



CORRELATION BETWEEN VITAMIN D3 AND SOME BONE TURNOVERS IN POSTMENOPAUSAL IRAQI WOMEN

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Abstract:

Osteoporosis is a disease causes bone damage, it is typically linked to postmenopausal, and characterized by changes in bone turnovers.

Present study goaled to assess serum levels of VD3-6, osteonectin, and calcitonin in postmenopausal Iraqi women with osteoporosis, 75 postmenopausal women (their ages ranged between 46-68 years) diagnosed biochemically and radiologically with osteoporosis only were included in present study and divided into 2 groups (healthy subjects, postmenopausal women with osteoporosis).

The study revealed that VD3 and Osteonectin were increased significantly ($P < 0.05$) in both patient group compared to healthy subjects, while serum level of calcitonin showed non-significant ($P > 0.05$) differences.

This study concludes that VD3 is highly correlated with Osteonectin in osteoporotic postmenopausal.

Key words: VD3, Osteonectin, Calcitonin, Osteoporosis.

Introduction

Osteoporosis is a disease that slowly deteriorates the microstructure of bone, It is characterized by disorder of some bone turnover.

Increased bone fragility and fracture risk are brought on by osteoporosis, a systemic skeletal illness defined by low bone mineral disorder (BMD) and micro architectural degeneration of bone tissue. Postmenopausal osteoporosis is the major osteoporosis that menopausal women experience most frequently. Due to its significant side effects, such as low-energy fractures, which raise the risk of morbidity and mortality, especially in the elderly, osteoporosis is clinically significant (Marozik *et al.*, 2021).

In postmenopausal osteoporosis, which is characterized by a loss of bone mass and an elevated risk of bone fractures, estrogen levels significantly decrease after menopause (Fischer & Haffner Luntzer, 2021).

As a steroid hormone, vitamin D plays a crucial role in maintaining calcium homeostasis by promoting intestinal calcium absorption and bone mineralization. Due to the fact that vitamin D is also involved in glucose metabolism, osteoporotic fractures may also result from vitamin D deficiency and vitamin D receptor (VDR) gene polymorphisms (Mohamed Abd El-Maksoud, & Elshaer, 2022; Al-Samarraie, *et al.*, 2021).

A multicellular protein called osteonectin controls how cells interact with their microenvironment. SPARC, a secreted protein that is acidic and rich in cysteine, is expressed

during remodeling of the extracellular matrix (López *et al.*, 2022).

A peptide hormone called calcitonin is known to lower the amount of calcium in the bloodstream. The main regulator of the bone resorption process is calcitonin (Xie *et al.*, 2020).

The present study aimed to assess serum levels of VD3, Osteonectin, and Calcitonin in osteoporotic postmenopausal women and test for possible correlation between VD3 and both Osteonectin and Calcitonin.

Materials and methods

Study population and design

The Medical Rehabilitation Hospital and Specialized Doctors Complex in Tikrit commissioned this cross-sectional study, which was carried out in Dijla. 75 postmenopausal women with osteoporosis who were identified biochemically and radiologically between the ages of 48 and 68 were the subject of the study, which ran from January 2022 to March 2022. divided into two categories:

1-G1: included 30 of the healthy Postmenopausal subjects' women.

2-G2: included 45 Postmenopausal women osteoporotic patients.

inclusion and exclusion standards

Only Postmenopausal women with confirmed osteoporosis and who agreed to be part of the study were included in this study.

Valuation of serum concentrations of VD3, Osteonectin and Calcitonin

Commercial kits mybiosource were used to evaluate serum concentration of these interleukins.

Statistical analysis

The differences between all groups assumed by the Duncan test were calculated using the SPSS version 23 program as Mean±Standard Deviation. The association between VD3 and both Osteonectin and calcitonin was examined using the Pearson correlation test.

Results and discussion

In the present study, serum level of VD3 was significantly increased ($P<0.05$) in patients with osteoporosis only compared to its concentration in healthy subjects, as its concentration in osteoporotic postmenopausal women reached (13.72 ± 2.18) ng/ml compared to (19.73 ± 2.92) ng/ml in healthy postmenopausal women. As shown in figure and table 1.

The statistical analysis in the present study also shows that serum level Osteonectin was significantly increased ($P<0.05$) in osteoporotic postmenopausal women reached (771.74 ± 239) ng/ml compared to (280.38 ± 33.96) ng/ml in healthy postmenopausal women. While serum level of Calcitonin showed no significant difference ($P>0.05$) between the two group. As shown in figure 2, figure 3, and table 1. As showed in figure 4 Pearson correlation test showed a significant ($P<0.05$) positive correlation between VD3 and Osteonectin, while VD3 and Calcitonin was non-significantly ($P>0.05$) correlated, as showed in figure 5.

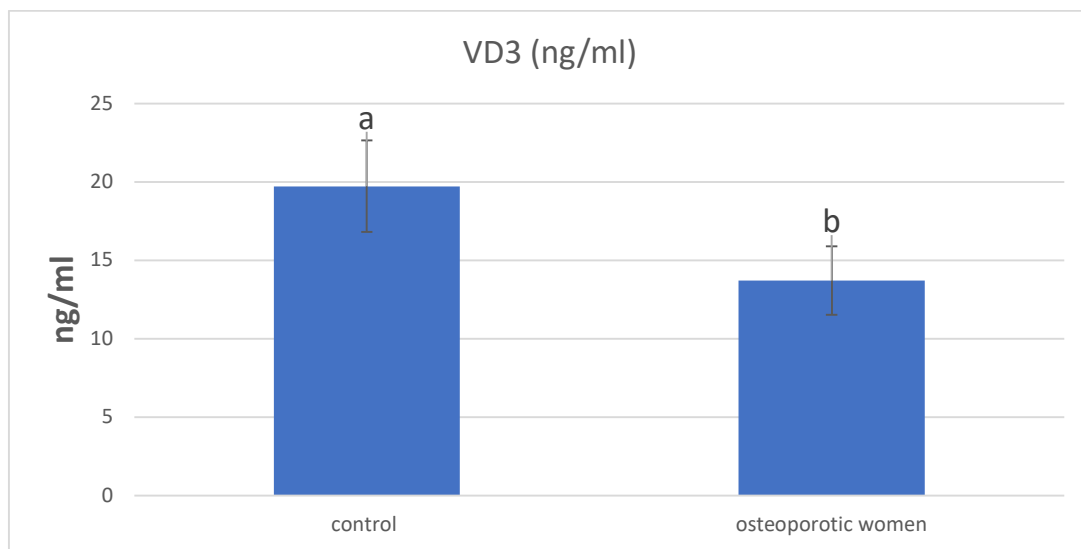


Figure (1): Assessed serum level of VD3 (ng/ml) in studies groups.

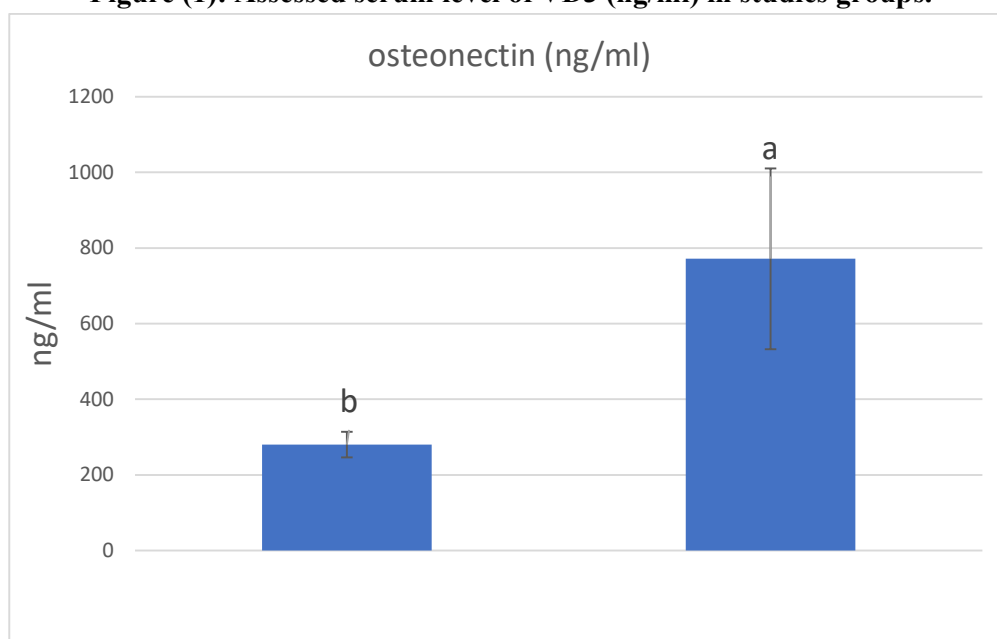


Figure (2): Assessed serum level of osteonectin (ng/ml) in studies groups.

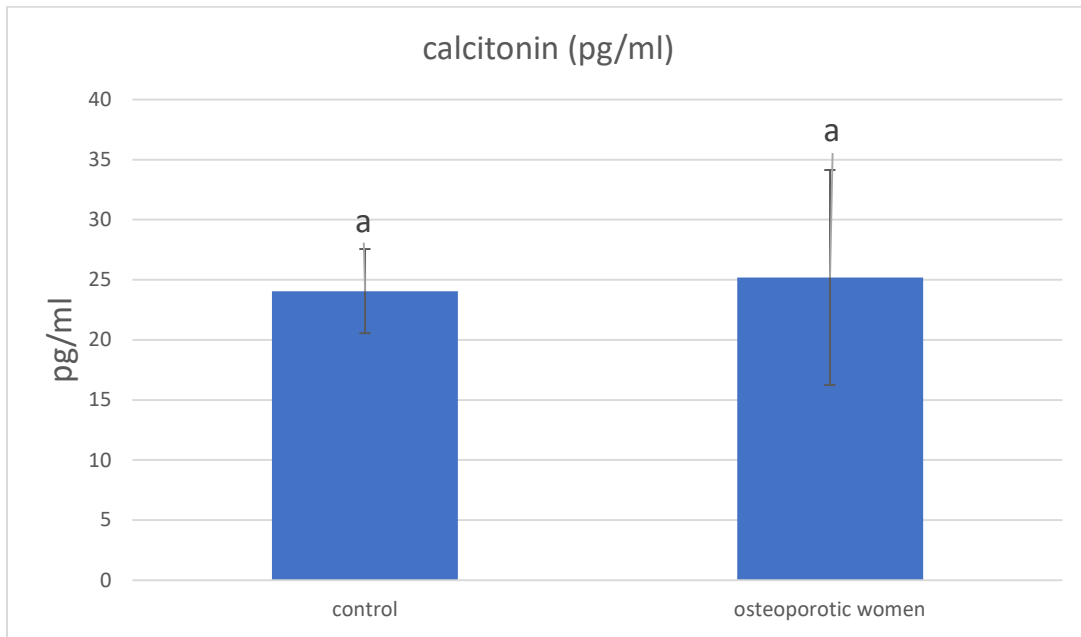


Figure (3): Assessed serum level of calcitonin (ng/ml) in studies groups.

Table (1): Assessed serum levels of VD3, Osteonectin, and Calcitonin in osteoporotic postmenopausal women compared to healthy postmenopausal women.

Parameter	Control Mean±S.D	Patients Mean±S.D	P-value
VD3 (ng/ml)	19.73±2.92a	13.72±2.18b	0.000
Osteonectin (ng/ml)	280.38±33.96b	771.74±239a	0.000
Calcitonin (Pg/ml)	24.06±3.51a	25.2±8.95a	0.000

- Different letters mean that there is a significant difference at $P \leq 0.05$.

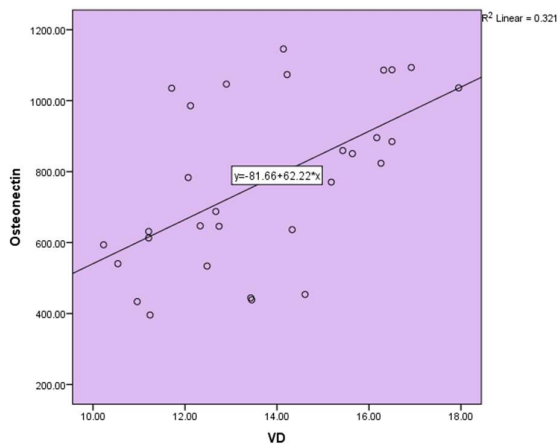


Fig4: Correlations between VD3 and Osteonectin.

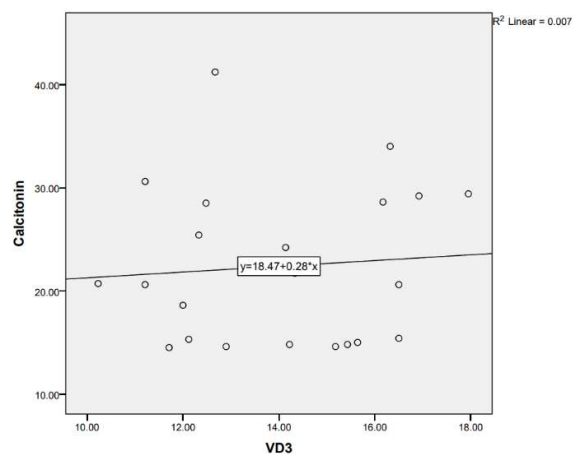


Fig5: Correlations between VD3 and Calcitonin.

The statistical analysis of the present study reveals a significant decrease ($P < 0.05$) in serum level of VD3 compared to healthy subjects, and this agrees with recent study by Kotwal *et al* (2020) which showed that VD3 level in aged women was significantly decreased.

Usually, low levels of vitamin D can worsen or cause IR, which resulted in an increase in AGEs in living tissue, which speeds up bone resorption, prevents bone production, and causes osteoporosis (Goltzman, 2018).

One of the most prevalent medical issues nowadays is a vitamin D deficiency. Due to inadequate UVB exposure, urbanization, pollution, and traditional clothing that prevents UVB from reaching the skin's surface, it is becoming endemic in many parts of the world. As a result, many countries have high rates of vitamin D deficiency (Botros *et al.*, 2022; Al-Samarraie, *et al.*, 2022).

Increased age is frequently a contributing factor in the development of osteoporosis. Additionally, patients with the underlying chronic disease took medications that affected the metabolism of calcium and vitamin D, resulting in osteoporosis and a decline in bone density (Memon *et al.*, 2020). and According to a study of Lia Ginaldi *et al* (2019), vitamin D (25 OH) deficiency was linked to decreased density. This finding is in line with our own research, which has shown that vitamin D deficiencies in female patients are often caused by insufficient sun exposure, a lack of vitamin D3 in their diets, and pathogenic conditions like gastrointestinal, renal, and liver diseases.

Additionally, vitamin D affects changes in bone metabolism. It has the power to affect the immune response, reducing mast cell activation and B cells' production of IgE while boosting the production of dendritic cells and T cells (Murdaca *et al.*, 2022).

Present study showed increased levels of serum level of osteonectin in patient group with osteoporosis compared to healthy women subjects and this agree with the study of Cherian *et al* (2021) that show serum level of osteonectin was significantly higher among postmenopausal patients with OP compared to healthy controls.

It is possible that osteonectin's high level is caused by low-grade inflammation, which could result in changes to the bones associated with this condition. Osteonectin participates in inflammation and bone formation (Cherian *et al.*, 2021).

Type I collagen and hydroxyapatite are strongly bound by osteonectin, which is essential for the mineralization of the extracellular matrix (Zhu *et al.*, 2020).

By directly inhibiting osteoclast-mediated bone resorption and enhancing calcium excretion by the kidney through high affinity calcitonin receptors, calcitonin hormone contributes to calcium homeostasis (Davey & Findlay, 2013).

Calcitonin is a hormone that affects hypocalcemia by effectively and swiftly inhibiting osteoclasts' ability to break down bone. Numerous studies of calcitonin have focused on its effects on calcium homeostasis and skeletal functions (Henriksen *et al.*, 2016).

Although calcitonin does not appear to be essential for maintaining human calcium homeostasis on a minute-by-minute basis, it may play a role in the maintenance of total body calcium, especially with aging and/or during periods of calcemic stress like pregnancy or lactation (Felsenfeld & Levine, 2015).

Conclusion: VD3 are high correlated with Osteonectin in osteoporotic postmenopausal women, and not correlated with calcitonin.

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