

Evaluation of biochemical marker for bone turnover in post menopausal women

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ABSTRACT

Introduction: Menopause is the permanent cessation of menses resulting from reduced ovarian hormone secretion that occurs naturally or is induced by surgery, chemotherapy, or radiation. **Aims and objectives:** To evaluate the risk of accelerated bone loss by assessing bone markers like alkaline phosphatase (ALP) and calcium in postmenopausal women. **Material and methods:** The present study was carried out on 100 total subjects out of which experimental group consists of 50 subjects i.e Post menopausal women. Control group consists of 50 subjects Pre menopausal women. **Results:** The result of the present study suggest that the serum calcium level were significantly reduced but the serum alkaline phosphatase (ALP) levels had a slightly raise in post menopause group when compared to the pre menopause groups. **Conclusion:** In normal post menopausal women, an increase in bone turnover accelerates the reduction in bone mass, whereas decrease in bone turnover is associated with preservation of bone mass.

Key words: Postmenopausal women, calcium and alkaline phosphatase

INTRODUCTION

The word 'menopause' is defined from the Greek words "meno" (month) and "paus" (to stop). Menopause is said to have occurred when menstruation has ceased for twelve months.¹ Menopause is defined as the permanent cessation of menses resulting from reduced ovarian hormone secretion that occurs naturally or is induced by surgery, chemotherapy, or radiation.²

Post-menopause is an estrogens deficient state. It applies to the whole of a woman's life after menopause.¹ Menopause and ageing 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 remodelling balance.³ Osteoporosis is an important public health problem in older adults. It is more common in postmenopausal women and not only gives rise to morbidity but also markedly diminishes the quality of life in this population. There is lack of information about the risk factor of osteoporosis in developing countries.⁴ Serum alkaline phosphatase is the most commonly used marker of bone formation. ALP is a ubiquitous enzyme that plays an important role in osteoid formation and mineralization. The total ALP serum pool consists of several dimeric isoforms which originate from various tissues such as liver, bone, intestine, spleen, kidney and placenta.⁵

Menopause is the permanent cessation of menstruation due to loss of ovarian follicular function, which results in decreased production of estradiol and

other hormones. Decreased levels of estrogen leads to increased osteoclast formation and enhanced bone resorption, which in turn leads to loss of bone density and destruction of local architecture resulting in microfractures.⁶

AIM OF THE STUDY:

To evaluate the risk of accelerated bone loss by assessing bone markers like alkaline phosphatase (ALP) and calcium in postmenopausal women.

MATERIALS AND METHODS

The present study was carried out on 100 total subjects out of which experimental group consists of 50 subjects i.e Post menopausal women. Control group consists of 50 subjects Pre menopausal women.

A total 50 post menopausal subjects were recruited for the study with the age group of >45 years for experimental group. Exclusion criteria were smokers, alcoholics and calcium supplement. A total 50 pre menopausal subjects were recruited for the study with the age group of 12-40 years for control group. Exclusion criteria were Pregnancy, Smokers, Alcoholics and Oral contraceptives.

RESULTS

The present study analyse the serum calcium level and ALP level in post menopausal women and compared with the pre menopausal women. The study was carried out on two groups of population, experimental

group i.e. post menopausal women consisting of 50 females and control group i.e. pre menopausal women consisting of 50 females. Exclusion criteria include smoking, consumption of alcohol, pregnancy, oral contraceptive administration and calcium supplementation.

Table 1: Comparison of mean values of Ca (mg/dl) and ALP (U/L) between Post and Pre Menopausal women

Variable	Post Menopausal				Pre Menopausal			
	Mean	SD	Mini	Max	Mean	SD	Mini	Max
Ca mg/dl	8.73	0.60	5.50	9.40	9.65	0.68	9.00	13.50
ALP U/L	111.86	66.56	41.00	414.00	82.40	78.50	21.00	550.00

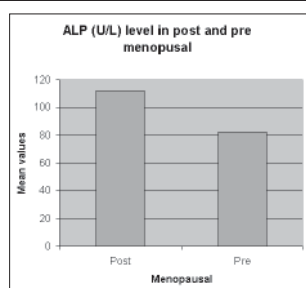
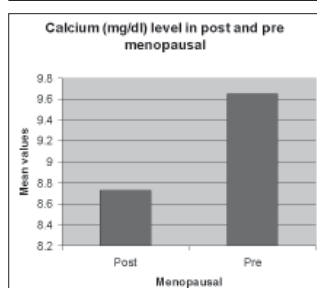


Table 2: Test of significance of mean values of Ca and ALP between post and Pre Menopausal women.

Variable	Post menopausal	Pre menopausal	P	t
Ca mg/dl	8.73	9.65	0.000	7.09*
ALP U/L	111.86	82.4	0.046	2.03*

*indicates 5 % level of significance

Table 1 and 2: shows that serum calcium were significantly reduced in post menopause group mean (8.73±0.60) when compared to the pre menopause group mean (9.65±0.68) which shows a strong significant of p=0.000, but both group values were within the normal reference range. Where as serum alkaline phosphatase (ALP) levels had a slight raise in post menopause group mean (111.86±66.5) when compared to the pre menopause group (82.40±78.50) showing only 5% significant with p= 0.046, in these group also the values fall in the normal reference range.

Table 3: shows a significant negative co relation between calcium and Alkaline phosphatase (r= -0.1496), where in serum Alkaline phosphatase levels are elevated whereas serum calcium levels are reduced in postmenopausal women.

Table 3: Pearson correlation coefficient of serum calcium and serum ALP levels in post menopausal women.

Correlation Coefficient	Case (n=50)
r value between calcium and ALP in post menopausal women	-0.1496

Correlation coefficient between post Ca and post ALP = - 0.1496

DISCUSSION

Menopause is associated with numerous physiological and biochemical changes affecting bone mineral metabolism. Results from various case control study on estimation of serum calcium, inorganic phosphate, total proteins, albumin, alkaline phosphatase and acid phosphatase activities in pre and post menopausal women have shown that serum calcium levels of post menopausal women is not statistically significant. This is in accordance with the findings of Ashuma , Suresh and Naidu and Masse et.al who also reported higher levels of these parameters in post menopausal women.⁷⁻⁹

In the present study we had significance in case and control means but still the values tend to remain in normal reference range. The serum calcium were significantly reduced in post menopause group mean (8.73±0.60) when compared to the pre menopause group mean (9.65±0.68) which shows a strong significant of p=0.000. Where as serum alkaline phosphatase (ALP) levels had a slight raise in post menopause group mean (111.86±66.5) when compared to the pre menopause group (82.40±78.50) showing only 5% significant with p= 0.046. Ashuma et.al, said that ageing and menopause, leads to decline in estrogen and progesterone production which has been implicated in the increased levels of calcium in post menopausal women.⁷ It is well known that estrogen deficiency induces synthesis of cytokines by osteoblast, monocytes and T cells and thereby stimulates bone resorption by increasing osteoclastic activity. This results in modification of the reabsorption, excretion and resorption of calcium leading to increased circulating levels of this ion.¹⁰⁻¹²

No significant variation was observed in serum levels of calcium and ALP in the various years since menopause group (YSM). However contrary to this finding higher calcium and ALP have been demonstrated in early post menopausal women (≤10 YSM) compared to late menopausal women (≤10 YSM).¹³

Bone is a connective tissue that provides mechanical support to the body vital organs and act as reservoir of calcium and phosphate as 99% of calcium and 85% of phosphate are present in skeleton. Peak bone mass is achieved during the third decade of life which gradually declines leading to osteopenia which predisposes to osteoporosis¹⁴.

CONCLUSION

In normal post menopausal women, an increase in bone turnover accelerates the reduction in bone mass, whereas decrease in bone turnover is associated with preservation of bone mass. In our present study serum calcium level and ALP levels were estimated in post

menopausal women were estimated and compared with pre menopausal women.

The comparison study reveals that the serum calcium were significantly reduced in post menopause group mean when compared to the pre menopause group mean which shows a strong significant of $p=0.000$. Whereas serum alkaline phosphatase (ALP) levels had a slightly raised in post menopause group mean when compared to the pre menopause group showing only 5% significant with $p= 0.046$. A significant negative correlation was observed between serum calcium and ALP levels in postmenopausal experimental women

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