

# Assessment Of Minerals In Premenopausal And Postmenopausal Women In Aba Metropolis, Abia State

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*Abstract: Menopausal women are at a greater risk of developing coronary artery disease (CAD), hypertension and osteoporosis than their premenopausal counterparts. Calcium, magnesium and inorganic phosphate are biomarkers for assessing people risk of Osteoporosis and other related bone diseases. It is on this basis that, this study aimed at evaluating the Serum Calcium, Inorganic phosphate and Magnesium among premenopausal and post-menopausal women in Aba metropolis, Abia State. A total of hundred subjects comprising of 40 post-menopausal women, 30 premenopausal and 30 perimenopausal women served as control and of Aged 21-60 years were selected for the study. Their weights, height, age and body mass index (BMI), were measured. Blood pressured were measured. Blood samples were collected by venipuncture and assayed for serum calcium, magnesium and inorganic phosphate. Using a semi-automated analyzer, data obtained were analyzed using Statistical Package for Social Sciences (SPSS version 25) and one-way analysis of variance (ANOVA), student t test and expressed as Mean standard deviation. Significant level for the analysis was set at P-value equal to or less than 0.05 (P<=0.05) which was considered as being statistically significant. Results showed that calcium, magnesium and inorganic phosphate were significantly higher in the premenopausal results than postmenopausal women. Equally, the results showed that calcium and magnesium were significantly higher in (P>= 0.05) in premenopausal women when compared to their counterparts, but magnesium was not significant (P>0.05) in the two groups involved. Age weight, height and body mass index (BMI) showed no statistical difference (P<=0.05) in the groups involved. The result implies that post-menopausal women are at risk of developing Osteoporosis and other related bone disorders.*

## I. INTRODUCTION

Menopause is associated with many arrays of metabolic changes which results into the appearance of disarrangements. Menopause occurs in most women between the age 45 and 55 years, although it may begin as early as 40 or appear in late 50s. The hormonal changes that occur during menopause may

modulate certain disease. The most common type of arthritis is seen in women after menopause, others are osteoarthritis, rheumatoid arthritis and gouty arthritis, joint pain. Menopause is associated with a natural decline in Estrogen, increase visceral fat mass, decreased bone mass density, muscle mass and strength (Naltasis *et al.*, 2019).

Menopausal women are at a greater risk of developing coronary artery disease (CAD), hyperthyroidism and Osteoporosis than their premenopausal counterparts just like men as a result of loss of hormone (estrogen) protection which accompanied menopause. Calcium, magnesium and inorganic phosphate are biomarkers for osteoporosis and other bone related diseases (Cosman et al 2020).

Osteoporosis is the most common and widespread chronic skeletal metabolic disease in the world and can lead to catastrophic features. Therefore, it is important to control and Prevent Osteoporosis. Although serum magnesium and calcium are believed to be associated with osteoporosis in many individuals, there are conflicting reports on the association between serum magnesium, calcium with osteoporosis as well as that between the concentration of serum Mg and Osteopenia (Rinaldo *et al.*, 2018, Hagi and Nihon 2020, Saris *et al.*, 2020), Nornna *et al.*, 2020).

In the years before menopause, a woman's period typically become irregular, which means that the period may be longer or shorter in duration or be lighter or heavier in the amount of flow (Nornna *et al.*, 2020). During this time, women often experience hot flashes; this typically last from 30 second to 10mins and may be associated with shivering and reddening of the skin. Hot flashes often stop occurring after a year or two, other symptoms may include vaginal dryness, insomnia and mood changes. The severity of symptoms varies between men and women. While menopause is often thought to be linked to an increase in heart disease, this primarily occurs due to decreasing in estrogen production. (Saris *et al.*, 2020).

The decline in ovarian function at menopause results in decreased production of Estrogen and a parallel increase in FSH levels. The combined effects of Estrogen deprivation and raised FSH production cause a marked stimulation of bone resorption and a period of rapid bone loss which is central for the onset of post-menopausal Osteoporosis. Several risk factors are implicated in favoring post-menopausal bone loss. Important non-modifiable predictors of bone demineralization are age, sex, period of amenorrhea, and parental history of fracture. Important modifiable factors are dietary calcium intake, low body mass index, smoking, reduced physical activity, and high alcohol intake (Stewart *et al.*, 2019).

It is based on these findings that this study was aimed at evaluating calcium, serum inorganic phosphate and Magnesium among pre- and post-menopausal women in Aba metropolis in Abia State.

## II. MATERIAL AND METHOD

The analysis of the samples was carried out at the Chemical Pathology Laboratory of Abia State University Teaching Hospital (ABSUTH), Aba in Abia State, South East of geographical region of Nigeria. It is located.

A total of 100 samples were collected, 30 samples from premenopausal women and perimenopausal women and 40 samples from post-menopausal women were recruited for the study. Serum was obtained from blood collected from the subjects for the determination of calcium, magnesium and inorganic phosphate.

Data was analyzed using statistical package for social sciences (SPSS) (Indrayan and Kumar, 2017). The difference between the groups were compared using one-way analysis of variance (ANOVA) and student t-test with a P-value less than or equal to 0.05 ( $P < 0.05$ ) which was considered as being statistically significant. Results were expressed as Mean  $\pm$  SD (Standard Deviation).

## III. RESULTS AND METHOD

| Parameters      | Post-menopausal | Pre-menopausal  | Crit f | Cal f | P-value | Sig |
|-----------------|-----------------|-----------------|--------|-------|---------|-----|
| Ca <sup>+</sup> | 1.71 $\pm$ 0.51 | 2.03 $\pm$ 0.29 | 0.39   | 0.008 | 0.0084  | Sig |
| POS             | 0.64 $\pm$ 0.02 | 1.16 $\pm$ 0.93 | 0.39   | 0.009 | 0.005   | Sig |
| Mg <sup>+</sup> | 0.14 $\pm$ 0.03 | 1.04 $\pm$ 0.52 | 0.39   | 0.007 | 0.5150  | NS  |

Table 1: Represents comparison of mean  $\pm$  Standard deviation of calcium, magnesium and inorganic phosphates in premenopausal woman, perimenopausal women and post-menopausal women

| Parameters | Post-menopausal | Premenopausal   | Crit f | Cal f | P-value | Sig |
|------------|-----------------|-----------------|--------|-------|---------|-----|
| Calcium    | 1.71 $\pm$ 0.51 | 2.03 $\pm$ 0.29 | 0.39   | 0.008 | 0.000   | Sig |
| POS        | 0.64 $\pm$ 0.02 | 1.16 $\pm$ 0.93 | 0.39   | 0.009 | 0.001   | NS  |
| Magnesium  | 0.14 $\pm$ 0.03 | 1.04 $\pm$ 0.52 | 0.39   | 0.007 | 0.003   | Sig |

Table 2: Represents comparison of mean  $\pm$  Standard deviation of calcium, magnesium and inorganic phosphates in premenopausal woman and post-menopausal women

| Parameters | Perimenopausal  | Premenopausal   | Crit f | Cal f | P-value | Sig |
|------------|-----------------|-----------------|--------|-------|---------|-----|
| Calcium    | 1.30 $\pm$ 0.22 | 2.03 $\pm$ 0.29 | 0.39   | 0.008 | 0.005   | Sig |
| POS        | 1.56 $\pm$ 0.61 | 1.16 $\pm$ 0.93 | 0.39   | 0.009 | 0.015   | Sig |
| Magnesium  | 0.18 $\pm$ 0.03 | 1.04 $\pm$ 0.52 | 0.39   | 0.007 | 0.090   | NS  |

Table 3: Represents comparison of mean  $\pm$  Standard deviation of calcium, magnesium and inorganic phosphates in premenopausal woman and perimenopausal women

Results showed that calcium and magnesium were significantly higher in ( $P \geq 0.05$ ) in premenopausal women when compared to their counterparts, but there was no significant difference in the level of magnesium among the groups ( $P > 0.05$ ). Menopause is associated with an array of metabolic changes which presents with an appearance of disarrangement of conditions. The result of this study conforms with the study of Peter *et al* (2020).

The study of Knochel *et al* (2019), showed increased in the markers of bone, indicating bone remodeling which subsequently is accelerated in the premenopausal and post-menopausal periods. The span of 5 to 10 years surrounding menopause is characterized by a decrease in Estrogen production and an increase in resorption of calcium from bone loss, resulting in a marked decrease in bone density. The bone loss is most rapid in the early years of menopause, and then approximately 6 to 7 years at post-menopausal the loss continues at lower rate. The bone loss associated with menopause results from uncoupling in the bone remodeling units, such that resorption of bone is greater than formation of new bone. Overtime, such changes leads to skeletal fragility and decreased bone mass. (Cosman et al 2020))

Disorders of inorganic phosphate homeostasis occur in a wide range of clinical conditions. Both hyper and hypophosphatemia can be caused by cellular shifts of phosphate. The primary conditions that lead to phosphate dysfunction are dietary intake, Gastrointestinal, and renal

status. Hypophosphatemia occurs in the presence of renal insufficiency with a decrease in phosphate excretion. Hypophosphatemia is seen most frequently in hospitalized patients. The primary mechanisms leading to hypophosphatemia is stated by Berkelhammer *et al* (2019): transcellular shift of Phosphorus from extracellular volume to either soft tissues or bones. Poor dietary intake, especially when associated with impaired gastrointestinal absorption or diarrhea; and increased phosphate excretion resulting from renal and non-renal cause as observed by Brautber, (2018).

Hypomagnesemia may result from one or more of the following mechanism: redistribution, reduced intake, reduced intestinal absorption, increased gastrointestinal loss and increased renal loss. (De Roaffagnac *et al.*, 2021).

This study was able to demonstrate like other studies stated above, the level of calcium and phosphate decline with decrease in estrogen level as seen in post-menopausal women.

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