

## CORRELATION OF THYROID-STIMULATING HORMONE AND PROLACTIN LEVELS IN NON-PREGNANT FEMALE

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### ABSTRACT

**Objective:** The objective of the study was to correlate prolactin (PRL) levels with different levels of thyroid-stimulating hormone (TSH).

**Methods:** The study included 221 non-pregnant females of the age group of 16–43 years. TSH and PRL were assayed. Subjects were divided into three groups based on TSH levels, namely, low, normal, and high TSH levels and results compared.

**Statistical analysis:** The comparison between different groups was done using test ANOVA. Correlation between TSH and PRL was established using Pearson's correlation test.

**Results:** Five subjects in Group-1 with low TSH values (mean  $0.096 \pm 0.08$   $\mu$ U/ml) had PRL  $9.8 \pm 6.25$  ng/dl, 186 subjects in Group-2 with normal TSH values (mean  $1.98 \pm 0.94$   $\mu$ U/ml) had PRL  $16.58 \pm 8.78$  ng/dl, and in Group-3 with high TSH values (mean  $6.45 \pm 3.91$   $\mu$ U/ml) had PRL  $26.53 \pm 15.98$  ng/dl. p value for TSH is  $<0.001$  (significant) and for PRL also is  $<0.001$  (significant). Positive correlation has been found in overall 221 subjects between TSH and PRL with correlation coefficient  $r=0.239$  and  $p=0.01$  (significant).

**Conclusion:** PRL levels were higher in group with high TSH values. In most previous studies (subjects with established subclinical or overt hypothyroid), PRL was found higher with higher TSH levels. This study showed strong positive association between TSH and PRL irrespective of the thyroid status.

**Keywords:** Thyroid-stimulating hormone, Prolactin, Infertility.

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### INTRODUCTION

Hypothyroidism a very common clinical syndrome results from thyroid hormone deficiency. Hypothyroidism, in turn, slows down the generalized metabolic process [1]. Hyperprolactinemia may result from different causes, namely, hypothyroidism, medication, and pituitary disorders. Hyperprolactinemia may result from primary hyperthyroidism mediated by several mechanisms [2].

The thyroid-stimulating hormone (TSH) and prolactin are under the control of central hypothalamopituitary axis. Hyperprolactinemia is a common condition encountered in hypothyroidism and infertility. This may be due to – (i) a compensatory increase in the discharge of central hypothalamic thyrotropin-releasing hormone, which results in stimulation of prolactin (PRL) secretion [3], (ii) decreased PRL elimination from the systemic circulation [3,4], (iii) decreased sensitivity to the suppressant effect of dopamine on PRL synthesis [5], and (iv) increased PRL messenger RNA levels in the presence of lower thyroid hormone levels [6].

This study was conducted to correlate different levels of TSH and PRL irrespective of thyroid status.

### METHODS

The study was conducted at Kasturba Medical College and Hospital, Mangalore, over a period of 8 months from January 2012 to August 2012. The study group comprised 221 non-pregnant female in the age group of 16–43 years visiting the infertility clinic. Proper consent from subject was taken. The 5 ml of blood was drawn with all aseptic measures. PRL and TSH were measured by electrochemiluminescence

immunoassay method using autoanalyzer COBAS e411. Subjects were divided into three groups based on their TSH levels as follows: Group 1 – low TSH levels ( $<0.4$   $\mu$ U/ml), Group 2 – normal TSH levels ( $0.4$ – $4.27$   $\mu$ U/ml), and Group 3 – high TSH levels ( $>4.27$   $\mu$ U/ml).

The comparison between three groups was done using ANOVA test. The correlation of PRL levels with TSH was performed using Pearson's correlation test statistically.

### RESULTS

The mean TSH and PRL levels in all the three groups are displayed in Table 1, Fig. 1. The correlation between TSH and PRL was found significantly positive with  $r=0.239$  and  $p<0.001$  (Fig. 2).

### DISCUSSION

In the current study involving different ranges of TSH levels from 0.045 to 10.39  $\mu$ U/L, a statistically significant positive association was found with PRL ( $p<0.001$ ) and a positive trend was observed ( $r=0.239$ ).

In most previous studies demonstrating a positive association were the subjects with established subclinical or overt hypothyroid patients [6]. The altered high TSH levels can alter the PRL levels.

Zeliha *et al.* [2] studies found the similar significant positive association of TSH and PRL ( $p=0.003$ ). They also found that 36% of overt hypothyroid and 22% of subclinical hypothyroid patients had increased PRL levels. Raber *et al.* [7] also noticed hyperprolactinemia in 8% of hypothyroid patients, but pregnancy and lactating women were included in the study. Meir *et al.* [8] found higher PRL in 19% of subclinical hypothyroid patients. They also noticed normalization of PRL

Table 1: TSH and PRL levels in three groups

	Group-1 (n=8)	Group-2 (n=183)	Group-3 (n=30)	p-value
TSH ( $\mu\text{IU/ml}$ ) (mean $\pm$ SD)	0.096 $\pm$ 0.08	1.98 $\pm$ 0.94	6.45 $\pm$ 3.91	<0.01
PRL (ng/ml) (mean $\pm$ SD)	9.8 $\pm$ 6.25	16.58 $\pm$ 8.78	26.53 $\pm$ 15.98	<0.01

TSH: Thyroid-stimulating hormone, SD; Standard deviation, PRL: Prolactin

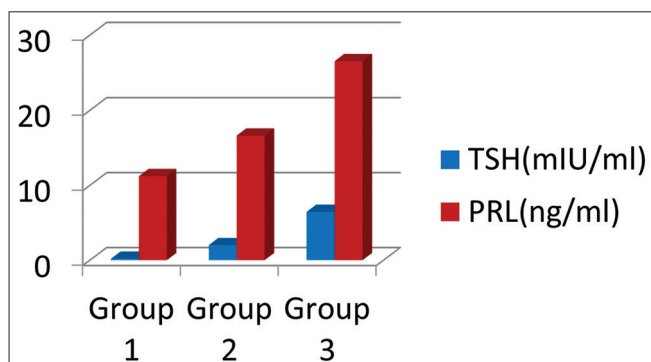


Fig. 1: Serum thyroid-stimulating hormone and prolactin levels among the three groups

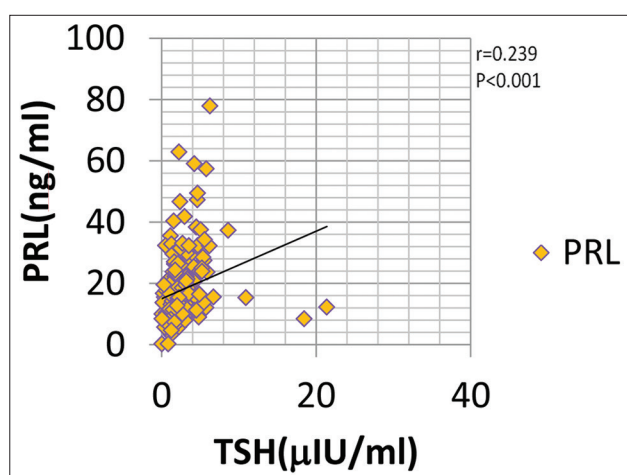


Fig. 2: Correlation of serum thyroid-stimulating hormone and prolactin levels

levels after treatment with L-thyroxine. In studies by Shrestha *et al.* [9], positive association was observed between PRL, body mass index, and TSH whereas negative with  $\text{fT}_3$  and  $\text{fT}_4$ . Sharma *et al.* [10] observed hyperprolactinemia highest in primary hypothyroidism followed by subclinical hypothyroidism and euthyroid individuals. They also noticed significant positive association between TSH and PRL in subclinical hypothyroidism and primary hypothyroidism. Anwary *et al.* [11] found that only 36% of subfertile women had normal serum PRL and 56% of same normal TSH. The study of hormonal status is very important in diagnosis and initiating treatment of infertility [12,13].

However, the positive trend was observed and the hypothesis framed can be tested in the continuation study involving exclusion of other causes of hyperprolactinemia.

## CONCLUSION

The thyroid function tests may be considered in evaluation in case of hyperprolactinemia or in infertility profile.

## AUTHORS' CONTRIBUTIONS

Dr. Sulekha Sinha – doing the research, Dr. Anupama Hegde – guiding and writing of article, Dr. Poornima A Manjrekar – guiding and writing of article, Dr. Rukmini MS – guiding and writing of article.

## CONFLICTS OF INTEREST

None.

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