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STUDY OF CALCIUM, PHOSPHORUS AND ACID PHOSPHATASE IN PRE-AND POST-MENOPAUSAL WOMEN

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Abstract

Introduction: More than 75 million individuals overall experience the ill effects of osteoporosis of which 80 % for example 44 million are postmenopausal ladies. Osteoporosis is second just to cardiovascular disease as a main medicinal services issue, as per the World Health Organization. Around the world, the lifetime hazard for ladies to have an osteoporotic break is 30 – 40%. Menopauseis one of the most significant physiological occasions; it is identified with the suspension of ovarian capacity and the finish of conceptive cycle. The occurrence of osteoporosis in postmenopausal ladies keeps on expanding with continuously maturing populaces. Pre-menopause refers to a ladies' regenerative or rich life, from the main menstrual period to the last. Post-menopause is characterized as the time after menopause, in any event one year without a period. Osteoporosisis a dynamic infection which prompts the exhaustion in the bone structure with loss of bone mineral thickness (BMD) expanding the hazard factor of breaks throughout the years. High danger of creating osteoporosis is described by low BMD and shows a disintegration of the smaller scale engineering with the BMD is the consequence of a harmony between bone resorption because of osteoclasts and bone arrangement because of osteoblasts, during an on-going renovating process.

Aim: Study of Calcium, Phosphorus, Acid Phosphatase and BMD T score in Pre-and Post-Menopausal Women.

Material and Methods: The present study includes total 100 subjects that include
50 pre-menopausal women (age 35 to 45 years) and 50 post -menopause women (age 46 to 60 years). Blood samples were collected from the subjects were obtained for Calcium, Phosphorus and Acid Phosphatase from Medicine /Orthopaedics/ Obstetrics and Gynaecology Wards.

Conclusion: Menopause is one of the most significant physiological occasions: it is identified with the end of ovarian capacity and the finish of conceptive cycle. The rate of osteoporosis in postmenopausal ladies keeps on expanding with continuously maturing populaces. Pre-menopause alludes to a lady's regenerative or prolific life, from the principal menstrual period to the last. Post-menopause is the time after menopause, in any event one year without a period. Beginning stage of menopause builds hazard for some postmenopausal wellbeing inconveniences, for example, osteoporosis, ischemic ailment, and ovarian malignancy, though later menopause is a hazard factor for endometrial and bosom disease.

Abbreviation: Menopause, Osteoporosis, BMD T score, Calcium, Phosphorus, Acid phosphatase.

Introduction

Osteoporosis is a quiet ailment, reflected uniquely in a low bone thickness, till a crack happens. A low bone thickness (reflecting poor bone wellbeing) inclines to osteoporotic cracks. With expanding life span of the Indian populace, it is presently being understood that, osteoporotic breaks are a significant reason for horribleness and mortality in the elderly.[(1)] Osteoporosis is characterized as significant in bone quality because of a strange amount and/or nature of bone. Amount is assessed by estimating BMD. Quality is influenced by numerous components, including the level of mineralization, the pace of bone redesigning, the availability of the hard trabeculae, the nature of the collagen strands, and the wellbeing of the bone cells.[(2)] Calcium is one of the principle bones framing minerals and 99% of the body's calcium lives in the skeleton. Phosphorous and calcium both are required for the proper mineralization of skeleton and in osteoblast work. A high admission of phosphorous in blend with low calcium, show adjustment in calcium digestion and increment in parathyroid hormone secretion.[(3)] Whereas, phosphorous is a basic bone-shaping component since it is required for the fitting mineralization of the skeleton. Thus the proportion of phosphorous to calcium admission is by all accounts more significant in bone wellbeing than outright admission of phosphorous.[(3)] Acid phosphatase is a lysosomal compound found in bone, prostate platelets, erythrocytes and spleen. Of the five isoenzymes of Acid phosphatase the bone isoform is tartrate safe. RRACP is a

lone one of a kind markers discharged from resorbing osteoclasts, rather than being a bone network debasement item. [3]

Bone Mineral thickness is the major of the hazard for osteoporotic breaks and is liked to analyze osteoporosis. It is estimated by Dual Energy X-Ray Absorptiometry (DEXA) which is currently the highest quality level to recognize osteoporosis. The most widely recognized method of deciphering BMD is to embrace the WHO definition for osteoporosis, in light of BMD T-Score. BMD T-Score quantifies how a subject's BMD esteem changes to those of an average youthful typical subject, communicated regarding the standard deviation (SD) of youthful, ordinary subjects. Bone mineral thickness (BMD) decreases in ladies with the beginning of menopause related with expanded bone resorption because of diminished estrogen levels.[4]

It was evaluated that the quantity of patients worldwide with osteoporotic hip cracks is in excess of 200 million.[1] It was accounted for that in both Europe and the United States, 30% ladies are osteoporotic, and it was assessed that 40% post-menopausal ladies and 30% men will encounter an osteoporotic break in the remainder of their lives.[4-6] Osteoporosis, or "permeable bones," is the debilitating of bones brought about by an awkwardness between bone structure and bone demolition. Individuals ordinarily lose bone as they age, regardless of devouring the prescribed admission of calcium important to keep up ideal bone wellbeing. An expected 10 million Americans - 8 million ladies and 2 million men have osteoporosis. Another 34 million have low bone mass, putting them at expanded hazard for osteoporosis. [1, 7]

Material and Methods

STUDY AREA

The study was conducted in the Department of Biochemistry, Department of Medicine/Orthopedics/ and OBGY, MGM Medical College and Hospital, Kamothe, Navi Mumbai, Maharashtra. The samples are also collected from Medical Camp organised in memory of Dr. Baba Sahib Ambedkar Birth Anniversary at Panchasil Samajik Sanghatana, Sec.18, Nerul, Navi Mumbai.

STUDY POPULATION

Group I (pre-menopause women): 50 pre-menopausal women (age 35 to 45 years).

Group II (post -menopause women): 50 post-menopausal women (age 46 to 60 years).

PATIENTS SELECTION

Total 100 subjects were enrolled and were grouped as mentioned ahead.

Inclusion criteria: - for pre-menopause women

1. Pre-menopause women (aged 35-45 Years)
2. Regular menses.
3. No complications related to menstruation

Inclusion criteria: - for post menopause women

1. Post-menopause women (aged 46-60 Years)
2. Peri-menopause woman is considered (irregular menses that is before menopause) and more than 1yr of menopause women is preferred more.

Exclusion criteria: - for both

1. Women with no fractures, any disease related bone, treatment with calcitonin vitamin-D, calcium supplementation.
2. Corticosteroids treatment within 6 months, diuretic or other medications that might interfere with water-mineral or lipid metabolism.
3. Women treatment with estrogen or progesterone, irregular menses and women with history of hysterectomy and myomectomy will be excluded.

Study Type:A cross-sectional study

Sample collection

Total 5 ml of venous blood was collected under aseptic condition and was allowed to clot, centrifuged at 3000rpm. Serum was obtained and was collected in a clean and dry, plain bulb to study following parameters Calcium, phosphorous and acid phosphatase were analysed on AU-480 Fully auto-analyser.

BIOCHEMICAL ANALYSIS

Serum Calcium, Serum Phosphorus were analysed on AU480. [8-9]and Acid Phosphatase were analysed by α-Naphthylphosphate kinetic method. [10]

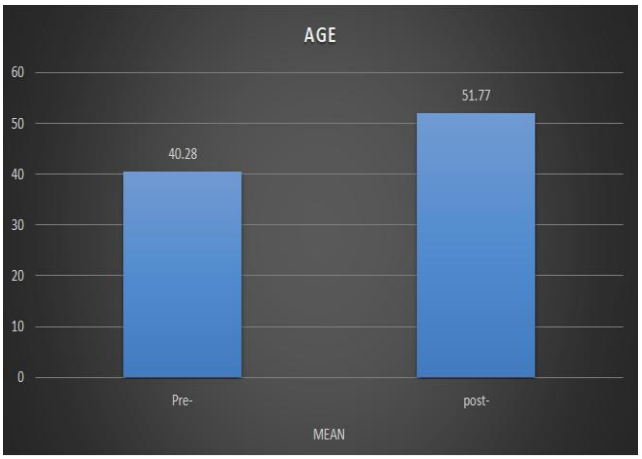
STATISTICAL ANALYSIS

Data collected was entered into Microsoft Excel Worksheet and statistically analysed by using SPSS (Statistical Package for Social Sciences) version 20. For quantitative data mean, standard mean, standard deviation, t-test and Karl Pearson's Coefficient of Correlation were calculated. P value < 0.05 (0.01) will be considered as statically significant (highly significant) at 95% confidence interval.

Result and Observation

Table 1: Age-Wise Comparison between Preand Post-Menopause Groups

	Age–group (Years)	Mean ± SD (Years)
PRE-MENOPAUSE (GROUP 1) (n=50)	35-45	40.28±3.93
POST-MENOPAUSE (GROUP 2) (n=50)	46-60	51.77 ±3.15

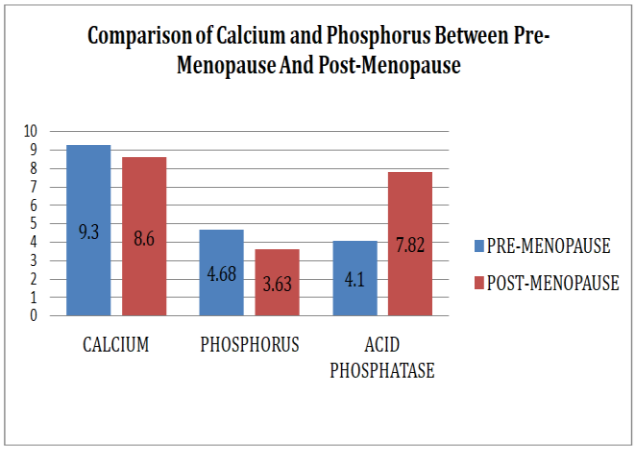


Graph 1: Age-Wise Comparison between Pre and Post-Menopause Groups

Table 2: Comparison of Calcium and Phosphorus between Pre-Menopause and Post-Menopause Groups

	Pre-Menopause (Group 1) (Mean ± SD)	Post-Menopause (Group 2) (Mean ± SD)
Serum Calcium (mg/dl)	9.30 ±0.81	8.60 ± 0.63**
Serum Phosphorus (mg/dl)	4.68 ± 0.73	3.63 ± 0.54**
Serum Acid Phosphatase	4.10 ± 1.80	7.82 ± 1.30**

Indicates **highly significant (p<0.001)



Graph 2: Comparison of Calcium and Phosphorus between Pre-Menopause and Post-Menopause Groups

Table No 2 and Graph 2 shows comparison of Calcium and Phosphorus Between Pre-Menopause and Post-Menopause Groups. Serum calcium in pre and post menopause groups are 9.30 ±0.81 and 8.60 ± 0.63 mg/dl, it is significantly decreased in post-menopause (p<0.001). Serum phosphorus in pre and post menopause groups are 4.68 ± 0.73 and 3.63 ± 0.54 mg/dl, it is significantly decreased in post-menopause (p<0.001).

Discussion

The sign of menopause is a decrease in skeletal mass brought about by awkwardness between bone resorption (osteoclastic action) and bone arrangement (osteoblastic movement) because of absence of estrogen. As a major aspect of the maturing procedure, ladies over 45 years old go into the period of menopause that prompts quiet physical changes including osteoporosis and Genitourinary issues which are preventable somewhat. In the in the interim, bones are continually redesigned with old bone being supplanted by new bone. In any case, the other fundamental explanation ladies experience fast bone misfortune because of decrease in estrogens during menopause. It is in this manner, basic to recognize these ladies in danger of creating osteoporosis. The current examination targets contrasting the degrees of biochemical markers, for example, bone development and bone resorption in pre and post menopause women.The biochemical markers were tested for each sound lady, by assessing absolute calcium, inorganic phosphorous, Acid phosphatase and BMD (T Score).

The outcomes in our investigation demonstrated that there is huge lessening in serum calcium level in post-menopause ladies when contrasted with pre-menopause ladies with huge (p<0.001) as found in (table 2; bar graph 2).

Table No 2 and Graph 2 shows correlation of Calcium and Phosphorus Between Pre-Menopause and Post-Menopause Groups. Serum calcium in pre and post menopause bunches are 9.30 ±0.81 and 8.60 ± 0.63 mg/dl, it is altogether diminished in post-menopause (p<0.001). Serum phosphorus in pre and post menopause bunches are 4.68 ± 0.73 and 3.63 ± 0.54 mg/dl, it is altogether diminished in post-menopause (p<0.001).

Postmenopausal ladies had fundamentally lower serum calcium levels than in pre-menopausal ladies. Declining ovarian capacity before menopause is joined by decrease in bone mass and changed calcium digestion. Estrogen inadequacy may prompt calcium misfortune because of diminished intestinal calcium ingestion and diminished renal calcium protection. These discoveries were as per the investigations of different agents **(Indumati et al., 2007)**.[11] But there was no noteworthy decline in serum all out calcium in postmenopausal cases contrasted with premenopausal controls (**Sachdeva, 2005**).[12]

Akshay Lekhi et al13 upheld our discoveries, as present examination uncovered that there was a decrease in the serum calcium levels in postmenopausal ladies, in this manner showing a requirement for calcium supplementation for them. This demonstrated the bone mass kept on declining with age, however at a more slow rate than during the early post-menopausal period, along

these lines showing that this marker assessment end up being an opportune activity in recognizing the objective ladies in the postmenopausal age bunch for the supplementation of calcium.

PHOSPHROUS:

Our investigation portrayed that there is decline in serum inorganic phosphorous level in post-menopause ladies when contrasted with pre-menopause ladies with noteworthy ($p<0.001$).

Table no 2 and chart 2 shows examination of Calcium and Phosphorus between Pre-Menopause and Post-Menopause Groups. Serum calcium in pre and post menopause bunches are 9.30 ±0.81 and 8.60 ± 0.63 mg/dl, it is altogether diminished in post-menopause ($p<0.001$). Serum phosphorus in pre and post menopause bunches are 4.68 ± 0.73 and 3.63 ± 0.54 mg/dl, it is essentially diminished in post-menopause ($p<0.001$).

Our examination is upheld by **Akshay Lekhi et al.**[13] it demonstrated noteworthy lessening in menopause ladies. **C. Palacios**[14], **A Prentice**[15] expressed that bone is emphatically affected by the admission of a few supplements. Not just the customary supplements identified with bone, for example calcium, protein, phosphorus, magnesium, nutrient D, and fluoride, are significant in bone wellbeing, yet in addition a few different nutrients and minerals.

ACID PHOSPHATASE:

Our current investigation communicated critical ($p<0.001$) increment in the movement of Acid phosphatase in menopause ladies when contrasted and pre-menopause ladies, which shows expanded bone resorption in menopause ladies.

Table No 3 and chart 3 shows examination of serum basic phosphatase and serum Acid phosphatase between Pre-Menopause and Post-Menopause Groups. Serum soluble phosphatase in pre and post menopause bunches are 135.46 ± 22.07 and 144.3 ± 11.20 IU/L, it is fundamentally expanded in post-menopause ($p<0.001$). Serum Acid phosphatase in pre and post menopause bunches are 4.10 ± 1.80 and 7.82 ± 1.30 IU/L, it is altogether expanded in post-menopause ($p<0.001$).

Jussi Halleen (2004)[16] upheld the investigation proposing that Tartrate-safe acid phosphatase (TRACP) is a protein that is communicated in high sums by bone-resorbing osteoclasts, provocative macrophages and dendritic cells. Two types of TRACP flow in human blood, TRACP 5a got from macrophages and dendritic cells, and TRACP 5b got from osteoclasts.

Jussi halleen (2004)[16] likewise presumed that TRACP is raised in menopause ladies when contrasted with ordinary sound ladies, consequently if estrogen treatment is given to post menopause ladies there is noteworthy diminishing in TRACP values.

Conclusion

This bone misfortune is found in present menopause ladies due on absence of estrogen creation and bone rebuilding. The occurrence of osteoporosis in postmenopausal ladies keeps on expanding with age progression. Our study could be valuable for observing bone status utilizing biochemical parameters and fill in as a screening measure in early intercession against over the top bone misfortune.

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