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Original Research Article

Role of thyroid dysfunction and thyroid autoimmunity in infertile women: study done in 450 bedded maternity hospital of Delhi, India

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ABSTRACT

Background: the aim was to study the prevalence of abnormal thyroid function and thyroid autoimmunity in infertile women and in general population (control group) and to correlate the thyroid dysfunction with presence of anti-thyroid antibodies. It was a case control study. The study was carried out at Department of obstetrics and gynaecology, Kasturba Hospital, Delhi. Population of the study was fifty infertile women in whom other causes of infertility are excluded and fifty fertile women attending out-patient department with other complaints.

Methods: All the women enrolled in the study were non pregnant, clinically euthyroid (with no signs and symptoms of thyroid disorders and no documented abnormal thyroid function test) and no known autoimmune disorder. Detailed history and a thorough general physical examination, including thyroid examination was done. Haemogram, blood group, fasting and post prandial blood sugar, VDRL, transabdominal ultrasound, TSH, free T₃, free T₄, and antithyroid per-oxidase antibody assay was done using the ELISA technique.

Results: The mean age of the study group was found 28.38±2.45 years, 22% had abnormal thyroid function, 20% had antithyroid antibodies positive and the mean TSH of the study group was 4.61±1.72μIU/ml. The mean age of the control group was found to be 29.10±2.01 years, 12% had abnormal thyroid function, 10% had antithyroid antibodies positive and the mean TSH of the control group was 3.89±1.56μIU/ml.

Conclusions: Thyroid dysfunction and anti-thyroid antibodies were more prevalent in patients with infertility. A statistically significant correlation was established between thyroid autoimmunity and thyroid dysfunction in infertile women in the study.

Keywords: Infertility, Thyroid dysfunction, Thyroid autoimmunity

INTRODUCTION

Infertility is defined as 1 year of unprotective intercourse without pregnancy.¹

The overall prevalence of infertility ranges from 10 - 15% of which female cause of infertility accounts for 35% of all couples, male related factors for 30%; a combination of both for 20% and idiopathic infertility for 15%.² Of all the autoimmune diseases, thyroid autoimmunity is the most common affecting 5-20% of

women in childbearing period and can be associated with both hypo and hyperthyroidism.³ Autoimmune thyroid disorders are characterized by the presence of mainly antiperoxidase (anti TPO) and antithyroglobulin antibodies. Antithyroid antibodies may serve as peripheral markers of abnormal T cell function. These abnormal T cell recognize the specific thyroid molecules -thyroglobulin, thyroid peroxidase and TSH receptors. Some of the T cells kill "self" thyroid cells and activate B cells to secrete antibody which binds to these same thyroid molecules.⁴

Anti-thyroid antibodies can occur in asymptomatic, euthyroid women who have never suffered from a thyroid disease.⁵

Thyroid hormones interact with both oestrogens and progesterone to maintain a normally functioning uterus and are necessary for the normal maturation of the oocytes.

Both a normal thyroid function and immune system are thus necessary to obtain normal fertility.⁶

METHODS

Place of study and study design

A case control study entitled 'The Role of thyroid dysfunction and thyroid autoimmunity in infertile women' was conducted between March 2012 and March 2013, in the Department of Obstetrics and Gynaecology, Kasturba Hospital, Delhi.

The study group comprised of 50 women with c/o of infertility, and the control group comprised of 50 parous women attending out-patient department with other complaints.

All the women enrolled in the study were non-pregnant, clinically euthyroid (with no signs and symptoms of thyroid disorders and with no documented abnormal thyroid function test) and with no known autoimmune disorder.

- Detailed history and a thorough general physical examination, including thyroid examination was done.
- Investigations- Haemogram, blood group, fasting and post prandial blood sugar, VDRL, transabdominal ultrasound, TSH, free T₃, free T₄, and anti-thyroid per-oxidase antibody assay was done using the ELISA technique.

The observations of the study were noted in Table 1 and Table 2.

Table 1: Observations in study (A).

		Study Group		Control Group		p-value
		No.	%	No.	%	
TSH	Low	0	0	0	0	0.031
	Normal	39	78	44	88	
	High	11	22	6	12	
Anti TPO Antibodies	Positive	10	20	5	10	0.029
	Negative	40	80	45	90	
Total		50	100	50	100	

Table 2: Observations in study (B).

Anti TPO	TSH				Total
	High		Normal		
	No.	%	No.	%	
Positive	10	58.82	5	6.41	15
Negative	7	41.18	78	93.59	85
Total	17	100	83	100	100

RESULTS

The mean age of the study group was found 28.38±2.45 years and the mean age of the control group was found to be 29.10±2.01 years.

The prevalence of abnormal thyroid function (high TSH) and anti-thyroid antibodies in patients with infertility was higher than the control population (22% vs 12% p-value= 0.031) and (20% vs 10%, p value= 0.029) respectively. The difference was statistically significant (p-value <0.05). None in either group were hyperthyroid (low TSH).

The mean TSH of the study group was 4.61±1.72µIU/ml and the mean TSH titre of the control group was 3.89±1.56µIU/ml. The difference between TSH titres were statistically significant (p value =0.031).

Among the women with high TSH, 58.82% were Anti-TPO antibody positive; and the p-value of the correlation between the two (thyroid autoimmunity and thyroid dysfunction), was found to be <0.001 i.e. statistically significant. Odds ratio was calculated as 22.28, which means that if a woman is having high TSH levels, there is almost 22 times increased risk of anti TPO antibodies to be positive.

The mean anti-TPO antibody titers of study group was 50.86±19.01 IU/ml and the mean anti TPO titre of control group was 43.04±16.09 IU/ml. The difference between anti TPO titres were statistically significant (p value= 0.029).

DISCUSSION

Comparison of prevalence of abnormal thyroid function in infertile women with other studies

The results of our study were comparable with other studies, with the difference that subclinical hypothyroidism was more prevalent in our study. This could be explained by the fact that our study population belonged to Indian women living in 'walled city' where iodine deficiency is common and there is lack of awareness of intake of iodized salt.

In a study by Lincoln et al on 704 women with infertility, he found that 2.35% i.e. (16/704) had hypothyroidism.⁷

Arojoki et al retrospectively evaluated the occurrence of hypothyroidism among 299 women with infertility. He found that 12 women (4%) exhibited hypothyroidism.⁸

Grassi et al investigated 129 women from couples with infertility.⁹ He found that out of 129, six women i. e. 4.6% had increased TSH levels.

Raber et al investigated 299 women with infertility. He found that 34 % of women had elevated TSH i.e. subclinical hypothyroidism.¹⁰

Abalovich et al studied 244 infertile women and observed a higher prevalence of subclinical hypothyroidism (13.9%) in patients with infertility.¹¹

Comparison of prevalence of antithyroid antibodies in infertile women with other studies

Table 3: Comparison of prevalence of abnormal thyroid function in infertile women with other studies.

Name of first author	Year of publication	No. of infertile women	Prevalence of abnormal thyroid function
Lincoln et al	1999	704	2.35% (b)
Arojoki et al	2000	299	4% (b)
Grassi et al	2001	129	4.6% (b)
Raber et al	2003	299	34% (c)
Abalovich et al	2007	244	13.9% (c)
This study	2013	50	22%

(a)Hyperthyroidism

(b)- Hypothyroidism

(c)- Subclinical hypothyroidism

The present study is supported by a number of other studies which took place in various parts of the world by various authors.

Geva et al conducted a study to investigate the usefulness of anti-thyroid autoantibodies as possible marker for reproductive failure in 78 patients with mechanical and unexplained infertility.¹² In all, 16 patients (20.5%) were positive for anti-thyroid antibodies. He concluded that anti-thyroid autoantibodies serve as possible marker for reproductive failure.

Grassi et al reported a high prevalence of thyroid antibodies in infertile patients.⁹ He investigated 129 women from couples with infertility. Five of the 129 women had thyroid autoantibodies positive.

Poppe et al studied the occurrence of thyroid autoimmunity and infertility in 438 women of infertile couples.¹³ For comparison, a control population of parous women (n=100), matched for age, was included. The proportion of positive TPO-Abs was higher in all women of infertile couples, compared with controls (14% versus 8%), but the difference was not significant. Considering

only the female causes of infertility a significant higher proportion of women had positive TPO-Abs compared with controls (18% versus 8%).

Correlation of thyroid autoimmunity and thyroid dysfunction

Table 4: Comparison of prevalence of antithyroid antibodies in infertile women with other studies.

Name of first author	Year of publication	No. of infertile women	Prevalence of anti TPO antibodies
Geva et al	1994	78	20.5%
Grassi et al	2001	129	3.88%
Poppe et al	2003	438	18%
This study	2013	50	20%

A significant association was present between thyroid autoimmunity and thyroid dysfunction in patients with infertility.

The results were comparable to that of a number of studies.

In a study by Gerhard et al in 185 infertile women without clinical signs of thyroid dysfunction, 25 women had thyroid auto-antibodies positive which correlated with elevated TSH.¹⁴

In a study by Grassi et al on 129 women from couples with infertility, six women (4.6%) had hypothyroidism, and five of the six women i. e. 83.33% had TAI.⁹

Negro et al studied 416 women who underwent assisted reproductive techniques of these 42 (10.1%) were TPO positive, and concluded that in euthyroid women undergoing ART the pregnancy and delivery rates are not affected by the presence of TPOAb.¹⁵ In TPOAb (+) high-normal TSH values are associated with increased risk of unsuccessful pregnancy or subsequent miscarriage.

CONCLUSION

Thus, from this study it may be concluded that there is higher prevalence of thyroid dysfunction and anti-thyroid antibodies in patients with infertility.

A statistically significant correlation is established between thyroid autoimmunity and thyroid dysfunction in infertile women in this study, so detection of anti-thyroid antibodies and estimation of thyroid dysfunction can be recommended to be a part of battery of tests for work up of infertile women.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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