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Evolution of Some Inflammatory Parameters and Tumor Necrosis Factor Alpha in Iraqi Postmenopausal Women with Hypertension

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Abstract

Hypertension is a global health concern, with women experiencing lower blood pressure during their reproductive cycle and postmenopausal women being more sensitive to it. Postmenopausal women's higher body mass increases the risk of hypertension, coronary artery disease, and death**.** Venous blood was taken from women of experimental groups by syringes into GEL tubes. Blood serum was obtained after allowing the blood to clot in the tube without anticoagulant for 10-20 min at room temperature. To calculate (TNF-alpha, CRP) for all samples, serum separation was done by centrifuge machine at 3000rpm for five minutes. C-reactive protein (CRP) kit and (TNF-alpha) kit by using the ELISA technique according to the manufacturer's instructions of MyBio Source USA kit. The results showed that there was no significant variation in age (T-test) value (2.348) in postmenopausal women in the mean of patients (59.45±0.68) years, while healthy women were (57.50±0.97). There were significant changes in body mass index (BMI) in postmenopausal women ($p\leq0.01$) that were found between the mean of patients (28.19±0.59) and the control group (25.65±0.19). Also, there were significant changes ($p\leq0.01$) in the mean values of blood pressure diastole (8.76±0.06) and systole (16.00±0.15) in postmenopausal women compared with the control group with mean values (7.73±0.12) and (11.60±0.14), sequentially. Significant difference ($p\leq0.01$) in mean value of HB patient women (12.89±0.16) as compared with healthy women (12.32±0.24). No significant changes in mean value of platelets (253.90±970) and WBCs (7.97±0.39) in patient postmenopausal women with control group (251±12.34) and (7.87±0.32), respectively. Significant change ($p\leq0.01$) in mean value of TNF-alpha patient women (146.79±4.45) as compared with control (66.13±1.32). CRP show a significant difference ($p\leq0.01$) in mean value, with patients being women (2.37±0.10) while the control group was (0.813±0.04). There was no significant change in the ESR mean of patients who were women (34.31±3.02) and the control group (31.40±3.02).

Keywords: Hypertension, TNF-alpha, Postmenopausal, CRP.

1. Introduction

Hypertension is one of the main reasons for malaise and death all around the world. It is known that women in their reproductive cycle have a bit lower blood pressure than men of the same age. While postmenopausal women with hypertension are more sensitive to

evolving hypertension with minor responses to therapies in contrast to men of similar age (1). Particularly, blood pressure paths can differ by age and may be linked to other levels of cardiovascular disease (2, 3). Factors involved in elevating hypertension included age, gender, smoking, BMI, diets, and family history (4-6). Women during post menopause have a higher body mass than premenopausal women. Being overweight in postmenopausal women led to raising the probability of hypertension, coronary artery disease, and death (7).

Just as in several data that reveal C-reactive protein (CRP) is related to CVD, diabetes, metabolic syndrome, and dyslipidemia, it may be used as an indicator for long-term monitoring or early screening that is important background for patients diagnosis (8-10). C-reactive protein is considered a prophesy of opportunity for cardiac disorders, peripheral vascular disease, and stroke. It could be used as an indicator for future risk in patients with steady or changeable myocardial infarction (11). Tumor necrosis factor-alpha (TNF-alpha) is formed by mononuclear phagocytic cells as incitation for inflammation (12). Additionally, TNF-alpha is considered a strong promoter for pro-inflammatory cytokines and chemokines (13).

Also, inflammation has been recognized to have an essential role in the pathogenesis processes of hypertension (14). The reason for this paper is to investigate the alternation in some inflammatory parameters and TNF-alpha in both healthy and patient women with hypertension.

2. Material and Methods

2.1. Experimental Design

Ninety postmenopausal women aged between 53 and 70 years at Baghdad Teaching Hospital, laboratories were chosen for our trials, which were divided into two studied groups: one had sixty women with hypertension, in addition to thirty healthy women.

2.2. Collection of Blood Trials

Venous blood was taken from women of experimental groups by syringes into GEL tubes. Blood serum was obtained after allowing the blood to clot in the tube without anticoagulant for 10-20 min at room temperature. To calculate (TNF-alpha, CRP) for all samples, serum separation was done by centrifuge machine at 3000 rpm for five minutes.

2.3. Hematological test

(CBC, ESR) venous blood was collected in to EDTA tube with anticoagulant. For complete blood count CBC putting the tube on roll mixer for 2 minutes then the results will appear on screen of Hematology Analyzer, while erythrocyte sedimentation rate (ESR) blood drained into ESR tube and hold it to ESR detector the ratio of RBCs falling out of plasma after one hour, then read the result in millimeter per hour (mm/h).

2.4. Biochemical Test

C-reactive protein (CRP) kit and (TNF-alpha) kit by using the (ELISA technique, according to the manufacturer's instructions of My Bio Source USA kit.

2.5. Statistical Analysis

The Statistical Analysis System—SAS (2018) program was used to detect the effect of different groups (patients and control) in study parameters. A t-test was used to significantly compare between means.

3. Results

Results of the study showed that there was no significant variation in age (T-test) value (2.348) in postmenopausal women in the mean of patients (59.45±0.68) years, while healthy

women were (57.50±0.97). There were significant changes in body mass index (BMI) in postmenopausal women (p≤0.01) that were found between the mean of patients (28.19±0.59) and the control group (25.65±0.19).

Also, there were significant changes (p≤0.01) in the mean values of blood pressure diastole (8.76±0.06) and systole (16.00±0.15) in postmenopausal women compared with the control group with mean values (7.73±0.12) and (11.60±0.14), sequentially. Significant difference (p≤ 0.01) in mean value of HB patient women (12.89 ± 0.16) as compared with healthy women (12.32±0.24). No significant changes in mean value of platelets (253.90±970) and WBCs (7.97±0.39) in patient postmenopausal women with control group value (251±12.34) and (7.87±0.32), respectively. Significant change (p≤0.01) in mean value of TNF-alpha patient women (146.79±4.45) as compared with control (66.13 ± 1.32).

C-reactive protein CRP results showed a significant difference (p ≤ 0.01) in mean value, with patients being women (2.37±0.10) while the control group was (0.813±0.04). There was no significant change in the ESR mean of patients who were women (34.31 ± 3.02) and the control group (31.40 ± 3.02), as shown in **Tables (1)** and **(2)**, as well as **Figure (1)**.

Table 1. Level of HB, Plat and WBCs in studied **groups.**

Parameters	Patients	Control	T- test
Age(years)	59.45±0.68	57.50±0.97	2.348NS
BMI (kg/ m²)	25.65±0.19a	28.19±0.59b	0.989**
Diastolic B.P(mmHg)	8.76±0.06b	7.73±0.12c	0.253**
Systolic B.P(mmHg)	16.00±0.15a	11.60±0.14c	0.476**
HB(g/dl)	12.89±0.16b	12.32±0.24a	0.574**
PLT*109(cell/cu³)	253.90±9.70	251±12.34	32.328NS
WBCs*109(cell/cu³)	7.97±0.39	7.87±0.32	1.195NS

Mean with different letters in the same row differs significantly, **(P≤0.01)

Table 2. Level of inflammatory parameters in studied groups.

Parameters	Patients	Control	T- test
TNF-alpha (µg/ml)	146.79±4.45a	66.13±1.32b	12.675**
CRP(mg/l)	2.37±0.10c	0.813±0.04a	0.299**
ESR(mm/h)	34.31±3.02	31.40±3.02	9.675NS

Mean with different letters in the same row differs significantly, **(P≤0.01).

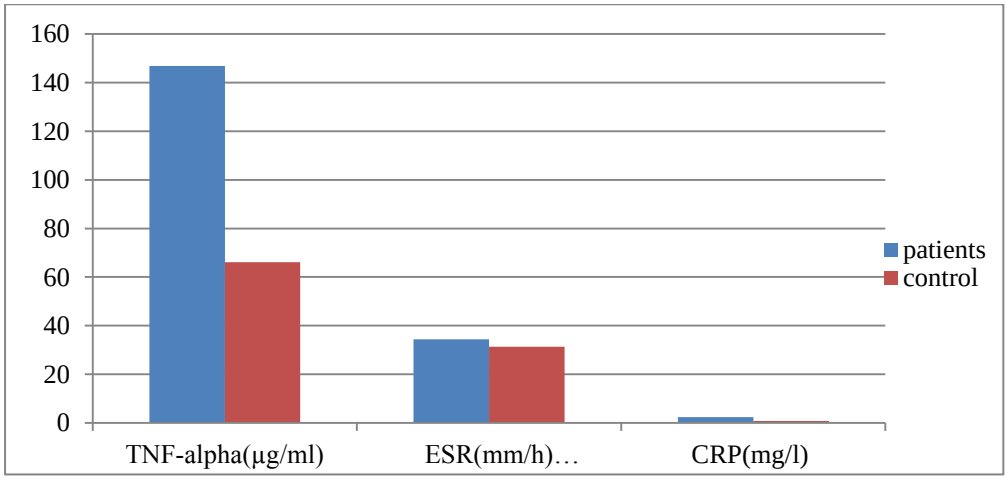

Figure1. Levels of inflammatory parameters in postmenopausal women with hypertension and control group.

4. Discussion

Females were selected for this study because data show that women have an increasing rate of hypertension more than men (15, 16). Older women have elevated levels of hypertension more than younger ones (17, 18). Hypertension has the highest rate in women aged sixty years (19).

Postmenopausal women with obesity resulted in elevated hypertension and other diseases like coronary artery disease and death (7). It has been noted that obesity in women is considered a mark for hypertension (20). Positive relation between BMI and body fat in postmenopausal women (21). Postmenopausal women have more chance of obesity, high blood pressure, and other metabolic syndromes (22). High BMI is considered a sign for coronary heart disease (23). Also, inflammatory parameters can be indicators for cardiovascular diseases (CVD) in postmenopausal women (24).

C-reactive protein CRP elevated levels in Iraqi postmenopausal women (25). The CRP with CVD count as a sign for postmenopausal women (26). Also, raising CRP in blood serum is considered a very significant mark for cardiovascular diseases (CVD). There are many factors that lead to elevated CRP levels, including smoking, hypertension, and diabetes (27).While, tumor necrosis factor alpha plays a critical role in regulating cytokine networks (28). Lately evidence clearly suggested that TNF-alpha has a main role in inflammatory mediators that may develop health problems, including CVD and insulin resistance (29). Additionally, the erythrocyte sedimentation rate (ESR) ratio shows elevation in postmenopausal women that can change due to the physiology of the body and aging (30).

5. Conclusion

Tumor necrosis factor-alpha changes in postmenopausal women, with levels of patient women raising, while there were reduced levels in the control group. Inflammatory parameters (ESR, CRP) both of them increasing levels in postmenopausal women with hypertension, and healthy groups have decreased levels.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Ethical Clearance

The study approved by Ethics Committees that referenced by the number CSEC/0922/0106 in 28 /9/ 2022 Department of Biology /College of Science/ University of Baghdad.

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