

Research Article**Correlation of TSH and Prolactin Levels in Patients with Primary Infertility****Gurmanpreet¹, Hardeep Singh Gill², Gurdeep kaur Bedi³, Amarjit Kaur⁴**¹Assistant Professor, Department of Biochemistry, Adesh Institute of Medical Sciences and Research, Bathinda-151001, India²Assistant Professor, Department of Surgery, Adesh Institute of Medical Sciences and Research, Bathinda-151001, India³Professor and Head, Department of Biochemistry, Govt. Medical College & Rajindra Hospital, Patiala-147001, India⁴Professor and Head, Department of Microbiology, Adesh Institute of Medical Sciences and Research, Bathinda-151001, India***Corresponding author**

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Abstract: The thyroid dysfunction, which is quite prevalent in the population, affects many organs including male and female gonads, thus interfering with the human reproductive physiology. Prolactin has suppressive effect on the pituitary-ovarian axis and may result in amenorrhea or oligomenorrhea due to anovulatory cycles. Hyperprolactinemia is a common problem in reproductive dysfunction, affecting about one third of infertile women. In the present study, 50 patients with primary infertility were taken as test and 50 patients with normal menstrual cycle and proven fertility were taken as control. When investigated a positive correlation was found between TSH and Prolactin levels in primary infertility patients.**Keywords:** TSH, TRH, Prolactin, Primary Infertility, ELISA, HPT Axis, Lactotrophs

INTRODUCTION

Infertility is defined as inability to conceive after at least one year of unprotected coitus [1-3]. 75% of perfectly normal couples will conceive within a period of one year [4]. 85% of normal couples conceive within one year and 93% within 2 years [5].

Menstrual cycle and conception depends upon complex physiological, anatomical and immunological factors. The essential requirement in the female is a functionally intact hypothalamic-pituitary ovarian axis to regulate normal folliculogenesis. Pituitary hormones FSH, LH, PRL and thyroid hormones are required for the normal development of ova and needs to be investigated in cases of infertility.

TRH has a stimulatory effect on prolactin secretions. This takes place possibly through changes in the number of TRH receptors on the lactotrophs as well as alterations of the controlling dopaminergic neurotransmitter system [6].

A study in 2008 investigated the role of pituitary gonadotrophic hormones i.e. FSH, LH, TSH and PRL levels in women with oligomenorrhea and amenorrhea. Conclusion was that hormonal assays are mandatory in evaluation of women with oligomenorrhea, amenorrhea and chronic anovulatory infertility for finding out the

cause and explaining the prognosis of the disease to the patient [7].

Hyperprolactinemia is a common problem in reproductive dysfunction affecting about one third of infertile women. It has been suggested that hypogonadism seen in hyperprolactinemic women is due to circulating levels of prolactin interfering with the action of the gonadotrophins at the ovarian level and impaired gonadal steroid secretion, which in turn alters positive feedback affects at the hypothalamic and pituitary levels. This leads to lack of gonatotrophin cyclicity and infertility. Prolactin can inhibit the follicular estradiol production and this result in infertility [8].

The synthesis of prolactin is done by the lactotrophs in the anterior pituitary gland and gene for its synthesis is located on chromosome [6]. The estrogen and TRH are positive modulators whereas dopamine is a negative modulator of prolactin secretion. Progesterone acts as an inhibitor of prolactin synthesis. A high level of TSH stimulates prolactin secretion and causes ovulatory dysfunction [9].

The menstrual pattern is influenced by thyroid hormones directly through impact on ovaries and indirectly through impact on SHBG, PRL, GnRH

secretion and coagulation factors. Treating thyroid dysfunction can reverse menstrual disorders thus improving fertility [10].

A positive correlation has been seen between hyperprolactinemia and hypothyroidism. This is due to the fact that Thyrotropin Releasing Hormone (TRH) has similar effect on prolactin gene and thyroid gland and leads to release of both hormones i.e prolactin and TSH [11].

MATERIAL AND METHODS

Study was conducted on 50 patients with primary infertility, who had never conceived. 50 patients of reproductive age group with normal menstrual cycle

and proven fertility were taken as control. After detailed history and routine investigations special investigations TSH and PROLACTIN were carried out using ELISA method. TSH and Prolactin ELISA kit was used for quantitative measurement of TSH and Prolactin in human serum or plasma [12].

RESULTS

The mean value of TSH were 7.44 +/- 6.67 mIU/ml in infertile patients as compared to control group having mean value of 1.88 +/- 1.11 mIU/ml. Mean prolactin levels in infertile group was 20.58 +/-13.00 ng/ml as compared to fertile group in which mean was 13.05 +/- 4.57 ng/ml.

Table 1: Correlation of TSH and prolactin in study group (primary infertility group)

1. Group	No. of Cases	Mean ± SD		Coefficient of correlation
TSH (mIU/ml)	50	7.45	6.67	+0.18, t=1.29
Prolactin (ng/ml)	50	20.57	13.00	

Table 1 showed positive correlation between TSH and prolactin when TSH and prolactin values are compared in the infertility group.

DISCUSSION

The magnitude of serum prolactin is proportional to the increase in thyroid stimulating hormone values and basal gonadotrophin concentrations are also elevated in this condition [13].

In a study in 1978, the serum prolactin level was found to be elevated (>14.0 ng/ml) in patients with untreated primary hypothyroidism [14].

A study was done in 1982, to see the relationship between TSH and prolactin responses to TRH in 36 patients with prolactinoma and 12 patients with autoimmune thyroiditis and 10 patients with grave’s disease. The results were that TRH response was exaggerated in patients with prolactinoma and autoimmune thyroiditis which were significant i.e p<0.05 and p<0.01, respectively, as compared with controls. So a positive correlation was established between TSH and prolactin [15].

Another study, in 1987, reviewed thyroid disease and reproductive dysfunction and stated that TSH is implicated in a broad spectrum of reproductive disorders ranging from menstrual irregularities to infertility. It also reviewed the relationship between prolactin and TSH, that increase in prolactin is directly proportional to the increase in TSH [16].

An attempt was made in 1994 to evaluate the origin of hyperprolactinemia in patients with primary hypothyroidism, using tests with metoclopramide which is a dopaminergic blocker and TRH. Two groups of patients were examined: 20 women with primary hypothyroidism and normal prolactin levels (group A) and 10 women with primary hypothyroidism and hyperprolactinemia (mean basal prolactin level 1514.8 ± 300.8 mIU/ml). Prolactin secretion in metoclopramide test in group A was markedly increased versus control group. It was concluded that hyperprolactinemia in patients with hypothyroidism is possibly by disturbed dopaminergic regulation [17].

Increasing evidence derived from experimental and clinical studies suggest that the hypothalamic-pituitary-thyroid axis (HPT) and hypothalamic-pituitary-adrenal axis (HPA) are physiologically related and act together as a unified system in a number of pathological conditions. The suggestions, that specific thyroid hormone receptors at the ovarian level might regulate reproductive function, as well as the suggested influence of estrogens at the higher levels of the HPT axis seems to integrate the reciprocal relationship between these two major endocrinal axis. Both hypo and hyperthyroidism may result in menstrual disorders [18].

The correlation between TSH and prolactin was studied in 2006. It was observed that incidence of hypothyroidism in hyperprolactinemia was 25.5%. The ratio of proportions between hyperprolactinemia and hypothyroidism was 5:1 i.e. in every four hyperprolactinemic patients one had hypothyroidism.

So it was concluded that there is a positive correlation between TSH and Prolactin [19].

CONCLUSION

Considering together, our findings support the hypothesis that women with primary infertility have subtle disturbances in hypothalamic-pituitary-ovarian axis compared to their fertile counterparts. A positive correlation was found between TSH and prolactin i.e elevated TSH levels were associated with elevated prolactin levels in infertile patients.

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