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Assessment of Malondialdehyde, and Some Inflammation Parameters in Iraqi Osteoporosis Women

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Abstract

Osteoporosis is chronic degenerative disease characterized by a decreased bon mass occurs when the balance between bone resorption and bone formation is lost. Recently , oxidative stress malondialdehyde (MDA) , and some inflammation parameters like C-reactive proteins (CRP), IL-1, IL6 and TNF-α are believed to play important role in osteoporosis disease. Fifty osteoporosis women patients were recruited into the study according to the presence of MDA ; as compared with forth healthy controls the age range was between (42-60) years. Hs-crp, IL-6, TNF-α and MDA determination by ELISA KIT , Biosorce ,USA. In present study showed significantly increase in MDA levels (mean ±SD) in osteoporosis women compared with control (27.01 ± 5.66) vs (12.01 ± 2.04) , p value = 0.01 , and also significantly increase in IL1β levels (mean ±SD) in osteoporosis women compared with control (7.44 ± 3.86) vs(2.11 ± 2.74), , p value = 0.01 and TNF-α also significantly increase p value =0.01, while there were significantly decrease in vitamin D3 levels p value =0.01. The study concludes that levels of malondialdehyde and Vit D may help diagnose women with osteoporosis and bone loss.

Keyword: Osteoporosis, Malondialdehyde, Vatamin D3,Cytokines

Introduction

Osteoporosis, one of the metabolic issues of bone, happens while bone loss and bone formation are out of stability (1). The dynamic technique of resorption and formation in bone tissue keeps to hold bone mass and skeletal homeostasis. Two varieties of osteoclasts, osteoclasts and osteoblasts, carry out particular features in bone remodeling (2). Osteoclasts resorb bone and osteoblasts synthesize and fill the bone matrix. Bone mass relies upon at the mutual characteristic of those cells (three). A traditional grownup continuously continues a stability among bone resorption and bone formation. However, as quickly as osteoporosis develops because of age, hormonal imbalance, or loss of exercise, great of existence deteriorates because of excessive ache and restrained exercise [4,5]. Malondialdehyde (MDA) is one of the very last merchandise of the peroxidation of intracellular polyunsaturated fatty acids. Increased unfastened radicals result in overproduction of MDA. Malondialdehyde tiers are generally referred to as markers of oxidative strain and antioxidant repute in most cancers patients (6,7). : Cytokines, CRP (Creactive Proteins) and ferritin are acknowledged markers of irritation. However, cytokines inclusive of interleukin (IL6) and tumor necrosis factor (TNFα) had been mentioned to intervene with each bone resorption and bone formation processes. Similarly, immune mobileular cytokines are acknowledged to make contributions to adipose tissue irritation, particularly in overweight human beings (8). Cytokines are a big institution of peptides and proteins acknowledged to be worried in sign transduction among cells of the immune device [9,10]. Cytokines play an essential position withinside the law of the immune device had to combat off bacterial and viral assaults at the immune device. Reactive protein

(CRP) is thought to be a touchy systemic marker of irritation. Production of CRP withinside the liver, which upregulates tiers of cytokines inclusive of IL1, IL6, and TNFα, is undoubtedly correlated with bone resorption, consisting of bone loss withinside the hip and backbone of wholesome premenopausal and postmenopausal ladies. It has been observed (11,12). .. Cytokines are acknowledged to be the definitive regulators of adipose tissue metabolism, particularly in overweight human beings with a frame mass index (BMI) of 25 kg / m2 or over 32% as a trademark of obesity. Cell types, preadipocytes, and mature adipocytes may also stimulate the secretion of cytokines and chemokines related to expanded mRNA expression, particularly in overweight individuals [13, 14]. Each year, osteoporosis reviews greater than 8.nine million fractures worldwide, inflicting one osteoporotic fracture each three seconds [15]. Therefore, the weight of osteoporosis isn't always restricted to monetary costs, however additionally to giant emotional and bodily consequences, particularly for middle-elderly and older guys and ladies. Abnormal or long-time period immune responses that motive slight irritation are related to the pathogenesis of osteoporosis. In postmenopausal ladies, that is related to reduced tiers of estrogen, main to expanded bone resorption [16]. This observe objectives to evaluate the tiers of malondialdehyde and a few inflammatory parameters in women with osteoporosis in Iraq.

Material and Methods:

Fifty osteoporotic female patients who visited the Alyarmouk Teaching Hospital between November 2020 and the end of September 2021 were enrolled in the study after MDA became available. The age range was between (4260) years, compared to the fourth healthy control group. Patients with underlying endocrine pathology, certain factors of heart disease or deficiency, patients receiving treatment that affect their vitamin D status, or those with a history of surgery were excluded. Data including age, gender, weight, height, and body mass index (BMI) were collected for all subjects. Laboratory tests include fasting blood glucose (FBS), total cholesterol (TC), triglycerides (TG), high density, low density, very low density lipoproteins (HDLC, LDLC, VLDLC), S.Ca, S.PO4. included. Measurement of vitamin D3 by Minividas, Biomeriux, French. Measurement of Hscrp, il1β, IL6, TNFα and MDA by ELISA KIT, Biosorce, USA.

Result and Dissociation:

The superoxide dismutase (ROS) molecule is more active than other cells and can attack any cell and cause more damage to other surrounding tissues. Oxidative stress can occur when free radicals produce more than neutralizing abilities. ROS can play an important role in the pathogenesis of many chronic diseases such as liver damage, atherosclerosis, and osteoporosis (17). In the present study , all data for (Waist, Weight, S.FBG, S.TC, S.TG, S.LDL) were increased significantly in patients with osteoporosis than control and decrease of S.HDL levels as atherogenic effects of lipid profile ,as shown in table (1) ,this results were agreement with Jharna Shukl et al. 2013(18) , where tooled that there were highly significant increase in lipid profile in patients with osteoporosis than control , the cardio protective effect of estrogen is attributing to this prevention of atherosclerosis .While there were significant decrease in the levels of S.Ca , S.PO4, and Vit.D, thes results were agreement with Shreya Shrestha et al. 2020(19), where showed that decreased in S.Ca and Vit D as various changes in the S.Ca and Vit D metabolism , such as decrease in dietary and production of Vit. D and decrease calcium absorption by intestine , can lead to osteoporosis and bone loss.

Table (1) Clinical parameters between osteoporosis women and control women.

Parameters	osteoporosis women	Control women	P-value
	Mean±SD	Mean±SD	
	N=50	N=40	
AGE (years)	50.24±10.35	45.25±8.50	NS
Waist(cmhg)	97.22±5.36	71.23±4.10	0.05
Weight (kg)	88.16±7.14	70.10±3.89	0.05
High (cm)	178.25±6.78	158.0±6.23	NS
BMI (Kg/m^2)	82.15±3.12	22.52±3.26	0.05
S.FBG(mg/dl)	145.10±12.32	86.61±10.05	0.01
S.TC (mg/dl)	215.16±3.25	9.95±2.10	0.05
S.TG (mg/dl)	174.22±33.20	90.0±20.23	0.01
S.HDL (mg/dl)	40.25±5.12	55.66±3.47	0.06
S.LDL (mg/dl)	120.25±15.12	85.66±3.47	0.05
Ca (mg/dl)	6.12±1.02	9.10±1.02	0.05
PO4(mg/dl)	2.58±1.66	4.00±1.02	0.05
Vitamin D3(ng/dl)	8.19±1.62	34.56±2.96	0.01

In table(2) showed significantly increase in MDA levels in osteoporosis women compared with control ,this agreement with NAJLAA KADHIM ISSA ,2018(20) showed that elevated levels of MDA levels in osteoporosis women and with Rao LG.2005(21) which showed that increased levels of MDA in bone disorders and decreased activities of antioxidant enzymes superoxidase dismutase SOD explain a defense mechanism .

Table (2): Malondialdehyde levels between osteoporosis women and control women.

Parameters	osteoporosis women (n=50) Mean±SD	control women (n=40) Mean±SD	*p* value
MDA (ng/ml)	27.01 ± 5.66	12.01 ± 2.04	0.01

In table(3) showed increased in hs CRP and IL6 in osteoporosis patients with control this agreement with Huang JV, et al 2017(22) .There were highly significant increase in IL1 β and TNF- α ,this

agreement with McLean RR.et al.2009(23) , where showed that elevated levels of inflammatory cytokines have been linked with lower bone mineral density.

Table (3) : Inflammatory markers between osteoporosis women and control women.

Parameters	osteoporosis women (n=50) Mean±SD	control women (n=40) Mean±SD	*p* value
hsCRP (mg/dl)	8± 3.15	.11 ± 1.313	0.01
IL1β (ρg/ml)	7.44 ± 3.86	2.11 ± 2.74	0.01
IL6 (ρg/ml)	56.41 ± 2.10	64.21 ± 1.30	0.01
TNF-α (ρg/ml)	33.22 ± 4.31	20.15 ± 1.40	0.01

Conclusions

The study concludes that levels of malondialdehyde and Vit D may help diagnose women with osteoporosis and bone loss.

References:

1. Harris P.E., Bouloux P.-M.G. Metabolic Bone Disease. In: Harris P.E., Bouloux P.-M.G., editors. *Endocrinology in Practice.* 2nd ed. CRC Press; London, UK: 2014. pp. 243–261. [Google Scholar]

2. Rosen C.J., Bouxsein M.L. Mechanisms of Disease: Is Osteoporosis the Obesity of Bone? *Nat. Clin. Pract. Rheumatol.* 2006;2:35–43. doi: 10.1038/ncprheum0070. [PubMed] [CrossRef] [Google Scholar]

3. Teitelbaum S.L. Bone Resorption by Osteoclasts. *Science.* 2000;289:1504–1508. doi: 10.1126/science.289.5484.1504. [PubMed] [CrossRef] [Google Scholar]

4. Parfitt A., Mathews C., Villanueva A., Kleerekoper M., Frame B., Rao D. Relationships between Surface, Volume, and Thickness of Iliac Trabecular Bone in Aging and in Osteoporosis. Implications for the Microanatomic and Cellular Mechanisms of Bone Loss. *J. Clin. Investig.* 1983;72:1396–1409. doi: 10.1172/JCI111096. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

5. Srivastava M., Deal C. Osteoporosis in Elderly: Prevention and Treatment. *Clin. Geriatr. Med.* 2002;18:529–555. doi: 10.1016/S0749-0690(02)00022-8. [PubMed] [CrossRef] [Google Scholar]

6. **Stefan Gaweł** [1], **Maria Wardas**, **Elzbieta Niedworok**, **Piotr Wardas**. Malondialdehyde (MDA) as a lipid peroxidation marker. Clinical Endocrine. 2004;57(9-10):453-5.

7. Ayse Nur Torun [1], Sevsen Kulaksizoglu, Mustafa Kulaksizoglu, Baris Onder Pamuk, Elif Isbilen, Neslihan Bascil Tutuncu. Serum total antioxidant status and lipid peroxidation marker malondialdehyde levels in overt and subclinical hypothyroidism. Clinical Endocrine 2009 Mar;70(3):469-74.doi: 10.1111/j.1365-2265.2008.03348.x.

8. Grimble RF. Interaction between nutrients, pro-inflammatory cytokines and inflammation. Clin Sci (Lond). 1996;91(2):121–30. 2.

9. Zhang H-F, et al. IL-33 promotes IL-10 production in macrophages: a role for IL-33 in macrophage foam cell formation. Exp Mol Med. 2017; 49(11):e388.

10. Fuggle N, et al. Relationships between markers of inflammation and bone density: findings from the Hertfordshire cohort study. Osteoporos Int. 2018; 29(7):1581–9. https://doi.org/10.1007/s00198-018-4503-z.

11. Ginaldi L, Di Benedetto MC, De Martinis M. Osteoporosis, inflammation and ageing. Immun Ageing. 2005;2(1):14. 8.

12. Berglundh S, et al. C-reactive protein, bone loss, fracture, and mortality in elderly women: a longitudinal study in the OPRA cohort. Osteoporos Int. 2015;26(2):727–35. 9. 13.Ginaldi L, De Martinis M. Osteoimmunology and beyond. Curr Med Chem. 2016;23(33):3754–74. 10.

14. Fain JN. Release of interleukins and other inflammatory cytokines by human adipose tissue is enhanced in obesity and primarily due to the nonfat cells. Vitam Horm. 2006;74:443–77. 11.

15.Coppack SW. Pro-inflammatory cytokines and adipose tissue. Proc Nutr Soc. 2001;60(3):349–56. 12.

16. McLean RR. Proinflammatory cytokines and osteoporosis. Curr Osteoporos Rep. 2009;7(4):134–9. 13.

17. Selverion SF,Mesarose S .Osteoclast radical interaction : NADPH causes pulsatile release of NO and stimulates superoxide production. Endocrinology 1995; 136: 5244- 5247.

18.Jharna Shukla , et al.Acomparative study of antioxidant defenses and lipid profile in premenopausal and postmenopausal osteoporotic women .Int J Biol Med Res. 2013 ;4(2):3196 – 3198.

19- Shreya shrestha et al.Vitamin D ,Calcium , Parathyroid Hormone , and Sex Steroids in Bone Health and Effects of Aging . Journal of osteoporosis, 2020 .

20. Najlaa Kadhim Issa , et al. Oxidant –antioxidant status in postmenopausal osteoporotic women in Duhok City .Duhok Medical Journal, 2018;Vol 12.No 2.

21. Rao LG.Will tomatoes prevent osteoporosis ? Endocr. Rounds, (2005): 5(2),

22. Huang JV, Schoolng CM.Inflammation and bone mineral density : a Mendelian randomization study .Sci Rep. 2017;7(1):8666.

23 .McLean RR.Proinflammatory cytokines and osteoporosis Curr Osteoporos Rep.2009;7(4):134-9.