ISSN: 0975-3583,0976-2833 VOL15, ISSUE 01, 2024

ESTIMATION THE LEVELS OF MELATONIN AND SOME OF PHYSIOLOGICAL VARIABLES IN WOMEN BEFORE AND AFTER MENOPAUSE IN SAMARRA CITY

KHALIDA KHALEEL ABDULLAH1 , IMAN ISMAEL KHALEEL2 ,

ASMAA HASSAN JUMAA Al_SAMARRAI3

1Department of Biology, College of Education, Samarra University, Samara, Iraq
2Department of Samarra Education, General Directorate of Salah al-Din Education
3Department of Biology, College of Education, Samara University, Samara, Iraq

Abstract:

The current study aimed to evaluate the levels of melatonin and estrogen hormones and the concentration of high-sensitivity C-reactive protein (hS.CRP) and interleukin (IL-17) in the serum of pre- and post-menopausal women in Samarra city The current study included (50) samples, 20 of which belonged to the group of premenopausal women, whose ages ranged from (25-45) years, and (30) samples from the group of postmenopausal women, whose ages ranged from (45-65) years.

The results of the tests showed a significant decrease in the level of Melatonin and Estrogen hormones in the group of postmenopausal women. While there was a significant increase in the level of the two variables mentioned in the group of women before menopause, while the results showed the presence and significant increase in the level of High - Sensitive C-reactive protein (hS.CRP) and interleukin-17 (IL-17) in the group of women after Menopause and their decline before menopause at a significant level ($P \leq 0.05$).

Key words: Premenopause, PostMenopause, Melatonin, Estrogen, High Sensitive C- reactive protein

Introduction:

Pre menopause represents the reproductive period, that is, before menopause, and it represents the years preceding the last menstrual period [1].

A woman's post-menopausal state is a normal biological transitional phase. For women, it signifies the end of their reproductive years, at which point the monthly cycle permanently ends, regardless of the cause natural or illnesses arising from the ovaries ceasing to function entirely. Due to hormonal shifts, the majority of women experience a wide range of symptoms at this point. While some women experience no symptoms at all, others have more severe symptoms [2].

The hormone melatonin is involved in the process of falling asleep. It is secreted by the pineal gland, and as one ages, so does its production. Its secretion in the brain is correlated with the time of day, increasing at night and decreasing throughout the day [3].

Estrogen is an important hormone that has a role in regulating many physiological processes and in the development of sexual characteristics. Women in menopause who have a low concentration of estrogen have a greater tendency to store fat, as a

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 01, 2024

decrease in the level of this hormone is linked to menopause, and thus an increase in body fat. It leads to an increased risk of various diseases [4].

Considered a biological correlate of inflammation, high sensitivity C-reactive protein (hS.CRP) has been linked to numerous diseases, including atherosclerosis and cardiovascular disorders [5].

Interleukin -17 is a cytokine secreted by a distinct type of T-helper cell and some other lymphocytes. These cytokines play major regulatory roles in the host's defenses against inflammatory diseases and enhance immunity against various infectious diseases [6].

Material and Methods:

The study, which involved women both before and after menopause, was carried out in Samarra . Samples were randomly selected and divided into age groups before and after menopause. These samples were also divided according to body mass index. (20) samples (women) were selected from the age group (25-45).) years, and this group represented the group of women before menopause, that is, before menopause. (30) samples (women) were selected from the age group, whose ages ranged between (45 - 65) years, representing the group of women after menopause, that is, after menopause.

Blood samples were collected for both groups of premenopausal women of reproductive age and after menopause. Blood was drawn from them on days (6-10) of the menstrual cycle to measure estrogen accurately. (5) ml of venous blood was drawn from each group. Sample (Subjects) By slowly drawing venous blood with a wine syringe, the blood sample was placed in a disposable tube and left at room temperature for (15) minutes to clot the blood, and then it was centrifuged in a centrifuge for five years. Minutes at (3000) revolutions per minute, after which the blood serum was separated and tests were performed on it. Both the melatonin group and the high-sensitivity C-reactive protein group were examined on the same day, and the remaining part of the serum was stored in (Eppendrof tube)at a temperature of (20). - Mo) until the interleukin 17 test and the estrogen test are performed. Body mass index was measured by measuring weight and height using the following equation: BMI (body mass index) = weight in kilograms / height (length) in meters2, and international standards have been adopted as the body mass index (BMI) [7].

Immune histo chemical technique was adopted to estimate HS. CRP in the blood using the i-CHROMATMhs CRP-25 analysis kit purchased by the manufacturer (Bod itechMedinc). Using the VIDAS device, the estrogen level was estimated for the total quantitative measurement of (17 B-Estradiol) in human serum using the method. Colorimetric and using (ELFA) technology (Enzyme Linked Fluorescently Assay). The (VIDAS Estradiol 11) test is a quantitative test for (Estradiol). Interleukin 17 was also measured in the serum using (Human-IL-17- Elisa kit) provided by company (Bio assay technology laboratory).

The data were analyzed statistically using the statistical program (MINI TAB) according to the T_test, with a significance level ($P \leq 0.05$). The arithmetic mean and standard deviation of the study data were obtained [8].

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 01, 2024

Results:

Parameters / Groups	(BMI) kg/m^2	Estrogen ng/L	Melatonin pg/mL
Premenopausal Women N(20)	24.428 ± 1.215 ^{b}	191.81 ± 25.02^a	10.9 ± 3.88^a
Postmenopausal Women N(30)	32.130±4.261^a	36.20 ± 5.52^b	7.07 ± 2.21^b

Table No. (1) Levels of estrogen, melatonin, and body mass index in the serum of pre- and post-menopausal women

Parameters / Groups	hs-)CRP) mg/L	(IL-17) pg
Premenopausal Women N(20)	1.85 ± 1.04^b	22.16±3.10^b
Postmenopausal Women N(30)	4.78 ± 1.26^a	30.87±6.15^a

Table No. (2) Levels of high-sensitivity C-reactive protein (hs-CRP) and interleukin- 17 in the serum of pre- and post-menopausal women

The values indicate the average ± standard deviation.

Significant differences (P≤0.05) are indicated by different lowercase letters arranged vertically.

(N) The quantity of samples

Discussion:

The study's findings were discussed. Melatonin levels in postmenopausal women were found to be significantly lower (P≤0.05) at (22.16±3.10) than in premenopausal women (30.87±6.15), and estrogen levels in general were recorded. Decreased and highly significant (P<0.05) in postmenopausal women when compared with premenopausal women. The study recorded low significant values of (36.20±5.52) in postmenopausal women when compared with premenopausal women (191.81±25.02).

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 01, 2024

In the postmenopausal stage, the decrease in melatonin concentration is related to the lack of estrogen, unlike other hormones, and the decrease in its concentrations after menopause is not considered a disease in itself, as it represents a normal condition [9]. Compared to premenopausal women, postmenopausal women had reduced serum melatonin concentrations at night. Melatonin levels progressively drop with age and may be linked to several circadian rhythm problems and reduced sleep efficiency, which is frequently linked to aging. Immunomodulatory qualities are exhibited by melatonin, and immune system remodeling is a fundamental aspect of aging. Different mechanisms, such as degradation of the suprachiasmatic nucleus or neuronal channels of transmission to the pineal gland that occur in neurodegenerative illnesses, may be responsible for the age-related drop in melatonin. [10]. The decrease in the melatonin hormone due to aging is due to several factors, including a decrease in the activity of the gland that mostly secretes melatonin, changes in sleep patterns, and natural hallucinations with age [11].

Estrogen has protective mechanisms for the heart by increasing the production of nitrous oxide, thus dilating blood vessels. This is important in stabilizing endothelial cells, enhancing antioxidant effects, and changing alters fibrinolytic protein. These are all protective mechanisms for the heart that are lost with the onset of menopause [12]. Low estrogen levels, inactivity, activity, and composition. An individual's genetics, which has an impact on the secretion of hormones, is an important factor in changing the level of fats in the blood during the postmenopausal period. Decreased estrogen production from the ovaries leads to an imbalance in the levels of fats and lipoproteins in the blood. It also leads to negative changes in glucose concentrations, insulin metabolism, distribution of fat in the body, blood clotting, fibrinolysis, and dysfunction of the lining of blood vessels [13].

Estrogen has protective mechanisms for the heart from causing changes in blood vessels by increasing the production of nitrous oxide, which is important in stabilizing endothelial cells, enhancing antioxidant effects, and changing fibrinolytic proteins. These are all heart-protective mechanisms that are lost with the onset of menopause [14].

The results of the study showed that there was a significant increase ($P<0.05$) in BMI in postmenopausal women (32.130±4.261) when compared with premenopausal women (24.428±1.215).

A significant increase in (hS.CRP) in postmenopausal women was (4.78 ± 1.26) while it was in premenopausal women (1.85 ± 1.04). A significant increase in IL-17 was also observed in postmenopausal women (30.87±6.15a 22.16±3.10) when compared with premenopausal women (22.16±3.10).

The reason for the high body mass index is that the estrogen hormone works to reduce the production of the lipoprotien lipase enzyme in adipose tissue, and thus it works to store fat [15]. However, after menopause, the concentration of estrogen in the blood decreases, so the concentration of the enzyme increases and it works to break down the stored fat, so its concentration increases. In the blood serum, the in vivo mass index increases. Before [16], changes in lipid levels may be due to hormonal differences that occur after menopause, as estrogen deficiency occurs, and this also affects lipids and the regulation of LDL-C receptors (LDL-Receptor), which leads to

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 01, 2024

an increase in LDL-C particles mediated by liver cells. Its important effect is on the decrease in their levels in the plasma. Thus, the process of eliminating normal, natural LDL-C is accelerated more than the removal of small, dense LDL particles (LDLIII). Women who suffer from the accumulation and increase of these small, dense LDL particles increase triglycerides in the plasma and reduce HDL. -C and visceral adipose tissue accumulation, thus estrogen improves the turnover of both natural and small dense LDL-C [17].

Obesity and low physical activity levels are significant contributors to the lipid profile changes that occur throughout the postmenopausal era. During activity, the primary energy source is free fatty acids. Physical activity can make use of the energy that is stored in adipose tissue [18].

The increase in hS.CRP concentrations in postmenopausal women is attributed to fat deposition due to lifestyle and estrogen deficiency, because fats participate in the production of inflammatory factors such as hS.CRP. This increase may be due to many factors during menopause. There may be a decrease in ovarian function and significant changes in the concentrations of sex hormones, and this affects the levels of (hS.CR). CRP is associated with oxidized low-density lipoprotein (LDL) and is partially degraded, which It causes an increase in adhesion molecules, which increases its effectiveness in causing atherogenicity. This enhances the activation of immune complement proteins and causes inflammation in atherosclerotic plaques. CRP also stimulates the production of tissue factor, which is a pre-monocyte protein. They are proteins found on the surface of monocytes, which are considered factors for clotting, increasing the expression of adhesion molecules, and manipulating the formation of nitric oxide. All the studies mentioned have indicated that removing the regulatory effect of estrogen on inflammatory factors such as (hS.CRP), as it leads to an increase in the level of (hS.CRP) in postmenopausal women, and thus we have higher chances of infection. With cardiovascular diseases [19].

Since the inflammatory process is a biological response to tissue injury and plays a major role in the mechanism of various heart diseases, including coronary artery disease (CAD) and other manifestations of atherosclerosis, including IL-17, the relationship between hormonal decline and an increase or decrease in the level of proinflammatory cytokines is still unknown. In activating the inflammatory response and involved in the pathophysiology of heart disease. Therefore, patients with atherosclerosis and heart failure may benefit by blocking the IL-17 signaling cascade. since it is the primary source of cytokines, such as IL-17, which is the primary source of activating the liver to create hS.CRP[20] .

Reference:

1. Miro F, Parker SW, Aspinall LJ, *etal*(2004). Origins and consequences of the elongation of the human menstrual cycle during the menopausal transition: the FREEDOM Study. *J ClinEndocrinol Metab*;89(10):4910-5.
2. Geetanjali B, Swati S, Pradeep N . (2014). Effect of menopause on lipid profile in relation to body massindex. Chronicles of young scientists : (5) 1 : 20-24.
3. Treister-Goltzman, Y., & Peleg, R. (2021). Melatonin and the health of menopausal women: A systematic review. *Journal of pineal research*, *71*(2), e12743.
4. Pisani M. (2012). Aging and lung disease: A Clinical Guides Springer; p.157
5. Lind L. (2003). Circulating markers of inflammation and atherosclerosis. Atherosclerosis , 169 (2):203-214.
6. Jin W., Dong C. (2013). IL-17 cytokines in immunity and inflammation. Emerging

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 01, 2024

Microbes and Infection. Emerging Microbes and Infections. Online Journal.

7. Roger, V. L.; Go, A. S.; Lloyd-Jones, D. M.; Adams, R. J.; Berry, J. D.; Brown, T. M. and Fox, C. S. (2011). Heart disease and stroke statistics-2011 update: a report from the American Heart Association. Circulation, 123(4), 18-209.
8. Duncan, D. B. (1955). Multiple range and multiple F tests. Biometrics, 11(1), 1-42.
9. Sultan N, Nawaz M, Sultan A, *etal*(2003). Effect of menopause on serum HDL-cholesterol level. J Ayub Med Coll Abbottabad;15:24-6.
10. Alamdari, A. F., Rahnemayan, S., Rajabi, H., Vahed, N., Kashani, H. R. K., Rezabakhsh, A., & Sanaie, S. (2021). Melatonin as a promising modulator of aging related neurodegenerative disorders: Role of microRNAs. *Pharmacological Research*, *173*, 105839.
11. Prodhan, A. S. U., Cavestro, C., Kamal, M. A., & Islam, M. A. (2021). Melatonin and sleep disturbances in Alzheimer's disease. *CNS & Neurological Disorders-Drug Targets (Formerly Current Drug Targets-CNS & Neurological Disorders)*, *20* (8), 736-754..
12. Suguna S, Mary PremJayarajan . (2013). Association of menopause with inflammation sensitive protein the c-reactive protein among the indian women. *Jemds* (2)52 : 10144-53.
13. Bales AC. (2000).In search of lipid balance in older women; New studies raise questions about what works best. *Postgrad. Med*.;108 (7): 57-72.
14. Igweh JC.*Nwagha,IUOkaro JM.* (2005). The effects of menopause on the serum lipid profile of normal females of south east Nigeria. Nigerian Journal of Physiological Sciences. 20 (1-2): 48-53.
15. KilimR K,Chandala R C (2013). A Comparative Study of Lipid Profile andOestradiol in Pre- and Post-Menopausal Women. Journal of Clinical and Diagnostic Research. Aug, Vol-7(8): 1596-1598.
16. Homma, H.; Kurachi, H.; Nishio, Y.; Takeda, T.; Yamamoto, T.; Adachi, K. and Murata, Y. (2000). Estrogen Suppresses Transcription of Lipoprotein Lipase Gene existence of a unique estrogen response element on the lipoprotein lipase promoter. Journal of Biological Chemistry, 275(15), 11404-11411.
17. Abdullah, K. K., Shakir, S. D., AL-Samarraie, M. Q., & Mustafa, M. A. (2022, November). A comparative study of effect of Cymbopogon citrates aqueous extract and rosuvastatin on experimentally induced hyperlipidemia in local rabbits. In AIP Conference Proceedings (Vol. 2394, No. 1). AIP Publishing.
18. Ko, S. H., & Jung, Y. (2021). Energy metabolism changes and dysregulated lipid metabolism in postmenopausal women. *Nutrients*, *13*(12), 4556.
19. Al-Salman, H. N. K. (2019). 17β-estradiol hormone and interleukin 1-beta change related to menopause in the women with rheumatoid arthritis. *Asian Journal of Pharmaceutics*, *13*(2).
20. Abubakar, M., Rasool, H. F., Javed, I., Raza, S., Abang, L., Hashim, M. M. A., ... & Abang, L. O. (2023). Comparative Roles of IL-1, IL-6, IL-10, IL-17, IL-18, 1L- 22, IL-33, and IL-37 in Various Cardiovascular Diseases with Potential Insights for Targeted Immunotherapy. Cureus, 15(7).