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Research Article

**THE CONSEQUENCE OF CALCIUM SUPPLEMENTATION
IN POSTMENOPAUSAL WOMEN AND CHANGES IN
SERUM PHOSPHORUS AND CALCIUM LEVEL**¹Dr Saira Bajwa, ²Dr Sidra Asghar, ³Dr Usama Bin Ishtiaq¹Fatima Jinnah Medical College Lahore²Shalamar Medical and Dental College Lahore³Avicenna medical college, Lahore**Article Received:** June 2020**Accepted:** July 2020**Published:** August 2020**Abstract:**

Objectives: To evaluate the effects of calcium supplementation in postmenopausal women and changes in serum calcium and phosphorus levels.

Study Design: Randomized controlled trial.

Place and Duration: In the Obstetric and Gynecology department of Nishtar Hospital, Multan for one-year duration from May 2019 to May 2020.

Patients and method: 98 postmenopausal women for 12 months. The patients were randomly divided into two groups. Patients in the calcium supplemented group (CSG) were to take a calcium supplement (1,200 mg / day), while the control group was not given any placebo and were advised to continue their regular diet.

Results: The study found that calcium supplementation increased the subject's daily calcium intake, which kept serum calcium levels within the normal range. Serum magnesium and phosphorus levels in this study remained normal, although there is a slight decrease in serum phosphorus levels which may be due to a reduction in the daily intake of this mineral.

Conclusion: Calcium supplementation significantly slowed the bone loss process in postmenopausal women and helps maintain serum calcium levels.

Key words: calcium supplements, serum calcium, magnesium, postmenopausal phosphorus.

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INTRODUCTION:

Among postmenopausal women, osteoporosis is one of the main symptoms, and the role of nutritional factors in the etiology of osteoporosis is controversial. However, proper nutrition affects all aspects of bone health throughout the human life cycle. Calcium is especially important in older women because low calcium intake is associated with decreased bone mineral density (BMD). Postmenopausal women need to get enough calcium to maintain bone health and stop parathyroid hormone (PTH) from working. In addition to its role in building and maintaining bones and teeth, calcium also has numerous metabolic functions in cells and other tissues. Although only small amounts of calcium are needed for these roles, it also has a strong influence on calcium homeostasis. Calcium intake is especially related to calcium balance, and calcium supplementation has a positive effect on cortical bone mass. The use of calcium supplements in pill, chewable tablet, and other formulas has increased due to increased community awareness about the effects of calcium deficiency on bone health. Phosphorus and magnesium are among the minerals that have been suggested to play an important role in bone metabolism. Phosphorus in the form of phosphates combines with calcium ions to form hydroxyapatite, the main inorganic molecule in teeth and bones. Magnesium (Mg) is an essential intracellular cation, a cofactor of many basic cellular processes, especially those related to energy metabolism. People with a low serum calcium to phosphorus ratio (serum Ca: P) would benefit from increasing their calcium intake from food or supplements. Epidemiological studies have shown a positive correlation between dietary Mg intake and bone density and / or an increased rate of bone loss with low dietary intake, suggesting that dietary Mg deficiency may be a risk factor for osteoporosis. While the beneficial effects of calcium on BMD have been investigated, there is little data on the biochemical status. The purpose of this study was to evaluate the effect of long-term calcium carbonate supplementation on serum calcium and phosphorus levels.

MATERIALS AND METHODS:

This is a randomized controlled trial conducted at the Obstetrics and Gynecology department of Nishtar Hospital, Multan for one-year duration from May 2019 to May 2020. Calcium supplementation has been recommended for postmenopausal women. Inclusion criteria were postmenopausal women over 5 years of age and 50 to 65 years of age, and none of the women used regular calcium supplements, hormone replacement therapy (bisphosphonates, estrogen, tamoxifen, or testosterone), anabolic steroids, glucocorticoids, anticonvulsants, or other medications that affect calcium or bone metabolism over the past year. Women with a history of bone disease and treated for osteoporosis, symptomatic vertebral fractures, other conditions affecting bone metabolism, including hypothyroidism or hyperthyroidism, liver disease, cancer, or metabolic bone disease were excluded. Women were recruited through a health screening test, of the 204 postmenopausal women screened for eligibility for the study, only 163 met the inclusion criteria, but 65 women were selected not to participate. Therefore, 98 women were selected for the study and randomly assigned to the calcium supplementation group (CSG) and the control group (CG). Subjects at CSG received daily 1,200 mg of elemental calcium in the form of carbonate, CaCO₃ (Caltrate, White Hall, USA), while CG was not given a placebo and were advised to continue a regular diet and lifestyle. Subjects were asked to take 600 mg tablets orally twice daily with water after meals, in the morning and evening. Patients' demographic background and lifestyle were assessed using a validated questionnaire. Food consumption was assessed using the Three-Day Food Record and analyzed using Nutritionist IV Diet Analysis, version 4.1. Compatibility was judged by the number of tablets. Serum calcium and phosphorus levels were measured. All data was collected at the baseline visit, 6 and 12 months.

RESULTS:

The clinical characteristics of the subjects are presented in Table 1.

Characteristics	Control Group	Calcium supplement group
Age(years)	59.3±3.7	60.0±3.4
Duration of menopause (yrs)	10.7±4.8	11±4.8
Weight(kg)	62.9±11.8	60.9±9.9
Height(m)	1.51±0.04	1.53±0.06
BMI(kg/m ²)	27.6±5.3	26.1±4.3
Compliance%		91.7%

The mean age of the women at the start of the study was 60 ± 4 years, and the mean age was 11 ± 5 years after the menopause. The physical characteristics of the women were similar in both groups. There was no significant difference between the groups in the intakes of calcium, phosphorus, and magnesium at baseline. The mean

calcium intakes among the subjects were low compared to the Recommended Nutrient Intake (RNI), which recommend an intake of 1000 mg / day for elderly people aged 50 to 65. Almost 78% had calcium intakes below 2/3 of the recommended value. Calcium supplementation has been found to increase daily calcium intake among people with CSG (Table 2).

This situation increased the ratio of calcium to phosphorus in the group from 0.5 to 2.1. However, the subject in both groups reduced phosphorus consumption (significant difference ($p < 0.05$) from baseline) at 6 and 12 months. The serum concentrations determined in this study were within the normal range in both groups. At the end of this study, serum calcium in CSG was significantly higher compared to CG. There was a decrease of -1.4% (after 12 months) in serum calcium among the CG subjects. However, CSG calcium levels were similar to baseline levels, although there was a slight decrease over 6 months. PTH levels decreased in both groups, which is significantly higher in CSG compared to CG. Dietary calcium intake and dietary Ca: P ratio were found to be positively correlated with serum calcium concentration. Dietary phosphorus has also been shown to influence

Variables	Dietary Ca	Dietary P	Dietary Ca: P
Serum Calcium	0.321	0.160	0.282
Serum Phosphorus	-0.057	-0.208	0.021
Serum Ca:P ratio	0.148	0.278	0.052
Serum PTH	-0.098	-0.166	0.129

the serum Ca: P ratio.

DISCUSSION:

Adequate calcium is considered a key component of any bone protection regimen, and when combined with vitamin D, it is essential for the achievement and maintenance of healthy bone quality and quantity, thereby achieving optimal bone strength. Ca has also been associated with a beneficial effect in several non-skeletal disorders, mainly hypertension, colorectal cancer, obesity nephrolithiasis, although the extent of these effects has not been fully elucidated. This study identified a situation of low calcium intake among postmenopausal women. Low calcium intake is commonly reported in Asian countries. Our population, especially postmenopausal women, should be encouraged to increase their calcium intake. The key to bone health is your body's calcium balance. Calcium intake is positively associated with calcium balance, and calcium supplementation has a positive effect on cortical bone mass, the value of calcium in slowing bone loss after menopause remains uncertain, possibly because the dominant factor affecting bone metabolism in these women is their recent decline in estrogen secretion. The important role of calcium in intracellular communication and other bodily processes requires that the concentration of ionized calcium in the plasma be controlled within narrow limits. The skeleton serves as a store of calcium from which calcium can enter and exit the blood as needed. If this reserve of Ca is not sufficient, it results in osteoporosis of brittle bones in which there is a reduction in bone mass or density, accompanied by deterioration of the skeletal microarchitecture with an associated increased risk of bone fractures. Maintaining serum calcium through adequate dietary intake could prevent this, or at least slow down one of the

consequences of aging, bone loss. As menopause is a critical phase in women's lives and creates a new chapter of discussion, controversy and anxiety among women, it is the responsibility of healthcare professionals to deal with these symptoms and what interventions are best for optimizing the long-term health of women entering menopause. This study proved that using calcium carbonate supplements at a daily dose of 1,200 mg of elemental calcium is sufficient to help maintain a constant serum calcium level. PTHi suppression is significantly higher in the calcium group, possibly in response to increased plasma calcium levels as a result of increased consumption. This "negative feedback" mechanism would keep serum calcium levels within the normal range. Magnesium is needed for the proper functioning of the parathyroid glands, and its deficiency significantly disturbs calcium homeostasis, leading to hypocalcemia, which explains the negative correlation between the mineral and PTH. Low serum magnesium levels have also been reported in postmenopausal women with osteoporosis. Serum phosphorus tended to decrease, which may be due to the decreased intake. While the change was not significant, the situation should not be encouraged. A study by scientists found that older women receiving calcium and vitamin D supplements, with or without anti-osteoporosis medications, ran a risk of hypophosphatemia that would prevent the bone from regenerating. However, in this study, it is likely that the phosphorus intake is actually high enough for most of the subjects. Their diet mainly lacks calcium. However, calcium phosphate supplementation should be encouraged, especially in the elderly, who tend to have low dietary phosphorus intake, and over the next decade, the increased awareness of the importance of calcium

supplementation among postmenopausal women will increase its use.

CONCLUSION:

Calcium supplementation in postmenopausal women benefits them by slowing the process of osteoporosis and increasing bone mass, while sufficient calcium intake maintains serum calcium and phosphorus levels.

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