

# Association of thyroid disorders in females with primary infertility attending a tertiary-care hospital in northeast India

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## Abstract

**Background:** A close interconnection is present between hypothyroidism and hyperprolactinemia. Failure to ovulate regularly in women of the reproductive age group may occur owing to hypothyroidism.

**Objective:** To look for thyroid disorders among the primary infertile group of female patients and to see the association of serum prolactin level and thyroid-stimulating hormone (TSH) level, if any.

**Materials and Methods:** In this study, we investigated 53 diagnosed female subjects of primary infertility who were sent to the Department of Biochemistry for hormonal investigation. Fifty-three fertile age-matched females were enrolled for the study as control subjects. Serum prolactin and the TSH levels were measured by using chemiluminescence method (Access 2, Beckman Coulter).

**Result:** Significantly higher prolactin and TSH levels were found among cases when compared with control subjects. A positive association was found between TSH and prolactin levels among the primary infertile female subjects.

**Conclusion:** This study showed significantly higher prolactin and TSH levels among the primary infertile female patients. Therefore, for proper management of infertile cases, it may be necessary to look for thyroid dysfunction and treat it accordingly.

**KEY WORDS:** Infertility, prolactin, thyroid hormones, TSH

## Introduction

Infertility is the inability to conceive even after 1 year of unprotected intercourse or the inability to carry a child to term. Infertility is a growing problem among women and men.<sup>[1]</sup> Primary infertility is a term that is meant for a couple who have never achieved a pregnancy. Secondary infertility means the

couple who had previously succeeded in conceiving at least once.<sup>[2]</sup> The WHO has estimated that 8%–12% of couples in the world face the problems of conception.<sup>[3]</sup> The consequences of childlessness in developing countries range from economic suffering, social stigmatization, fierceness, and even rejection of proper burial rites. There are many causes that are considered as risk factors for infertility such as structural and functional defects of reproductive organs including fibroid endometriosis etc., infections such as tuberculosis and sexually transmitted diseases, and stress.<sup>[4,5]</sup>

A close interconnection is present between hypothyroidism and hyperprolactinemia. Failure to ovulate regularly in women of the reproductive age group may occur owing to hypothyroidism. A few women showing high prolactin levels have been detected with hypothyroidism, which is characterized by high levels of serum thyroid-stimulating hormone (TSH).<sup>[6]</sup> Hyperprolactinemia badly affects the fertility possibility by

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ruining the pulsatile secretion of gonadotropin releasing hormone (GnRH), thereby interfering with ovulation.<sup>[7,8]</sup> This is implicated in menstrual and ovulatory dysfunctions such as amenorrhea, oligomenorrhea, anovulation, inadequate corpus luteal phase, and galactorrhea.<sup>[9,10]</sup> However, despite a raised serum prolactin level, many infertile women present with normal menstruation.

In areas with endemic goiter, iodine deficiency is the major cause of thyroid dysfunction. Infertility associated with thyroid dysfunction in these areas is not uncommon.<sup>[11]</sup>

Keeping the abovementioned points in mind, we intended to do a study to look for thyroid disorders among the primary infertile female patients attending our hospital and to see the association of serum prolactin level and TSH level, if any.

## Materials and Methods

Fifty-three diagnosed female subjects of primary infertility aged between 20 and 40 years who were sent to the Department of Biochemistry for hormonal investigation were included for the study. Patient with tubal factors or any congenital anomaly of the urogenital tract, with a history of thyroid disease or a previous thyroid surgery, or those who were currently on thyroid medication were excluded from this study. Fifty-three fertile age-matched female subjects were enrolled for the study as control subjects.

Fasting blood sample was collected for estimation of serum prolactin and thyroid hormone (TSH, FT3, and FT4) levels on the second day of menstrual cycle. The estimation of the hormones was done by chemiluminescence method (Access 2, Beckman Coulter).

## Statistical Analysis

A database was constructed on Microsoft Excel 2007, and statistical analysis was done using SPSS software, version 20 (SPSS Inc., Illinois, USA). *t*-test and Pearson's correlation test were done to analyze the data. A *p* value < 0.05 was considered statistically significant.

## Result

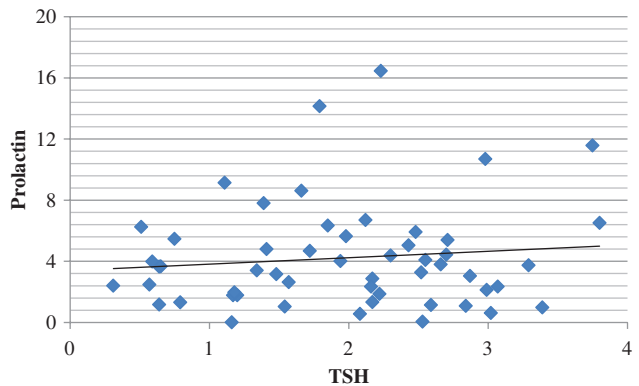
The mean  $\pm$  SD of TSH, FT3, FT4, and PRL were  $4.22 \pm 3.42$  mIU/mL,  $4.02 \pm 2.3$ ,  $1.13 \pm 1.21$ , and  $14.33 \pm 10.71$ , respectively, in infertile patients, and, in control group, the parameters were within reference range [Table 1]. Of 53 infertile patients, 24% (13) were found to present hypothyroidism and only 3% (2) hyperthyroid.

When *t*-test was done, statistically significant higher prolactin ( $p = 0.001$ ) and TSH ( $p = 0.001026$ ) levels were found among infertile subjects when compared with control subjects.

A statistically significant positive correlation was found between prolactin and TSH levels ( $r = 0.320$ ) among the infertile subjects [Figure 1].

**Table 1:** Biochemical parameters of the study group

Parameters	Control (n = 53)	Case (n = 53)	<i>p</i>
FT3	$3.01 \pm 2.92$	$4.02 \pm 2.3$	0.0506
FT4	$0.86 \pm 0.11$	$1.13 \pm 1.21$	0.1087
TSH	$1.95 \pm 0.89$	$4.22 \pm 3.42$	0.0001
Prolactin	$8.3 \pm 4.5$	$14.33 \pm 10.71$	0.001026



**Figure 1:** Scatter diagram showing correlation of TSH and prolactin in primary infertility patients ( $r = 0.320$ ).

## Discussion

In our study, it was found that, majority of the patients (73%) were euthyroid. Prevalence of hypothyroidism is more common among infertile female subjects than hyperthyroidism. This finding is consistent with the findings of the study done by Binita *et al.* They found 87% patients as euthyroid, 8% hypothyroid, and 5% hyperthyroid.

A statistically significant higher prolactin level ( $p = 0.001$ ) was found among infertile patients when compared with control subjects. Similar results were found by Gurmanpreet *et al.* in 2014 and Turankar *et al.* in 2013. Increased prolactin secretion is common in reproductive disorders.<sup>[12]</sup> Prolactin inhibits follicle stimulating hormone and the GnRH, which are required for ovulation. When the level of prolactin secretion increases in the blood, it will inhibit ovulation, and this will result in infertility.<sup>[13–15]</sup>

In our study, we found that TSH level is significantly higher among infertile cases than the control subjects. This finding is validated by the study done by Sridevi and Sandhya Rani<sup>[16]</sup> and Turankar *et al.*,<sup>[2]</sup> who found that hypothyroidism is a more common thyroid disorder among infertile female subjects. Clinical and experimental studies have stated an interrelationship between the hypothalamic–pituitary–thyroid axis and the hypothalamic–pituitary–ovarian axis.<sup>[17]</sup> The specific thyroid hormone receptors present in the ovary may regulate the reproductive function.

We have found a significant positive correlation between TSH and prolactin levels among infertile group. Our finding is similar to the findings of Turankar *et al.*<sup>[2]</sup> and Sridevi and

Sandhya Rani<sup>[16]</sup> A study done by Tasneem *et al.*<sup>[18]</sup> also got similar findings according to which some of the women with high prolactin levels had been observed to have hypothyroidism.

The limitation of our study is lack of a follow-up study after treatment of infertility or hypothyroidism or both of the patients and the influence of the treatment on the hormone levels.

## Conclusion

This study showed a significantly higher prolactin and TSH levels among the primary infertile female patients. A positive correlation is also found between serum prolactin and serum TSH level among primary infertile group of patients. Therefore for proper management of infertile cases, it may be necessary to look for thyroid dysfunction and treat it accordingly.

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