Determine levels of Estradiol, Follicle-stimulating hormone, Luteinizing hormone, anti-FSH, and anti-LH in Thyroiditis and Polycystic ovarian syndrome (comparison study)

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Abstract

Determination and comparative study of the levels of some hormones (Estradiol, Follicle-stimulating hormone, Anti-FSH, Luteinizing hormone, and Anti-LH) in Thyroiditis and Polycystic ovarian syndrome. Serum was collected from patients with Polycystic ovarian syndrome (PCOS) (30 samples) a group of thyroid disease (30 samples, as well as a group of healthy (30samples) as control. During the months (April – November) 2021, the study was conducted in many hospitals in Baghdad-Iraq. Measurement of E2, TSH, anti-LH and LH, and anti-LH by sandwich ELISA technique results of current study showed higher percentages in Thyroiditis group (70.0%) among (40- ≥50) years, but higher percentages of age group (≤30 -39) years among PCOSP (60.0%), so no significantly higher levels of E2, FSH, Anti FSH, LH and Anti LH are among Thyroiditis group (177.61± 236), (14.90± 1.68), (0.55± 0.29), (5.53± 4.930) and (0.54± 0.45) respectively]. Also no significant relationship with PCOS (128.74±), (5.25± 3.59), (0.51± 0.28), (3.05±), (0.37±0.22) respectively) and control groups, no significant relationship between serum hormonal concentrations and Marital Status in Thyroiditis group (P=0.922, P=0. .283, P=0.844, P=0 .447 and P=0.168 respectively) and PCOS group (P=0.739, P=0.388, P=0.100, P=0.687 and P=0.586) respectively), as well as FSH level (P=0 .025), Anti FSH (P=0.000) were significant between the Thyroiditis group and control, while no significant for LH level (P=0.143), as well no significant with PCOS (P=0.088). Higher levels of E2, FSH, Anti FSH, LH, and Anti LH are among the Thyroiditis group, but no significant between serum hormonal concentrations (Estradiol, Follicle-stimulating hormone, Anti-FSH, luteinizing hormone, and Anti-LH with age group in Thyroiditis group, also no significant relationship among PCOS comparing with control groups. No significant between serum hormonal concentrations and Marital Status in the Thyroiditis group and PCOS group's level; Anti FSH were significant between the Thyroiditis group and control, while no significant for LH level, as well no significant with PCOS.

Keywords: *Estradiol; Follicle-stimulating hormone; Anti-FSH, Luteinizing hormone, and Anti-LH; Thyroiditis; Polycystic ovarian syndrome.*

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مستويات بعض الهرمونات (استراديول ، الجريب ، الهرمون المنبه ، مضادات FSH الهرمون اللوتيني ومضاد –TLH) في التهاب الغدة الدرقية ومتلازمة تكيس المبايض (دراسة مقارنه)

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الخلاصة

هدفت الدراسة الحالية تحديد مستويات بعض الهرمونات (الاستراديول, هرمون المحفز للحويصلات, مضاد للهرمون المحفز للحويصلات , هرمون الملوتن , هرمون المضاد للملوتن) والمقارنة بين مستوياتهم في التهاب الغدة الدرقية ومتلازمة تكيس المبايض المتعدد. جمعت المصول المأخوذة من مرضى متلازمة تكيس المبايض (30 عينات) ؛ ومن مجموعة امراض الغدة الدرقية (30 عينة) اضافة الى مجموعة السيطرة (نساء سليمات) (30 عينة) , خلال الاشهر (نيسان - تشرين الثاني)- 2021, اجريت الدراسة في العديد من المستشفيات في بغداد - العراق. وقد تم قياس مستويات الهرمونات باستخدام جهاز الاليزا . أظهرت نتائج الدراسة الحالية نسبًا أعلى في مجموعة التهاب الغدة الدرقية (70٪) بين المريضات اعمار(40-50) عامًا ، في حين مجوعة النساء المصابات بالتكيس كانت أعلى النسب المئوية للفئة العمرية (-30 -39) عامًا بين(60.0٪). لذا فإن المستويات الأعلى من E2 و FSH و Anti FSH و LH و Anti LH هي من بين مجموعة التهاب الغدة الدرقية [(177.61 ± 236) ، (14.90 ± 1.68) ، (0.55 ± 0.29) ، (5.53 ± 4.930) و (0.54 ± 0.45) على التوالي]. لكن لم تظهر الدراسة معنوي بين التراكيز الهرمونية في الدم (استراديول ، الهرمون المنبه للجريب ، مضادات FSH ، الهرمون اللوتيني ومضاد LH) والفئة العمرية في مجموعة التهاب الغدة الدرقية (P = 0.203، P = 0.344، P = 0.495، P = 0. 676، P = 0.718 على التوالي) أيضًا ليس هناك فرقا معنويًا مع متلازمة تكيس المبايض (P = 0.669، P = 0.330، P = 0.100، P = 0.060 و P = 0.654 على التوالي) ومجموعة السيطرة ، وجد فرق معنوية بين في التراكيز الهرمونية والحالة الاجتماعية في مجموعة التهاب الغدة الدرقية (P = 0.922، P = 0. .283، P = 0.844، P = 0 .447 و P = 0.168 على التوالي) ومجموعة متلازمة التكيس P = 0.739، P = 0.388، P = 0.100، P = 0.687 و P = 0.586) على التوالي) ، وكذلك مستوى FSH (P = 0 .025)) ، مضاد FSH (P = 0.000), وقد كان معنويا بين مجموعة التهاب الغدة الدرقية والسيطرة ، بينما لم يكن معنويا لمستوى LH (P = 0.143) ، وكذلك لم يكن معنويا P = 0.088مع متلازمة التكيس. إن المستويات المرتفعة من E2 و FSH و Anti FSH و LH و Anti LH هي من بين مجموعة التهاب الغدة الدرقية ، ولكن لا توجد أهمية كبيرة بين التراكيزالهرمونية في المصل (استراديول ، وهرمون منشط للجريب ، ومضاد FSH ، وهرمون Luteinizing ومضاد LH مع الفئة العمرية في مجموعة التهاب الغدة الدرقية ، ليس هناك فرقا معنويًا أيضًا مع متلازمة تكيس المبايض ومجموعات السيطرة . لا يوجد فرق معنوي بين التراكيز الهرمونية والحالة الاجتماعية في مجموعة التهاب الغدة الدرقية ومجموعة متلازمة تكيس المبايض ، كانت مضادات FSH معنوية بين مجموعة التهاب الغدة الدرقية والسيطرة ، بينما لا توجد معنوية لمستوى LH أيضًا ليس له أهمية مع متلازمة تكيس المبايض.

الكلمات المفتاحية: *الاستراديول، هرمون المحفز للحويصلات، مضاد للهرمون المحفز للحويصلات ، هرمون الملوتن ، هرمون المضاد للملوتن ، الغدة الدرقية ، تكيس المبايض .*

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Introduction

Polycystic ovarian syndrome (PCOS) is a diverse combination of signs and symptoms that can range from a mild disturbance of reproductive, endocrine, and metabolic function in some women to a severe disruption in others. The etiology of the polycystic ovarian syndrome appears to be complex and polygenic. Disruption of the menstrual cycle, hyperandrogenism, and obesity are all prevalent symptoms [1].

In the general population, thyroid problems and polycystic ovarian syndrome are two of the most frequent endocrine ailments (PCOS). Despite the fact that the causes of hypothyroidism and PCOS are fundamentally different, they have a lot in common. Primary hypothyroidism has been linked to an increase in ovarian volume and cystic abnormalities in the ovaries. Taking the opposite approach, it's becoming obvious that PCOS women have a higher rate of thyroid problems than the overall population [2،3] polycystic ovarian disease, abnormality of the hypothalamic-pituitary-ovarian or adrenal axis has been suggested. The gonadotrophin-releasing hormone (GnRH) secretion pattern is disrupted, resulting in a relative increase in LH to FSH release [4]. Ovarian estrogen is to blame for an aberrant feedback process that resulted in an increase in LH production [5], The ratio between LH and FSH in healthy women is normally between 1 and 2. This ratio is inverted in women with polycystic ovarian disorder, and it can reach as high as 2 or 3 in some cases [6].

Aim of the study :

1- Determine the levels of Estradiol, Follicle-stimulating hormone, Luteinizing hormone, anti-FSH, and anti-LH in Thyroiditis and Polycystic ovarian syndrome

2- Comparative between levels of Estradiol, Follicle-stimulating hormone, Luteinizing hormone, anti-FSH, and anti-LH in Thyroiditis and Polycystic ovarian syndrome

Patients and methods:

After obtaining consent, (90) blood samples were taken in this study as patients with PCOS) (30 samples); group of thyroid disease (30 samples, as well as group of healthy women fertile (30samples) as control. The serum was isolated and kept at -20 C until it was needed. During the months (April – November) 2021, the study was conducted in many hospitals in Baghdad- Iraq. Measurement of E2, TSH, anti-SH and LH and anti-LH by sandwich ELISA technique, manufacture by Roi-Med, Germany kits

Statistical analysis:

Data were revised, coded, and analyzed using the “Statistical Package of Social Science(SPSS) version 26.0.

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Results

Distribution of study groups (Thyroiditis, Polycystic, and Control) according to age groups (years) shown in Table 1. Results in this table demonstrated that higher percentages in Thyroiditis group (70.0%) was among (40- ≥50) age group years, also in Control group was (63.3%), but higher percentages of age group (≤30 -39) years was among Polycystic group (60.0%).

Table (1): Distribution of study groups according to age groups (years).

Age (years)	Thyroiditis		Polycystic		Control	
	No.	%	No.	%	No.	%
(≤30 -39)	9	30.0	18	60.0	11	36.7
(40- ≥50)	21	70.0	12	40.0	19	63.3
Total	30	100.0	30	100.0	30	100.0

Results in Table 2 represented that, the higher (Mean ± SD.) of E2, FSH, Anti FSH, LH and Anti LH are among Thyroiditis group [(177.61 ± 24.66), (14.90± 1.68), (0.55 ± 0.29), (5.53 ± 4.930) and (0.54 ± 0.45) respectively]. There were no statistically significant difference between the serum hormonal concentrations (Estradiol, FSH, Anti-FSH, LH and Anti-LH) and age group (years) in Thyroiditis group (P = 0.203, P = 0.344, P=0.495, P = 0 .676 and P = 0.718 respectively). Also the same comparison was no statistically significant difference with Polycystic (P = 0.669, P=0.330, P = 0.100, P = 0.060 and P=0. 654 respectively) and control groups (P = 0. 252, P = 0.457, P=0. .699, P = 0. 363 and P = 0. 273 respectively).

Table (2): Comparison of Serum hormonal concentrations (Estradiol, FSH, Anti-FSH, LH and Anti-LH) among Study groups and age groups.

Study Groups	Age Groups (years)	Mean ±SD.				
		E2 (pg/ml)	FSH (mIu/Ml)	Anti FSH (mIu/Ml)	LH (mIu/ml)	Anti LH (mIu/ml)
Thyroiditis	(≤30 -39)	177.61± 24.66	14.90± 1.68	0.55± 0.29	5.53± 4.93	0.54± 0.45
	(40- ≥50)	155.71± 47.37	9.85± 7.38	0.48± 0.21	4.90± 3.12	0.48±0.32
	P-Value	.203 (NS)	.344 (NS)	.495 (NS)	.676 (NS)	0.718 (NS)
Polycystic	(≤30 -39)	128.74± 30.20	5.25± 3.59	0.51± 0.28	3.05± 0.44	0.37±0.22
	(40- ≥50)	123.76± 32.01	4.21± 0.57	0.36± 0.16	2.71± 0.25	0.34±0.16
	P-Value	.669 (NS)	.330 (NS)	.100 (NS)	.060 (NS)	.654 (NS)

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Control	(≤30 -39)	186.60± 20.48	5.67± 0.61	0.30± 0.03	5.59±3.75	0.32±0.09
	(40- ≥50)	175.36± 27.74	5.82± 0.51	0.29± 0.05	6.92±3.81	0.360±0.11
	P-Value	.252 (NS)	.457 (NS)	.699 (NS)	.363 (NS)	.273 (NS)

In table 3 results show the highest (Mean ± Std.) of E2[(180.38 ± 25.41) and (178.70 ± 26.47)] was among marital status (single and married) in Control group. The highest (Mean ± Std.) of FSH [(9.07 ± 6.58) and (14.36 ± 18.51)] was among marital status (single and married) in Thyroiditis group, also the highest (Mean ± Std.) of Anti FSH [(0.51 ± 0.24) and (0.49 ± 0.30)] was among marital status (single and married) in Thyroiditis group. The highest (Mean ± Std.) of LH [(5.86 ± 3.87) and (6.92 ± 3.75)] was among marital status (single and married) in Control group. The highest (Mean ± Std.) of Anti LH [(0.57 ± 0.35) and (0.61 ± 0.34)] was among marital status (single and married) in Polycystic group. Thyroiditis there were no statistically significant difference between the serum hormonal concentrations (Estradiol, FSH, Anti-FSH, LH and Anti-LH) and Marital Status in Thyroiditis group (P = 0.922, P = 0.283, P = 0.844, P = 0 .447 and P = 0.168 respectively). Also the same comparison was no statistically significant difference with Polycystic (P = 0.739, P = 0.388, P = 0.100, P = 0.687 and P = 0.586) respectively and control groups (P = 0.862, P = 0.220, P = 0.521, P = 0 .453 and P = 0.146 respectively).

Table (3): Compere the Serum hormonal concentrations (Estradiol, FSH, Anti-FSH, LH and Anti-LH) in Serum between Study groups and Marital Status.

Study groups	**Marital Status**	**Mean ±Std.**				
		E2 (pg/ml)	**FSH (mIu/Ml)**	**Anti FSH (mIu/Ml)**	**LH (mIu/ml)**	**Anti LH (mIu/ml)**
Thyroiditis	Single	161.59±40.38	9.07±6.58	0.51±0.24	4.63±3.37	0.42±0.26
	Married	163.18±47.14	14.36±18.51	0.49±0.30	5.68±4.10	0.60±0.45
	P-Value	.922 (NS)	.283 (NS)	.844 (NS)	.447 (NS)	.168 (NS)
Polycystic	Single	129.91±24.57	4.08±0.65	0.33±0.09	2.86±0.23	0.57±0.35
	Married	125.60±32.82	5.10±3.24	0.50±0.28	2.93±0.45	0.61±0.34
	P-Value	.739 (NS)	.388 (NS)	.100 (NS)	.687 (NS)	.586 (NS)
Control	Single	180.38±25.41	5.53±0.53	0.29±0.04	5.86±3.87	0.32±0.08
	Married	178.70±26.47	5.97±0.48	0.30 ±0.05	6.92±3.75	0.37±0.11
	P-Value	.862 (NS)	.220 (NS)	.521 (NS)	.453 (NS)	.146 (NS)

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Table (4) represented the Comparison of Serum hormonal concentrations (Estradiol, FSH, Anti-FSH, LH, and Anti – LH) in the Serum of the Control group with Thyroiditis and Polycystic. The highest (Mean ± Std.) E2 level (179.48 ± 25.54), so on the level of FSH (11.36 ± 13.14) and level of Anti FSH (0.50 ± 0.23) and the level of Anti LH (0.50 ± 0.36) among Thyroiditis group. But The highest (6.43 ± 3.78) LH level was among the Polycystic group. Therefore, no statistically significant difference between the Control group and the Thyroiditis group (P = 0.060), but the difference between the Control group and the Polycystic group was highly statistically significant (P = 0.000). FSH level was a statistically significant difference between the Control group and the Thyroiditis group (P = 0 .025), while the difference between the Control group and Polycystic group was not statistically significant (P = 0.088). The level of Anti FSH was a highly statistically significant (P = 0.000) difference between the Control group and Thyroiditis group, and also was a highly statistically significant (P = 0.003) difference between the Control group and the Polycystic group. Between the Control and Thyroiditis groups, there was no statistically significant difference in LH levels (P = 0.143). but the difference between the Control group and the Polycystic group was highly statistically significant (P = 0.000). Anti LH level was a statistically significant difference between the Control group and Thyroiditis group (P = 0.033), while the difference between the Control group and Polycystic group was not statistically significant (P = 0.774).

Table (4): Compare the Serum hormonal concentrations (Estradiol, Follicle-stimulating hormone, Anti-FSH, Luteinizing hormone, and Anti-LH) in Serum of the Control group with Thyroiditis and Polycystic groups.

Serum hormonal concentrations	Mean ±Std.		
	Thyroiditis	**Control**	**Polycystic**
E2(pg/ml)	179.48±25.54	162.28±42.66	126.75±30.49
	P= .060 (NS)		P=.000 (HS)
FSH(mIu/Ml)	11.36±13.14	5.764±0.54	4.83±2.82
	P=.025 (S)		P=.088 (NS)
Anti FSH(mIu/Ml)	0.50±0.23	0.29±0.04	0.45±0.25
	P=.000 (HS)		P=.003 (HS)
LH (mIu/ml)	5.09±3.67	6.43±3.78	2.91±0.40
	P=.143 (NS)		P=.000 (HS)
Anti LH (mIu/ml)	0.50±0.36	0.35±0.10	0.36±0.20
	P=.033 (S)		P=.774 (NS)

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Discussion

According to the findings, the Thyroiditis group has a higher mean of E2, FSH, Anti FSH, LH, and Anti LH. [7] observed that E2, FSH, Anti FSH, LH, and FSH antibodies were considerably higher in Thyroiditis women than in the control group, and autoantibodies to a specific FSH beta epitope were more common in endometriosis and polycystic ovarian syndrome patients (PCOS). Hyperprolactinemia, disruption of luteinizing hormone (LH) pulsatile secretion, decrease in sex hormone-binding globulin (SHBG) synthesis, disruption of estrogen peripheral metabolism, and an increase in ovarian androgen production are all linked to overt hypothyroidism, when hypothyroidism was researched in female pigs, researchers observed that it enhanced gonadotropin receptor sensitivity in the ovary, leading to ovarian hypertrophy and the production of numerous ovarian cysts.

The highest concentration of FSH [(9.076.58) and (14.3618.51)] was among marital status (single and married) in the Thyroiditis group, as was the highest of Anti FSH [(0.510.24) and (0.490.30)]. the decreased ovarian function causes changes in both the quantity and quality of ovarian components (inhibin) and FSH is raised through the feedback system [8]. In the Control group, marital status (single and married) had the highest concentration of LH [(5.863.87) and (6.923.75)]. Different studies have observed similar results when LH and FSH levels are higher in married women than in non-married women, which is consistent with the study findings [9-11]. So, both [12] and [13] findings demonstrated that PCOS patients had lower TSH levels than controls (0.143 0.026 vs 1.933 0.191) due to excessive LH. Elevating LH levels in PCOS patients may have a growth effect on the thyroid gland, resulting in high T3 and T4 (as seen in the current study) and a decrease in TSH in the PCOS group.

Conclusion

Higher levels of E2, FSH, Anti-FSH, LH, and Anti-LH were found in the Thyroiditis group, but no significant association was found between serum hormonal concentrations (Estradiol, Follicle-stimulating hormone, Anti-FSH, Luteinizing hormone, and Anti-LH) and age in the Thyroiditis group. So there was no significant association between serum hormonal concentrations and Marital Status in the Thyroiditis and PCOS groups, as well as FSH levels; Anti FSH was significant between the Thyroiditis and control groups, but LH levels and PCOS were not.

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