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Research Article

**A DESCRIPTIVE STUDY TO DETERMINE THE EFFECTS
OF HORMONES ON BONE MINERAL DENSITY IN
PREMENOPAUSAL AND POSTMENOPAUSAL FEMALE**

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Abstract:

Objective: To determine the hormonal effects on bone mineral density in premenopausal and postmenopausal women to detect bone mineral density, osteopenia and osteoporosis in these women.

Material and Methods: This was a cross sectional study conducted in In the Medicine Department of Services Hospital Lahore from May 2019 to July 2019. There were 34 premenopausal and 33 postmenopausal women sampled and their bone mineral densities were determined using the DXL calscan heel densitometer. The weight and height of each individual were determined to gauge the body mass index (BMI). To determine the variation between the two groups, a t-test was performed, and Pearson's correlation coefficient was used to determine the correlation between the two groups.

Results: In postmenopausal women, Bone mineral density (T score) was significantly lower than in premenopausal women ($p = 0.000$). Osteopenia was present in 70.59% of premenopausal women and 63.64% of postmenopausal women and osteoporosis was present in 30.30% of postmenopausal women. There was a static negative correlation ($p = 0.0016$) between bone mineral density and age in postmenopausal women.

Conclusion: Bone mineral density decreased significantly in postmenopausal women and this density decreased with age. More than two thirds of premenopausal and postmenopausal women were found to demonstrate osteopenia, while 30% of postmenopausal women were osteoporotic.

Key words: Bone mineral density (BMD), osteoporosis, osteopenia, Premenopausal, postmenopausal.

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INTRODUCTION:

The bone consists of a hard-organic matrix, which is strongly fortified by bone minerals in the form of a calcium salt ^[1]. The rate of bone turnover and bone mineralization are under control of some hormones in the human body. Parathyroid hormone helps to maintain calcium levels in blood and causes bone resorption ^[2]. Estrogen has a significant effect on bone remodeling in women by inhibiting the production of interleukin-6 (IL-6), which controls the timing of osteoclast apoptosis and reduces bone resorption. Estrogen deficiency, therefore, causes the prolongation of osteoclast life. In females, at 40-50 years of age, sexual cycle becomes irregular monthly, ovulation does not occur in many cycles and, consequently, the cycle called menopause stops ^[3]. The female sex hormones are hardly reduced. In females, two main causes of bone loss are age-related processes and lack of estrogen after menopause. Immediately after menopause, bone turnover in women rises to peak levels. In addition, estrogen deficiency can cause calcium loss due to indirect effects on extra-cortical calcium homeostasis. Calcitonin reduces bone loss and bone resorption. Like estrogen, calcitonin result in slight increase in bone mass ^[4]. Bone density is one of the main determinants of osteoporotic fractures in the elderly. Bone mineral density (BMD) is the most readily available measure that is strongly associated with bone fragility. The quantitative ultrasound (QUS) technique is a safe, painless and non-invasive technique to evaluate bone mineral density. For osteoporotic fracture, an important risk factor is Low mineral density ^[5]. This study was planned to determine the bone mineral density in premenopausal and postmenopausal women and to detect osteoporosis and osteopenia in these women.

MATERIALS AND METHODS:

This was a cross sectional study conducted in In the Medicine Department of Services Hospital Lahore from May 2019 to July 2019. There were 34 premenopausal and 33 postmenopausal women sampled and their bone mineral densities were determined using the DXL calscan heel densitometer. The weight and height of each individual were determined to gauge the body mass index (BMI). To determine the variation between the two groups, a t-test was performed, and Pearson's correlation coefficient was used to determine the correlation between the two groups. According to the selection criteria, the subjects were selected from the general population. The women selected excluded those suffering from diabetes mellitus, hypertension, those who had undergone hysterectomy, and those who had a history of hormone replacement therapy or a history of fractures. Informed consent was taken from each subject. The bone mineral density was determined by a DXL Calscan heel densitometer. The mean values \pm SD of all the variables were determined. To determine the importance of the difference of parameters between the two groups, Student's t test was applied. To determine the correlation between different parameters, the Pearson correlation coefficient was determined.

RESULTS:

A total of 67 patients were selected for the analysis. The age distribution of the patients was between 40-55 years of age. Demographic details are given below in tables.

Table : Age distribution of subjects:

Age (yr)	N	% age
35-40	07	11
41-45	09	13
46-50	18	27
51-55	17	25
56-60	16	23
Total	67	100

Bone mineral density (T score) decreased significantly in postmenopausal women ($p = 0.000$) compared to premenopausal women -2.09 ± 0.93 (-1.32 ± 0.70) (Table 2), 70.59% of premenopausal women and 63.64 % of postmenopausal women had osteopenia.

Table 1. Comparison of anthropometric features between premenopausal and postmenopausal women

Parameter s	Premenopaus al (n=34)	Postmeno- pausal (n=33)	p- value
Age (years)	36.53±3.90 (30-42)	54.85±6.25 (47-69)	-
Height (cm)	154.62±4.84	154.70±5.35	0.949*
Weight(Kg)	72.07±12.78	66.94±13.66	0.117*
BMI(Kg/m ²)	30.17±5.32	27.85±5.25	0.076*

Values are given as mean±SD

Range of age is given in parenthesis

*Non-significant

Table 2. Bone mineral density (T Score), in premenopausal and postmenopausal women

Parameters	Premeno- pausal (n=34)	Postmenopaus al (n=33)	p- value
Bone mineral density (T score)	-1.32±0.70	-2.09±0.93	0.000*

Values are given as Mean±SD

*statistically highly significant

Eight of the 34 (30.30%) postmenopausal women had osteoporosis, while only 01 (2.49%) of the 33 women had osteoporosis before menopause. (Table 3) There was no significant relation between bone mineral density (T score) and age in postmenopausal women ($r = -0.416$, $p = 0.016$).

Table 3: Social and demographics details of subjects

	N	%age
Educational status		
Illiterate	07	11
Primary	09	13
Secondary	18	27
Higher secondary	07	11
Graduate	16	23
Post graduate	10	13
Monthly income		
Less than 10000	12	18
More than 10000	15	22
Non-employee	40	60
Residence		
Rural	45	67
Urban	22	33

Table 3. Number and percentage of premenopausal and postmenopausal women having normal bone mineral density, osteopenia and osteoporosis.

Bone mineral density (T-score)	Premenopausal women (n=34)		Postmenopausal women (n=33)	
	n=	%age	n=	%age
Normal (>-1)	09	26.47	02	06.06
Osteopenia (-1 to 2.4)	24	70.59	21	63.64
Osteoporosis (<-2.5)	01	2.94	10	30.30

DISCUSSION:

In this study, bone mineral density was evaluated in postmenopausal and premenopausal women. According to the WHO criteria, premenopausal women were obese (BMI > 30 kg / m²) and postmenopausal women were overweight (BMI > 25 kg / m²) [6-8]. Bone mineral density (BMD) was lower significantly in postmenopausal women than in premenopausal women (p = 0.000). According to the criteria of the World Health Organization, BMD osteopenia from -1 to -2.5 is considered to be less than -2.5 osteoporosis [9-11]. It has been reported that postmenopausal women have a lower bone mass than premenopausal and peri menopausal women. In this study, 70.59% of premenopausal women and 63.64% of postmenopausal women had osteopenia [12]. Of the 33 postmenopausal women, 10 (30.30%) had osteoporosis (BMD > -2.5) and only 34 (2.94%) of the 34 premenopausal women had osteoporosis (BMD > -2.5). In postmenopausal women, BMD (T score) showed a significant negative correlation with increasing age [13]. The low risk of BMD (osteopenia and osteoporosis) is linked with menopausal status and age. Decreased ovarian function before menopause is accompanied by an altered calcium metabolism and a decrease in bone mass. In a Quetta study, osteopenia was found in 43.4% and osteoporosis in 12.9% of premenopausal women [14]. Another study in Karachi reported that 55% of premenopausal women had low BMD and 73.9% of postmenopausal women had low BMD [15].

CONCLUSION:

While premenopausal women were obese, it was found that postmenopausal women were overweight. Two third of the premenopausal and postmenopausal women had osteopenia and 30% of

the postmenopausal women had osteoporosis. In postmenopausal women, bone mineral density decreased markedly with age.

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