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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  $-2.09 \pm 0.93$  ( $-1.32 \pm 0.70$ ) (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

<b>Parameters</b>	<b>Premenopausal (n=34)</b>	<b>Postmenopausal (n=33)</b>	<b>p-value</b>
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 <sup>2</sup> )	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

<b>Parameters</b>	<b>Premenopausal (n=34)</b>	<b>Postmenopausal (n=33)</b>	<b>p-value</b>
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
<b>Educational status</b>		
Illiterate	07	11
Primary	09	13
Secondary	18	27
Higher secondary	07	11
Graduate	16	23
Post graduate	10	13
<b>Monthly income</b>		
Less than 10000	12	18
More than 10000	15	22
Non-employee	40	60
<b>Residence</b>		
Rural	45	67
Urban	22	33

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

<b>Bone mineral density (T-score)</b>	<b>Premenopausal women (n=34)</b>		<b>Postmenopausal women (n=33)</b>	
	<b>n=</b>	<b>%age</b>	<b>n=</b>	<b>%age</b>
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 ( $BMI > 30 \text{ kg} / \text{m}^2$ ) and postmenopausal women were overweight ( $BMI > 25 \text{ kg} / \text{m}^2$ ) [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.

#### REFERENCES:

- Lin, Jie, Lijin Chen, Saili Ni, Yuan Ru, Sunyue Ye, Xiaohua Fu, Da Gan et al. "Association between sleep quality and bone mineral density in Chinese women vary by age and menopausal status." *Sleep medicine* 53 (2019): 75-80.
- Fotani, Shilpa, Anuradha Bhatsange, Alka Waghmare, Rohit Tekwani, Mathew Rinnu, and Amol Agrawal. "Cone beam computed tomography (CBCT) analysis of alveolar bone density in pre-menopausal and post-menopausal women with chronic periodontitis." *World Journal of Advanced Scientific Research* 2 (2019): 1-11.
- Feurer, Elodie, Casina Kan, Martine Croset, Elisabeth Sornay-Rendu, and Roland Chapurlat. "Lack of Association Between Select Circulating miRNAs and Bone Mass, Turnover, and Fractures: Data From the OFELY Cohort." *Journal of Bone and Mineral Research* (2019).
- Kato, Camila Nao, Núbia PK Tavares, Sâmila G. Barra, Tânia MP Amaral, Cláudia B. Brasileiro, Lucas G. Abreu, and Ricardo A. Mesquita. "Digital panoramic radiography and cone-beam CT as ancillary tools to detect low bone mineral density in post-menopausal women." *Dentomaxillofacial Radiology* 48, no. 2 (2019): 20180254.
- Yu, Lisha, Huanhuan Qi, Guohua An, Jun Bao, Bo Ma, Jianwei Zhu, Gang Ouyang, Pengling Zhang, Hongwei Fan, and Qi Zhang.

- "Association between metabolic profiles in urine and bone mineral density of pre-and postmenopausal Chinese women." *Menopause* 26, no. 1 (2019): 94-102.
6. Irmayati, S., Reagan, M., & Legiran, L. (2019). Sleep and Bone Density: A Study on Postmenopausal Indonesian Women. *BioScientia Medicina*, 3(1), 38-50.
  7. Zuo, Hongling, Aijun Sun, Lihong Gao, Wei Xue, Yan Deng, Yanfang Wang, Shiyang Zhu, Xiao Ma, and Hong Xin. "Effect of Menopausal Hormone Therapy on Bone Mineral Density in Chinese Women: A 2-Year, Prospective, OpenLabel, Randomized-Controlled Trial." *Medical Science Monitor* 25 (2019): 819-826.
  8. Xu, Lili, Yue Han, Yan hua Zhang, Xiao ying Zhang, Chun Fan, Hai tao Huang, Peng Li, and Zhuang Geng. "2 Correlation analysis of bone mineral density and static balance ability in postmenopausal women." (2019): A1-A1.
  9. Silva, TR da, C. C. Martins, L. L. Ferreira, and P. M. Spritzer. "Mediterranean diet is associated with bone mineral density and muscle mass in postmenopausal women." *Climacteric*(2019): 1-7.
  10. Xia, Jumei, Ran Luo, Shuiming Guo, Yi Yang, Shuwang Ge, Gang Xu, and Rui Zeng. "Prevalence and Risk Factors of Reduced Bone Mineral Density in Systemic Lupus Erythematosus Patients: A Meta-Analysis." *BioMed Research International* 2019 (2019).
  11. Filardi, T., V. Carnevale, R. Massoud, C. Russo, L. Nieddu, F. Tavaglione, I. Turinese, A. Lenzi, E. Romagnoli, and S. Morano. "High serum osteopontin levels are associated with prevalent fractures and worse lipid profile in postmenopausal women with type 2 diabetes." *Journal of endocrinological investigation* 42, no. 3 (2019): 295-301.
  12. Cauley, Jane A., Kristine Ruppert, Yinjuan Lian, Joel S. Finkelstein, Carrie A. KarvonenGutierrez, Sioban D. Harlow, Joan C. Lo, SherriAnn M. Burnett-Bowie, Arun Karlamangla, and Gail A. Greendale. "Serum Sex Hormones and the Risk of Fracture across the Menopausal Transition: Study of Women's Health Across the Nation." *The Journal of Clinical Endocrinology & Metabolism* (2019).
  13. Livi, Lorenzo, Vieri Scotti, Isacco Desideri, Calogero Saieva, Sara Cecchini, Giulio Francolini, Carlotta Becherini et al. "Phase 2 placebo-controlled, single-blind trial to evaluate the impact of oral ibandronate on bone mineral density in osteopenic breast cancer patients receiving adjuvant aromatase inhibitors: 5-year results of the single-centre BONADIUV trial." *European Journal of Cancer* 108 (2019): 100-110.
  14. Ganji, Reza, Meysam Moghboli, Ramin Sadeghi, Golnaz Bayat, and Azita Ganji. "Prevalence of osteoporosis and osteopenia in men and premenopausal women with celiac disease: a systematic review." *Nutrition journal* 18, no. 1 (2019): 9.
  15. Madansingh, Stefan I., Dennis H. Murphree, Kenton R. Kaufman, and Emma Fortune. "Assessment of Gait Kinetics in PostMenopausal Women Using Tri-Axial Ankle Accelerometers during Barefoot Walking." *Gait & posture*(2019).