



STUDY OF SERUM THYROID STIMULATING HORMONE AND SERUM PROLACTIN IN FEMALE INFERTILITY

Biochemistry

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ABSTRACT

The aim of this research work was to evaluate the level of serum TSH and prolactin in infertile women and healthy age matched controls and to determine the correlation of TSH with Prolactin in infertile women. In this study 100 infertile women and 50 normal fertile women volunteers were selected on OPD basis between age group of 20 to 45 years. They were investigated for serum TSH and Prolactin by Enzyme linked immunosorbent Assay (ELISA) technology. The mean TSH level were 7.92 ± 0.78 μ IU/ml and 3.82 ± 1.71 μ IU/ml in the infertile and fertile females ($p < 0.001$). The mean serum prolactin level were 28.4 ± 6.32 ng/ml and 10.3 ± 4.25 ng/ml in the infertile and fertile females ($p < 0.001$) respectively. Thus hypothyroidism can be said to be associated with hyperprolactinemia. From our study we have concluded that most frequent hormonal abnormality in female infertility has been hyperprolactinemia, also seen associated with hypothyroidism.

KEYWORDS

Infertility, TSH, Prolactin.

INTRODUCTION

Infertility has been recognized as a public health issue worldwide. Many people may be infertile during their reproductive years. Many parameters are outlined for the cause of infertility like age, lifestyle and physical problems (Stephen E.H. et al. 2000). Pituitary gland composed of adenohypophysis (anterior pituitary) that secretes gonadotropins (FSH and LH), TSH, ACTH, GH, and Prolactin (PRL) and neurohypophysis (posterior pituitary) that stores Antidiuretic hormone (ADH) and Oxytocin released in the hypothalamus. These hormones play important roles in a wide variety of physiological processes, including metabolism, growth and development, and reproduction (Karaca Z et al. 2010). Gonadotropin-releasing hormone (GnRH), produced in the hypothalamus, controls the release of FSH from anterior pituitary. FSH plays an important role in oogenesis. It triggers the maturation of follicles (e.g., the proliferation of granulosa cells) and synthesis of the androgen-converting enzyme aromatase. Furthermore, it plays a central role in the recruitment of the dominant follicle. LH and FSH promote ovulation and stimulate secretion of the sex hormones estradiol and progesterone from the ovaries (Gaber SS et al. 2011). Prolactin is an essential factor for normal production of breast milk following childbirth, negatively modulates the secretion of pituitary hormones responsible for gonadal function, including LH and FSH.

Hyperprolactinemia is a common problem affecting about one third of infertile women. Hypogonadism seen in hyperprolactinemic women is due to circulating levels of prolactin interfering with the action of the gonadotropins 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 (Kalsum A et al. 2002). Thyroid hormones change the sensitivity of the gonads to follicle stimulating hormone (FSH), luteinizing hormone (LH) and prolactin. Besides menstrual cycle disorders, hypothyroidism can also cause an increase particularly in the release of thyrotropin releasing hormone (TRH), which in turn increases the release of TSH and prolactin, eventually causing hyperprolactinemia, which is an important factor inhibiting the development of pregnancy. So, hypothyroidism should be taken into account in patients with hyperprolactinemia (Joshi JV et al. 1993).

MATERIAL AND METHODS

The present study was conducted on 100 infertile women attending the OPD of Gynecology and Obstetrics and special investigation Laboratory of the Biochemistry, Department of JLN Medical College and Associated Group of Hospitals, Ajmer. The results were compared with 50 age matched healthy control subjects (Normal Fertile Women). Participants were selected on the basis of detailed history (including age, menstrual history, obstetric history, history of any medications, addictions), clinical examination and laboratory investigations. Inclusion criteria: Age of subjects between 20 to 45 years. Exclusion criteria: Male factor infertility, Patient who received medication that

could alter TFT, Amongst the female, the factors are tubal factor, any congenital anomaly of the urogenital tract, or any obvious organic lesion and any history of thyroid disease or previous thyroid surgery. Serum levels of TSH and Prolactin were measured by Enzyme linked Immuno Sorbent Assay (ELISA) technique. Data were presented as mean \pm standard deviation. Level of statistical significance was set at $p < 0.05$.

RESULTS AND OBSERVATION

In this study 100 infertile women were compared with 50 healthy fertile women.

Table -1: Comparison of anthropometric parameters in both groups.

Parameters	Infertile Women (Cases) (Mean \pm SD)	Fertile Women (Control) (Mean \pm SD)	P-Value
Age (years)	32.2 ± 2.32	26.32 ± 1.34	$p < 0.001$ (HS)
Height (cm)	161.08 ± 4.75	162.43 ± 4.22	$P > 0.05$ (NS)
Weight (kg)	66.28 ± 4.75	65.22 ± 5.23	$P > 0.05$ (NS)
BMI (Kg/m^2)	24.21 ± 2.92	23.43 ± 2.08	$P > 0.05$ (NS)

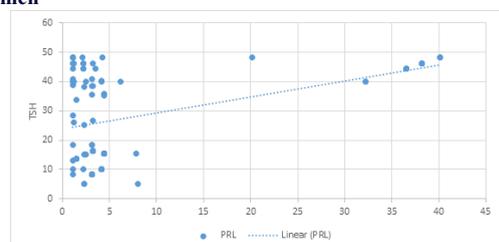
Table-2: Comparison of biochemical parameters in both groups.

Parameters	Infertile Women (Cases) (Mean \pm SD)	Fertile Women (Control) (Mean \pm SD)	P-Value
TSH (μ IU/ml)	7.92 ± 0.78	3.82 ± 1.71	$p < 0.001$ (HS)
PRL (ng/ml)	28.4 ± 6.32	10.3 ± 4.25	$p < 0.001$ (HS)

Table-3: Correlation between prolactin with TSH in infertile women.

Parameters (Mean \pm SD)		Correlation Coefficient (r)	p-value
Prolactin (ng/ml)	TSH (μ IU/ml)		
28.4 ± 6.32	7.92 ± 0.78	$r = 0.4251$	$p < 0.001$

FIGURE :1 Correlation between TSH and Prolactin in infertile women



In our study, there is statistically significant increase in the mean age of the infertile group ($P < 0.001$), while the changes in the weight, height and body mass index were not significant ($P > 0.05$) (Table: 1). Table: 2 shows the increase in TSH and Prolactin statistically highly significant ($P < 0.001$) in infertile women, when compared to normal fertile women. Table: 3 & Fig. 1 shows Prolactin and TSH have strong positive correlation with each other ($r = 0.4251$) ($P < 0.001$).

DISCUSSION

Our main finding was that serum TSH and Prolactin level was higher in infertile women than fertile women ($p < 0.001$). We also found positive correlation between these parameters in infertile women.

Our findings are in agreement with Kumkum *et al* (2006) who studied the correlation between TSH and prolactin in infertile women and noted 25.5% prevalence of hypothyroidism in hyperprolactinemia. Goswami *et al* (2009) also reported 46.1% infertile women with hypothyroidism developing hyperprolactinemia. In another recent study conducted by Lal *et al* (2016) 40.7% of infertile women with hypothyroidism were found exhibiting hyperprolactinemia. Rakhee Yadav, *et al.* (2016) found that, there was a significant (p value < 0.05) high serum level of Prolactin in patients of infertility as compared to controls. Moreover there was a significant positive correlation between the levels of TSH and Prolactin in infertile patients thus it might be imperative to say that hypothyroidism was strongly associated with hyperprolactinemia.

Thyroid hormones have profound effects on reproduction and pregnancy. Thyroid dysfunction is implicated in a broad spectrum of reproductive disorders, ranging from abnormal sexual development to menstrual irregularities and infertility. Hypothyroidism is associated with increased production of TRH, which stimulates pituitary to secrete TSH and PRL. Prolactin inhibits the hormones necessary for ovulation i.e. FSH and GnRH. Thus, in the setting of hyperprolactinemia; ovulation is inhibited and contributes to infertility. Moreover when GnRH secretions become low, LH and FSH secretions also fall. So, gamete production is not stimulated and gonadal steroidogenesis is hampered.

Limitations of Study

First, our sample size was relatively small, and it is a single center study.

ACKNOWLEDGEMENTS

NIL

CONFLICTS OF INTEREST

We have no competing interests.

FUNDING

NIL

CONCLUSIONS AND FUTURE STUDY

From our study we have concluded that most frequent hormonal abnormality in female infertility has been hyperprolactinemia, also seen associated with hypothyroidism. This study is very useful in prevention and management of infertility. This can establish counseling strategies possible for those who are affected by the reproductive dysfunction.

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