

Measuring the level of some parameters in osteoporosis women in Karbala city – Iraq

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Abstract

Back ground: Osteoporosis is a skeletal condition that affects the entire body. illness characterized by a decrease mass of bone, reduced Bone Mineral Density (BMD), deterioration of microarchitectural integrity and skeletal toughness, as a result of which bone fragility and fracture risk are raised , primarily at the spine and femur levels. Estradiol (E2)it is The most strong as well as widespread member of estrogen steroid hormone class. Estradiol obtained from their mother, their own gonads, and produced locally in their brains is administered to fetuses and infants. Calcium is most often associated with healthy bones and teeth, but it also plays an important part in blood clotting, muscle contraction, appropriate heart rhythms, and neuron activity. About 99 percent of the calcium in the body is stored in bones, with the remaining 1% found in blood, muscle, and other tissues. Intracellular calcium (Ca) levels are critical in the production of aldosterone. Potassium is a mineral that is required by all human tissues. It is commonly referred to as an electrolyte because it carries a little electrical charge that stimulates a variety of cell and nerve processes.. Total-body potassium (K⁺) concentration and proper distribution of K⁺ across the cell membrane are critical for good cellular function. Phosphorus is a mineral that is present in your bones. Phosphorus, like calcium, is necessary for the production of strong, healthy bones as well as the preservation of other aspects of your body's health.. Normal functioning kidneys can eliminate excess phosphorus from your blood. In marine settings, phosphorus (P) is one of the limiting macronutrients for algal development. Method: 100 patients clinically diagnosed as osteoporosis . tow study groups have been investigated: (25 in premenopause and 25 in postmenopause). The Aim of study is determine the level of some parameters(albumin , calcium , potassium , phosphor , E2) in premenopausal osteoporosis and postmenopause osteoporosis and comparison to control group in women .Result : The current study was significant no difference in albumin level in osteoporosis , and decreased significant (P≤ 0.05) in levels of calcium and phosphor in osteoporosis ,also increased significant(P≤ 0.05) in potassium level in osteoporosis ,as well as there was a significance decreased (P≤ 0.05) in E2 hormone concentration of osteoporosis women compared to control .Conclusion : the albumin level no effected in osteoporosis when compared with control , the level of calcium and phosphor decreased in osteoporosis when compared with healthy women , the level of potassium increased in osteoporosis when compared with control group ,the E2 hormone decreased in patients with osteoporosis , and this decreased is more significant in postmenopausal age than premenopause.

Key words : Albumin , potassium , calcium , phosphor , Estradiol , osteoporosis

Introduction

Osteoporosis is a skeletal condition that affects the entire body. illness characterized by a decrease mass of bone, reduced bone mineral density (BMD), deterioration of microarchitectural integrity and skeletal toughness, as a result of which bone fragility and fracture risk are raised , primarily at the spine and femur levels(De Martinis et al., 2020) . Osteoporosis is a significant health issue for postmenopausal women(Marozik et al., 2019). Age, female sex, postmenopausal state, hypothyroidism or polycystic ovary, body mass index is low, racial origin , rheumatoid arthritis, decrease Bone Mineral Density (BMD), Vitamin D3 insufficiency, and inadequate Calcium consumption are all causes of osteoporosis(Akkawi & Zmerly, 2018). Over the course of their lives, one out of every two postmenopausal women will have an osteoporotic fracture .Those have already suffered an fracture are at a significant risk to having another one . Fractures can be caused discomfort, impaired movement and function, as well as fear of Falling, also are linked to a worse quality of life and an increased risk of death(Eastell et al., 2019). In older women, postmenopausal osteoporosis (PMOP), defined by decreased bone mass, is related to an imbalance between bone synthesis and bone resorption. 5. As a result, bone fragility and fracture susceptibility increase. 6. Numerous studies have shown that osteoporosis are connected with significant death in postmenopausal women (Tang et al., 2017). The latter is mostly caused by cumulative fatigue damage, although decreased collagen cross-link as well as another intrinsic material weaknesses may be also plays role. Decreased bone density is caused by a number of causes, including a lack of gonadal hormones, inadequate calcium and vitamin D consumption, decreased physical activity, comorbidity, and the impact of medications which used treat unrelated medical disorders. Once bone density has been lost, it cannot be repaired(Orr, 2019).

Finally, the typically poor results of hip fracture in the elderly are attributed in part to protein-calorie malnutrition. Traditional osteoporosis pathophysiological hypotheses centered on endocrine pathways like Estrogen or Vitamin D3 insufficiency, and secondary hyperparathyroidism An effective osteoporotic fracture prevention program must target as many of these elements as feasible, and it must be as diverse as the illness itself. (Föger-Samwald et al., 2020) . Estrogens are female hormones. The major female sex hormones are in charge of controlling female reproductive system functions as well as the development of secondary sexual features that manifest throughout puberty and sexual maturity. Estradiol, estrone, and estriol are the three primary estrogens, with estradiol being the most common.(Fuentes & Silveyra, 2019). Unsurprisingly, ovarian estrogen reduction after menopause has been linked to Estradiol, estrone, and estriol are the three primary estrogens, with estradiol being the most common.(Schmitz et al., 2021).

Estradiol (E2) it is The most strong as well as widespread member of estrogen steroid hormone class. Estradiol obtained from their mother, their own gonads, and produced locally in their brains is administered to fetuses and infants(McCARTHY, 2008). Calcium is most often associated with healthy bones and teeth, but it also plays an important part in blood clotting, muscle contraction, appropriate heart rhythms, and neuron activity. About 99 percent of the calcium in the body is stored in bones, with the remaining 1% found in blood, muscle, and other tissues. Intracellular calcium (Ca) levels are critical in the production of aldosterone (Gao et al., 2019). Potassium is a mineral that is required by all human tissues. It is commonly referred to as an electrolyte because it carries a little electrical charge that stimulates a variety of cell and nerve processes. Total-body potassium (K+) concentration and proper distribution of K+ across the cell membrane are critical for good cellular function .(Palmer & Clegg, 2019). Phosphorus is a mineral that is present in your bones. Phosphorus, like calcium, is necessary for the production of strong, healthy bones as well as the preservation of other aspects of your body's health.. Normal functioning kidneys can eliminate excess phosphorus from your blood. In marine settings, .phosphorus (P) is one of the limiting macronutrients for algal development. (Sharma et al., 2020).

Materials and methods

This research was carried out from November 2021 to April 2022 at (Endocrine gland and diabetic center) in Imam Hussien Teaching Hospital and some private clinics in Karbala Governorate. This study was approved by the Faculty of Applied Medical Sciences' ethics committee and the Ministry of Health.

The Study Design

The study uses a case-control approach to determine the levels of Estradiol (E2) , albumin , potassium , calcium ,phosphor in premenopausal and postmenopausal osteoporosis women and healthy females.

Sample of the Study

100 patients clinically diagnosed as osteoporosis . tow study groups have been investigated: (25 in premenopause and 25 in postmenopause). Each sample yielded approximately 5 ml of venous blood. The blood was collected and placed in gel tubes. Each blood specimen was allowed to clot before being centrifuged for five minutes to separate the serum and perform a chemical test for hormones by (ELISA) and by spectrophotometer .

Statistical Analysis

Data were subjected to analysis. The value was reported as Mean+ SE, while ANOVA and LSD were used to test for difference science (SPSS) version ($P \leq 0.05$) was accepted as significant.

Result

Table 1 : Albumin level in osteoporosis and control

var	Groups	Mean \pm S. D	S. E	P value	lsd
albumin	control in premenopause	4.02 \pm 0.40	0.08	.251	N.S
	control in postmenopause	4.13 \pm 0.40	0.08		
	osteoporosis in premenopause	4.20 \pm 0.52	0.10		
	osteoporosis in post menopause	3.99 \pm 0.61	0.12		

When comparing the level albumin between osteoporosis patients and control groups , the result reveal no significant difference in the levels of these parameter between patients and control . This indicates that these parameter no effected with female age , as was reflected by no change in level of it in postmenopause osteoporosis when compared with premenopause osteoporosis than in healthy women

Table 2 : Calcium level in osteoporosis and control

var	groups	Mean \pm S. D	S. E	P. value	lsd
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calcium	control in premenopause	9.12 ± 0.55	0.11	.000	0.5
	control in postmenopause	9.17 ± 0.57	0.11		
	osteoporosis in premenopause	6.79 ± 1.00	0.20		
	osteoporosis in postmenopause	6.41 ± 1.17	0.23		

When comparing the level calcium between osteoporosis patients and control groups, the result reveal significant difference in the levels of these parameter between patients and control. This indicates that these parameter no effected with female age, but it is significant decreased in both premenopaus and postmenopause osteoporosis when compared with control women.

Table 3: Phosphor level in osteoporosis and control

var	groups	Mean ± S. D	S. E	P. value	lsd
phosphor	control in premenopause	3.21 ± 0.69	0.14	.000	0.47
	control in postmenopause	3.58 ± 0.65	0.13		
	osteoporosis in premenopause	2.45 ± 1.10	0.22		
	osteoporosis in postmenopause	2.05 ± 0.97	0.19		

When comparing the level phosphor between osteoporosis patients and control groups, the result reveal significant difference in the levels of these parameter between patients and control. This indicates that these parameter no effected with female age, but it is significant decreased in both premenopaus and postmenopause osteoporosis when compared with control women.

Table 4 : Potassium level in osteoporosis and control

var	groups	Mean ± S. D	S. E	P. value	lsd
potassium	control in premenopause	4.00 ± 0.65	0.13	.000	0.43
	Control in postmenopause	4.23 ± 0.56	0.11		
	osteoporosis in premenopause	6.36 ± 0.63	0.13		
	osteoporosis in postmenopause	6.20 ± 0.76	0.15		

When comparing the level potassium between osteoporosis patients and control groups, the result reveal significant difference in the levels of these parameter between patients and control. This indicates that these parameter no effected with female age, but it is significant increased in both premenopaus and postmenopause osteoporosis when compared with control women.

Table 5 : Estradiol level in osteoporosis and control

var	groups	Mean \pm S. D	S. E	P. value	lsd
E2	control in premenopause	310.20 \pm 92.01	18.40	.000	31.57
	control in postmenopause	15.06 \pm 7.96	1.59		
	osteoporosis in premenopause	199.89 \pm 86.96	17.39		
	osteoporosis in postmenopause	6.96 \pm 6.30	1.26		

Table (5) When comparing the level E2 between osteoporosis patients and control groups, the result reveals a significant difference in the levels of this hormone between patients and control. This indicates that this hormone is affected with female age, as was reflected by the clear decreased level of it in postmenopausal osteoporosis when compared with premenopausal osteoporosis than in healthy women.

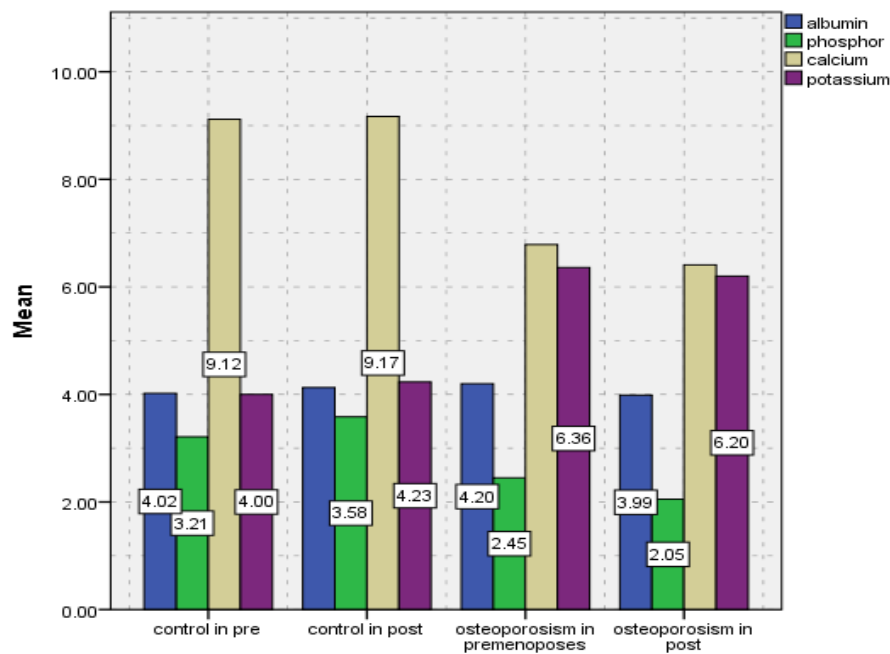


Figure 1: levels of albumin, calcium, phosphorus, potassium in osteoporosis and healthy women.

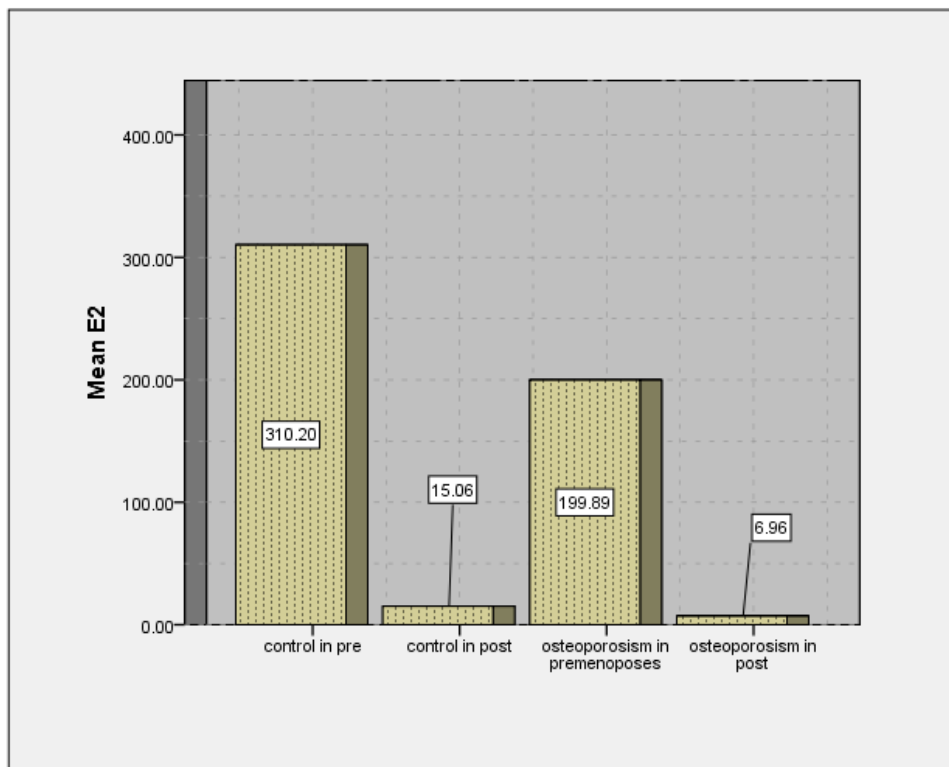


Figure 2 : level of E2 in osteoporosis and healthy female

Discussion

The current study showed as in table (1) there was a no significance difference ($P \leq 0.05$) in albumin concentration of osteoporosis women compared to control. The results of this study incompatible with other study in this filed .this study showed decreased level of albumin in osteoporosis (Rai et al., 2018) , also other study showed decreased level of albumin in postmeopause osteoporosis (Nagayama et al., 2021). Albumin is one of the important proteins that are made in the liver and plays an important role in transporting substances and hormones and regulating osmotic pressure. Since albumin is responsible for transporting thyroid hormones ,and transporting the essential materials for bone building , its percentage decreases in the case of hypothyroidism and osteoporosis (Gburek et al., 2021), but it is likely that due to the treatments used to treat hypothyroidism , as well as to treat osteoporosis, the level of albumin returned to the normal level (Bolkiny et al., 2019).also It is showed as in table (2) there was a significance decreased ($P < 0.05$) in calcium concentration of osteoporosis women compared to control. The results of this study are disagree with other study in that filed that showed no change in level of calcium in osteoporosis (Catalano et al., 2018). Bone is a calcium store, which has multiple vital functions in building bone cells as well as in heart functions and many other functions. If the level of calcium in the blood decreases, the deficiency is compensated by the stock in the bones. Also, one of the reasons for calcium deficiency is vitamin D deficiency, which works to absorb calcium from the intestines and withdraw it from the blood and concentrate it in the bone(Bouillon & Suda, 2014). while showed as in table (3) there was a significance decreased ($P \leq 0.05$) in phosphor concentration of osteoporosis women compared to control. The result of this study is consistence with previous study ,The level of phosphor no change in osteoporosis in premenopause and postmenopause (Al-Azzawie et al., 2020). The level of phosphor are decreased in osteoporosis (El-Baz et al., 2019). The results of this study are disagree with other study in that filed (Di et al., 2021)it is showed increased level of phosphor in osteoporosis. they are often calcium carbonate salts or citrates that bind phosphorus from food in the intestine and cause a reduction in the percentage of phosphorous available to build bones (Heaney, 2004) .

The current study showed as in table (4) there was a significance increased ($P \leq 0.05$) in potassium concentration of osteoporosis women compared to control. The result of this study was consistent with previous study in this

field ,(Ayed et al., 2019) This study indicates that potassium levels are elevated in osteoporosis. Since potassium plays an important role in the health and strength of bones, the more thin and brittle the bones need an increase in the proportion of potassium, so most of the treatments used for osteoporosis cause high levels of potassium in the blood (LaCroix et al., 2000). As well as it is showed as in table (5) there was a significance decreased ($P \leq 0.05$) in E2 hormone concentration of osteoporosis women compared to control. The results of this study compatible with other study in this filed . (Li & Wang, 2018; Jamka et al., 2021)) this studies showed decreased in estradiol level in postmenopause . (Shieh et al., 2019) this study showed the estradiol level started decreased when close to menopause.

The estradiol is a receptor for estrogen hormone , and it is important female hormone . Since the estradiol hormone is one of the basic hormones for regulating bone metabolism, as this hormone is produced by the ovaries, its proportion is normal in premenopausal age and gradually decreases with age (Ko & Jung, 2021) , and that its percentage decreased very much after menopause, as there is a close relationship between menopause and the accompanying a reduction in level of that hormone with a low in bone density, as lower the percentage of this hormone affects bone strength and leads to osteoporosis(Vakili et al., 2021) .

Conclusion:

Based on the results and discussions , the albumin level no effected in osteoporosis when compared with control ,but the level of calcium and phosphor decreased in osteoporosis when compared with healthy women , and the level of potassium increased in osteoporosis when compared with control group , as well as the E2 hormone decreased in patients with osteoporosis , and this decreased is more significant in postmenopausal age than premenopause for E2

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