic and those with values

more than -1 were considered to be normal. The results of BMD were interpreted using WHO t-score criteria. Likewise, the details regarding risk factors, their medical co-morbidities, and treatment received were obtained from the study subjects and recorded in the proforma. Later, health education was given regarding the osteoporosis i.e., the risk factors, early screening methods, treatment and prevention of osteoporosis.

STATISTICAL ANALYSIS

All data were entered into MS excel and analysed properly using SPSS software. Univariate logistic regression analysis was done along with calculation of odd's ratio and p-value.

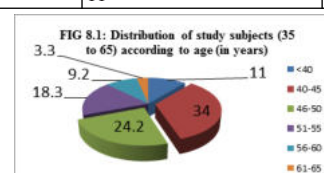
III. Results

1. AGE

Most of the study subjects that is 123(34%), were in age group 40-45 years, followed by 87(24.2%), were in the age group 46 to 50 years, 40 (11%) were in the age group <40 years but ≥35 years, 66(18.3%) were in the age group 51-55 years, 33(9.2%) were in the age group 56-60 years and 11(3.3%) were in the group 61-65 years. This has been shown below in tabular and graphic format (table 8.1 and figure 8.1).

TABLE 8.1: Distribution of study subjects (35 to 65 years) according to age

Age	Frequency (n=360)	Percentage (%)
<40	40	11
40-45	123	34
46-50	87	24.2
51-55	66	18.3
56-60	33	9.2
61-65	11	3.3



2. BONE MINERAL DENSITY

In the present study, 35.8%, 39.5% & 24.7% subjects are normal, osteopenic & osteoporotic respectively according to BMD. Thus, the prevalence of osteoporosis in our study is 24.7% as shown in table 8.2 and figure 8.2.

Table 8.2: Distribution of the study subjects according to Bone mineral density (T value)

Bone mineral density (BMD)	Number (n=360)	Percentage (%)
Normal	129	35.8
Osteopenia	142	39.5
Osteoporosis	89	24.7

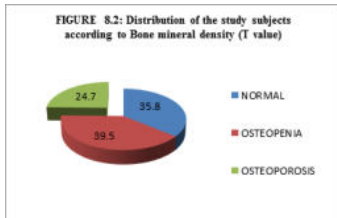
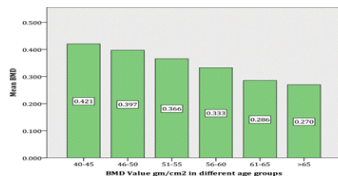


FIGURE 8.3: Mean BMD in different age groups



3. MENOPAUSE AND BMD

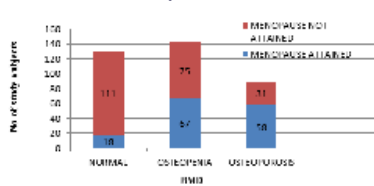
In the present study, among 143 subjects who had attained menopause, 40.6% had osteoporosis, 46.8% had osteopenia and 12.6% had normal bone mineral density. There is statistical significance between BMD and menopause status as shown in table 8.3 and figure 8.4.

Table 8.3: Association between menopause status and bone mineral density

BMD	Menopause attained		OR (95% CI)	p value
	No	Yes		
Normal	111	18 (12.6)	Ref.	
Osteopenia	75	67 (46.8)	5.50 (3.03-10.01)	< 0.0001*
Osteoporosis	31	58 (40.6)	11.54 (5.95-22.37)	< 0.0001*

* p value of statistical significance; OR: OddsRatio; CI: Confidence interval

FIGURE 8.4: Distribution of the subjects according to menopause status and bone mineral density



4. AGE OF MENOPAUSE AND BMD

In the present study, out of 89 osteoporotic patients, most of them that is 45 (50.6%) belong to age group 40-45 years, followed by 12 (13.5%) belong to age group 46-50 years, 1 (1.1%) belong to age group 51-55 years and 31 (34.8%) are yet to attain menopause. There is statistical significance between age of attainment of menopause and osteoporosis. And it indicates early onset menopause is associated with Osteoporosis. This has been shown in table 8.4.

Table 8.4: Association between age of attainment of menopause and osteoporosis

Age of attainment of menopause	Normal n (%)	Osteoporosis n (%)	OR (95% CI)	p value
40-45	9 (7.0)	45 (50.6)	17.90 (7.89-40.61)	< 0.0001*
46-50	8 (6.2)	12 (13.5)	5.37 (2.02-14.30)	0.001*
51-55	1 (0.8)	1 (1.1)	3.58 (0.22 - 58.90)	0.372
yet to attain menopause	111 (78.2)	31 (34.8)	Ref.	

* p value of statistical significance; OR: Odds Ratio; CI: Confidence interval

Age of attainment of menopause	Normal n (%)	Osteopenia n (%)	Osteoporosis n (%)	OR (95% CI)	p value
40-45	9 (7.0)	45 (50.6)	17.90 (7.89-40.61)	< 0.0001*	
46-50	8 (6.2)	12 (13.5)	5.37 (2.02-14.30)	0.001*	
51-55	1 (0.8)	1 (1.1)	3.58 (0.22 - 58.90)	0.372	
yet to attain menopause	111 (78.2)	31 (34.8)	Ref.		

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5. DURATION OF MENOPAUSE AND BMD

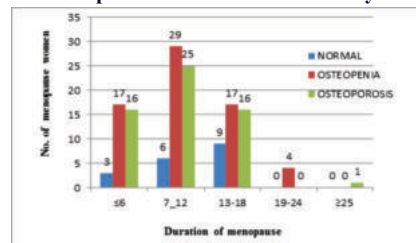
In the present study, out of 143 menopause subjects, 36 (25.1%) had duration of menopause of ≤6 years, 60 (41.9%) had duration of menopause of 7-12 years, 42 (29.3%) had duration of menopause of 13-18 years, 4 (2.8%) had duration of menopause of 19-24 years and 1 (0.9%) had duration of menopause of ≥25 years.

In the present study, most of the subjects that is 16 (44.4%) had osteoporosis, 17 (47.2%) had osteopenia and 3 (8.3%) had normal BMD, who had a duration of menopause of ≤6 years, followed by 25 (41.7%) had osteoporosis, 29 (48.3%) had osteopenia and 6 (10%) had normal BMD, who had a duration of menopause of 7-12 years, followed by 16 (38.1%) had osteoporosis, 17 (40.5%) had osteopenia and 9 (21.4%) had normal BMD, who had a duration of menopause of 13-18 years, followed by 4 (100%) had only osteopenia, who had a duration of menopause of 19-24 years and only 1 (100%) subject had osteoporosis, who a duration of menopause of ≥25 years. These have been shown in table 8.5 and figure 8.5.

Table 8.5: Distribution of the study subjects (n=143) according to duration of menopause and bone mineral density

Duration of menopause (In years)	Normal (+1 to -1) (n=18)	Osteopenia (-1 to -2.5) (n=67)	Osteoporosis (-2.5 or less) (n=58)	Total (n=143)
≤6	3 (8.3%)	17 (47.2%)	16 (44.4%)	36 (25.1%)
7-12	6 (10.0%)	29 (48.3%)	25 (41.7%)	60 (41.9%)
13-18	9 (21.4%)	17 (40.5%)	16 (38.1%)	42 (29.3%)
19-24	0 (0.0%)	4 (100.0%)	0 (0.0%)	4 (2.8%)
≥25	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (0.9%)

FIGURE 8.5: Distribution of the study subjects (n=143) according to duration of menopause and bone mineral density



DISCUSSION

1. In the present community study, we studied the prevalence of osteoporosis in 360 middle-aged to elderly tea garden women of the Jorhat district. Table 8.1 and figure 8.1 illustrate the age-wise distribution of the study participants. Most of the study subjects that is 123 (34%), were in age group 40-45 years, followed by 87 (24.2%), were in the age group 46 to 50 years. Therefore, 58.2% were in the age group 40 to 50 years. The mean age was 48.04 ± 6.83 years. This is supported by a study done by Vaasanthi PA et al, where 252 (63%) were in the age group of 40-49 years with the mean age of 50.91 (7). In a study done by borgohain et al, 54.3% were in the age group 45-65 years (8). In other study done by sridevi et al, (39%) of the subjects were in the age group of 41-50 years. (9)

2. The prevalence of osteoporosis was 24.7% (89/360). (table 8.2 and figure 8.2) Out of the 360 participants in the age group of ≤50, there were 114 regular bone mineral density patients, 92 osteopenic patients, and 49 osteoporotic patients. In the age group > 50 years, there were 15 normal bone mineral density patients, 50 osteopenic patients and 40 osteoporotic patients, making 231 osteopenic and osteoporotic patients. The mean value of BMD was 0.39 ± 0.13 g/cm2. Thus, the study witnessed an age-dependent decline in the bone mineral density of the participants (Fig. 8.3). BMD decline within the cohort was

statistically significant ($\chi^2 = 26.07$, $p = 0.000$). Consequently, females in their 50s were also at an elevated risk of suffering from osteoporosis - 51-55 years (4.24, 95% CI 1.30-13.78) and the 55-60 years age group (7.15, 95% CI 3.15-16.21). A study done by Nikose et al revealed a prevalence of osteoporosis in 32.13% and osteopenia in 35.78% of females in age between 20 and 76 years and the mean BMD was 0.354 ± 0.096 gm/cm². (6) In a study done by vaasanthi et al, the prevalence of osteoporosis is 17.25 % in women aged 40-60 years (7). In another study done by borgoahin et al, the prevalence of osteoporosis in vulnerable adults of north-eastern state was 29.4%. (8)

3. The study evaluated several parameters to understand factors influencing female BMD in the community. BMD was significantly lower among females who have attained menopause ($\chi^2 = 44.03$, $p = 0.000$) and frequently manifested as osteoporosis and osteopenia in this group. The mean age at menopause was 44.7 ± 2.1 years. From the univariate logistic regression analysis, it was evident that females in the 40-45 (17.90, 95% CI 7.89-40.61) and the 46-50 years age group (5.37, 95% CI 2.02-14.30) were at an elevated risk of developing osteoporosis (Table 8.4). 55% of women who had osteoporosis were postmenopausal as revealed by vaasanthi et al in their study (7). Women are always at higher risk of developing osteoporosis particularly at post-menopausal age, as reported by gupta et al (10). 44.3% were postmenopausal in a study done by kadam et al and they reported that these postmenopausal women were at increase risk of developing osteoporosis. (1) Table 8.5 summarizes the distribution of BMD among females who have attained menopause.

V. Conclusion

This study was conducted to study the prevalence of osteoporosis in middle-aged to elderly tea garden women of Jorhat district and to determine the associated factors influencing the osteoporosis. The present study to our best knowledge is the largest study on tea garden women of Assam.

All the study subjects were between 35 to 65 years of age. An overwhelming majority that is 58.2% of the patients were in the 5th decade of life of which 34% of the subjects were in the age group 40-45 years followed by 24.2% of the subjects were in the age group 46- 50 years. 24.7% of the subjects were osteoporotic, followed by 39.5% were osteopenic and 35.8 had normal BMD. Thus, the prevalence of osteoporosis in our study, in the female population at tea gardens of Jorhat district was 24.7%. 40.6 % of the post-menopausal women were osteoporotic whereas 46.8% were osteopenic.

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