

# To Investigate Premenopausal and Postmenopausal Women for Evaluation of their Serum Calcium, Calcitonin and Parathormone Levels

Pre and Postmenopausal Women with Serum Calcium, Calcitonin and Parathormone

Sara Sajjad, Syed Salman Shah, Tooba Khan, Hunya Amin, Dur E Shehwar Ali and Syed Shahmeer Raza

## ABSTRACT

**Objective:** To investigate premenopausal and postmenopausal groups of women and evaluate their serum levels of Calcium, Calcitonin and Parathormone.

**Study Design:** Cross-sectional/ Observational Study

**Place and Duration of Study:** This study was conducted at the Department of Physiology at Khyber Medical College/Teaching Hospital in Peshawar from April, 2020 to October, 2020.

**Materials and Methods:** 100 Subjects were included according to the Inclusion criteria. The subjects were divided into two groups: Group I (Premenopausal Women) and Group II (Postmenopausal Women). Blood for Calcium, Calcitonin and Parathormone Levels was taken and analysed at the Hospital Lab. All information was recorded using proforma and analysed on SPSS for MacBook, Version 26.0.

**Results:** Mean and standard deviations for age were recorded as  $34.5 \pm 10.1$ . The Mean and standard deviations for the levels of Serum Calcium (taken in mg/dl) were recorded as  $9.74 \pm 0.56$  for Group I (Premenopausal Women) and  $7.92 \pm 0.72$  for Group II (Postmenopausal Women), Serum Parathormone (taken in pg/ml) were recorded as  $31.29 \pm 18.56$  for Group I (Premenopausal Women) and  $60.16 \pm 42.63$  for Group II (Postmenopausal Women) and Serum Calcitonin (taken in pg/ml) were recorded as  $5.8 \pm 3.02$  for Group I (Premenopausal Women) and  $5.1 \pm 1.98$  for Group II (Postmenopausal Women).

**Conclusion:** Our study finds out that Calcium levels were lower in the Postmenopausal women (Group I) with significantly higher parathormone levels. This has a strong correlation and suggests an increased bone turnover.

**Key Words:** Calcium; Calcitonin; Parathormone; Obesity; Menopause

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## INTRODUCTION

Age related decrease in the calcium absorption has been reported for well over five decades now.<sup>1,2</sup> Calcium ion has been reported as an essential anatomic constituent of the body's framework. Nutrition is important to keep healthy joints and bones. One of the major causes of osteoporosis is an imbalance nutrition alongside endocrine related illnesses.<sup>3</sup>

<sup>1</sup> Department of Physiology, Khyber College of Dentistry, Peshawar.

<sup>2</sup> Department of Physiology, Khyber Medical College, Peshawar.

Correspondence: Syed Shahmeer Raza, Dept. of Physiology, Khyber Medical College, Peshawar.

Contact No: 0305-9006082

Email: shamir.raza@gmail.com

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Parathormone is the hormone secreted by the Parathyroid Glands. This hormone along with Vitamin D and Calcitonin controls the levels of calcium in the extracellular fluid. It does so by keeping a balance in the calcium renal excretion, calcium absorbed from the gut, calcium release from the bone and its uptake at the level of bone.<sup>4,5</sup>

There are a number of hormones which control the bone mineralization and turnover.<sup>6</sup> Parathyroid hormone (Parathormone-PTH) releases calcium from the bones and maintains the level of calcium in the blood.<sup>7</sup> Estrogen plays an important role in the reduction of calcium released from the bone. Estrogen inhibits interleukin-6 production.<sup>8</sup> This leads to an overall reduction in the calcium released from the bone. It is evident from the above mentioned facts that the deficiency of Estrogen results in a greater and longer osteoclast cell activity.<sup>9</sup> So there is an increased level of osteoporosis which is known as postmenopausal osteoporosis.<sup>10,11</sup>

Females around the age of 45-50 years, first experience an irregularity and later the complete cessation of the monthly menstrual cycle. This is called menopause.

The female sex hormones reach very low levels.<sup>12</sup> Hence, the loss of hormones (especially estrogen) after menopause and ageing, lead to lower levels of calcium.<sup>1</sup> Calcitonin works in a manner opposite to that of parathormone. Calcitonin plays an important role in the reduction of calcium released from the bone. In our study we investigate premenopausal and postmenopausal groups of women and evaluate their serum levels of Calcium, Calcitonin and Parathormone. 100 subjects were divided into two groups: Group I (Premenopausal Women) and Group II (Postmenopausal Women). Their Body Mass Index (BMI), Serum Calcium, Calcitonin and Parathormone levels were checked and recorded.

**MATERIALS AND METHODS**

A study was performed in the Department of Physiology at Khyber Medical College/Teaching Hospital in Peshawar from April 2020 to October 2020. Subjects were included according to the Inclusion criteria. Exclusion criteria included patients with Hx of Hormone Replacement Therapy (HRT), Hysterectomy, Diabetes Mellitus, secondary hypertension, thyroid, liver or parathyroid related medical conditions. These were excluded. 100 subjects were divided into two groups: Group I (Premenopausal Women) and Group II (Postmenopausal Women). Blood for Calcium, Calcitonin and Parathormone Levels was taken and analysed at the Hospital Lab. Written informed, voluntary consent was obtained. The Institutional Review and Ethics Board approved the study. All information was recorded using proforma and analysed on IBM SPSS Statistics for Windows, Version 26.0. (Armonk, NY: IBM Corp.).

**RESULTS**

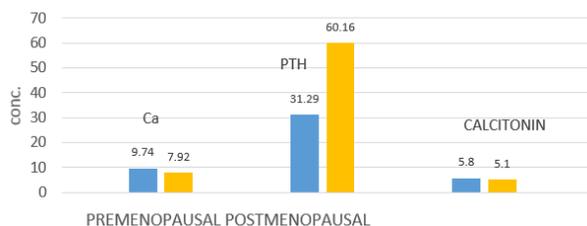
Mean and standard deviations for age were recorded as 34.5 ± 10.1. The Mean and standard deviations for the levels of Serum Calcium (taken in mg/dl) were recorded as 9.74 ± 0.56 for Group I (Premenopausal Women) and 7.92 ± 0.72 for Group II (Postmenopausal Women).

The Mean and standard deviations for the levels of Serum Parathormone (taken in pg/ml) were recorded as 31.29 ± 18.56 for Group I (Premenopausal Women) and 60.16 ± 42.63 for Group II (Postmenopausal Women).

The Mean and standard deviations for the levels of Serum Calcitonin (taken in pg/ml) were recorded as 5.8 ± 3.02 for Group I (Premenopausal Women) and 5.1 ± 1.98 for Group II (Postmenopausal Women).

This study finds out that Calcium levels were lower in the Postmenopausal women (Group I) with significantly higher parathormone levels. This has a strong correlation and is suggestive of an increased bone turnover.

Ca, PTH & CALCITONIN LEVELS FOR GROUP I (PREMENOPAUSAL) VS GROUP II (POSTMENOPAUSAL).



**Figure No.1 shows Calcium, PTH and Calcitonin levels in Group I (Premenopausal Women) and Group II (Postmenopausal Women)**

Serum Calcium (mg/dl) Serum PTH (pg/ml)  
Serum Calcitonin (pg/ml)

**Table No.1: Shows Calcium, PTH and Calcitonin levels in Group I (Premenopausal Women) and Group II (Postmenopausal Women)**

	Group I (n=50)	Group II (n=50)	Mean difference	p-value
Serum Calcium (mg/dl)	9.74±0.56	7.92±0.72	1.82	0.039
Serum PTH (pg/ml)	31.29±18.56	60.16±42.63	(-)28.87	0.014
Serum Calcitonin (pg/ml)	5.8±3.02	5.1±1.98	0.7	0.216

**Table No.2: Shows Mean Calcium levels on the basis of age group**

Age Group (Years)	Patient Number	Mean Ca Level (mg/dl)
20-30	23	10.3
31-40	22	9.18
41-50	25	8.64
51-60	18	8.47
61-70	13	7.20

**DISCUSSION**

Our study checked calcium levels in premenopausal and postmenopausal women. It was noted that Group II (Postmenopausal Women) showed lower levels of serum calcium in comparison to Group I (Premenopausal Women). Deficiency of Estrogen results in a greater and longer osteoclast cell activity.<sup>9, 13</sup> At menopause the female sex hormones reach very low levels. Hence, the loss of hormones (especially estrogen) after menopause and ageing, lead to lower levels of calcium.<sup>1, 13</sup> Which is evident from the results of our study in the Group II (Postmenopausal Women).

Our study also finds out that not only the Calcium levels were lower in the Postmenopausal women (Group 2) but subjects had significantly higher parathormone levels (Fig. 1 and Table. 1). When the

Calcium levels are low in the body, Parathyroid hormone (Parathormone-PTH) releases calcium from the bones and maintains the level of calcium in the blood. Hence, Low Calcium Group II (Postmenopausal Women) is consistent with high PTH Levels.<sup>4</sup>

**Table. 2** shows mean calcium levels on the basis of age group. The subjects were divided into 5 groups with an age range of 10 years. The mean calcium levels showed a decremental decrease in the higher age group ranges. Calcium supplementation has proved to be promising in elderly postmenopausal population and has shown benefits in yielding a better bone density. Some studies have found out that a deficiency of calcium in the diet had association with high blood pressure. This can simply be corrected by supplementation.<sup>14,15</sup>

Given the circumstances and the high risk of osteoporosis, hypertension and other associated risks & complications, it is recommended that a national calcium supplementation plan be initiated by the government of Pakistan. As this is the need of the hour and high time to take a decision on the issue.

## CONCLUSION

Our study finds out that Calcium levels were lower in the Postmenopausal women (Group I) with significantly higher parathormone levels. This has a strong correlation and is suggestive of an increased bone turnover. Still, many systemic reviews, meta-analysis and level I evidence studies are required not only to understand the medical condition but also establish a possible link and to further help us understand the pathophysiology governing this change.

### Author's Contribution:

Concept & Design of Study: Sara Sajjad  
 Drafting: Syed Salman Shah, Tooba Khan  
 Data Analysis: Hunya Amin, Dur E Shehwar Ali, Syed Shahmeer Raza  
 Revisiting Critically: Sara Sajjad, Syed Salman Shah  
 Final Approval of version: Sara Sajjad

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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