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A STUDY OF SERUM PROLACTIN LEVEL IN PATIENTS WITH HYPOTHYROIDISM

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ABSTRACT

Background: Prolactin is a peptide hormone secreted by the adenohypophysis. The secretion of prolactin is controlled by the hypothalamus. There are some others factors such as vasoactive inhibitory peptide (VIP) and thyrotropin releasing hormone (TRH) which enhance the prolactin secretion. Hyperprolactinemia is a clinical condition characterized by the hyper secretion of prolactin in both male and female that can result from a number of causes including hypothyroidism. The aim of this study were to estimate the serum prolactin level in patients with hypothyroidism and to find out the correlation between serum thyroid stimulating hormone (TSH) and prolactin level. **Material and methods:** A total number of 60 samples were taken; among these 30 were hypothyroid patients and 30 controls. The study group and control group were well matched in regard to age and sex. Fasting venous blood samples has been taken from each individual and analyzed for TSH, T_3, T_4 and prolactin by ELFA (enzyme linked fluorescent assay) technique using VIDAS analyzer. Obtained data was analyzed by using SPSS. **Results:** Differences between mean serum prolactin levels among hypothyroid patients and controls were statistically significant (p= 0.005). No correlation was found between serum prolactin and TSH levels (r= -0.194, p= 0.303). **Conclusion:** Serum prolactin level was found to be increased in hypothyroid patients as compared to that of controls. If thyroid function tests are normal in patients with raised prolactin level, further test should be done to find out the etiology of hyperprolactinemia.

KEYWORDS: Hyperprolactinemia, Hypothyroidism, Prolactin.

INTRODUCTION

Hypothyroidism is known to cause infertility as a result of anovulatory cycles, luteal phase derangement, hyperprolactinemia and sex hormone imbalance.[1]

Various studies have shown a higher incidence of serum prolactin level in patients with primary hypothyroidism[2] Further, about one third of infertile women having reproductive dysfunction have been suffering from hyperprolactinemia as prolactin is known to inhibit follicular estradiol function.[3] Prolactin (PRL) is a peptide hormone secreted by the adenohypophysis. The secretion of prolactin is controlled by an inhibitory factor like dopamine which is secreted from the hypothalamus. There are some other factors such as vasoactive inhibitory peptide (VIP) and thyrotropin-releasing hormone (TRH) which enhance the prolactin secretion.[4]

A positive correlation has been seen between hyperprolactinemia and hypothyroidism. This is due to the fact that TRH has similar effect on prolactin gene and thyroid gland and leads to release of both hormones i.e. prolactin and TSH.[5]

There are various mechanisms by which hyperprolactinemia may develop in patients with primary hypothyroidism. Development of the hypothyroid state causes the elevation in secretion of central hypothalamic thyrotropin releasing hormone, which stimulates prolactin secretion. Other mechanisms also contribute to increased prolactin level in hypothyroid patients like decreased sensitivity to the inhibitory action of dopamine on prolactin synthesis. The role of TRH as a hypothalamic hormone releasing TSH from the anterior pituitary gland is well identified but its role in the stimulation of prolactin secretion from the adenohypophysis is still disputed.[6,7]

In view of the above facts further investigation was required to correlate the relationship between serum prolactin level and hypothyroidism. Therefore, the present study was undertaken to study the role of

prolactin in hypothyroidism which in turn may cause infertility.

MATERIAL AND METHODS

Subject selection: In the current study, 30 hypothyroid individuals aged 20 to 50 years were included who were confirmed by the estimation of serum T_3, T_4 and TSH (>6.16µIU/ml) level were selected from the OPD of Teerthanker Mahaveer Hospital, Moradabad and 30 healthy subjects having comparable age and sex were used as controls. Informed consent was taken from each individual before the collection of blood sample.

Exclusion criteria[12]

- Known history of hyperprolactinemia
- Pregnant and lactating women
- Liver or kidney diseases
- Patient taking antidepressants, estrogens or antipsychotics
- Diabetes mellitus

Sample collection

Fasting blood sample was collected with aseptic precautions from antecubital vein from all individuals and was collected into plain vial. The sample was incubated at 37°C for 30 minutes for clotting and the serum was separated by centrifugation for T_3, T_4, TSH and prolactin estimation.

METHODOLOGY

The serum total TSH, T_3, T_4 and prolactin were estimated by ELFA technique (Enzyme Linked Fluorescent Assay) using fully automated VIDAS analyzer.

Fig 1: VIDAS fully automated analyzer.

Data analysis

Mean ±SD were calculated for T_3, T_4, TSH and prolactin analyzed and were compared by Student's t-test and the parameters were correlated by the calculation of coefficient of correlation (r-value). All these data analysis were done in SPSS.

P <0.05 was considered as significant.

P<0.001 was considered as highly significant.

RESULTS AND DISCUSSION

A total of 30 hypothyroid patients and 30 healthy individuals having comparable age and sex were selected as control for the study. The statistical analysis for the test parameters are as follows.

Table1: Comparison of serum prolactin and TSH level between controls and hypothyroid patients by student's t-test.

Sr. No.	Parameters	Control group (n=30) Mean ± SD	Hypothyroid group (n=30) Mean ± SD	p – value
1.	Prolactin (ng/ml)	13.68 ± 7.64	23.05 ± 15.62	0.005
2.	TSH (µIU/ml)	3.41 ± 1.26	12.11 ± 6.59	0.000

Increased amount of serum TSH and prolactin was found in hypothyroid patients, which was statistically significant.

Table2: Comparison of serum prolactin level between males and females hypothyroid patients.

Sr. No.	Parameter	Males (n =3) Mean ± SD	Females (n=27) Mean ± SD	p–value
1.	Prolactin (ng/ml)	13.36 ± 7.47	24.12 ± 15.99	0.105

Statistically significant difference was not found in serum prolactin level between males and females.

Table 3: Pearson correlation of prolactin with TSH, T_3 and T_4 among hypothyroid patients.

Sr. No.	Parameters	r – value	p –value
1.	TSH-Prolactin	-0.194	0.303

There were no correlation among serum prolactin levels and serum TSH, T_3 and T_4 in hypothyroid patients.

Many authors have observed infertility in hypothyroid patients.[13] The causes of infertility have been attributed to hyperprolactinemia which are associated with hypothyroidism.[14] Various mechanisms have been proposed for hyperprolactinemia in hypothyroid patients. Firstly, high prolactin levels can be due to increased TRH release from the hypothalamus caused by reduction in feedback inhibitors such as T_3 and T_4. Increased TRH stimulates both PRL and TSH release from anterior pituitary gland.[15, 16, 17, 18] Secondly impaired prolactin clearance has also been reported in hypothyroid patients.[15, 19] However there are other conflicting reports about the mechanism by which hyperprolactinemia is caused by hypothyroidism.[6, 7]

In the present study, it was found that mean serum prolactin level of hypothyroid group was 23.05±15.62ng/ml, and for control group it was found to be 13.68±7.64ng/ml (Table 1). The serum prolactin level of hypothyroid patients were significantly higher in the hypothyroid patients than that of healthy individuals (p=0.005). Higher prolactin level has also been investigated by other authors in the hypothyroid patients.[20, 12]

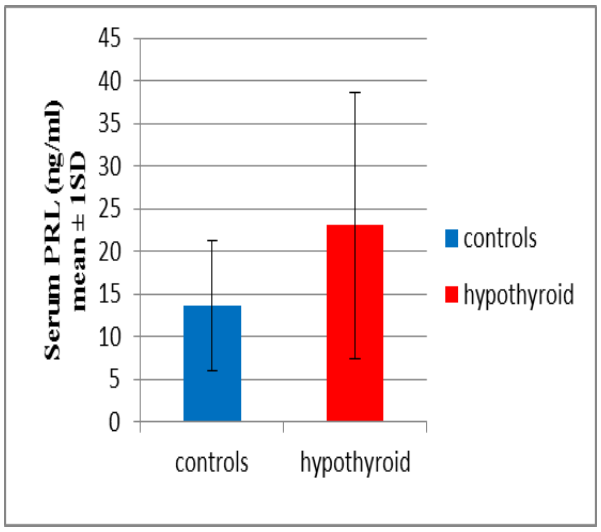

Fig. 2: Comparison of serum prolactin between hypothyroid patients and controls.

The enhanced TRH level is not the only stimulus for more prolactin secretion but there are other factors which causes the high prolactin secretion from the adenohypophysis. Estrogen level also stimulates prolactin secretion from the adenohypophysis and therefore, hyperprolactinemia is observed to be more in females as compared to males.[21, 22]

In the present study we also tried to compare the prolactin level between males and females (Fig. 3). Although the findings are statistically insignificant (p=0.105) but we found higher prolactin level in female as compare to males (Table 2). This effect may be attributed to high estrogen level in females as compared to males.

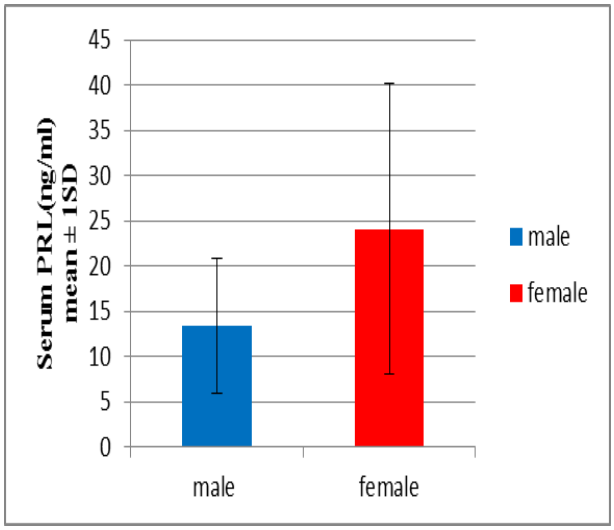

Fig. 3: Comparison of serum prolactin between males and females.

There is other experimental evidence in which Foord et al. studied the cultured adenohypophysis cells from hypothyroid gland and observed that the increase prolactin synthesis is due to reduction in the sensitivity to the inhibitory action of dopamine and dopamine agonists.[23] Experimental evidence also support that the thyroid hormones themselves can increase the messenger RNA for prolactin synthesis in rodent pituitary cells.[24] Thus, in view of all the factors the suppressing thyroid hormones results in increased prolactin synthesis in hypothyroid patients.

In the present study, when the TSH level was correlated with PRL level among hypothyroid patients (Table 3). It was found that there is no correlation between TSH and prolactin(r= -0.194, p=0.303). Similar findings were also revealed by Bahar et al; in their study on 481 patients with hypothyroidism.[25] Supporting this view is a study by Basu et al; on 32 hypothyroid patients.[26] However, some findings contraindicate with our findings such as Hekimsoy et al. found that serum prolactin positively correlated with TSH.[20]

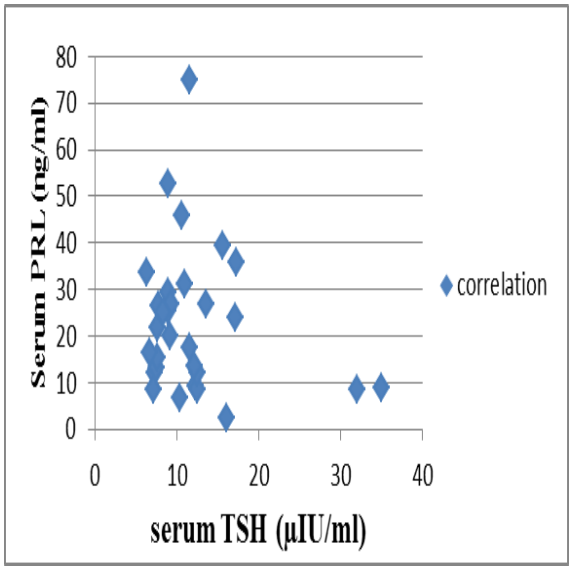

Fig. 4: Correlation of serum prolactin with serum TSH among hypothyroid patients.

Rarely, hyperprolactinemia in hypothyroid patients is associated with an enlarged pituitary gland leading to diagnostic confusion with prolactinomas. This pituitary enlargement might be explained by lactotrophs and/or thyrotroph hyperplasia, related to the severity and duration of hypothyroidism.[18, 27, 28, 29]

Therefore, the present study demonstrates that serum prolactin was found to be increased in patients with hypothyroidism as compared to that of controls. If thyroid function tests are normal in patients with raised prolactin levels, further tests should be done to find out the etiology of hyperprolactinemia.

CONCLUSION

These findings suggest that hypothyroidism was associated with hyperprolactinemia. Hence, routine monitoring of serum PRL test should be performed in patients with hypothyroidism in order to improve their prognosis. It is also suggested to find out the causes of hyperprolactinemia; this may lead to better diagnosis and management of hyperprolactinemia.

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