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Comparision of Prevalence and Risk Factors for Osteoporosis in Pre and Post Menopausal Women in India

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ABSTRACT

Osteoporosis is the silently progressing metabolic bone disease is widely prevalent in India and osteoporotic fractures are a common cause of morbidity and mortality in post menopausal women. So it is of utmost importance that we take immediate steps to create awareness and treatment of this disease Aim: determine the prevalence of osteoporosis among pre and post menopausal women and identify the risk factors associated with the osteoporosis. The present study was a cross-sectional study, 150 women from each group i.e. premenopausal and postmenopausal women were selected for this study. The Bone Mineral Density (BMD) was measured by Bone Densitometer and osteoporosis was diagnosed according to T-score. Using statistical methods, risk factors for osteoporosis were analysed and compared. Results: The mean age in the pre menopausal women was 36.50±2.74 and among posts menopausal women 52.67±9.41 years. Prevalence of osteoporosis was higher among postmenopausal women (70%) than pre menopausal women (24%). Advanced age, Physical inactivity, family history of osteoporosis, calcium and vitamin D deficiency emerged as significant risk factors of osteoporosis among post menopausal women. Higher prevalence of osteoporosis among post menopausal women as compared to pre-menopausal women. The public awareness is important, and strategies to identify and manage osteoporosis in the primary care setting needs to be established and implemented.

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Key Words

Pre-menopausal women, post-menopausal women, osteoporosis, bone mineral density

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INTRODUCTION

Osteoporosis, a multifactorial systemic skeletal disease, is characterized by low bone mineral density (BMD) and micro-architectural deterioration of bone tissue resulting in bone fragility and an increased risk of fractures[1-2]. Osteoporosis is a silent disease; if it remains undiagnosed and untreated nearly 60% of women will sustain fragility fractures during their life time. The reported prevalence of osteoporosis among Indian women varies between 53%-81[3]. Menopause is defined as the permanent cessation of menses resulting from reduced ovarian hormone secretion that occurs naturally or is induced by surgery, chemotherapy or radiation[4]. A low bone density value in a very elderly woman is likely due to progressive bone loss over many years since menopause. In this process bone mass is reduced and bone quality or architecture also deteriorates, adding further to skeletal fragility[5]. Osteoporosis is commonly seen in postmenopausal women, resulting in fragile and weak bones highly susceptible to fractures. Several studies have shown an age related decrease of bone mineral content (BMC) and density (BMD) that occurs predominantly after the menopause[6-7]. Calcium has definite role in bone metabolism is particularly important in elderly women because low dietary intake have been associated with reduced bone mineral density[8]. The prevalence of osteoporosis increases with age for all sites and by the World Health Organization (WHO) definition, up to 70% of women over the age of 80 years have osteoporosis[9]. Osteoporosis is a condition that can be prevented and treated if diagnosed early and accurately. Unfortunately, it is often undiagnosed until a fracture occurs. Therefore, the number of people who are screened for this disease must be increased. According to the National Osteoporosis Foundation, increasing awareness is the key to prevention and early detection of osteoporosis. Unfortunately, many individuals are either unaware of their risk of developing osteoporosis, uninformed of preventive behaviors or have failed to engage in preventive behaviors as they view osteoporosis as a distant threat[10-11].

Aims and objectives: Aim of this study was to evaluate prevalence and risk factors of osteoporosis in pre-menopausal and post menopausal women.

MATERIALS and METHODS

The present study is a prospective cross sectional study that was conducted in the collaboration of the department of orthopedics and OBG, in a tertiary care center, central India. All pre and post menopausal women attending outpatients department or admitted in our hospital during the study period were enrolled in this study.

Inclusion criteria:

- Pre menopausal women between the ages of 25-44 years
- Post menopausal women between the ages of 46-70 years
- Women provided written informed consent for the study

Exclusion criteria:

- Women <25 or >70 years of age group
- Women with chronic medical illness such as diabetes, renal, thyroid disorders
- Patients those using medications that might affect bone mass such as corticosteroids, diuretics and hormone therapy
- Women those not provide consent for the study

Study subjects were divided into 2 groups:

Group 1: pre-menopausal women (within age group of 25-44 years).

Group 2: Post-menopausal women (between the age group of 45-70 years).

A detailed medical, obstetrical, menstrual and drug history was recorded in a proforma designated for the study. Information on past fracture history, family history of fracture and osteoporosis, socioeconomic status, occupation, educational level, daily activities, sunlight exposure and weight-bearing exercises was collected and recorded. Symptoms such as knee pain, back pain were elicited and BMI was calculated.

Their physical standard was noted in the form of height and weight was measured by a trained person, with the women in light cloth and without footwear. Body mass index (BMI) was calculated using the formula weight (kg^{-1} height $(cm)^2$.

After explaining the procedure to the participants, the BMD of the right calcaneal bone was measured using Lunar Achilles Ultrasound Densitometer (software version 1.3) which was calibrated before usage.

The machine converts the BMD values into T-score (WHO). A T-score of -1 and above was considered normal; T-score between -1 and -2.5 was considered osteopenia and T-score -2.5 and below considered osteoporosis.

Statistical analysis: Categorical outcomes were compared between study groups using Chi square test /Fisher's Exact test and $p<0.05$ was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

RESULTS

A total of 300 pre and post menopausal women were enrolled in this study (150 were pre-menopausal and 150 was post menopausal). Prevalence of osteoporosis was significantly higher in post menopausal women (70%) as compared to pre-menopausal women (24%) (Fig. 1).

The mean age of the pre menopausal women was participants were 36.50±2.74 (range-25-44), whereas mean age among post menopausal women was 52.67±9.41 (range 45-70 years). Most of the participants belongs to middle socio-economic status (46%) and majority of them, was Multipara.

On assessment of the risk factors, family history of the osteoporosis and vitamin D deficiency was the significantly associated with the osteoporosis ($p<0.05$). Previous history of fracture, calcium intake, Exposure to sunlight, sedentary life style, Caffeinated drinks and hormone replacement therapy were the other common risk factors of osteoporosis but not associated significantly ($p>0.05$). Details shown in Table 2.

DISCUSSION

Osteoporosis is a major global health problem affecting 200 million women worldwide.

Approximately one-tenth of women aged 60, one-fifth of women aged 70, two-fifths of women aged 80 and two-thirds of women aged 90 are affected[12]. Being a major health issue, this study was undertaken to know the prevalence of osteoporosis, its risk factors the public awareness about the disease, so that preventive measures can be undertaken.

The prevalence of osteoporosis in our study was significantly higher among post menopausal women (70%) as compared to pre menopausal women (24%), similar to our study, other Indian studies have also shown a high prevalence of osteoporosis in post menopausal women: Mishra *et al*.[13], Shaki *et al*.[14] and Babu *et al*.[15].

Ageing is an important risk factor for osteoporosis and the prevalence increases with age. In women, there is gradual loss of skeletal mass beginning in the fourth to fifth decade after the age of 50 years the bone is lost at a rate of 0.75-1% per year which increases to a rate of 2%-3% after menopause. Unless timely action is taken, in the years to come, India is going to face an enormous number of elderly populations suffering from osteoporosis and its morbidity.

Table 1: Descriptive analysis of socio-demographic details among pre and post menopausal women

Variables	Pre menopausal (%)	Post menopausal (%)	p-value
Mean age ±SD (range)	36.50±2.74	52.67±9.41	0.23
	(25-44)	(45-70)	
Age at menarche	13.3±1.9	14.3±1.8	0.56
Age at menopause	-	49.43±4.52	
BMI (Kg m^{-2})			
Under weight (<18.5)	22 (14.7)	18 (12%)	
	0.555		
Normal (18.5-24.9)	85 (56.7)	81 (54	
Obese (>24.9)	43 (28.6)	51 (34)	
Socio-economic status			
Lower	42 (28)	38 (25.3)	0.852
Middle	69 (46)	70 (46.7)	
Upper	39 (26)	42 (28)	
Parity			
Nullipara	21 (14)	18 (12)	0.606
Multipara	129 (86)	132 (88)	

Table 2: Risk factors for osteoporosis among pre and post menopausal women

Risk factors		Post menopausal (%)	Post menopausal	p-value
Family history of osteoporosis	Present	17 (11.3)	28 (18.7)	
	Absent	133 (88.7)	122 (81.3)	
Previous history of fracture	Present	12 (8)	19 (12.7)	
	Absent	138 (92)	131 (87.3)	
Calcium intake	Adequate	70 (46.7)	72 (48)	
	Not adequate	80 (53.3)	78 (52)	
Exposure to sunlight	Adequate	40 (26.6%)	37 (24.7)	0.742
	Minimal	85 (56.7)	83 (55.3)	
	Inadequate	25 (16.7)	30 (20)	
Sedentary life	Yes	47 (31.3)	54 (36)	0.392
	No	103 (68.7)	96 (64)	
Vitamin D deficiency	Yes	32 (21.3)	50 (33.3)	0.019
	No	118 (78.7)	100 (66.7)	
History of hormonal replacement medication	Present	34 (22.7)	45 (30)	0.149
	Absent	116 (77.3)	105 (70)	
	No	144 (96)	141 (94)	
Caffeinated drinks	Yes	48 (32)	53 (35.3)	0.541
	No	102 (68)	97 (64.7)	

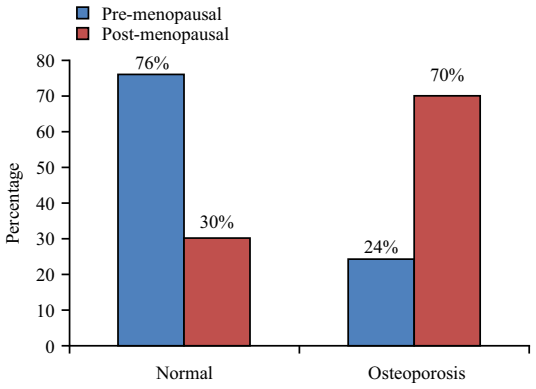

Fig 1: Prevalence of osteoporosis among pre and postmenopausal women according to T score

In our study, the prevalence of osteoporosis was statistically increases with the age, low levels of BMD was reported in women aged 60-70 years, our results concordance with the Monique *et al*.[16] and Seema *et al*.[17].

In present study most of the women were belongs to middle socio-economic class and majority of them was multiparous, comparable with the other studies. Thangappah *et al*.[18] and Aggarwal *et al*.[19].

The knowledge on osteoporosis in younger women was very poor compared to relatively older females. However, women belonging to higher socioeconomic status and better education had slightly more knowledge about osteoporosis compared to those with a low education level, regardless of age. The majority of women had modest knowledge on osteoporosis. Younger women were at increased risk for low bone mass and premature osteoporosis[20].

The risk score for hip fracture was significantly higher among post-menopausal women, because of osteoporotic and osteopenic changes. There is increasing concern that a research highlighted the importance of fracture risk assessment among post-menopausal women for the early detection of fracture risk and thus the prevention of fragility fracture[21].

Meeta *et al*.[22] reported that lack of exercise is found to be significantly associated with lower BMD in Indian women. Physical inactivity and a sedentary lifestyle lead to reduced muscle strength, and are detrimental to bone health. In this study, there was no statistically significant difference in the BMD scores whether the women were sedentary or active.

In this study serum vitamin D level is significantly lower ($p<0.05$) in postmenopausal women when compared to premenopausal women. Vitamin D level also had a positive correlation with T score in both the groups which explains role of vitamin D in osteoporosis, correlates with the many other studies like. Souberbielle *et al*.[23], Holick *et al*.[24] and D'Silva *et al*.[25].

Calcium and vitamin D are the two main nutrients involved in bone health and they play a major role in influencing the risk of osteoporosis. Although India is a sun rich country, several reports state that Indians suffer from vitamin D deficiency due to the low sun exposure, traditional clothing, inadequate dietary intake and highly pigmented skin[26].

Family history of osteoporosis also significantly associated with the osteoporosis among post menopausal women observed in current study, consistent finding reported by salari *et al*.[27].

Decreased intake of calcium is a significant risk factor of osteoporosis. Most Indian diets have a higher ratio of phytates to calcium, which may interfere with calcium absorption from the already calcium-deficient diets, thus predisposing to lower BMD and increasing the risk of osteoporosis[28]. The beneficial effect of calcium intake on bone mass in postmenopausal women may be modified by factors including age, number of years since menopause, baseline calcium intake before supplementation and possibly physical activity level. In addition the effect of calcium may be greater at the sites with more cortical bone[29].

A study shown that in the urban population only 10-15% are familiar with the disease and the awareness is more in the educated and those with a family history of the fractures[30].

Osteoporosis is extensively studied in the literature and many factors affect its development. Increasing age, especially when women become postmenopausal, low education level, frequent childbirth, low socioeconomic status, low education, and poor dietary intake have been associated with higher prevalence of osteoporosis.

CONCLUSION

The prevalence of osteoporosis is high among post menopausal women as compared to pre-menopausal. Age of the individual, post menopausal status and duration of menopause have emerged as major risk factors related to osteoporosis. It is, therefore, necessary to create awareness among these post menopausal women, about the risk of osteoporosis, educate them regarding preventive measures and implementing screening strategies to pick up osteoporosis early and treat it adequately.

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