Status of Thyroid Profile in Female Infertility Cases

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Abstract

Infertility is defined as an inability to conceive after at least one year of unprotected coitus. Hormonal disorders of female reproductive system are comprised of a number of problems resulting from dysfunction of hypo-thalamic-pituitary ovarian axis. These relatively common disorders often lead to infertility. An observational, cross-sectional study was conducted which consisted of 60 infertile females of age group 20-40 years.TSH T3 and T4 were estimated. In both primary and secondary infertility groups TSH was significantly raised(p value < 0.01). Subclinical hypothyroidism is more prevalent than overt hypothyroidism in infertility.

***Key Words**: Infertility, euthyroid, hypothyroid, hyperthyroid, TSH*

Introduction

Infertility is defined as an inability to conceive after at least one year of unprotected coitus.[1]75% of perfectly normal couples conceive within a period of one year. 85% of normal couples conceive within one year and 93% within 2 years .[2] It can be divided into two broad categories – primary and secondary infertility. Primary infertility refers to the inability to ever have a child. Secondary infertility refers to those cases where people have had children but fail to conceive after that.[3-4] Many parameters are outlined for the cause of infertility like age, lifestyle and physical problems etc. The infertility problem is more common phenomenon among the women now days and has increased over past 30 years. The prevalence of infertility is estimated to be between12 and 14%. It thus represents a common condition, with important medical, economic and psychological implications.[5,6]

Hormonal disorders of female reproductive system are comprised of a number of problems resulting from dysfunction of hypo-thalamic-pituitary ovarian axis. These relatively common disorders often lead to infertility. Thyroid dysfunction which is quite prevalent in the population affects many organs including male and female gonads, interferes with human reproductive physiology, which reduces the likelihood of pregnancy and adversely affects pregnancy outcome, thus becoming relevant in the algorithm of reproductive dysfunction. However, many infertile women present with normal menses despite a raised serum prolactin level. Pituitary hormones such as TSH, prolactin or growth hormone may act synergistically with FSH and LH to enhance the entry of non-growing follicles into the growth phase . Morphological changes observed in the follicles in hypothyroidism can be a consequence of higher prolactin production that may block both secretion and action of gonadotropins . [6-12]

Thyroid dysfunction is known to affect all aspects of reproductive function in the female. The increased prevalence of upper normal limit of serum TSH and raised antithyroperoxidase antibody titer indicate relatively more frequent occurrence of compensated thyroid function in infertile women than normal women of reproductive age. This necessitates considering such cases as subgroup of women in which all aspects of pituitary-thyroid axis should be thoroughly investigated than merely do with TSH testing.[13,14] This study was done with the aim of evaluation of thyroid profile in infertile females of reproductive age.

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Material and Method

An observational, cross-sectional study was conducted in the Department of Biochemistry, IGIMS, Patna in collaboration with Dept of Reproductive Biology. The study period was of one year from August 2017 to July 2018. This study consisted of 60 infertile females of age group 20-40 years, who were then subdivided into primary and secondary infertility cases .40 fertile healthy females were taken as control.

2ml of venous blood was collected after an overnight fast for hormonal assay. Serum TSH, TotT3, TotT4 were estimated by Chemi-luminescence immunoassay method after proper quality control both internal and external.

Inclusion criteria:

1. Infertile women age between 20 to 40 years.

2. Normal fertile women age between 20 to 40 years as control.

Exclusion criteria:

1. Male factor infertility.

2. Patient who received medication that could alter Thyroid function.

3. Amongst the female factors were tubal factor, any congenital anomaly of the urogenital tract, or any obvious organic lesion.

4. Any history of thyroid disease or previous thyroid surgery.

Statistical Analysis: All the biochemical datas are expressed as mean and standard deviation. Student's t test(unpaired) is used for analysis .p value <0.05 is taken as statistically significant.

Results

In this study , there were 60 cases of infertility which were further divided into cases of primary and secondary infertility. There were 48 females in primary infertility group while secondary infertility group consisted of 12 females. 40 age matched healthy fertile females were taken as control.

The mean age of primary infertility group was 26.8 ± 5.4 years and that of secondary infertility group was 28.7 ± 6.2 years. The serum total T3 level in infertility cases was found to be significantly low . In the primary infertility cases it was 1.31 ± 0.72 ng/ml and 1.02 ± 0.64 ng/ml in secondary infertility.

Mean T4 level in primary and secondary infertility cases were 6.12 ± 2.01µg/dl and 5.92 ± 1.98 µg/dl respectively. TSH level in control was 2.63 ± 1.83 µIU/ml . In both primary and secondary infertility groups TSH was significantly raised(p value < 0.01).

Table 1: Age wise distribution of cases and control

Age grp (yrs)	control	Primary inferility	Secondary infertility
20 -25	10	12	1
26-30	18	25	3
31-35	8	7	6
36-40	4	4	2
Total	40	48	12

Table 2: Level of thyroid hormones in control and cases

parameters	control	primary infertility	secondary infertility
n	40	48	12
Age(years)	24.3 ± 5.2	26.8 ± 5.4	28.7 ± 6.2
T3(ng/ml)	1.31±0.72	0.89 ± 0.53	1.02 ± 0.67
T4(µg/dl)	8.41±2.16	6.12 ± 2.01	5.92 ± 1.98
TSH(µIU/ml)	2.63±1.83	4.95 ± 2.58	4.62 ± 2.93

Discussion

Female infertility occurs in about 37% of all infertile couples and ovulatory disorders account for more than half of these. Thyroid hormone have profound effects on reproduction and pregnancy. Both subclinical hyperthyroidism and subclinical hypothyroidism are

increasingly being recognized as having significant health implications. In both the conditions, the serum concentration of circulating thyroid hormones, T3 and T4 are within the normal reference ranges. TSH levels are low or suppressed in subclinical hyperthyroidism and elevated in subclinical hypothyroidism .

In the present study,euthyroidism was the most common thyroid picture in the infertility cases followed by hypothyroidism. There were 29 euthyroid ,16 hypothyroid and 3 hyperthyroid cases in primary infertility. Similarly in the secondary infertility group, there were 7 euthyroid,4 hypothyroid and 1 euthyroid case.

In study done by N Sridevi et al ,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 study by Verma et al.

TSH levels were significantly ($P < 0.01$) higher in both primary and secondary groups than in the fertile group. 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 (Crain *et al*., 2008; Artini *et al*., 2013).

Cramer et al showed that serum TSH levels are a significant predictor of fertilization failure in women undergoing In Vitro Fertilization (IVF). These data support the importance of the role of thyroid hormones in oocyte physiology.

Serum T3 and T4 both were significantly lower in infertility (p value <0.01) as compared to the fertile females in the present study.

Conclusion: Hypothyroidism is a common feature in infertility both primary and secondary. Subclinical hypothyroidism is more prevalent than overt hypothyroidism.

Limitations: Small sample size is a limitation of this study. Further study with larger population size is needed .

Conflict of Interest: None

Ethical Clearance: Taken From Institutional Ethical Committee

Source of Funding: Self

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