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Osteoporosis Associated with Pregnancy and Lactation in Iraq

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Abstract: This study aimed to evaluate osteoporosis associated with pregnancy and lactation in the early postpartum period. A cross-sectional study was conducted on pregnant women suffering from osteoporosis from several different hospitals in Iraq, where 20 patients with ages ranging from 20-40 years were included. Information and demographic data of patients were analyzed using IBM SPSS SOFT 20, Microsoft Excel 2013.The patient MEAN ±SD was 30+5.5 years old at symptom onset height, and weight mean ± sd were 160±3.6 cm and 55.4±4.4 kg, respectively. The study revealed the presence of disturbances in the results of biological tests, as it was observed that there were disturbances in Urinary calcium (mg/24 hours).In this study, the comparative design was relied on according to the age of pregnant women to know Changes in Bone Mineral Density at 1-Year Follow-up results also showed improvements in L-BMD and H- BMD ratios (0.955 ± 0.155) (0.933±0.140) respectively of age between 30-40 and high values of ucOC in addition to the effective contribution of vitamin D3 in reducing osteoporosis.

Keywords: D3, Follow, pregnancy, BMD, L-BMD, DXA, ucOC, NTX.

INTRODUCTION

Osteoporosis is the most common metabolic bone disease, and it mostly affects women in Iraq, where approximately 5-7 million people suffer from osteoporosis. The World Health Organization has included osteoporosis in the list of the ten most important diseases globally, both in terms of disease consequences and treatment costs [Hardcastle, S.A. *et al*., 2019].

Pregnancy-related osteoporosis is extremely rare, with approximately 100 cases described in the literature [Hadji, P. *et al*., 2017; Paoletta, M. *et al*., 2020]. The prevalence of osteoporosis and pregnancy is likely to be higher than recorded because, during the third trimester of pregnancy, about 50% of patients complain of lumbosacral low back pain, without a valid etiological study of this condition [Grana, E. *et al*., 2016].

As with the physiology of changes in bone metabolism during pregnancy, the mechanism by which osteoporosis occurs during pregnancy is poorly understood as it defines a condition in which calcium is largely transferred from mother to fetus [Terzi, R. *et al*., 2014; Gehlen, M. *et al*., 2019] in order to allow fetal bone mineralization. However, there is a parallel readjustment in different mechanisms and regulatory pathways [Khoo, C.C. *et al*., 2011].

Pregnancy-related osteoporosis is usually detected in the postpartum period (56%) or in the third trimester (41%) [Rojano-Mejía, D. *et al*., 2011]. This is accompanied by several complications represented by back pain and a slight decrease in height. This pathology usually appears during the first pregnancy, and it is temporary, personal, and, as a rule, does not recur [Carranza-Lira, S. *et al*., 2002; Kojima, N. *et al*., 2002].

Bone densitometry, as a radiodiagnostic method, plays an important role in assessing BMD in these patients and also allows dynamic studies to be performed to assess treatment efficacy [Lenora, J. *et al*., 2009].

Through scientific studies, it is clear that the complications generated are the weakness of the lumbar spine during pregnancy, 3-5% of the BMD is lost, and from 3 to 10% during six months of breastfeeding, in addition to the loss of the hip joint and thigh bones 2-4% of the Bone mineral density during six months of infancy [Lovejoy, J.C. *et al*., 1998; Weaver, C.M. *et al*., 1996].

Results from a 2009 Rant Taus study on the topic indicate that changes in bone density due to pregnancy and lactation and subsequent bone density recovery do not affect bone density during and after menopause and do not increase the risk of fractures in old age [Michaelsson, K. *et al*., 1996].

However, there are exceptions, also identified by research: having multiple children and prolonged

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breastfeeding are associated with a long-term decrease in the amount of minerals in bone tissue.

MATERIAL AND METHOD

Patient Sample

A cross-sectional study was conducted on pregnant women suffering from osteoporosis from several different hospitals in Iraq, where 20 patients with ages ranging from 20-40 years were included.

Information and demographic data of patients were analyzed using IBM SPSS SOFT 20, Microsoft Excel 2013**.**

The patient MEAN ±SD was 30+5.5 years old at symptom onset, and height, weight mean ± sd were 160±3.6 cm and 55.4±4.4 kg, respectively**.**

Study Design

A cross-sectional study was established in cooperation with the hospitals from which patients were collected, where information and demographic data were collected by pulling the patients' primary information from the electronic record to the hospital.

Dual-emitter x-ray absorptiometry (DXA) is the preferred method for measuring bone mineral density (BMD). A DXA scanner is a machine that produces two beams of X-rays, each with different energy levels. Single beam differs from high energy while low energy. The amount of X-rays passing through the bone is measured for each beam. This varies according to the thickness of the bones on the basis of the difference between the two beams to measure bone density.

The radioimmunoassay to measure serum alkaline phosphatase is a very sensitive in vitro screening technique used to measure antigen concentrations (e.g., hormone levels in the blood) by using antibodies.

Study Period

Cooperated with the special committees for the purpose of obtaining the necessary and required approvals for the purpose of collecting patients and demographic information.

Patients were evaluated through advanced follow-up to the complications that occurred, and the study period was for a one year.

Which include Assessment of complications, collecting primary and demographic data for patients, in addition to analysing data and results for patients.

Aim of Study

This study aimed to evaluate osteoporosis associated with pregnancy and lactation in the early postpartum period.

RESULTS

Table 1: Demographic results of patients, N=20

Characteristic	20-29	30-40
Age (N, Frequency)	8	12
Height (cm)	159±3.6	158+4.4
Weight (kg)	69 ± 15	68±12
BMI (kg/m^2)	25.8 ± 4.7	26.6±4.5
DXA whole-body fat (%)	35 ± 7	36±6
Serum albumin–corrected calcium (mg/dL)	9.0 ± 0.3	9.0 ± 0.4
Urinary calcium (mg/24 hours)	181 ± 92	180±88
25(OH)D (ng/mL	33±4	35±4
ucOC (ng/mL)	8.9±4.2	10.2±3.3
u-NTX (pmol/mmol)	45±6.5	48±9.4
phosphorous (mg/dL)	3.1±1.1	3.3±1.2

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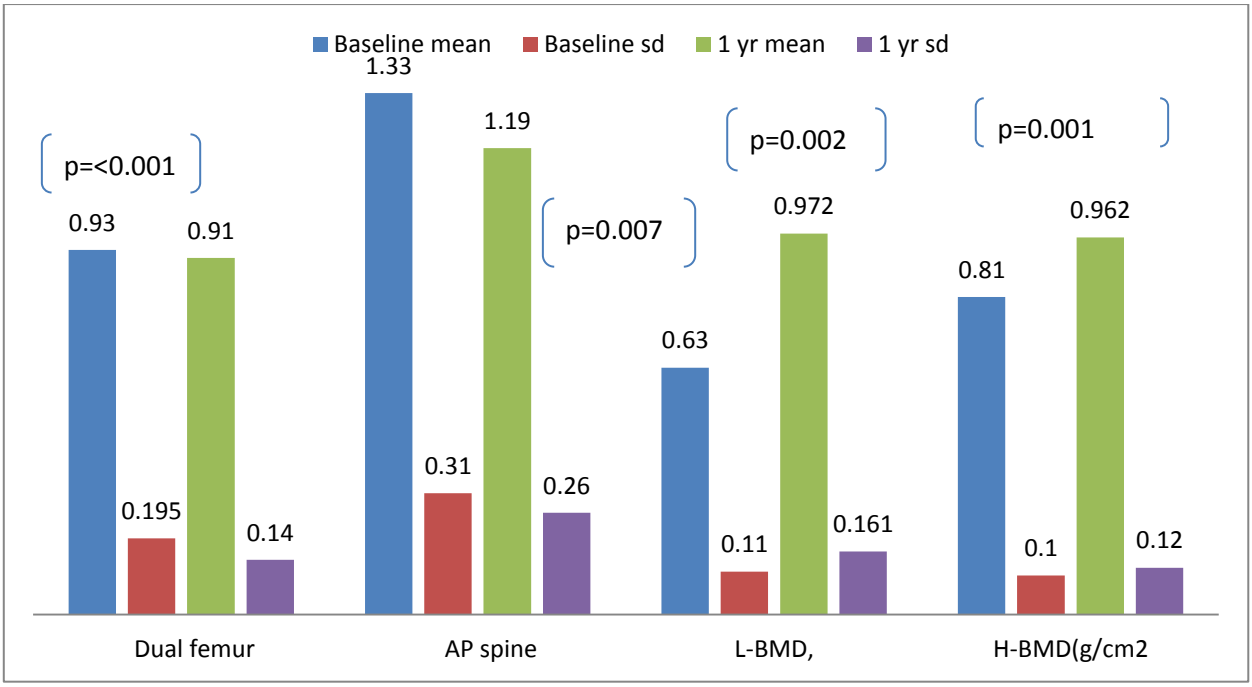

Figure 1: Changes in Bone Mineral Density at 1-Year Follow-up of age from 20-29 years BMD (g/cm2)

Table 2: Changes in Bone Mineral Density at 1-Year Follow-up of ages 30-40

	BMD (g/cm^2)		
	Baseline	**1 yr**	***P*-Value**
All (n = 20)			
Dual femur	0.99 ± 0.155	0.89 ± 0.20	<0.005
AP spine	1.39 ± 0.35	1.10 ± 0.23	0.001
L-BMD,	0.69±0.15	0.955 ± 0.155	0.05
H-BMD (g/cm2)	0.79±0.55	0.933±0.140	<0.001

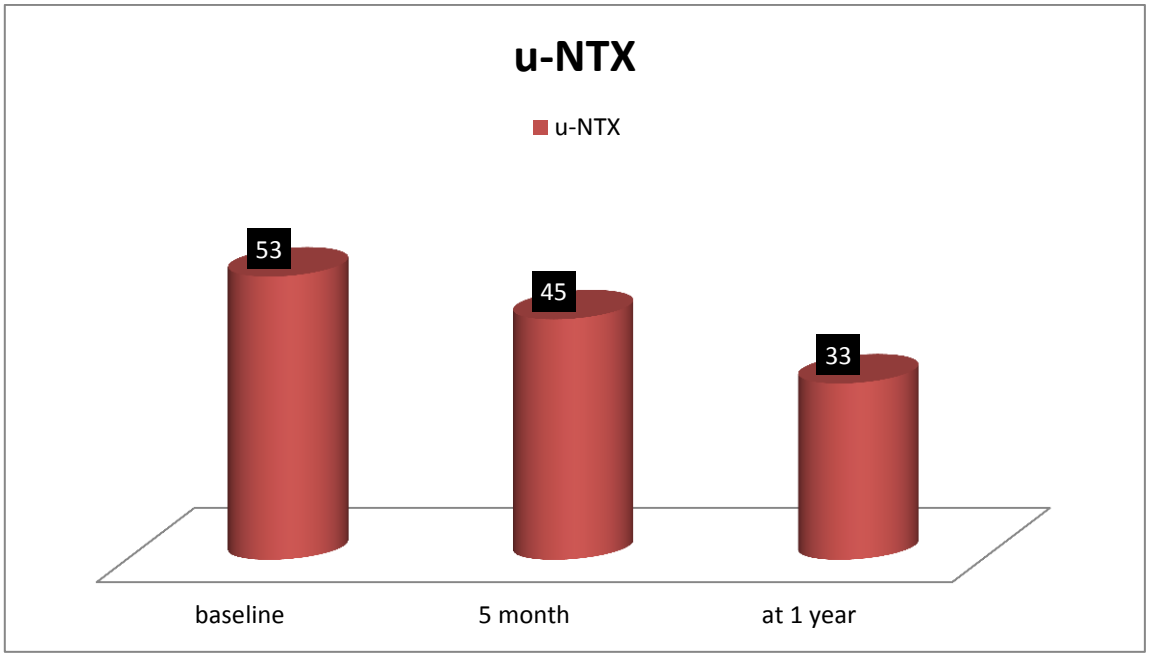

Figure 2: Outcomes before and after treatment Changes of u-NTX

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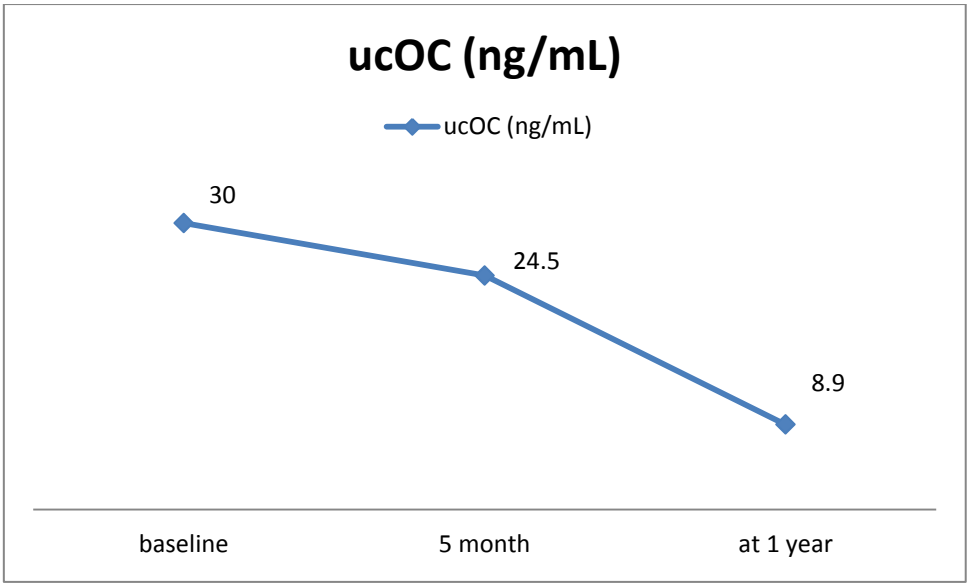

Figure 3: Outcomes before and after treatment Changes of ucOC (ng/mL)

DISCUSSION

In this study, 20 patients were collected and distributed for two groups (from 20-29 years old to 8 patients) (from 30-40 years old to 12 patients).

The patients' primary information was also collected, which included height and weight, from which the body mass index was calculated, which was high when Patients aged 30-40 years (26.6±4.5), and demographic data included results related to DXA whole-body fat to pregnant women ages 20-29 years (35 ± 7), (36 ± 6).

The study revealed the presence of disturbances in the results of biological tests, as it was observed that there were disturbances in Urinary calcium (mg/24 hours).

In this study, the comparative design was relied on according to the age of pregnant women to know Changes in Bone Mineral Density at 1-Year Follow-up.

Through scientific sources, it has been observed that there is an association between PO and adverse outcomes for pregnant women, and this may be due to several reasons, including osteoporosis, as previous clinical studies on the presence of family history have been implicated in causing this disease.

The results showed Changes in Bone Mineral Density at 1-Year follow-up of ages 20-29 of L-BMD was low at 0.69±0.15 g/cm2, and H-BMD was mildly depressed at 0.79±0.55 g/cm2.

Although urinary NTX and ucOC were increased, vitamin D values were normal at the first visit. Soon began vitamin K with ALF. At five months of treatment, urinary NTX and ucOC had greatly decreased.

The results showed a significant decrease in L-BMD values at 0.69 ± 0.15, And it was revealed that there is a direct relationship when using the treatment with a statistically significant relationship where the values of L-BMD increased after a full year of follow-up at 0.955 ± 0.155.

Low serum calcium during pregnancy has been considered a persistent trigger of reactive hyperparathyroidism. In this case, the tendency to lose bone mass that underlies cases of osteoporosis during pregnancy is easy to understand [Kalkwarf, H.J. *et al*., 1997].

It is now clear that the decrease in calcium is explained by a decrease in albumin levels - physiological during pregnancy - because of the concentration of free calcium, which is the true criterion for the modulation of circulating hormone [Sowers, M. *et al*., 1998]; however, previous cases of osteoporosis, which are almost universally detected, determine susceptibility. Besides, and in contrast to the histological data, there are clinical studies that indicate a state of increased resorption, especially in the third trimester of pregnancy [Prentice, A. *et al*., 1995]. Specifically, a change was found in biochemical markers indicating this. There is also densitometric data, especially with devices that use ultrasound, which also indicate a decrease in bone density throughout pregnancy.

The strength of this type of information, especially that referring to biochemical variables, should be taken with caution. Biochemical variables

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measured in the blood are influenced by the hematopoietic expansion inherent in pregnancy via increased glomerular filtration rate and renal clearance. [Lopez, J.M. *et al*., 1996]

Urtiss and Kinkaid first described a radiological fragility of the hip of three women in the third trimester of pregnancy. Since then, only 200 cases have been reported in the literature. Some authors have described four subsections of having idiopathic osteoporosis during pregnancy, transient hip osteoporosis during pregnancy, lumbar osteoporosis after pregnancy or lactation-related osteoporosis, and drug-induced osteoporosis.

During pregnancy and lactation, calcium requirements increase, so adaptive mechanisms can have a negative impact on bone mass. Among the coping mechanisms in response to the increased needs involved in pregnancy, the increase in PTHrP (thyroid hormone-related protein) and cytokine levels stand out. In infancy, there is an increase in PTH (parathyroid hormone) and prolactin, with a decrease in estrogen and these changes lead to an increase in bone turnover with a decrease in bone mineral density [Miller, S.C. *et al*., 2004]

CONCLUSION

This study aims to evaluate osteoporosis associated with pregnancy and lactation in the early postpartum period.

The results were evaluated to patients after one year of follow-up, and the contribution of treatment to improving the values for Bone Mineral Density was noted by finding a positive, statistically significant relationship.

We conclude from this study that the presence of high values of ucOC in addition to the effective contribution of vitamin D3 in reducing osteoporosis.

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