Thyroid Function Test Alteration In Infertile Females

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Abstract

Background: The aetiology of infertility is multi factorial with thyroid disorders as the most common presenting factor, hypothyroidism in particular. Infertility in women can lead to emotional and psychological stress. Hypothyroidism and hyperthyroidism can result in menstrual irregularities and anovulatory cycles, thus affecting the fertility. Thus, present study is carried out to observe the levels of free Tri-iodothyronine (fT3), free Thyroxine (fT4) and Thyroid stimulating hormone (TSH) in women with infertility. **Aims and Objectives** :The present study was conducted to observe importance of thyroid function test in female patients with infertility. **Material and Methods**: Current cross sectional study was conducted among 50 infertile female patients selected on an OPD basis in . Laboratory investigations included. Serum TSH, FT3, FT4 was done by kit based Chemiluminescent Micro particle Immunoassay. **Results**: Elevated serum TSH levels were observed in46% of patients with infertility. Significant association was observed between raised serum TSH with infertility. **Conclusion**: Present study showed 53% prevalence of thyroid dysfunction in infertile patients. High level of TSH and low FT4 showed strong correlation among infertile women, clinically reported with abnormal menstrual symptoms. Long duration of undiagnosed and untreated hypothyroidism can lead to infertility and therefore, infertile women should be assessed for thyroid hormones.

Keywords: Hypothyroidism, Infertility.

Introduction

According to the International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO), infertility is a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse. The term primary infertility is used for a couple who have never achieved a pregnancy despite cohabitation and regular sexual intercourse and secondary infertility is used for a couple who had previously succeeded in achieving at least one pregnancy, even if it had ended in abortion. Worldwide around 8 to 12% of the couples experience some form of infertility during their reproductive lives. This has led the problem of infertility to be recognized as a public health issue. The cause of infertility lies within the female in 45% of the couples, male factor infertility in 30% and in the remaining 25% the cause is unexplained. [1, 2, 3, 4].

Materials and Method

Study area: The study was conducted among 50 infertile patients with the mean age of 30+10 years in Civil hospital, Ahmedabad, Gujarat from November 2020 to July 2021.With necessary permission and all due precautions serum sample were collected and analyzed for serum TSH, FT3, FT4.
Inclusion criteria: Patients with history of primary & secondary infertility, Age30+10 years.
Exclusion criteria: Pregnancy, Tubal factors and male factor of infertility, Congenital anomaly of urogenital tract, History of thyroid disease or previous thyroid surgery or currently on thyroid medication.

Biochemical Analysis
Fifty diagnosed cases of infertility were included in the study. Serum TSH, FT3, FT4 levels of all the patients were analyzed by Fully Automated Immunochemistry Analyzer Abbott Architect i1000 in Biochemistry Laboratory of Civil Hospital, Ahmedabad, Gujarat.
Data Analysis
Master chart was prepared using Excel 2007 software. Data were statistically analyzed by IBM SPSS Statistics v.25on basis of p value.

Results

Table 1:Number of cases and controls according to age.

Age group(years)	Primary Infertility	Secondary Infertility	Control
25+10	24	4	30
35+10	8	14	20
Total	32	18	50

Table 2:Thyroid hormones in patients of Primary and Secondary Infertility.

	Primary Infertility	Secondary Infertility	Control
FT3 (pg/ml)	3.49 + 0.74	3.61 + 0.79	3.95 + 0.32
FT4 (ng/ml)	0.95 + 0.10	0.75 + 0.10	0.91 + 0.11
TSH (uIU/ml)	4.61 +5.57	4.52 +5.25	1.90 + 0.98

In this study, there were 50 cases of infertility which were further divided into cases of primary and secondary infertility. There were 32 females in primary infertility group while secondary infertility group consisted of 18females. 50 age matched healthy fertile females were taken as control. The mean age of primary infertility group was 28.8± 4.4 years and that of secondary infertility group was32.7 ± 5.2 years. In both primary and secondary infertility groups 46% (n=23) have raised TSH4.61 + 5.57μ IU/ml and 4.52 + 5.25 μ IU/ml (p value <0.001), whereas TSH level in control was 1.90 + 0.98 μ IU/ml. In the primary infertility cases serum FT3 was 3.49 + 0.74 pg/ml and 3.61 + 0.79 pg/ml in secondary infertility. Mean T4 level in primary and secondary infertility cases were0.95 + 0.10 ng/dl and 0.75 + 0.10 ng/dl respectively.

Discussion

To summarize our study, we found 46 % hypothyroidism among primary infertility and secondary infertility patients.TSH levels were significantly ($P < 0.001$) higher in both primary and secondary groups than in the fertile group. Few other studies also reported a higher number of female infertile patients with hypothyroidism.

Amongst them, in one of the study thyroid dysfunction was present in 53% of the infertile women, 29 % infertile women were suffering from subclinical hypothyroidism. Subclinical hypothyroidism was more common than clinical hypothyroidism in another study. Female infertility occurs in about 37% of all infertile couples and ovulatory disorders account for more than half of these. Thyroid dysfunction interferes with female reproductive physiology due to which infertility may result. The ovaries are responsive to thyroid hormones due to the presence of thyroid hormone receptors in human oocytes. Thyroid hormones also synergize with the Follicle stimulating hormone-mediated Luteinizing hormone/human chorionic gonadotropin (hCG) receptor to exert direct stimulatory effects on granulosa cell function (progesterone production), and in in vitro studies, effects on differentiation of the trophoblast have been shown. Another pathway through which hypothyroidism may impact on fertility is by altering the peripheral metabolism of oestrogen and by decreasing Sex Hormone Binding Globulin(SHBG) production. Thyroid hormones interact with reproductive hormones, estrogen and progesterone, to maintain the function of normal development of the egg and ovaries. The over secretion or hyposecretion of thyroid hormones could lead to the imbalance in these reproductive hormones, causing ovulation disorders, irregular menstrual cycle and reduced fertility.[5,6,7,8,9]

Conclusion

From this study we concluded that hypothyroidism is a widely prevalent cause of infertility and correlates with a broad range of reproductive disorders due to which evaluation of thyroid hormones is required for patients presenting with infertility. Especially measurement of S. TSH levels should be emphasized in infertility work up and treatment should be initiated accordingly.

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