

## Study of Changes in Serum Calcium Level during Postmenopausal Period of Women in Bangladesh

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### Abstract

**Introduction:** The study was designed to evaluate the serum calcium levels may be altered in postmenopausal women.

**Materials and Methods:** This case control study was carried out in the Department of the Biochemistry, Mymensingh Medical College, Mymensingh, from January 2015 to December 2015. The subjects were selected on the basis of inclusion and exclusion criteria by purposive (non-random) method. This study included 50 postmenopausal women as case. **Results:** The results were compared with 50 apparently healthy premenopausal women as control. All statistical analysis was done by SPSS windows package. The values were expressed as Mean  $\pm$  SD. Statistical significance of difference between two groups were evaluated by using student's unpaired t-test. Serum calcium level was analyzed. Serum calcium was determined by using colorimetric method. The mean value of serum calcium was  $8.59 \pm 1.02$  (mg/dl) respectively in group B (Case) and  $6.36 \pm 1.06$  (mg/dl) in group A (Control). The levels of serum calcium was significantly decreased in group B. **Conclusion:** Menopause has an effect on serum calcium which leads to increased risk of development of osteoporosis. The present study may facilitated the clinicians and gynecologists to update their knowledge in regard to serum calcium level of women associated with menopause.

**Key words:** Serum calcium, post menopausal women.

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### Introduction:

The menopause is a period of decreasing ovarian function and diminished estrogen level, followed by cessation of menstruation. The term 'peri-menopause' includes the period immediately before the menopause (when the endocrinologic, biologic, and clinical features of approaching menopause

commence) and the first year after menopause. The term 'peri-menopause' includes the period immediately before the menopause and the first year after menopause. The term 'menopausal transition' include the period before the final menstrual period when variability in the menstrual cycle is usually increased and has been applied to the part of the peri menopause that ends with the final menstrual period (FMP). Premenopause is often used either to refer to the 1 or 2 years immediately before the menopause or to refer to the whole of the reproductive period before the menopause. Induced menopause is defined as the cessation of menstruation that follows either surgical removal of both ovaries (with or without hysterectomy) or iatrogenic ablation of ovarian function (e.g. by chemotherapy or radiation).

Calcium is an important mineral component in our diet. 99% of Calcium in the human body is distributed in the skeleton 1% which is extra skeletal, is present in every cell in the body, and in the extracellular fluid (ECF). Ionized Calcium concentration in the ECF is 4.8% mg/dl and total calcium is approximately double. 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<sup>1</sup>. The secretion of parathormone affects these changes when ECF calcium is sensed to be low by the calcium receptor in the parathormone gland<sup>2</sup>.

The decreased level of serum calcium in postmenopausal women is due to lack of oestrogen and with the advancement of age. The postmenopause is associated with a fall in calcium absorption, which is only in part attributable to a fall

in calcitriol levels<sup>3</sup>. Dr. Menopause and aging is associated with accelerated loss of cortical bone. Bone loss occurs when the balance between formation and resorption is upset and resorption is excessive resulting in a negative remodeling balance<sup>4,5</sup>. Despite its seemingly static appearance, bone is remarkably labile tissue and bone turnover is a dynamic process which increase in postmenopausal period as consequence of oestrogen deficiency<sup>6</sup>. Adverse changes in plasma calcium due to oestrogen deficiency have been implicated in the incidence of osteoporosis in postmenopausal women<sup>7</sup>. This is in accordance with the findings<sup>4,8,9</sup> who also reported lower levels of serum calcium in postmenopausal women. Ageing and menopause, which lead to decline in oestrogen and progesterone production has been implicated in the decreased levels of calcium in postmenopausal<sup>4</sup>.

In this study, estimation of serum calcium of postmenopausal women and to compare with the apparently healthy premenopausal women has been made.

#### Materials and Methods:

This study was carried out at the department of biochemistry, Mymensingh Medical College and the subjects were collected from the outpatient department (OPD), Mymensingh Medical College Hospital, Mymensingh during the period of January 2015 to December 2015. A total of 100 subjects were studied. Finally the subjects of this study were included on the basis of inclusion and exclusion criteria. With all aseptic precautions 5 ml of blood was collected with a disposable syringe by ante-cubital venepuncture. Then blood is kept in testube for centrifugation at 3000rpm for 30 minutes. The serum obtained by centrifuging were kept in eppendorf after proper labeling. To avoid diurnal variations, samples were collected from 8AM-9AM after overnight fast. Serum calcium was determined by colorimetric method.

Statistical analysis:

All statistical analysis was done by using Statistical Package for Social Science (SPSS) using version 20.

#### Results:

A total of 100 subjects were included in the present study. Subjects were classified into group A (Control) and group B (Case). Group B comprising of (n = 50) postmenopausal women aged between 45-55 years served as case. Group A comprising of (n = 50) apparently healthy women aged between 30-40years served as control. The mean value of serum calcium was 8.59±1.02 (mg/dl) in group B(Case) and 6.36 ± 1.06 ( mg/dl ) in group A(Control). The mean serum calcium was significantly decreased in group B (Case) when compared to that in group A (Control).

**Table-I: Serum calcium level of the study subjects.**

| Biochemical variables   | Group A (Control, n = 50 )<br>Mean ± SD | Group B (Case, n = 50 )<br>Mean ± SD | P value   |
|-------------------------|---|--------------------------------------|-----------|
| Serum calcium ( mg/dl ) | 8.59 ± 1.02                             | 6.36 ± 1.06                          | < 0.001** |

P value less than 0.05 taken as level of significance.

SD = Standard deviation

\*\* = Highly significant

#### Discussion:

The present study was done to observe the various changes of serum calcium level in postmenopausal women compared with premenopausal women. Related medical history and clinical information of the subjects were taken by questionnaires from all the individuals included in this study.

In this study, serum calcium level in group B (Case) was significantly lower compared to group A (control). This finding is supported by the studies of<sup>10,11</sup>; Nordin et al in 1989<sup>12</sup>; The decreased level of serum calcium in postmenopausal women is due to lack of oestrogen and with the advancement of age. The postmenopause is associated with a fall in calcium absorption, which is only in part attributable to a fall in calcitriol levels<sup>3</sup>. Menopause and aging is associated with accelerated loss of cortical bone. Bone loss occurs when the balance between formation and resorption is upset and resorption is excessive resulting in a negative remodeling balance<sup>4,5</sup>. Despite its seemingly static appearance, bone is remarkably labile tissue and bone turnover is a dynamic process which increase in postmenopausal period as consequence of oestrogen deficiency<sup>6</sup>. Adverse changes in plasma calcium due to oestrogen deficiency have been implicated in the incidence of osteoporosis in postmenopausal women (Recker et al, 1998)<sup>7</sup>. This is in accordance with the findings of<sup>4,8,9</sup> who also reported lower levels of serum calcium in postmenopausal women . Ageing and menopause, which lead to decline in oestrogen and progesterone production has been implicated in the decreased levels of calcium in postmenopausal women<sup>4</sup>. However, contrary to this finding, higher calcium in postmenopausal women was reported by<sup>9,13</sup>. Heterogeneity of older adults, variabilities in body chemistry and their unique rate of ageing may be responsible for the disparity in these results.

#### Conclusion:

Menopause has an effect on serum calcium which leads to increased risk of development of osteoporosis. The present study may facilitated the clinicians and gynecologists to update their knowledge in regard to serum calcium level of women associated with menopause

**Conflict of Interests:** None.

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