

The Relationship Between Thyroid Disorders and Polycystic Ovary Syndrome

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ABSTRACT

This study was conducted at the Fertility Center at Al-Sadr Teaching Hospital in Najaf Governorate from 16/10/2016 to 10/3/2017 to determine the relationship between thyroid disorders and polycystic ovary syndrome in women of reproductive age. There was no significant difference in body mass and age for thyroid function. The study as well showed not significant difference in T3 and T4 levels when comparing the two groups, but there was a significant difference ($P < 0.05$) in the TSH level, which is higher in the patients. It is concluded that there is a relationship between thyroid disorders and PCOS due to increased TSH in women with the syndrome.

Keywords: Thyroid gland, Polycystic Ovary Syndrome, T3, T4, TSH.

INTRODUCTION

Thyroid disorders are a common and important disease in the world because they affect almost all cells and tissues of the body, causing changes in vital functions. They play influence the central nervous system, and the anterior pituitary and play a role in maintaining the rate of metabolism in the body^{1,2}. The thyroid gland is essential for life because its hypothyroidism or absence causes mental or physical impairment, and low resistance to cold. In children, its absence causes mental retardation and dwarfism. Hyperthyroidism increases sweating, weight loss, nervousness and other mental disorders, tremor, and tachycardia³. The thyroid gland is located in the lower part of the neck and consists of many grains that secrete hormones called thyroid hormones, most notably thyroxine T4 and triiodothyronine T3. The thyroid gland also contains cells located between the follicles called the parafollicular cells that produce calcitonin which unlike T3 and T4, does not contain iodine on the contrary of T3 and T4, which is the iodine element in their composition^{3,4}. PCOS is the most common hormonal imbalance affecting 6-10% of women of childbearing age, resulting in menstrual irregularity, infertility, anovulation, obesity, irregular menstruation or no menstruation. It could lead to cardiovascular or arterial diseases, and arteriosclerosis (5,6).

Objectives of the study

Demographic study (age, residence, BMI for infected and uninfected women to reduce confusion between the two groups) confounders.

Study of changes in the hormonal parameters of thyroid function associated with PCOS TSH, T3 and T4 in uninfected women

MATERIALS AND METHODOLOGY

Samples Collection

The study was conducted in the laboratories of the Fertility and Infertility Center at Al-Sadr Teaching Hospital in Najaf Governorate for the period from October/ 2016 to March/2017. The study included 80 blood samples, including 60 blood samples from women with PCOS. Their ages ranged from 15-40 years after identifying their status through the medical examinations by the specialist doctor. In addition, a random group of 30 blood samples of healthy women was selected. They aged (15-40) years and have been cleared of any hormonal disorders through laboratory tests by the competent physician. The samples were divided into two groups:

The first group of women with PCOS is 60

The second group of healthy women is 20

Hormonal assay

Blood samples were taken when reviewing patients with polycystic ovaries at the above-mentioned hospital and private laboratories, and information on age, body mass and housing was obtained. Blood samples were obtained from the basilic vein of the infected, as well as control group (5 ml) and were placed in GellTube test tubes.

The blood was then centrifuged in at 300 cycles/ minute for 10 minutes. The serum was then withdrawn by a micro pipette and placed in a test tube (Pandrouph tube) to measure hormonal criteria and preservation of serum. In deep freeze until use.

Statistical Analysis

The statistical analysis was carried out by SPSS version 20, where the rate was used with the standard error as well as the numbers with the percentages as a descriptive statistic. The Chi-square, T-tests and ANOVA with LSD

Table 1: shows the relationship between thyroid function and age for women with PCOS.

P value	total	thyroid functions			
		Hyperthyroidism	Hypothyroidism	normal	
0.738	7	0	1	6	15-20
	100.0%	0%	14.3%	85.7%	Age/year
	21	1	5	15	
	100.0%	4.8%	23.8%	71.4%	21-25
	24	2	7	15	26-30
	100.0%	8.3%	29.2%	62.5%	31-35
	5	0	0	5	
	100.0%	0%	0%	100.0%	36-40
	3	0	0	3	
	100.0%	0%	0%	100.0%	total
	60	3	13	44	
	100.0%	5%	21.7%	73.3%	

Table 2: shows the relationship between thyroid function and BMI for women with PCOS.

P value	Total	Thyroid functions			
		Hyperthyroidism	Hypothyroidism	Normal	
0.573	13	0	4	9	normal
	100.0%	0.0%	30.8%	69.2%	Overweight
	18	2	3	13	
	100.0%	11.1%	16.7%	72.2%	Obesity
	29	1	6	22	
	100.0%	3.4%	20.7%	75.9%	Total
	60	3	13	44	
	100.0%	5.0%	21.7%	73.3%	

were used to calculate the significant differences among groups.

If the (P value) is less than 0.05, then there is a significant difference.

Measuring hormone levels

Hormone levels (TSH, T4, T3) were measured in serum (for the PCOS group and control group) by following the steps associated with each hormone kit according to Monobind Inc.'s instructions by Elisa device.

RESULTS AND DISCUSSION

There was no significant relationship between the age of women and the function of the thyroid gland for PCOS women.

There was no significant association between BMI and thyroid function for PCOS women.

In Table (3), there was no significant difference in the two groups between T3 and T4, but there was a significant difference in TSH, which is higher in patients.

The results shown in the table indicated no significant differences in levels of thyroid hormones T3 and T4 when comparing the PCOS group and the control group which agrees with⁷. The results indicated in the same table showed a significant increase ($P < 0.05$) in the level of thyroid stimulating hormone TSH which was in the PCOS group (0.752 ± 6.255) and in the control group (0.278 ± 3.364) which is consistent with⁸. The significant rise in TSH could be ascribed to malfunction of the thyroid gland to form T3 and T4 hormones. This decrease stimulates the pituitary gland to increase TSH secretion to stimulate the thyroid gland⁹. Also, the increase in TSH in the case of

hypothyroidism in some women infected with PCOS is associated with the increase in the secretion of Thyrotropin releasing hormone TRH from hypothalamus, which in turn increases TSH secretion¹⁰.

Or the significant rise in TSH could be due to hypothyroidism in women infected with polycystic ovaries, leading to secondary menopause, and when the ovaries cannot produce mature eggs and the failure to synthesize enough E2 and progesterone for the occurrence of the menstrual cycle continuously except for small amounts from the adrenaline gland causing hypothyroidism (11). The results shown in the table indicated that subclinical hypothyroidism (SCH) was diagnosed in patients with PCOS, which appears when TSH levels are high with normal levels of thyroid hormone (T4).

In Table(4), all non-infected women had normal thyroid function, while women with PCOS had 21.7% of them with hypothyroidism and 5% had hyperthyroidism.

In the light of our study, patients with clinical advantage of thyroid disorder were assessed by testing thyroid function, further studies are needed to detect the association of thyroid disorder and PCOS. Women with PCOS have higher levels of thyroid antibodies and larger size of the gland (compatible with inflammation of the gland compared with normal women)^{8,12}. Thyroid hormones have effects on the human reproductive system where disorders of thyroid function, especially hypothyroidism, can lead to functional dysfunction in ovulation causing poor female fertility. Thyroid and PCOS are often associated with an increase in free testosterone in

Table 3: Comparison of thyroid function in patients and control.

P value	(n=20)Control Average± Standard error	(n=60) patients Average± Standard error	Thyroid functions
0.816	0.049±1.216	0.059±1.191	T3 IU/ml
0.754	0.873±7.446	0.358±7.195	T4 IU/ml
*0.001	0.278±3.364	0.752±6.255	TSH IU/ml

Table 4: Thyroid function in patients and control group.

21.7	13	hypothyroidism	Patients
5	3	hyperthyroidism	
73.3	44	Normal	
100	20	'normal	Control

serum, luteinizing hormone, and cholesterol in the blood. Thyroid diseases have been observed in some women with PCOS. Hypothyroidism was noticed in 21.7% of women with PCOS, while hyperthyroidism was 5% in women with PCOS and this was consistent with the study of¹⁴.

REFERENCES

1. Cown,A; and Newlands,S.(2006) Benign thyroid disease.University of texas Medical branch.PP;13.
2. Chandramouli,R.(2009). Textbook of physiology.2nd ed.Jaypee Brothers Pub.New Delhi.PP;316_321.
3. Vanderpumped M(2013).The epidemiology of thyroid disease.Br.Med.Bull.99:39_51.
4. Albasri A,Sawaf Z,Hussainy AS,Alhujaily A(2014).Histopatholoical patterns of thyroid disease in AL_Mandianah region of Saudi Arabia.Asian Pac.J.Cancer Prev.15:5565_5570.
5. Legro RS, Arslanian SA, Ehrmann DA, et al: (2013) diagnosis and treatment of polycystic ovary syndrome: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab;98:4565-4592.
6. D. Danfeng, L. Xuelian; The relationship between thyroiditis and polycystic ovary syndrome, Int J Clin Exp Med. 2013, 6(10), 880-889.
7. De Carvalho GA, Perez CS, Ward LS; (2013) "The clinical use of thyroid function tests.," Arq. Bras. Endocrinol. Metabol.; 57(3):193–204.
8. Sinha U, Sinharay K, Saha S, Longkumer TA, Baul SN, Pal SK. (2013) Thyroid disorders in polycystic ovarian syndrome subjects: A tertiary hospital based cross-sectional study from Eastern India. Indian J Endocrinol Metab;17:304-9.
9. Natural Health Solutions for (PCOS).(2004). Hypothyroidism and PCOS. Nancy Ounne, Naturo pathic physician, Billslater.
10. Kazuk, R.; Kazawwa,S .and Orio, N.(2008). Hypothyroidism with Poly Cystic Ovary Syndrome .J.Clin. Endocrinol; 6(3):P:431- 439.
11. Elslimani, F.AL.;Elhasi,M.and Elmhdwi,M.F.(2016)The Relation between hypothyroidism and Polycystic Ovary Syndrome.J.Pharm.APPI.Chem.2(3):197-200.
12. Garelli S,Masiero S,Plebani M,Chen s,Furmaniak J,Armanini D,et al. (2013) High prevalence of chronic thyroiditis in patients with polycystic ovary syndrome.Eur J obstet Gynecol Reprod Biol;169:248_51.
13. AL-Jubory,W.A.T.(2006)secondary menopause and its relationship with physiology cal and Hormonal status of Women.M.SC.thesis.College of Education,Tikrit university.
14. Janssen OE, Mehlmauer N, Hahn S, Offner AH, Gärtner R; (2004) "High prevalence of autoimmune thyroiditis in patients with polycystic ovary syndrome.," Eur. J. Endocrinol; 150(3):363-9. 26:3138.