

A Study of Antithyroid Peroxidase Antibody and Its Correlation with Polycystic Ovary Syndrome in Reproductive Age Group Women

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ABSTRACT

Objective: To find the correlation of thyroid autoimmunity in PCOS women of reproductive age group.

Methods: Study design: prospective study was done at sree Balaji medical college and hospital, Chennai. July 2021- July 2022. Fifty nine cases of reproductive women with PCOS based on Rotterdam's criteria and an equal number of age-matched controls (women without PCOS) were included in the study. Antithyroid peroxidase titre were estimated using chemiluminescence techniques.

Results: Menstrual irregularity (oligomenorrhoea and amenorrhoea) was the most common abnormality found in patients with PCOS compared with non-PCOS ($p < 0.0001$). Our study shows upper lower class (55.9%) was statistically significant difference in socio-economic class between groups ($p=0.001$).

Our study shows that the mean serum levels of anti-TPO antibodies were significantly higher in PCOS patients than in healthy women. The finding denotes the anti-TPO positivity was noted in 25% of patients with PCOS.

Conclusion: Our study depicts that PCOS was associated with increased anti-TPO titres, thus highlights the importance of screening all PCOS patients for anti-TPO and by adding anti TPO Antibody in the investigation protocol.

Keywords: Antithyroid peroxidase antibody; Autoimmune thyroiditis; PCOS; Thyroid profile.

INTRODUCTION

Polycystic ovarian syndrome is a metabolic disorder by which women are predominantly affected in their reproductive years. Currently, it is estimated to impact approximately 8-13% of women within this age group. Alarmingly, up to 70% of these affected individuals worldwide go undiagnosed [1]. PCOS is a multifaceted condition with a myriad of endocrine irregularities, and its etiology has been the subject of various genetic and environmental theories. Among these, the hyperandrogenism and the insulin resistance theory are widely acknowledged as key contributors [2]. Recently, there can be seen a growing interest in the potential inflammatory and autoimmune factors involved in PCOS pathogenesis [3]. A common autoimmune disorders' category is represented by autoimmune thyroid diseases (AITD) which affects women who are in childbearing age, with a prevalence ranging from 5% to 20% [4].

Recent research has suggested a potential link between anti-TPO activity and polycystic ovary syndrome (PCOS). PCOS is already known for its complex hormonal and metabolic disturbances, and also the anti-TPO antibodies presence could have clinical implications potentially in PCOS patients [6]. PCOS is associated with various reproductive and metabolic challenges, including infertility, irregular menstrual cycles, and an increased risk of metabolic disorders such as insulin resistance and type 2 diabetes.

The presence of anti -TPO antibodies may help in the clinical management of PCOS, especially in cases with thyroid dysfunction [7].

AIM:

- To determine the correlation of antithyroid peroxidase antibody in women with Polycystic ovary syndrome (PCOS) in reproductive age group.

OBJECTIVE:

- To estimate the antithyroid peroxidase antibody titre in women of reproductive age.
- To analyse the risk ratio.
- To correlate the antibody titre level with disease severity.

MATERIALS AND METHODS:

This prospective study was conducted in the outpatient department of obstetrics and gynaecology in tertiary care center in Chennai over 12 months.

Inclusion criteria includes women aged 20 to 40 years with PCOS as per Rotterdam criteria (ESHRE/ ASRM) 2003 and those who agreed to participate in the study after providing informed written consent. The diagnosis of PCOS was made based on the above mentioned criteria on atleast two out of three criteria namely oligomenorrhea /anovulation , clinical and biochemical signs of hyperandrogenism and polycystic appearance in one or both ovaries on ultrasonography (an ovarian volume > 10 ml³ or >12 follicles measuring 2-9mm in at least one ovary).

Exclusion criteria includes Women aged <20 years and >40 years, regular menstrual cycles, normal ultrasonography parameters and those who are not willing to participate in the study.

Nearly, 118 patients had been screened for PCOS. Based on the inclusion and exclusion criteria, they are divided into 59 participants with PCOS and 59 Participants without PCOS and enrolled for the study after getting a proper informed consent. In our study, all the participants included were subjected to general and systemic examination and detailed clinical history with investigations . Venous blood samples were obtained from patients who are in reproductive age group for measuring the anti -TPO antibody in empty stomach by chemiluminescence method.

RESULTS:

Table 1: Comparison of Age group between PCOS and control

AGE	GROUP				Chi-square value	P value
	PCOS (n=59)		Control (n=59)			
	Count	N %	Count	N %		
20-25	15	25.4%	13	22.0%	1.614	0.656
26-30	18	30.5%	16	27.1%		
31-35	14	23.7%	12	20.3%		
36-40	12	20.3%	18	30.5%		

Pearson chi -square test p-value >0.05 NS; p -value <0.05 S; p -value <0.0001 HS Among the patients with PCOS, 15 (25.4%) were in the 20 -25 age group, 18 (30.5%) were in the 26 -30 age group, 14 (23.7%) were in the 31-35 age group, and 12 (20.3%) were in the 36 -40 age group. Among the patients without PCOS, 13 (22.0%) were in the 20 -25 age group, 16 (27.1%) were in the 26 -30 age group, 12 (20.3%) were in the 31-35 age group, and 18 (30.5%) were in the 36-40 age group. There is no statistically significant difference in age group between groups (p=0.656).

Table 2 Comparison of Socio Economic Class between PCOS and control

SOCIO ECONOMIC CLASS	GROUP				Chi-square value	P value
	PCOS (n=59)		Control (n=59)			
	Count	N %	Count	N %		
lower class	4	6.8%	9	15.3%	19.835	0.001
lower middle class	7	11.9%	20	33.9%		
upper class	6	10.2%	9	15.3%		
upper lower class	9	15.3%	10	16.9%		
upper middle class	33	55.9%	11	18.6%		

Pearson chi-square test p-value >0.05 NS; p-value <0.05 S; p-value <0.0001 HS.

Among the patients with PCOS, 4 (6.8%) were in the lower class, 7 (11.9%) were in the lower middle class, 6 (10.2%) were in the upper class, 9 (15.3%) were in the upper lower class, and 33 (55.9%) were in the upper middle class. Among the patients without PCOS, 9 (15.3%) were in the lower class, 20 (33.9%) were in the lower middle class, 9 (15.3%) were in the upper class, 10 (16.9%) were in the upper lower class, and 11 (18.6%) were in the upper middle class. There is a statistically significant difference in socio-economic class between groups (p=0.001).

Table 3 Comparison of Menstrual Irregularity between PCOS and control

MENSTRUAL IRREGULARITY	GROUP				Chi-square value	P value
	PCOS (n=59)		Control (n=59)			
	Count	N %	Count	N %		
No	1	1.7%	50	84.7%	82.914	<0.0001
Yes	58	98.3%	9	15.3%		

Pearson chi-square test p-value >0.05 NS; p-value <0.05 S; p-value <0.0001 HS.

Among the patients with PCOS, 1 (1.7%) did not have menstrual irregularity, while 58 (98.3%) did. Among the patients without PCOS, 50 (84.7%) did not have menstrual irregularity, while 9 (15.3%) did. There is a statistically significant difference in the prevalence of menstrual irregularity between the groups (p<0.0001).

Table 4: Comparison of No. of Ovarian Follicle between PCOS and control

NO OF OVARIAN FOLLICLE	GROUP				Chi-square value	P value
	PCOS		Control			
	Count	N %	Count	N %		
No	0	0.0%	53	89.8%	112.00	<0.0001
<10	2	3.4%	6	10.2%		
10-12	10	16.9%	0	0.0%		
>12	47	79.7%	0	0.0%		

Pearson chi-square test p-value >0.05 NS; p-value <0.05 S; p-value <0.0001 HS.

Among the patients with PCOS, 3 (5.1%) had no ovarian follicles observed, 0 (0.0%) had 8 follicles, 0 (0.0%) had 9 follicles, 19 (32.2%) had 10 follicles, and 37 (62.7%) had more than 12 follicles. Among the patients without PCOS, 50 (84.7%) had no ovarian follicles observed, 2 (3.4%) had 8 follicles, 1 (1.7%) had 9 follicles, and 5 (8.5%) had 10 follicles. There is a statistically significant difference in the distribution of ovarian follicle counts between the groups (p<0.0001).

Table 5 Comparison of Anti-TPO between PCOS and control in different age groups

Pearson chi-square test p -value >0.05 NS; p -value <0.05 S; p -value <0.0001 HS.

Among the patients with PCOS, in the age group 20 - 25, 4 (26.7%) had anti-TPO levels <35 , while 11 (73.3%) had levels ≥ 35 .

In the age group 26 - 30, 2 (11.1%) had anti-TPO levels <35 , and 16 (88.9%) had levels ≥ 35 . For the age group 31 - 35, 10 (71.4%) had anti-TPO levels <35 , and 4 (28.6%) had levels ≥ 35 . In the age group 36 - 40, 7 (58.3%) had anti-TPO levels <35 , and 5 (41.7%) had levels ≥ 35 . There is a statistically significant difference in the Anti-TPO level between the groups in different age group ($p=0.002$).

Among the patients without PCOS, in the age group 20 - 25, 12 (92.3%) had anti-TPO levels < 35 , while 1 (7.7%) had levels ≥ 35 . In the age group 26 - 30, 15 (93.8%) had anti-TPO levels <35 , and 1 (6.3%) had levels ≥ 35 . For the age group 31 - 35, 12 (100.0%) had anti-TPO levels <35 , and 0 (0.0%) had levels ≥ 35 . In the age group 36 - 40, 18 (100.0%) had anti-TPO levels <35 , and 0 (0.0%) had levels ≥ 35 . There is no statistically significant difference in the Anti-TPO level between the groups in different age group ($p=0.534$).

Table 6 Comparison of Anti-TPO between PCOS and control

GROUP		Mean	Std. Deviation	Std. Error	t value	P value
ANTI-TPO	PCOS (n=59)	35.31	9.44	1.23	7.886	<0.001
	Control (n=59)	22.42	8.28	1.08		

Independent Sample t test p -value >0.05 NS; p -value <0.05 S; p -value <0.0001 HS.

Patients with PCOS ($n=59$) had a mean anti-TPO level of 35.31 ± 9.44 IU/ml, significantly higher than patients without PCOS ($n=59$), who had a mean anti-TPO level of 22.42 ± 8.28 IU/ml, $p < 0.001$.

DISCUSSION

PCOS is characterised by hyperandrogenism, menstrual irregularities, polycystic ovarian morphology and hyperinsulinemia and a prevalent cause of infertility in women. PCOS and hypothyroidism share symptoms, such as dyslipidaemia, abnormal glucose metabolism, hypertension, and insulin resistance, leading to increasing research on the link between thyroid disease and PCOS. Biochemical changes in PCOS and autoimmune thyroid disorders (AITD) intersect at multiple points.

Anti-thyroid peroxidase antibodies (anti-TPO) were significantly elevated in a substantial proportion of PCOS patients compared to control subjects. In the age group 20 - 25 years, 73.3% of PCOS patients had elevated anti-TPO levels ($p < 0.001$), in 26 - 30 years, 88.9% of PCOS patients had elevated anti-TPO levels compared to 22.2% of control subjects ($p < 0.001$). Elevated anti-TPO levels are indicative of autoimmune thyroiditis, which has been frequently associated with PCOS. The high prevalence of elevated anti-TPO levels in PCOS patients suggests an autoimmune component in the pathophysiology of PCOS. This significant thyroid autoimmunity highlights the screening importance for thyroid antibodies in PCOS patients as part of the comprehensive management of PCOS.

Findings from the Sharma VK et al study observed that among anti-TPO positive cases ($n=16$), the distribution of TSH levels was as follows:

31.25% had TSH levels <2.5 mIU/L, 37.50% had levels between 2.5 - 4.5 mIU/L, 25% had levels between 4.5 - 10 mIU/L, and 6.25% had levels >10 mIU/L. [59] Amaska A reported observing positive serum anti-TPO Abs in 21.9% of women with PCOS, with a p -value of 0.07 which was similar to our study findings. [6]

Our study findings align with those of Akhter S, showing that the mean serum levels of anti-TPO antibodies were significantly higher in PCOS patients than in healthy women. The finding denotes the anti-TPO positivity was noted in 25% of patients with PCOS [7]. Similarly, other studies have documented anti-TPO positivity rates of 19.6% and 26.9% within PCOS cohorts [5].

Positive anti-TPO antibodies were detected even in individuals with TSH values within the reference range, suggesting that thyroid autoimmunity can persist in PCOS women without overt thyroid dysfunction. Elevated levels of these autoantibodies may contribute to inadequate responses to infertility treatment. This finding is supported by previous studies. Moreover, emerging evidence has indicated that inflammation as well as autoimmunity may play many significant roles in the PCOS pathogenesis. [4] The higher autoimmunity prevalence in PCOS may increase the risk of developing metabolic syndrome, infertility, and adverse pregnancy outcomes.

CONCLUSION

The association between anti-TPO antibodies and PCOS underscores the intricate interplay between thyroid autoimmunity and reproductive health. In women with PCOS, the presence of anti-TPO antibodies has highlighted the need for vigilant thyroid screening and holistic management approaches that address both endocrine disorders. While current evidence supports a link between thyroid autoimmunity and PCOS, further research is essential to unravel the underlying mechanisms and develop targeted interventions. Ultimately, addressing the role of anti-TPO antibodies in PCOS by antibody estimation in investigation protocol represents a significant step towards optimizing the management of this complex and multifaceted syndrome.

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