

# Hypothyroidism and Hyperprolactinemia as a Cause of Primary Infertility: A Single Center Study

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## ABSTRACT

**Introduction:** Infertility is a common condition, with important medical economic and psychological implications. We have observed a surge in cases of primary infertility in our OPD of late. Hypothyroidism and hyperprolactinemia have been implicated as a cause of primary infertility.

**Materials and methods:** We conducted a prospective cross-sectional study in our hospital, Government Medical College, on an OPD basis, between May 2017 and January 2019, to check for hypothyroidism and hyperprolactinemia as a cause of primary infertility among females, after ruling out other common implicated factors that may be the cause of infertility. We labeled the study group as group I and the control group as group II.

**Results:** The mean age of patients in group I was 26.21 years, and that in group II was 25.63 years, respectively. The average time since marriage in group I was found to be 1.67 years and that in group II was 1.78 years, respectively. The rural–urban ratio of patients in group I was 23:27 and that in group II was 34:16. The mean TSH level in group I was found to be  $7.11 \pm 1.91$  and that in group II was found to be  $3.28 \pm 2.11$ . The mean levels of serum prolactin in group I were  $41.62 \pm 20.02$  and that in group II were  $22.36 \pm 15.61$ , respectively. There was a high prevalence of hypothyroidism and hyperprolactinemia in group I when compared with group II.

**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.

**Keywords:** Hyperprolactinemia, Primary infertility, Thyroid-stimulating hormone.

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## INTRODUCTION

The prevalence of infertility is estimated to be between 12% and 14%. It thus represents a common condition, with important medical, economic, and psychological implications.<sup>1</sup>

Infertility is defined as an inability to conceive even after 1 year of unprotected intercourse or the inability to carry a child to term.<sup>2</sup> Primary infertility is a term that is meant for a couple who have never achieved a pregnancy.<sup>3</sup> There is a close relationship between the hypothalamic-pituitary-thyroid axis and the hypothalamic-pituitary-ovarian axis.<sup>4</sup>

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>5</sup> 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.<sup>6</sup>

Primary hypothyroidism is commonly associated with hyperprolactinemia due to the stimulatory effect of TRH on lactotrophs.<sup>7</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.<sup>8</sup>

## MATERIALS AND METHODS

Our study was a prospective cross-sectional study conducted in the Government Lala Ded Hospital of Government Medical College, Srinagar between May 2017 and January 2019.

After taking consent for the study, 50 married females with primary infertility were selected on OPD basis. After taking a

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detailed history and complete general physical and gynecological checkup, blood samples were taken from patients for thyroid profile (T3, T4, TSH) and serum prolactin levels. This group was labeled as group I (cases).

At the same time, similar history, examination, and biochemical profiles of 50 age-matched fertile females were done for a similar profile, to act as a control. This group was labeled as group II (controls).

## Inclusion Criteria

- Age 20–40 years.
- Married for a period of >1 year.
- Medically fit patients.

## Exclusion Criteria

- Any gynecological disorder/deformity.
- Women with tubal blockage, pelvic inflammatory disease.
- Renal/cardiac disease.
- Previously detected hypothyroidism.
- On thyroxine medication/previous thyroid surgery.
- Abnormalities in semen analysis of partner.
- Patient on any long-term medication.

## Statistical Analysis

Continuous variables were summarized as mean  $\pm$  SD and categorical variables were expressed as frequencies and percentages. Chi-square test or Fisher's test, whichever appropriate, was applied for data analysis. A *p* value of  $<0.05$  was considered statistically significant.

## RESULTS

In our study, the range of age of the patients in either group was between 20 years and 40 years of age. The mean age of patients in group I was 26.21 years, and that in group II was 25.63 years, respectively.

The average time since marriage in group I was found to be 1.67 years and that in group II was 1.78 years, respectively.

The rural–urban ratio of patients in group I was 23:27 and that in group II was 34:16, depicting a more frequency of infertility in the urban population when compared with the rural population.

The mean TSH level in group I was found to be  $7.11 \pm 1.91$  and that in group II was found to be  $3.28 \pm 2.11$  (Table 1).

The mean levels of serum prolactin in group I were  $41.62 \pm 20.02$  and that in group II were  $22.36 \pm 15.61$ , respectively (Table 1).

There was a high prevalence of hypothyroidism in group I when compared with group II. The mean T3 levels in group I were lower ( $0.98 \pm 0.18$ ) when compared with that in group II ( $1.81 \pm 0.22$ ), whereas T4 levels in group I were higher ( $9.12 \pm 0.96$ ) when compared with T4 levels in group II ( $5.16 \pm 0.71$ ) (Table 1).

## DISCUSSION

Infertility is a serious problem, more so in the present era of digitalization and urbanization, with busy life schedules, the problem of primary infertility seems to have magnified. The causes of primary infertility are manifold and can be due to problems with either of the partners or both. Among females, the cause of infertility may range from hormonal disorders, gynecological problems, medical causes, or intake of medication.

We have witnessed a huge increase in the number of female patients attending our OPD with primary infertility. We also noticed untreated hypothyroidism and hyperprolactinemia associated with many of these patients. With these findings in mind, we

decided to conduct a study to validate hypothyroidism and hyperprolactinemia as a cause of primary infertility, after ruling out other common causes of primary infertility.

In our study, we took samples from 50 patients for serum TSH, T3, T4, and prolactin levels having primary infertility, after ruling out other causes of infertility in these patients. We also took a similar biochemical profile of 50 age-matched fertile females, to act as a control group.

The mean age of patients in group I was 26.21 years, and that in group II was 25.63 years, respectively. The average time since marriage in group I was found to be 1.67 years and that in group II was 1.78 years, respectively.

The rural–urban ratio of patients in group I was 23:27 and that in group II was 34:16. We found the prevalence of primary infertility to be more among the urban population when compared with the rural population. Although the sample size is small to validate the fact that primary infertility is more prevalent among the urban population.

Thyroid dysfunction is a condition known to reduce the likelihood of pregnancy and to adversely affect pregnancy outcomes. Data on the relationship between thyroid disorders and infertility remain scarce and the association with a particular cause of infertility has not been thoroughly analyzed.<sup>9</sup>

The mean TSH level in group I was found to be  $7.11 \pm 1.91$  and that in group II was found to be  $3.28 \pm 2.11$  (Table 1). The mean levels of serum prolactin in group I were  $41.62 \pm 20.02$  and that in group II were  $22.36 \pm 15.61$ , respectively (Table 1).

In our study, we found that the 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>10</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>11–13</sup>

Kumkum et al. in their study incidence of hypothyroidism in hyperprolactinemic women was 25.50% (13/51). So, a positive correlation of 1:4 was found between hypothyroidism and hyperprolactinemia.<sup>14</sup>

A study by Binita et al. found that 46.1% of infertile women with hypothyroidism had hyperprolactinemia.<sup>5</sup>

Turankar et al. reported increased levels of prolactin and TSH in infertile women compared with the control group.<sup>3</sup>

Characterized by high levels of serum TSH and low levels of thyroid hormones (T3 and T4) is high in infertile women when compared with normal fertile females.<sup>15</sup>

The mean prolactin level in hyperprolactinemic women in our study was  $89.43 \pm 7.20$  ng/mL, similar findings were found by Mishra et al.<sup>16</sup>

## CONCLUSION

This study showed 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 the 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.

## ETHICAL CLEARANCE

Institutional ethical clearance.

**Table 1:** Thyroid profile and prolactin levels

Biochemical test	Normal reference range	Group I (mean $\pm$ SD)	Group II (mean $\pm$ SD)
T3 (ng/mL)	0.9–1.95	$0.98 \pm 0.18$	$1.81 \pm 0.22$
T4 (ng/dL)	4.4–12.5	$9.12 \pm 0.96$	$5.16 \pm 0.71$
TSH ( $\mu$ IU/L)	0.40–4.5	$7.11 \pm 1.91$	$3.28 \pm 2.11$
Prolactin (ng/mL)	$<25$	$41.62 \pm 20.2$	$22.36 \pm 15.6$

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