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PLASMA CALCIUM AND PHOSPHORUS LEVELS AMONG SUDANESE POSTMENOPAUSAL WOMEN IN KHARTOUM STATE

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ABSTRACT

Background: The aging process and hormonal changes during menopause may have effect on the bone metabolism particularly Plasma Calcium and Phosphorus levels. **Objective:** The Present study aimed to assess the Level of Plasma Calcium and Phosphorus in Sudanese Postmenopausal Women. **Material and Methods:** This Cross Sectional study was carried out in Khartoum State during the period from February to May 2017, 50 Premenopausal women as control group and 50 postmenopausal women as cases were enrolled in this study. Plasma calcium and phosphorus level were measured by using MINDRAY Bs-200. **Results:** The results revealed that, plasma calcium level was significantly decreased in postmenopausal women (mean ± SD: 8.43 ± 0.95 mg/dL) as compared to control (mean ± SD: 9.82±0.48 mg/dL) p-value 0.000. Plasma phosphorus, levels showed significant increase in postmenopausal women (mean ± SD: 3.45±0.37 mg/dL) compared to control group (mean ± SD: 3.20±0.31 mg/dL) p-value: 0.000. Calcium levels was positively correlated with age per years of postmenopausal women (R=0.458, P=0.001), while it was inversely correlated with weight of postmenopausal (R=-0.394, P=0.034) phosphorous levels among the postmenopausal women was positively correlated with weight(R=0.320, P=0.024) While it was no correlation with age of postmenopausal women(R=-0.153, P=0.290). **Conclusion:** The postmenopausal women had low plasma calcium, and high levels of plasma phosphorus. Therefore postmenopausal women at high risk for developing osteoporosis, bone fracture and low bone mineral density than pre-menopausal women.

KEYWORDS: Menopause, Bone metabolism, Calcium, Phosphorus.

INTRODUCTION

The term "postmenopausal" describes women who have not experienced any menstrual flow for a minimum of 12 months, assuming that they have a uterus and are not pregnant or lactating.[1] In study of postmenopause without flushes, night sweats, insomnia, anxiety and mood swings, low -dose estrogen and low -dose micronized progesterone improved sleep to a greater extent than could be explained by a reduction in vasomotor symptoms.[2] also symptoms may include vaginal dryness, dyspareunia, vaginal itching, burning and pain Dyspareunia Can adversely affect a postmenopausal women's sexual quality of life or intensity pre -existing sexual disorder[3] over active bladder is a highly prevalent disorder , as much as 16.9, with higher rates and symptom severity in postmenopausal women.[4] Postmenopausal women which in turn may be associated with their low progesterone and estrogen level.[5]The menopausal transition, and postmenopause itself, is a natural change, not usually a disease state or a disorder. The main cause of this transition is the natural depletion and aging of the finite amount of oocytes. The transition has a variable degree of effects.[6] The menopausal transition is characterized by marked, and often dramatic, variations in FSH and estradiol levels. Because of this, measurements of these hormones are not considered to be reliable guides to a woman's exact menopausal status.[7] Menopause occurs because of the sharp decrease of estradiol and progesterone production by the ovaries. Long-term effects of menopause may include osteoporosis, vaginal atrophy as well as changed metabolic profile resulting in cardiac risks.[8] A lack of estrogen in postmenopausal women prevents the absorption and utilization of calcium and is the single most important factor in the development of osteoporosis in older women and also affect phosphorus level.[9] Bone metabolism is a dynamic and continuous process to maintain a balance between the resorption of old initiated by osteoclasts and the formation of new bone under the control of osteoblasts.[10] Biochemical markers of bone turnover have been shown to provide valuable information for the diagnosis and monitoring of metabolic bone disease.[11] Bone turnover increases to high levels in women soon after menopause, In addition, estrogens deficiency may induce calcium loss by indirect effects on extraskeletal calcium homeostasis. Intestinal calcium absorption decreases in postmenopausal women.[12]

MATERIAL AND METHODS

Study design: This was a cross sectional case control study.

Study area and period: This study was conducted in Khartoum state during the period from February to May.

Study population: A total of 100 subjects were enrolled in this study, 50 Postmenopausal women considered as case Weight match (70-110 kg) and Age match (50-100years). 50 fertile healthy women as control group Weight match (60-90 Kg) and Age match (20-35).

Inclusion criteria and Exclusion criteria: Postmenopausal women were included in this study. The study excluded all women during reproductive age and postmenopausal women with any disease that may affect calcium and phosphorous levels like immune disease, renal disease, surgical bypass and bone disease.

Ethical Consideration: The study was approved by the local ethics committee of Alneelain University. All participants in the study were informed with the aims of the study.

Sampling: 3 ml of blood in aseptic conditions were collected from each participants in lithium heparin containers, plasma was obtained after centrifugation at 3000 RPM for 20 min, then stored at – 20 ^{o}C until the time of analysis.

Data analysis: Data was analyzed using SPSS version 21. Mean ± SD of all the variables was determined. Independent T-test was applied to compare and difference of parameters between two groups. Pearson's correlation coefficient was determined to evaluate correlation between different parameters. P-value ≤ 0.05 consider as significant.

Quality control: The accuracy of result was confirmed by using of normal and pathological control sera.

Methods: Calcium and phosphorus levels were measured by MINDRAY Bs_ 200 auto analyzer.

RESULTS

Serum calcium level was significantly decreased in postmenopausal women compared to control. While Serum phosphorus level showed significant increase in postmenopausal women compared to control group (Table-1).

Calcium levels was inversely correlated with weight of postmenopausal women (Figure 1), and was positively correlated with age per years of postmenopausal women (Figure3).

Phosphorous levels among the postmenopausal women was positively correlated with weight (Figure 2), and showed no correlation with age (Figure 4).

Table 1: Comparison of calcium and phosphorous levels among the study groups.

Parameters	Case (Mean±SD) N=50	Control (Mean±SD) N=50	P-value
Calcium	8.43±0.95	9.82±0.48	0.000
Phosphorous	3.45±0.37	3.20±0.31	0.002

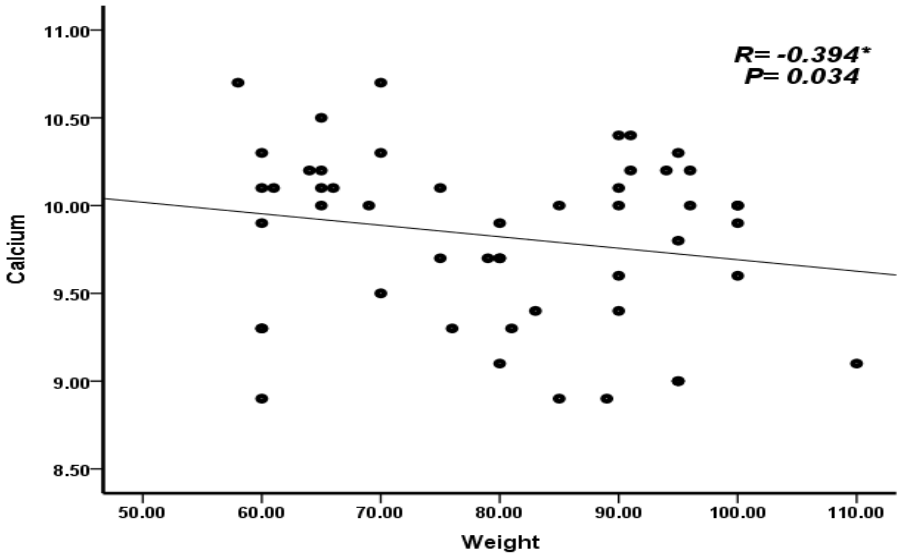

Figure 1: correlation between calcium levels and weight of postmenopausal women.

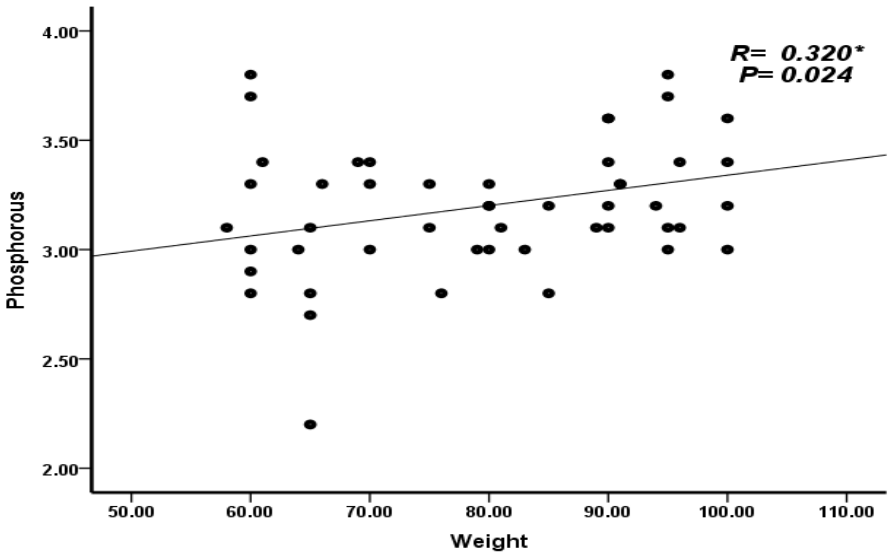

Figure 2: Correlation between phosphorous levels and weight of postmenopausal women.

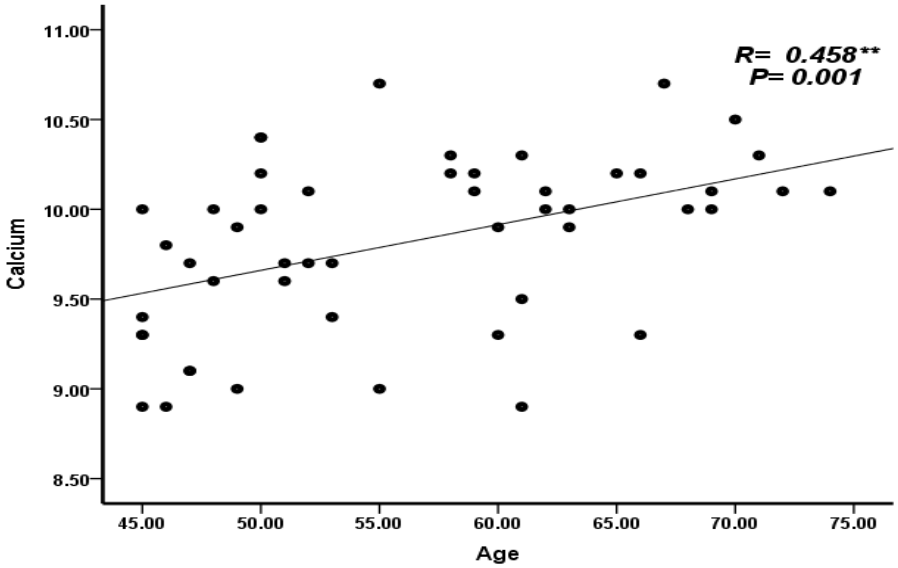

Figure 3: Correlation between calcium levels and age of postmenopausal women.

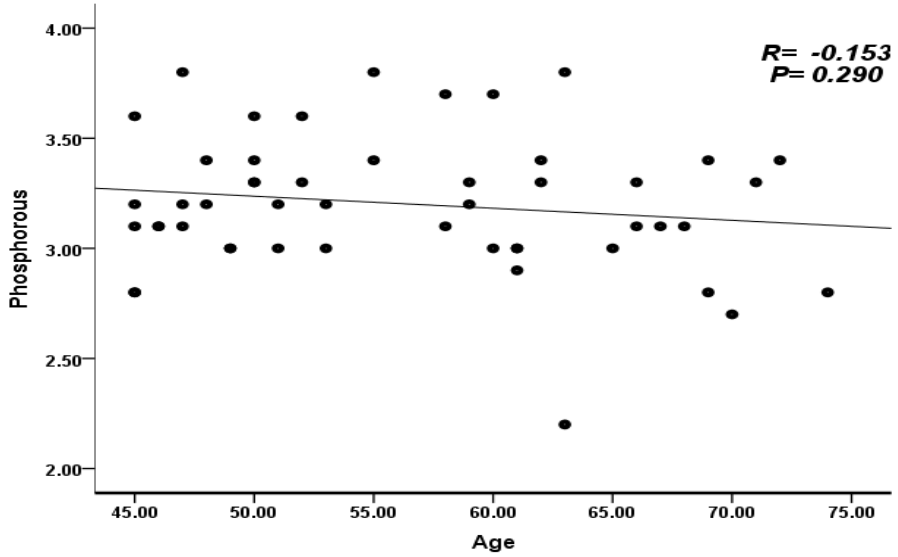

Figure 4: Correlation between phosphorous levels and age of postmenopausal women.

DISCUSSION

The results of the present study provide experimental evidence that postmenopausal women had significantly lower serum calcium levels than in pre-menopausal women p- value 0.000, in contrast postmenopausal women had higher phosphorus levels as compared to pre-menopausal women. This finding agreed with study done by Sujatha et al 2015[12] who found a significant decrease in serum total calcium in postmenopausal women (P<0.001), and significant increase in serum phosphorus in postmenopausal women (P<0.001). Also the current study results are similar to study done by Hamid Javaid Qureshi et al 2010[13] who reported that serum calcium levels was significantly lower (*p*=0.039) in postmenopausal

women as compared to that in pre-menopausal women. Another study done by Mona Adam ELmalik 2016[14] who reported serum calcium was significantly lower (p=0.005) in postmenopausal women as compared to that in pre-menopausal women, serum phosphorus, showed significant difference (p<0.05) between the two groups. Declining ovarian function before menopause is accompanied by reduction in bone mass and altered calcium metabolism. Oestrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation.[13] Calcium levels was inversely correlated with weight of postmenopausal R=-0.394, P=0.034, also Phosphorous levels among the postmenopausal women was positively correlated with weight R=0.320, P=0.024. These finding disagreed to Kyung-Jin Lee at el 2014[14] who reported positively associations calcium levels and weight in premenopausal women.Calcium level was positively correlate with age of postmenopausal women R=0.458, P=0.001. These findings disagreed with Hamid Javaid Qureshi et al 2010,[13] who reported that the correlation of age with serum calcium in postmenopausal women were non-significant.

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