

A comparative study on parathyroid hormone among premenopausal and postmenopausal women

Pratima D Khatake¹, Snehalata Mali^{2*}

¹Assistant Professor, Department of Physiology, Great Eastern Medical School and Hospital, Srikakulam, Andhra Pradesh, INDIA.

²Assistant Professor, Department of Physiology, Government Medical College, Latur, Maharashtra, INDIA.

Email: pratima8687@gmail.com

Abstract

Background: Calcium is one of the main bone-forming minerals and an appropriate supply to bone is essential at all stages of life. Calcium plays important role in osteoporosis pathology. The two main regulators of calcium homeostasis are PTH and vitamin D. **Objective:** To compare parathyroid hormone levels in premenopausal and postmenopausal women. **Material and Methods:** The present study was a cross-sectional study conducted in Department of Physiology, Government Medical College, Latur. 30 premenopausal women with age between 38 to 45 years and 30 postmenopausal women between 50 to 57 years age group were selected from general population for the study. The study subjects with medical, surgical or gynecological abnormalities were excluded. The present study was approved by the Institution Ethical Committee. The informed written consent was taken from subjects. **Results:** Postmenopausal women had significantly lower serum calcium (8.13 ± 0.43) as compared to premenopausal women (9.36 ± 0.50). Postmenopausal women have significantly higher levels of serum parathyroid hormone as compared to premenopausal women but within the normal range limits and the difference was statistically significant ($p < 0.0001$). **Conclusion:** This study suggests that there was increase in serum PTH levels in postmenopausal women as compared to premenopausal women.

Key Words: Parathyroid hormone, Postmenopausal Women.

*Address for Correspondence:

Dr. Pratima D. Khatake, Assistant Professor, Department of Physiology, Great Eastern Medical School and Hospital, Srikakulam, Andhra Pradesh, INDIA.

Email: pratima8687@gmail.com

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INTRODUCTION

Calcium is an important mineral component of our diet. Calcium, a component of skeleton, soft tissues, and extra cellular fluid is the fifth most common element and the most prevalent cation found in the body.¹ Serum calcium is maintained within a narrow normal range, chiefly by resorption from the skeleton and alteration of urinary calcium loss and absorption from gut. Absorption is dependent on vitamin D sufficiency, presence of calcium

binders in diet (such as phosphate, oxalate and phytate), age group and physiological state.¹ Over the last 3 to 4 decades, the clinical implications of calcium deficiency are being better recognized, the economic burden of osteoporosis is increasing, and deficiency of vitamin D (important for calcium absorption) is being documented in tropical countries.² The clinical implications of calcium deficiency include rickets, poor bone mass accrual as well as poor peak bone mass due to poor accrual in childhood and adolescence, postmenopausal osteoporosis and osteoporosis of the elderly.² A normal functioning calcium homeostasis is essential for most functions in the human body. Calcium is one of the main bone-forming minerals and an appropriate supply to bone is essential at all stages of life. Calcium plays important role in osteoporosis pathology. The two main regulators of calcium homeostasis are PTH and vitamin D.^{3,4}

MATERIAL AND METHODS

The present study was a cross-sectional study conducted in Department of Physiology, Government Medical

College, Latur. 30 premenopausal women with age between 38 to 45 years and 30 postmenopausal women between 50 to 57 years age group were selected from general population for the study. The study subjects with medical, surgical or gynecological abnormalities were excluded. The present study was approved by the Institution Ethical Committee. The informed written consent was taken from study group after explaining the procedure to them. Serum intact parathyroid hormone was analyzed by fully automated Chemi Luminescent Immuno Assay. Serum calcium was measured on autoanalyser. The two groups were compared by using unpaired 't' test and p value of less than 0.05 was considered significant.

RESULTS

Table 1: Comparison of Serum Calcium levels in Premenopausal and Postmenopausal Women

Sr. No.	Parameter	Premenopausal (n=30)	Postmenopausal (n=30)	p- value
1	Serum calcium (mg/dl)	09.36 ± 0.50	08.13 ± 0.43	<0.0001*

(Values are expressed as Mean ± SD; * p value < 0.0001Significant)

Table 2: Comparison of Serum PTH level in Premenopausal and Postmenopausal Women

Sr. No.	Parameter	Premenopausal (n=30)	Postmenopausal (n=30)	p- value
1	Serum PTH (ng/L)	20.01 ± 5.31	45.32 ± 6.23	<0.0001*

(Values are expressed as Mean ± SD; * p value < 0.0001Significant)

DISCUSSION

The present cross-sectional study included thirty premenopausal and thirty postmenopausal women with age range of 38 to 45 years and 50 to 57 years respectively. The mean age was 39.63±3.12 and 55.35 ±3.34 years in pre and postmenopausal women respectively. Post menopausal women had significantly lower serum calcium as compared to premenopausal women (p<0.0001) as shown in table 1. Our result was comparable with that obtained by Hamid Javaid Qureshi *et al.*⁵, B.K. Jain *et al.*⁶, Indumati. V *et al.*⁷ Calcium balance depends on various factors, including the amount of calcium in the diet, the efficacy of absorption by intestine and excretion of calcium. There is extra urinary calcium loss during the postmenopausal period and calcium absorption in this age group is lower than young adulthood. The decreased concentration of calcium in postmenopausal women indicates that they are more prone to fractures and osteoporosis. Postmenopausal women have significantly higher levels of serum

parathyroid hormone as compared to premenopausal women but within the normal range limits and the difference is statistically significant (p<0.0001) as shown in table 2. Similar result was observed in following studies as – Mona M. Abaza, Wafaa S. Ragabet *al*⁸, Hamid Javaid Qureshi *et al*⁵ Strict calcium (Ca) homeostasis is essential for the human organism. The biologically active ionized calcium varies in serum within a very narrow span (8.8-10mg/dl) and controls important functions such as neurotransmission, muscle contraction, blood clotting and hormone secretion. The main regulator of serum Ca is PTH, secreted from the parathyroid glands and controlled by a tight feedback system. PTH acts via the PTH type 1 receptor (PTH1R) a class B G-protein-coupled receptor with seven trans-membrane domains mainly present bone, kidney and intestine. Vitamin D and to some extent calcitonin (in children) are also involved in calcium homeostasis. A few percent reduction of serum calcium is enough for the calcium sensing receptors (CaSR) in the parathyroid glands to induce a large increase in PTH secretion.⁹ In the kidneys, PTH acts directly on the tubules, increasing re-absorption of calcium and also inducing conversion of 25-hydroxy vitamin D (25OHD) into the active metabolite 1,25(OH)₂ vitamin D (1,25(OH)₂D).¹⁰ PTH and the active vitamin D is then both increasing serum calcium via their respective receptors in bone, intestine and kidney. The effect in bone tissue is increased bone resorption mediated through increased osteoclastic activity.¹¹ In the intestine PTH is suggested to facilitate calcium uptake through a direct mechanism.

CONCLUSION

This study suggests that there was increase in serum PTH levels in postmenopausal women as compared to premenopausal women.

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