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STUDY OF HORMONAL CHANGES AND LIPID PROFILE OF IRAQI WOMEN PRE-MENOPAUSE AND POST-MENOPAUSE

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Abstract: Menopause is a normal part of aging for women and marks the end of their capacity to procreate, which is manifested by the cessation of periodic ovarian function and periodic menstruation. In this study, 25 postmenopausal women and 25 premenopausal women were selected within the age group that is fertile. The study measured Estrogen, Thyroid hormones (T3, T4, and TSH), and lipid profile [Total cholesterol (TC) and Triglycerides (TG)] in the blood serum of several Iraqi women both prior and post menopause, and compared the associated parameters. A negative and significant correlation was seen between total EST, age, T3, and T4. EST and cholesterol were positively and statistically significantly correlated. The study also showed statistically significant total T3, T4, and TSH between groups, were greater in premenopausal women compared to postmenopausal women, and showed lower blood estrogen values in women who have gone through menopause as opposed to those who have not. The study also showed that postmenopausal women have remarkably high concentrations of cholesterol and triglycerides, compared to women suffering from menstruation, and sensitivity analysis indicated that age is a potentially effective biomarker of menopausal effects, supplementing the sensitivity to cholesterol and triglycerides. These disorders are observed in the picture of the thyroid gland in postmenopausal women. Thus, they should be monitored at regular intervals to reduce thyroid dysfunction. Given the findings of recent studies and the analysis of earlier findings, there may be a problem with thyroid hormone activity as people age. In addition, the study showed a change in the profile of lipids in the blood in postmenopausal women. In premenopausal women, estrogen might be the protective factor. As a result, all postmenopausal women require a fat profile analysis and specialized health education.

Key words: Estrogen, Thyroid hormones, Total cholesterol, Triglycerides, pre-menopause and post-menopause.

Introduction

"The permanent cessation of menstruation as a result of the loss of ovarian activity" is how the World Health Organization defines menopause (Anita Deshpande. *et al* 2012). Nowadays, a woman will spend roughly one-third of her life following menopause (Fatima, Y., and Sreekantha, R. 2017). Low estrogen

production brought on by the irregular ovulation cycle causes menopause (Wylie-Rosette, J., 2005). Following menopause, the ovaries' decreased production of estrogen causes abnormalities in the distribution of body fat, coagulation, fibrinolysis, glucose and insulin metabolism, vascular endothelium dysfunction, and lipoprotein profile (Grady, D., *et al* 1992). Estrogen has many heart-protecting functions that change the nature of blood vessels by increasing the production of nitrous oxide. After menopause, estrogen insufficiency is one of the main risk factors for CVD in women. By altering the lipid state, estrogen replacement treatment has decreased the risk of CVD in postmenopausal women by 25–50% (Arora, S., Jain, A., and Chitra, R. 2006). The incidence of thyroid disorders is five to twenty times higher in women than in males, primarily affecting women. As people age, thyroid disorders become more common. Thyroid gland abnormalities are among the most common conditions in women globally, second only to diabetes (Heuck, C. C, *et* al 2000). Middle-aged and older postmenopausal women are more likely to suffer from thyroid disorders. It is extremely challenging to diagnose and interpret thyroid function tests in older adults, including estimating the activities of triiodothyronine (T3), tetraiodothyronine (T4), and thyroid stimulating hormone (TSH) (Schindler, A. E. 2003). In order to assess the serum lipid status, estrogen level, TSH, T3, and T4 activities in young, middle-aged premenopausal women and postmenopausal older women, a comparative cross-sectional study was conducted. A lipid panel or lipid profile is a collection of blood tests used as a first, comprehensive medical screening tool for lipid disorders, including triglycerides and cholesterol. The test's findings can be used to identify specific hereditary illnesses as well as estimate the risk of cardiovascular conditions, some types of pancreatitis, and other illnesses (Usoro *et al*., 2006).

It has been demonstrated that a person's lipid profile can accurately predict their risk of suffering a heart attack or stroke due to artery hardening (atherosclerosis) or blood vessel obstruction. Triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL), and total cholesterol (TC) are commonly included in the lipid profile. Very low-density lipoprotein cholesterol (VLDL-C) can be computed using these data (Sidhu and Naugler., 2012). Because estrogen increases the generation of nitrous oxide, it improves the arteries' permeability. A healthy pregnancy depends on consuming enough protein, vitamins, and minerals. It helps to preserve endothelial cells, maintains a balanced lipoprotein profile, enhances the antioxidant impact, and modifies the fibrinolysis protein. All of these cardio-protective processes are absent during menopause. All of these cardiac activities are absent at menopause because postmenopausal women are more likely to develop cardiovascular disease and pre-eclampsia (Kotecha, R., 2020: Kamble, A., 2020). Today, a woman will live roughly one-third of her life following menopause. The ovaries stop producing large amounts of estrogen after menopause, thus symptoms and illnesses associated with an estrogen shortage are becoming more and more important for women's health (Kilim, S. R., and Chandala, S. R. 2013).

Material and Methods

25 premenopausal volunteer women between the ages of 20 and 48 and 25 postmenopausal volunteer women between the ages of 50 and 65 participated in the study. Excluded were patients having a history of serious chronic conditions like diabetes or high blood pressure, an endocrine disorder, hysterectomy patients who have not yet reached puberty, pregnant women or early menopause were excluded, and Female participants were chosen at random from among acquaintances, family, and relations. The study was carried out in 2024 from February to September. From each group, six milliliters of venous blood samples were taken. Prior to the test, the serum was kept in refrigerated at 20ºC in append-rove tubes, and estimated serum total cholesterol (TC) and serum triglycerides (TG), serum estrogen level, and thyroid hormone (TSH, T_3, T_4), estimation of the serum lipid profile, Triglycerides, and Cholesterol respectively (Tietz 1999) and (Allain et al. 1974), In UV IS Spectrophotometer SP-3000 nano. Using Finecare plus from (Wondfo Germany company) (Finecare kit) T_3, T_4, TSH, (THAKUR, C.et al 1997; Burger, H. G., & Patel, Y. C. 1977) and E2 were measured (Pamelo C Champe., 2005).

Statistical analysis

Graph Pad Prism version 8 and the statistics package for social sciences computer software (SPSS) version 26 were used to conduct the statistical analysis. The mean ± standard deviation (SD) was used to express the data values. The Independent-Samples student's t-test was used to compare the mean ± SD; a difference is deemed very significant if it is $p<0.001$, significant if it is $p\leq0.05$, and non-significant if it is $p>0.05$. Additionally, the associations between all of the study variables are ascertained through the use of Pearson's correlation analysis.

Results and Dissections

This study showed that the mean age of pre-menopausal subjects was (35.08) and post-menopausal was (57.64) Table (1), Figure (1).

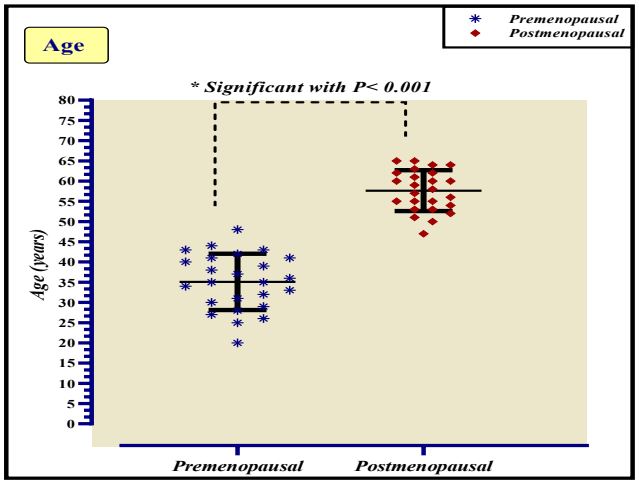

Figure (1): mean age between pre and postmenopausal

Table (1): The statistical disparities among Premenopausal and Postmenopausal.					
	Premenopausal		Postmenopausal		
Parameters	**Mean**	**SD**	**Mean**	**SD**	***P*-value**
Age (year)	35.08	6.964	57.64	5.057	0.001* **S**
Est. (pg/ml)	166.19	90.452	21.396	13.241	0.001* **S**
T_3 (nmol/L)	2.349	0.445	1.348	0.678	0.001* **S**
T_4 (nmol/L)	98.93	18.84	65.731	21.245	0.034* **S**
TSH (M/U/ml)	2.146	0.775	0.942	0.452	0.045* **S**
T.G (mg/dl)	95.40	35.92	115.68	33.89	0.046* **S**
Cholestrol (mg/dl)	154.48	37.304	178.36	30.942	0.017* **S**
***Significant at *P*<0.05, NS: Non-Significant.**					

After comparing total T_3, T_4, and TSH between the groups in this study, T_3 (2.349±0.445), T_4 (98.93±18.843), and TSH (2.146±0.775) were higher in pre-menopausal women. There was a statistically significant difference ($P<0.05$) seen between. The collections (pre-menopausal and post-menopausal women) Table (1), Figure (2).

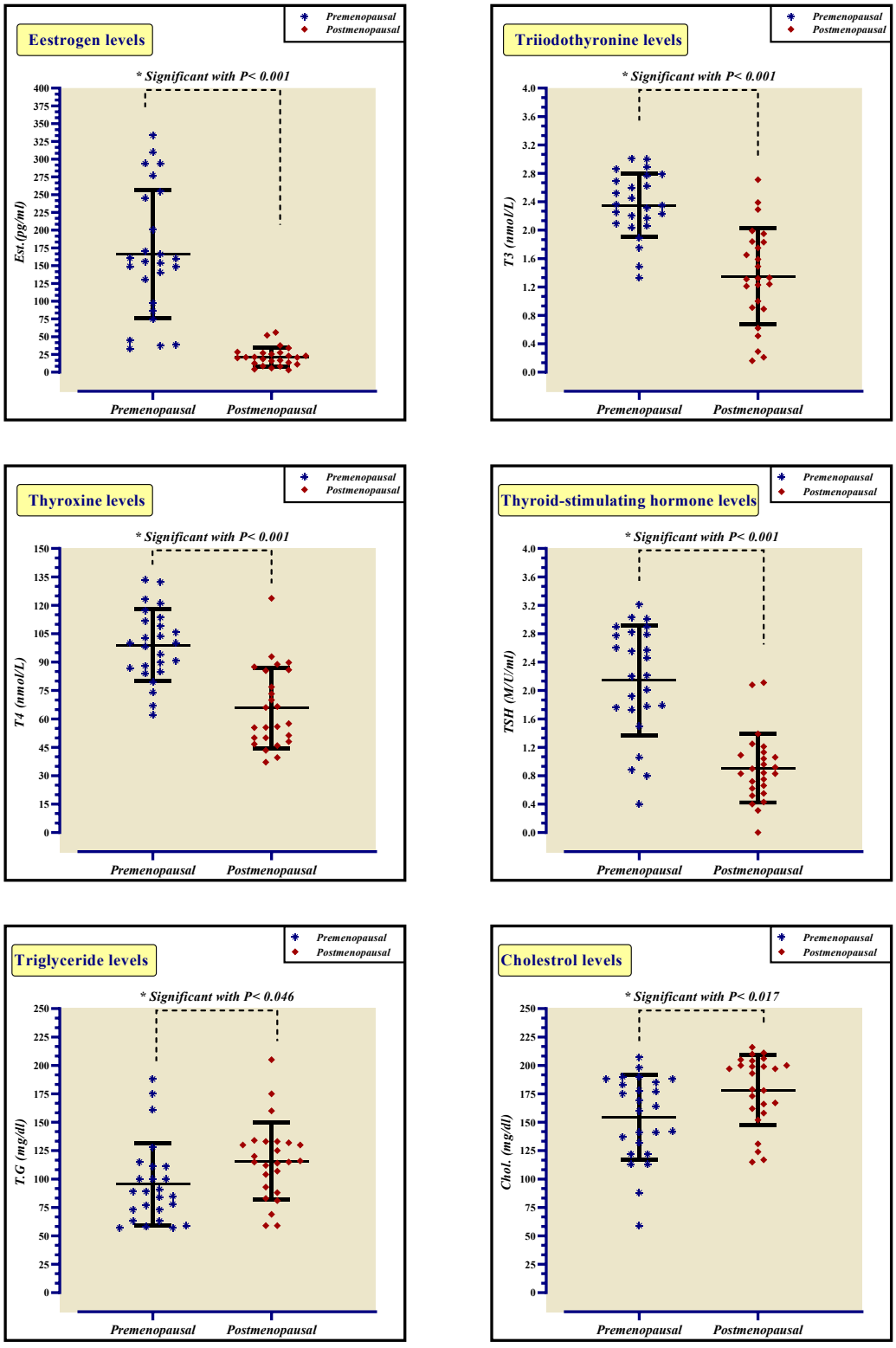

Figure (2): Comparison of the groups (pre-menopausal and post-menopausal women).

This study was mainly undertaken to compare the thyroid profile between pre and post-menopausal women. The mean age of pre-menopausal subjects was (35.08) years and post-menopausal was (57.64) years.

Increased TSH activity in the elderly has been attributed to a number of thyroid factors, such as dietary iodine supply, sleep disorders, changing sleep patterns, and others (Sarne D. 2000). Age-related alterations in the pituitary-thyroid pathway lead to an increase in blood TSH activity (Benhadi N., 2010). TSH levels were considerably greater in post-menopausal women than in pre-menopausal women, according to a study by Bordoloi et al (Bordoloi G A., 2018). Our study is comparable to According to Kolanu et al., post-menopausal women had a lower mean T3 than pre-menopausal women (Kolanu BR Patwa *et al*., 2019) and also observed similar results (Patwa CK., 2016). Other earlier research revealed the exact same findings, with older and post-menopausal women having lower serum TSH activities than pre-menopausal women, who had higher serum TSH activities (Pearce, E. N., 2007). Previous research indicated that aging was linked to decreased TSH secretion, and these investigations have revealed that this kind of situation may be age-related and may have been influenced by the pituitary gland. Nevertheless, more recent data (National Health and Nutrition Examinations Survey-NHANES III) demonstrated that in individuals without clinical or biochemical signs of thyroid illness, serum TSH concentration rises with age when iodine adequacy is maintained.

Women who have gone through menopause had reduced levels of the hormone estrogen (21.396± 13.241) as compared to menstruating women (166.19±90.452) (P<0.001) Table (1) and Figure (2). This finding is from a study done by (Fatima, Y., & Sreekantha, R. 2017). According to Table (1) and Figure (2), women who have gone through menopause had considerably higher (P<0.05) levels of triglycerides (115.98±33.89) and serum cholesterol (178.36±30.94) than women who are menstruating. According to this new study, postmen struating women had considerably higher blood cholesterol and triglycerides than the pre-menopausal women in the study population (P <0.001). These results are consistent with those of (Warjukar, P., 2020; Fatima et al., 2017), where reduced estrogen causes postmenopausal women to have higher total cholesterol, and) is a statistically significant number. According to our research, women who had gone through menopause had higher triglycerides than those who had not. These results are comparable to those of other studies that have been published (QS, A. 2017). Postmenopausal women have higher blood fatty acid release and fat storage, and these extraneous free fatty acids provide a better substrate for the liver's triglyceride synthesis (Kumar, S., 2012). Following the loss of ovarian function, an estrogen-related decrease in lipoprotein lipase (LPL) activity may be the cause of the elevated blood triglyceride and cholesterol levels shown in the data (Manafa, P. O., 2015).

Table (2): The following table shows statistical comparisons between the measured parameters for both pre-and postmenopausal females.

Premenopausal			**Postmenopausal**		
Parameters	***r***	***p*-value**	**Parameters**	***r***	***p*-value**
Age/Est	0.108	0.607	Age/Est	-.504-*	0.010
Age/T_3	-0.001	0.996	Age/T_3	-0.109	0.605
Age/T_4	0.206	0.323	Age/T_4	0.256	0.217
Age/TSH	-0.110	0.600	Age/TSH	0.201	0.347
Age/Chol	0.070	0.741	Age/Chol	0.186	0.373
Age/TG	-0.057	0.786	Age/TG	0.247	0.233
Est/T_3	0.099	0.639	Est/T_3	-0.274	0.185
Est /T_4	0.169	0.420	Est /T_4	-0.031	0.885
Est /TSH	0.183	0.382	Est /TSH	-0.038	0.860
Est /TG	-0.151	0.471	Est /TG	0.195	0.349
Est /Chol	.426*	0.034	Est /Chol	0.056	0.789
T_3 /T_4	0.002	0.993	T_3 /T_4	-.441-*	0.027
T_3 /TSH	-0.034	0.871	T_3 /TSH	0.157	0.465

T_3 / TG	-0.112	0.594	T_3 / TG	-0.195	0.350
T_3 / Chol	-0.172	0.412	T_3 / Chol	-0.111	0.599
T_4/TSH	0.197	0.345	T_4/TSH	0.343	0.101
T_4/ TG	0.057	0.786	T_4/ TG	-0.165	0.432
T_4/ Chol	-0.164	0.433	T_4/ Chol	0.298	0.149
TSH/TG	-0.050	0.812	TSH/TG	-0.153	0.475
TSH/ Chol	-0.313	0.128	TSH/ Chol	0.371	0.074
Chol/TG	0.068	0.746	Chol/TG	0.211	0.312
*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).					

A negative and significant correlation was seen between total E2 and age (r=-.504-, p=0.010); T_3 and T_4(r-.441-, p=0.027); There was a positive and significant correlation seen between Est and Cholesterol (r=-.426, p=0.034) Table (2) and Figure (3).

Figure (3): Pearson's correlation between parameters for both pre-and postmenopausal females

Table 3: The significant Parameters of ROC outcomes between pre- and postmenopausal females.

Parameters	AUC	SE	*P*-value	Cut-off value	Sensitivity	Specificity
Age	0.998	0.003	<0.001	45.5	100 %	96 %
Est.	0.015	0.012	<0.001	334.5	0 %	100 %
T_3	0.11	0.047	<0.001	4.01	0 %	100 %
T_4	0.125	0.051	<0.001	134.5	0 %	100 %
TSH	0.118	0.052	<0.001	4.21	0.0 %	100 %
T.G	0.701	0.077	<0.016	102	70.8 %	72 %
Chol.	0.726	0.073	<0.007	191.5	54.2 %	92 %
*Significant at P≤ 0.05, NS: Non-Significant.						

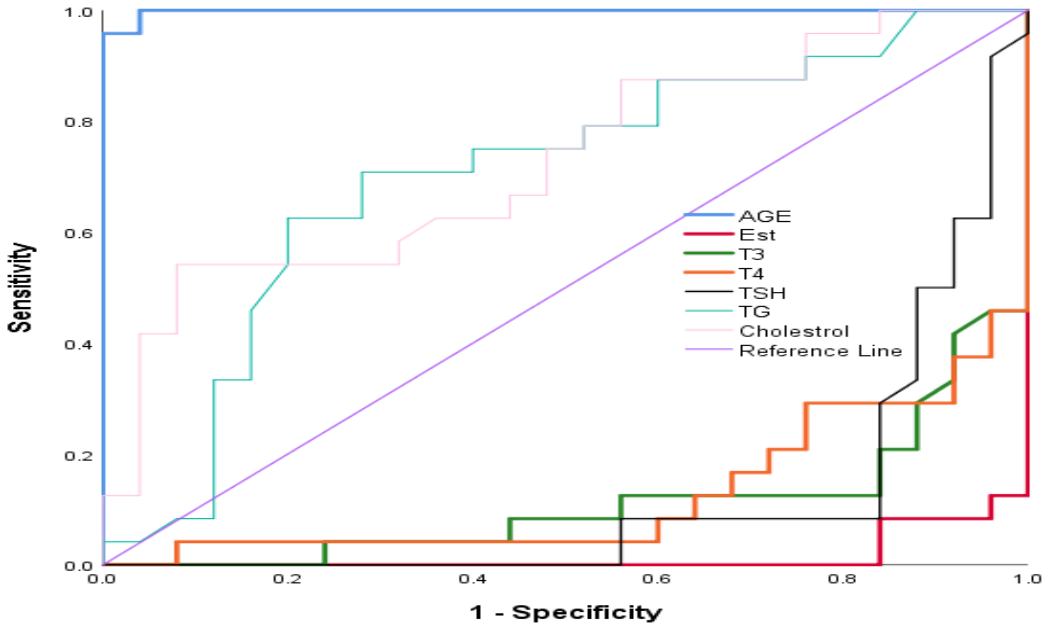

Figure (4) The significant post-menopausal Parameters ROC outcomes.

The ROC results in Table (3) and Figure (4) show that the parameters age had the highest sensitivity (100%) and specificity (96%), as well as the highest diagnostic efficacy among the other parameters in both pre and post menopause. Cholesrol had the highest sensitivity (54.2%) and the highest specificity (92%), with an AUC of 0.726, and triglycerides had the lowest sensitivity (70.8%) and the lowest specificity (72%), while the remaining parameters had lower sensitivity and lower specificity (Table (3) and Figure (4)).

Conclusions:

Thyroid hormone activities may become disordered with age, according to the findings of the current study; therefore, continuous monitoring is necessary to prevent thyroid dysfunction. Our research revealed that postmenopausal women had a changed serum lipid profile. In premenopausal women, estrogen might be the protective factor. As a result, all postmenopausal women require lipid profile monitoring and specialized health education.

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