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Estimation of serum prolactin levels in patients with primary hypothyroidism

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ABSTRACT

Introduction: The aim of this study is to see whether routine screening for serum prolactin level in all primary hypothyroid patients is necessary or not. **Materials and methods**: Primary Hypothyroidism was established initially on the basis of increased TSH and decreased or normal T4 and / or T3 levels in serum. The serum prolactin levels were estimated in all such diagnosed cases (32 cases, 28 females and 4 males) and compared with that of 32 ages and sex matched controls. **Results:** Differences between mean serurn prolactin levels among cases and controls were statistically insignificant (10.19 ± 9.68 pg/L *vs* 10.73 ± 4.76 Hg/L; $p > 0.75$). No correlation between serum prolactin and TSH levels ($p > 0.37$, $r = - 0.17$) among cases was found. **Conclusion:** Prolactin levels in serum of primary hypothyroid patients of all categories remain within normal limits.

KEYWORDS

Primary hypothyroidism;
Serum prolactin;
Prolactinoma;
Galactorrhea.

INTRODUCTION

Primary hypothyroidism is characterized by low serum level of thyroxine (T4), tri-iodolhyrorune (T3) and decreased negative feedback on the hypothalamo-pituitary axis. The resulting increased secretion of thyrotropin releasing hormone (TRH) stimulates thyrotrophs and lactotrophs, thereby increasing the levels of both thyroid stimulating hormone (TSH) and prolactin[1].

Van Gaal et al had written in his article, that in spite of recent advances in human prolactin (PRL) assay, the number of hypothyroid patients with hyperprolactinemia remains limited and the pathogenesis of hyper-secretion of PRL in primary hypothyroidism is still controversial[2]. He further told that Primary hypothyroidism is a well-known but still infrequent cause of hyperprolactinemia with or without galactorrhea. The literatures on this subject are very conflicting: Onishi et al found elevated PRL levels in 10 out of 16 hypothyroid women[3] and Honbo et al reported hyperprolactinemia in 39% of the patients with untreated hypothyroidism[4]. Fossati et al, however, reported normal PRL levels in 14 hypothyroid patients[5]. Out of that 14 hypothyroid women, 3 had galactorrhea without hyperprolactinemia. They opined that a breast receptor deregulation during dysthyroidism can be the reason of this feature. In the

presence of hypothyroidism, the breast tissue may be more sensitive to normal circulating levels of PRL[5]. The prevalence of amenorrhea or galactorrhea varies from 10 to 50% of the patients with primary hypothyroidism as they opined. Studies about the prevalence of clinically significant hyperprolactinemia in hypothyroidism are rare. How and Bewsher showed that galactorrhea may be the sole manifestation of primary hypothyroidism. A differential diagnosis with PRL-secreting adenomata of the pituitary gland has to be made[6]. However, PRL secretion in these patients fails to increase after TRH or metoclopramide. In their study Van Gaal et al found out of 14 hypothyroid women, the mean PRL level was admittedly higher than in the controls, but in 9 out of 14 patients normal values were found. Elevated values are only present in 30% of the cases. Even in hypothyroid patients without clinical signs of hyperprolactinemia (12 out of 14 patients) significant difference remains. Both Trejbal et al and Akhter et al found no correlation between the levels of prolactin and TSH levels in patients[7, 8].

Keeping the above controversies in mind, the aim of this study was to find whether there were any changes in the serum prolactin levels in symptomatic patients who were diagnosed as having primary hypothyrioidism with or without treatment or after treatment.

EXPERIMENTAL

This was a hospital based case-control study. Cases were selected from the group of patients referred to the Department of Biochemistry first time with clinically suspected thyroid disorder, follow-up cases with hypothyroidism receiving levothyroxine and follow-up cases of thyrotoxicosis receiving carbimazole. Cases had serum TSH levels above 6.16 mlU/L (maximum normal limit fixed for the RANBAXY ELISA TSH KIT used) with serum T4 and/ or T3 levels either within normal limits or less than the minimum normal values. Patients who were pregnant, on oral contraceptive pills, on corticosteroids or received iodine containing dye were excluded from this study. In addition to the newly diagnosed cases of hypothyroidism, patients who were sub-optimally treated with levothyroxine and continue to have high abnormal TSH levels and patients developed hypothyroidism (high abnormal TSH levels) due to overdoses of carbimazole were included in this study. Age and sex matched patients who were found to have normal serum TSH, T4 and T3 levels were included as hospital based controls. Informed consents were duly taken from them. For TSH, T4, T3 and prolactin (PRL) estimation, a fasting morning venous sample was taken. Blood was allowed to clot for 30 minutes and serum separated using RENO centrifuge and levels were estimated using RANBAXY ELISA KIT for TSH, T4, T3 and PRL. TECAN ELISA reader and washer were used. A comparison was also done between the levels of TSH and PRL among patients. The study populations were further classified into newly diagnosed hypothyroid cases (N), levothyroxine-treated hypothyroid cases (L) and carbimazole treated hyperthyroid cases (C). Similarly control population was subdivided into patients without thyroid disorders (X), previously diagnosed hypothyroid patients in euthyroid state presently after receiving levothyroxine (Y) and diagnosed hyperthyroid patients presently became euthyroid after receiving carbimazole (Z) and each subclass of case and control are age and sex matched to each other. We have compared parameters between (N) + (L) + (C) *vs* (X) + (Y) + (Z) as a whole. The statistical data analysis was done using SPSS (Statistical Package for Social Sciences) software for-windows, version 10, Microsoft exel 2007, and Stat calc software.

RESULTS AND DISCUSSION

Demographic profile of the cases and controls are presented in TABLE 1. Cases presenting with different histories, clinical symptoms are presented in figure 1.

Statistical comparisons of measured values

TABLE 1 : Demographic profile of cases and controls

Characters	Cases	Controls
Number	32	32
Male	4	4
Female	28	28
No. of New hypothyroid cases / controls without thyroid disorder	21 (N)	21 (X)
No. of cases / controls receiving Levothyroxine	9 (L)	9 (Y)
No. of cases / controls receiving Carbimazole	2 (C)	2 (Z)

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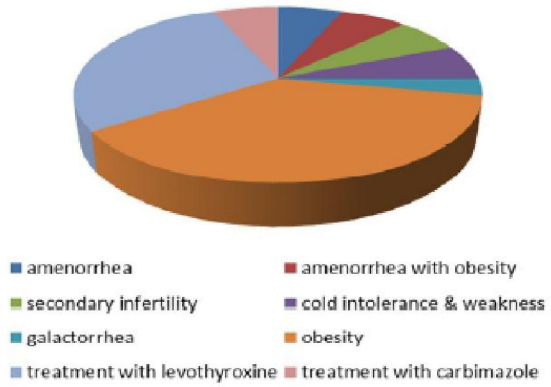

Figure 1: Distribution of cases according to their histories and clinical presentations. In the figure category 1 is cases presenting only with secondary amenorrhea (excluding pregnancy) (2 cases), category 2: secondary amenorrhea (excluding pregnancy) with obesity/ overweight (BMI more than 25 kg/m^2) (2 cases), category 3: secondary infertility (2 cases), category 4: cold intolerance and weakness (2 cases), category 5: galactorrhea (excluding pregnancy) (1 case), category 6: only obesity (BMI more than 25 kg/ m^2) (12 cases), category 7: patients receiving levothyroxine (9 cases), and category 8: receiving carbimazole (2 cases).

between two groups were performed by student 't' test of the means. Pearson's correlation analysis was used to determine the correlation and correlation coefficients between serum prolactin and TSH levels among patients.

From TABLE 2 & 3 it was found that Prolactin levels remain within normal limit in all cases of primary hypothyroidism. This result is against the common belief that the rebound rise in the TRH level in hypothyroidism also induces prolactin secretion and lead to hyperprolactinemia. When patients present predominantly with the symptoms of primary hypothyroidism in the hospital out-patient-department, usually they do not have any secondary factors like hyperprolactinemia. There are several studies which supported the findings of this study as mentioned in the introduction part. In our study neither we have found any significant differences in mean values of prolactin levels among hypothyroid patients in respect of that in control group nor any correlation between them. The mean prolactin levels were within normal limit among cases and controls.

This study showed that maximum women with hypothyroidism are obese (39%). Second most common presentation of patients in different out-patient-departments of a Medical College was sub-optimally treated

TABLE 2 : Mean & standard deviation of hormone status of patients and controls

Parameters	Cases (N=32)	Controls (N=32)	Significance (p)
Prolactin (µg/L)	10.19 ±9.68	10.73 ±4.76	p > 0.75
TSH(mIU/L)	24.07 ±15.6	2.7 ±1.48	p < 0.001
T4(nmol/L)	82.17 ±36.12	93.4 ±21.4	p > 0.17
T3 (nmol/L)	0.17 ±0.16	0.17 ±0.06	p > 0.91

TABLE 3 : Correlations between different parameters in patients

Parameters	Significance & correlation coefficient (r)
Correlation between serum prolactin & TSH levels in patients	$p > 0.37$ r = - 0.17

hypothyroidism (28%). Infertility is found to be the rare presenting symptom of primary hypothyroidism (3%). Prolactin levels in serum of primary hypothyroid patients remain within normal limits.

ABBREVIATIONS

TSH – Thyroid Stimulating Hormone, TRH - Thyroid Releasing Hormone, PRL – Prolactin, BMI – Body Mass Index, ELISA – Enzyme Linked Immunosorbent Assay.

CONCLUSION

Routine screening of all primary hypothyroid patients for prolactin level is not necessary.

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