



Original Article

Study of Thyroid Autoantibodies in Infertile Women Visiting Chittagong Medical College Hospital, Chattogram, Bangladesh

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Abstract

Background: *Thyroid hormones are essential for normal growth, sexual development and reproductive function. Thyroid dysfunction can lead to a variety of gynaecological disorders ranging from menstrual irregularities to infertility. Autoimmune thyroid disease (AITD) is now one of the most important causes of female infertility. Thus, this study was designed to study possible relationship between thyroid disorders, as well as thyroid autoimmunity and unexplained infertility.* **Methodology:** *This was a hospital based cross-sectional observational study comprising hundred (100) infertile women aging 18-35 years in Outpatient Department of Obstetrics & Gynaecology and Endocrinology in Chittagong Medical College Hospital and Department of Biochemistry, Chittagong Medical College, Chattogram. Samples were taken by non-probability consecutive sampling. Important variables in this study were serum FT3, FT4, TSH and thyroid antibodies (anti TPO and anti TG).* **Results:** *The majority of the infertile women were 21-30 years. Primary and subclinical hypothyroidism were 5% and 17% cases in this study. On the other hand, 22% cases of this study had anti-TG antibody positive and 26% cases had anti-TPO antibody positive.* **Conclusions:** *The results of the present study suggest that, increased anti thyroid antibody were associated with a higher prevalence of thyroid dysfunction and mainly hypothyroidism. So, we propose that a systematic screening of TSH, FT3, FT4 and the presence of thyroid antibodies could be considered in all women with a female cause of infertility.*

Key words: Infertility, T3, T4, TSH, thyroid antibodies (anti TPO and anti TG)

Received: February 21, 2022; **Accepted:** April 19, 2022

Introduction

Human infertility is a major health problem worldwide having its impact on the social, psychological, economical and sexual life of a couple. There are multiple factors that can lead to the infertility which are subdivided into four broad categories: female infertility (35%), male infertility (30%), a combination of both (20%) and unexplained or 'idiopathic' infertility (15%)¹⁻². Infertility has been recognized as a public health issue worldwide by the World Health Organization (WHO)³.

Infertility is defined as the inability to conceive after one year of regular intercourse without contraception⁴. It can be divided into two broad categories – primary and secondary infertility. Primary infertility refers to the inability to ever have a child and secondary infertility refers to those cases where people have had children but fail to conceive after that⁵. The overall primary and secondary

infertility rate in South Asia is approximately 10%, 8% in India, 10% in Pakistan, 11% in Srilanka, 12% in Nepal and 15% in Bangladesh. Infertility affects approximately 1.3 million women in the world⁶. Causes of female infertility comprise endometriosis, tubal damage and ovulatory dysfunctions⁷.

Thyroid hormones interfere with numerous aspects of reproduction⁸. So, normal thyroid function is necessary for fertility, pregnancy and to sustain a healthy pregnancy, even in the earliest days after conception⁹. Thyroid dysfunction can affect female infertility by various ways resulting in delayed onset of puberty, menstrual disorders, anovulatory cycles, luteal phase defect, high prolactin levels and sex hormone imbalances¹⁰. Hyperthyroidism (both clinical and subclinical) is thought to be found in approximately 2.3% of women presenting with subfertility,¹⁰ compared with an incidence of 1.5% of women in the general population. The prevalence of hypothyroidism in women in the reproductive age

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(20–40 years) varies between 2% and 4%^{9,11}. In this age group, autoimmune thyroid disease (AITD) is the most common cause of hypothyroidism¹².

Autoimmune thyroid disorders are characterized by the presence of mainly antithyroid peroxidase (anti TPO) and antithyroglobulin (anti TG) antibodies. Antithyroid antibodies may serve as peripheral markers of abnormal T cell function¹³. These abnormal T-cells 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 molecules¹⁴. Anti-thyroid antibodies can occur in asymptomatic, euthyroid women who have never suffered from a thyroid disease¹⁵⁻¹⁶. The prevalence of autoimmune thyroid disease (AITD) varying between 5 and 15% in women of reproductive age¹⁷.

Materials & Methods

This study was a hospital based cross sectional observational study. Duration of the study was 1 year from July 2018 to June 2019. This study was carried out on 100 infertile females selected from outpatient department of obstetrics & gynaecology and endocrinology, Chittagong Medical College, Chattogram, Bangladesh and has been referred to the biochemistry department, Chittagong Medical College, Chattogram, Bangladesh for thyroid profile evaluation. Permission for the study was taken from the Ethical Review Committee of Chittagong Medical College. Informed consent from each subject was taken before the collection of samples.

Sampling technique was non probability consecutive sampling and inclusion criteria were infertile woman aged between 18 and 35 years. Exclusion criteria were male infertility, any history of thyroid disorder and taking treatment for thyroid disorders, amongst the female factors were tubal factors, any congenital anomaly of the genital tract or any obvious organic lesion and any history of thyroid surgery. Thyroid function test panel (T₃, T₄ and TSH) and thyroid antibodies (anti TPO and anti TG) were assessed by the Siemens autoimmunoassay system. All the data were processed and analyzed using Microsoft Excel and IBM-SPSS v22.0 for Windows. Statistical inference was based on 95% confidence interval and p value ≤ 0.05 was considered statistically significant. Variables were expressed as mean \pm standard error of means (SEM). The distributions were expressed in percentages. The summarized data were presented in the form of tables.

Results

This cross-sectional observational study comprising hundred (100) infertile women with the age range 18-35 years. Most of the subjects were in the age

group of 21-30 years (68%) which is showed in [Table-I]. Table-I shows that, most of the subjects of the study were in the age group of 21-30 years and were mostly housewife. Table-II demonstrates that, 5% cases were primary hypothyroidism and 17% cases were subclinical hypothyroidism in this study. Table-III shows that, 22% cases of this study had anti-TG antibody positive and 26% cases had anti-TPO antibody positive. On the other hand, combined anti-TG and anti-TPO positive cases were found to be 15% cases in this study.

Table-I: Distribution of baseline socio-demographic characteristics among the study subjects (n = 100)

Socio-demographic Variables		Percentage (%)
Age in Groups	≤ 20 Years	11
	21 – 30 Years	68
	> 30 Years	21
Married For	< 5 Years	57
	5 – 9 Years	34
	≥ 10 Years	09
Occupation	House Wife	88
	Service holder	12

Table-II: Distribution of hypothyroidism among the infertile females (n = 100)

Category of hypothyroidism	Percentage (%)
Primary Hypothyroidism (Serum FT ₃ , FT ₄ Decreased and TSH increased)	05
Subclinical Hypothyroidism (Serum FT ₃ , FT ₄ Normal and TSH increased)	17

Table-III: Distribution of serum ant-thyroid antibody status among infertile females (n = 100)

Serum Anti-Thyroid Antibody Status		Percentage (%)
Serum anti-TG	Normal	78
	Increased	22
Serum anti-TPO	Normal	74
	Increased	26
Combined anti-TG and anti-TPO	Normal	85
	Increased	15

Discussion

Thyroid dysfunction is implicated in a broad spectrum of reproductive disorders, ranging from abnormal sexual development to menstrual irregularities and infertility¹⁸. Hypothyroidism is the

more prevalent variant and is linked to thyroid autoimmunity¹⁹. Hypothyroidism is commonly associated with ovulatory dysfunction and is associated with increased production of TRH, which stimulates pituitary to secrete TSH. Another pathway through which hypothyroidism may impact on fertility is by altering the peripheral metabolism of estrogen and by decreasing SHBG production²⁰.

In this study, 5% cases showed primary hypothyroidism. This is similar to the observations made by Shrewastwa MK²¹ and Goswami B²². However, the prevalence of hypothyroidism in infertile woman were observed 35.4% and 23.9% in other studies²³⁻²⁴. Subclinical hypothyroidism appears to one of the important thyroid dysfunction resulting infertility²¹.

Among the study cases with thyroid dysfunctions 17% cases had subclinical hypothyroidism, which is close to another study conducted by Abalovich M²⁵. In another study by Raber found that 34 % of infertile women had subclinical hypothyroidism²⁶.

Thyroid autoantibodies are also the most prevalent cause of hypothyroidism in women of reproductive age,^{11,19} even though thyroid autoimmunity can be present without hormonal dysfunction. Elevated levels of thyroid autoantibodies, such as thyroid peroxidase autoantibodies (TPO-Ab) and thyroglobulin autoantibodies (TG-Ab) induce chronic inflammation in the thyroid gland, which leads to the loss of functional tissue. Thyroid autoimmunity may remain latent, asymptomatic or even undiagnosed for an extended period²⁷. Analysis of anti-TG and anti-TPO antibody titer in this study showed raised anti-TG in 22% cases and raised anti-TPO in 26% cases which is in agreement with the studies by Zina Hasan²⁸ and Jyotsana Gupta²⁹. These observations indicate that autoimmunity is an important factor in female infertility.

Conclusion

The thyroid hormones are involved in almost all phases of reproduction. Altered thyroid hormone levels are associated with disturbed folliculogenesis, a lower fertilization rate and lower embryo quality. There is also an increased prevalence of thyroid autoantibodies among infertile women. Therefore, screening for thyroid function and autoimmunity should be performed as part of the work-up in women with infertility or miscarriage.

Limitations of the Study:

This study has certain limitations, which include-Sample size in the present study was small, cross-sectional type of the study lowered its strength and samples were collected only once from the participants.

Conflict of Interest: The authors declare to have no conflicts of interest.

Acknowledgement

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript.

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Citation of this article

Zohora FT, Islam N, Karmakar P, Sultana D, Nahid KA, Hossain N. Study of Thyroid Autoantibodies in Infertile Women Visiting Chittagong Medical College Hospital, Chattogram, Bangladesh. *Eastern Med Coll J.* 2022; 7 (2): 6-9.