

Determination of some Biochemical Marker in Postmenopausal Women with Chronic Periodontitis

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Abstract

Aim: Menopause, resulting from the permanent cessation of menstrual cycle, acts as the potential risk factor for periodontal diseases. Due to the long life-expectancy, today women live about half of their life after menopause. This study aimed to evaluate, estrogen, estradiol, Leptin, adiponectin, paraoxonase (PON-1), oxidative stress and oxidative stress indices between postmenopausal women with chronic periodontitis (CP) and premenopausal women without CP as control.

Methods: Serum samples were collected to measure the mean levels of the following hormones: cortisol, estradiol, Leptin, adiponectin, as well as to measure biomarkers of oxidative stress including malondialdehyde (MDA), glutathione peroxidase (GPX), and total antioxidant capacity (TAC), and status of antioxidant enzymes (superoxide dismutase (SOD), and Gamma-glutamyl transpeptidase (GGT), and catalase (CAT), levels were estimated in the blood of postmenopausal women with chronic periodontitis (CP) (n=70) and compared with those in age matched premenopausal women without CP as control (n=70).

Results: The serum estrogen, adiponectin, PON1, catalase, TAC, and SOD were higher in controls as compared to cases. Serum leptin, Cortisol, GGT, and MDA levels were found to be higher in case as compared to controls.

Conclusion: In postmenopausal women, leptin and adiponectin concentrations are substantially correlated with sex hormone and associated with an increased risk of incident of CP. Serum oxidative stress level may be an indicator of worsened chronic periodontitis related to post menopause and the count of metabolic risk factors which causes pathology in this stage of life.

Keywords: Postmenopausal Women; Malondialdehyde; Estrogen

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Introduction

Menopause is an uncommon period in a lady's life. The creation of estrogens changes radically at menopause, that can prompt osteoporosis in skeletal bones, portrayed by the loss of bone mass and decrease of bone thickness, and with a subsequent increment in bone delicacy and helplessness to break. Postmenopausal status is additionally a significant hazard factor for periodontal diseases [1].

Periodontitis is a plaque prompted ailment, the movement of which is affected by altering components, for example, foundational sickness conditions, age, and sociodemographic conditions, periodontitis ordered by its step by step submit bat, yet sooner or later experiences worsening, in which microbial plaque causes periodontal tendon and bone destruction [2-4].

The ebb and flow recommendation for the pathogenesis of periodontal malady stresses on "microbial dysbiosis" wherein a move in the cooperative advantageous microbial networks in the plaque biofilm to pathogenic microorganisms fundamentally represents the inception of periodontal disease [4].

Fat tissue is dynamic endocrine organ that discharges numerous metabolically dynamic peptide hormones, cytokines, chemokines and adipokines, for example, leptin, visfatin, resistin, apelin, omentin, sex steroids, and different development factors are cell flagging proteins. Adipokine dysregulation seems to play an assume a focal job in the improvement of insulin opposition, the principle pathologic instrument of numerous metabolic and vascular diseases [5,6].

Leptin is a hormone-like protein, which from the start stood apart due to its enormous activity in coordinating weight and processing of the human body. Leptin impacts the body's obstruction parts, including Immune system microorganisms, macrophages and endothelial cells. Thusly, a couple of masters have named it a cytokine [7].

Adiponectin a 244-amino destructive protein, is one of the promptest adipokines produced from fat tissue, has moderating, and insulin-honing properties, and antagonistic to atherosclerotic administrator that chokes cardiovascular danger which may be credited to its quieting properties. It controls IL-6 and TNF-creation by macrophages and grows the production of critical quieting factors, for instance, IL-10 or IL-1RA by human monocytes, macrophages,



and dendritic cells [8,9]. Thus, the reason for this investigation was to decide the impact of the periodontitis on serum leptin, and adiponectin, oxidative pressure and cell reinforcement status levels in postmenopausal ladies.

Materials and Methods

Patient Selection

This case–control study was performed from June 2019 and January 2020 at the dental division in Tikrit Teaching Hospital. Tikrit territory/ Iraq which done in 70 premenopausal ladies and 70 postmenopausal ladies with ceaseless periodontitis (CP). The subjects were arbitrarily chosen from all-inclusive community around the medical clinic territory.

Gathering 1: Control (Premenopausal Women) without constant periodontitis (CP) Women old enough 25–45 years with ordinary menstrual cycle were chosen and inspected in follicular stage when the hormonal varieties are not impacted by progesterone.

The prohibition criteria were ladies on oral preventative pills or any drug that changes cardiovascular capacity or endocrine capacity; lactating and pregnant ladies; ladies inside 2.5 long stretches of baby blues; prepared competitor, or ladies playing out any sort of strenuous exercise, yoga, or contemplation.

Gathering 2: Cases (Postmenopausal Women) The consideration criteria were postmenopausal ladies old enough 45-60 years with normal end of monthly cycle for a long time.

The rejection criteria were ladies on hormone substitution treatment or whatever other medication that adjusts cardiovascular capacity or endocrine capacity; ladies with history of hypertension, diabetes, or any foundational or metabolic issue; ladies with any history of dependence; prepared competitor, or ladies playing out any sort of strenuous exercise, yoga, or reflection. The mean systolic and diastolic blood weights of the subjects were 77.6 ± 2.11 and 110.5 ± 7.3 mm Hg separately. Postmenopausal interminable periodontitis (45-55 years) patients having ≥ 20 teeth were selected into the examination. Menopause was affirmed by the nonattendance of feminine cycle for over two years. The analytic criteria for periodontitis depended on American Academy of Periodontology Criteria 1999: at least at least two interproximal destinations with connection misfortune ≥ 4 mm, or at least two interproximal locales with examining profundities ≥ 5 mm, not on the equivalent tooth [10,11].

Blood tests were gathered at 07 h 30 min two unique days: after 12 hrs of medium-term quick (fasting) and after every day breakfast (postprandial). Blood tests were promptly centrifuged at 3000 rpm during 10 min and the supernatant (serum) was isolated into a few aliquots and put away at $- 80^{\circ}\text{C}$ for future examinations. Leptin, adiponectin, were estimated by ELISA utilizing reagents from Linco Research. Serum GGT levels were estimated by an enzymatic strategy utilizing a Hitachi 7600-110 computerized science analyzer, PON 1 by spectrophotometric examine of [12]. Estrogen, estradiol was estimated by chemiluminescence immunoassay framework utilizing UniCel DxI 600 Access (Beckman Coulter, Inc., Brea, CA, USA). All out-cell reinforcement capacity (TAC) was assessed [13]. Grass was evaluated by Marklund and Marklund method [14]. MDA was evaluated by Ohkawa method [15]. Catalase (CAT) was assessed by Aebi method [16]. The outcomes were investigated with the Chi square test and Student's t test ($P < 0.05$).

Results

Mean \pm SD estimations of the deliberate qualities for the examination populace are introduced in Table 1. There were 70 premenopausal ladies running in age from 25 to 45 yr (38.5 ± 10.47 yr); 70 postmenopausal ladies with CP going in age from 45 to 60 yr (38.5 ± 10.47 yr), who had been postmenopausal for > 2 yr.

The examination bunch included 70 Postmenopausal Women with CP with a mean period of 57.46 ± 10.95 year, and control bunch involved 70 sound people with a mean time of 38.5 ± 10.47 year.

The after effects of table 1 show the mean of serum leptin (8.41 ± 1.10 ng/ml), Cortisol (523.20 ± 104.44 nmol/L), levels were altogether higher while estrogen (35.66 ± 6.18 pg/ml), and adiponectin (5.870 ± 0.400 $\mu\text{g}/\text{ml}$) were lower in study bunch separately than in charge gathering (17.70 3.35 ng/ml), (413.60 ± 94.74 nmol/L), (7.260 ± 0.686 $\mu\text{g}/\text{ml}$), and (180.39 ± 39.44 pg/ml) individually.

Likewise the outcomes indicated a huge diminishing in serum PON1 (144.4 ± 1.2 U/L), Catalase (2.087 ± 0.151 K/ml), T A C (39.38 ± 3.23 mmol/L) and SOD (1.710 ± 0.313 U/L), while huge increment in serum GGT (11.2 ± 2.3 U/L), and M D A (1.6730 ± 0.0798 μM) in the event that review in correlation with control gathering (160.7 ± 1.0 U/L), (6.969 ± 0.763 K/ml), (48.15 ± 3.07 mmol/L) (2.000 ± 0.146 U/L) (6.1 ± 1.1 U/L), and (0.6400 ± 0.0877 μM), individually.

The segment, periodontal and biochemical qualities at pattern for the two gatherings are plot in Table 1.

Table 1: Biochemical parameters of study groups.

Groups	Case group	Control group	
Estrogen(pg/ml)	35.66±6.18	180.39±39.44	0.05
Cortisol(nmol/L)	523.20±104.44	413.60±94.74	0.05
Leptin (ng/ml)	8.41 ±1.10	17.70 3.35	0.0004
Adiponectin (µg/ml)	5.870 ± 0.400	7.260 ± 0.686	0.0003
SOD (U/L)	1.710 ± 0.313	2.000 ± 0.146	0.001
GGT (U/L)	11.2±2.3	6.1±1.1	< 0.001
TAC (mmol/L)	39.38 ±3.23**	48.15±3.07	0.05
MDA (µM)	1.6730±0.0798	0.6400±0.0877	0.05
Catalase (K/ml)	2.087±0.151	6.969 ±0.763	0.0007
PON1 (U/L)	144.4±1.2	160.7±1.0	< 0.001

Discussion

Postmenopausal ladies can impact changes in sex hormone and their coupling protein focuses. Flowing degrees of adipokines likewise change during menopausal transition [17]. There was a noteworthy increment in serum estrogen and diminished in serum cortisol in postmenopausal ladies as contrasted and control gathering. The decay of estrogen because of the maturing of ovaries which answerable for the emission of estrogen and progesterone. The salivary centralization of cortisol is solid pointer of serum cortisol fixation. The cortisol may impacts and lessening the degree of serum calcium by impact the parathyroid hormone, decline intestinal retention of calcium and diminishing renal reabsorption [18,19].

The leptin is seen as an association between the neuroendocrine and immune systems. It could control various physiological and pathophysiological structures, especially disturbance and safety. Leptin and adiponectin may in like manner control bone absorption and be locked in with osteoporosis pathophysiology. Huge degrees of leptin, generally associated with huskiness, are danger factor for bone loss [20-23].



The bigger abatements in adiponectin over the menopause progress were related with more prominent increment in systolic circulatory strain, insulin and insulin obstruction and with more noteworthy reductions in high thickness lipoprotein (HDL-cholesterol) [24].

As per Napoli N, et al. adiponectin serum levels in old men are fundamentally lower than in old ladies [25]. This might be a characteristic postmenopausal adiponectin increment in ladies associated with a diminishing centralization of estrogens. Lipids are among the most promptly oxidizable substrates, in this manner expanded lipid peroxidation (LPO) could be one result of ROS harm. LPO prompts a course of responses, in this manner annihilates film lipids as well as creates endogenous toxicants that can promptly respond with adjoining particles like layer proteins or diffuse to increasingly inaccessible atoms like DNA, which may prompt progressively hepatic difficulties and useful anomalies [26,27].

Our outcomes indicated that MDA levels expanded may have caused down guideline of Grass featuring that stoutness assuming significant job in increment oxidative worry in postmenopausal women [28]. Just as ROS causes periodontal tissue decimation either by debasing the ground substance or by arrival of collagenases or by arrival of different provocative mediators [29]. Polymorphonuclear leukocytes enactment in fringe blood could bring about the addition of ROS in circulation [30].

Superoxide dismutase (Turf) Grass is a significant resistance catalyst which catalyzes the dismutation of two superoxide radicals to hydrogen peroxide and oxygen and can be distinguished in extra- and intracellular compartments [31,32]. In the present examination indicated altogether lower levels of Grass in study bunch when contrasted with the sound gathering. This is conceivably ascribed to the more super oxides were incited as periodontal aggravation, more Grass would be devoured and cause Turf level lessening. Likewise more Grass were delivered to bear the cost of natural assurance against expanded superoxide age during periodontal inflammation [30]. Past investigation by Daiya S, et al. have likewise indicated a comparable report [10].

The outcomes of this examination are instead of analyzes done by Ramesh, et al. [33], which showed vital decreased in the degrees of TAC in G1 in relationship with control social affairs. The abatement in the present examination could be attributed to the usage of malignant growth avoidance specialists attempting to execute the ROS development during periodontal inflammation [34].

Glutathione (GSH) is the most huge thiol disease anticipation operator monitor in the body murdering free radicals hence expect a conclusive occupation in protection from oxidative stress during cell absorption which applies its action by shunting between oxidized (GSSG) and lessened state (GSH) [35,36].

Gamma-glutamyltranspeptidase/transferase (GGT) (GGT; E.C. 2.3.2.2) a heterodimeric glycosylated protein introduced into outside surface of the plasma layer of different cells, with the most raised obsessions found in the liver, applies its action by hydrolysis and transpeptidation of extracellular GSH, thusly having a central activity in keeping up glutathione homeostasis. The hydrolysis of glutathione starts cysteinyl-glycine, which is an unbelievable reductant of Fe^{3+} , prepared to simultaneously make Fe^{2+} and a free thiyl radical [37-39]. It is a protein that is a routinely used logical marker to recognize diseases of the liver and bile ducts [40].

In the present examination, serum GGT of study pack was inside

and out lower than control gathering. This result resembled Abdul et al. [41] study, which revealed that the extension in its free radical looking through property and in- wrinkled use to kill the oxidative weight and to frustrate film lipid peroxidation which shows that the augmentation in serum GGT with redesigned oxidative weight and diminished cell fortification assurance structure in the post-menopausal women may provoke the hypothesis that GGT could be seen as a rundown or an oxidative weight marker [41]. Arredondo, et al. [42], show that raised serum GGT may reflect both of the started atherogenic frameworks and the abatement of oestradiol, it can exhibit that GGT is a marker for oestradiol and oxidative weight.

The eventual outcomes of this examination are as opposed to analyzes done by Ramesh et al. which demonstrated essential diminished in the degrees of TAC in G1 in assessment with control groups. The decline in the present examination could be attributed to the usage of disease anticipation operators attempting to execute the ROS development during periodontal inflammation [43].

Catalase is a basic malignant growth counteraction specialist shield part that screens the cells from hydrogen peroxide created inside them. It expects an occupation in strength making sure about to oxidative stress in the adaptable response of cells [44]. A reducing in the development of Feline could be a direct result of addition in the lipid peroxidation thing, malondialdehyde which can outline cross associations, right now a couple of layer bound enzymes [27].

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