

# A Study on Serum FSH, LH and Prolactin Levels in Women with Thyroid Disorders

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**Abstract-** Thyroid disorders both hypo and hyperthyroidism are frequently seen in women, the incidence of hypothyroidism is being much higher than hyperthyroidism. Reported studies in these two conditions on reproductive physiology in women and in experimental female animals have shown that both hypo and hyperthyroidism are associated with delay in onset of puberty, anovulation, various menstrual irregularities, infertility and spontaneous abortions. The present study conducted on the levels of FSH, LH and Prolactin in 36 women subjects between the age group 18 – 35 years out of which 10 are control, 26 are with thyroid disorders. In this 26 thyroid disorder patients 16 are hypothyroid cases and 10 are hyperthyroid cases. The result of the present study indicates that there is significant (>0.001) increased basal levels of serum LH as compared to FSH. Thus the ratio of LH: FSH altered from 1:1 to 6:1, and also there is significant (>0.001) increase in serum prolactin levels in hypothyroidism, where as no change in hyperthyroidism seen. From the present study it is concluded that the alteration in menstrual cycle and decreased reproductive performance of women are similar to polycystic ovarian disease and can be explained on the basis of altered hormone profile of LH, FSH and prolactin. Here increased levels of prolactin and LH with normal FSH in hypothyroid cases seen, indicating their susceptibility for the development of polycystic ovarian syndrome. There are normal levels of prolactin and FSH along with increased LH levels in hyperthyroid cases. In both hypo and hyperthyroidism menstrual irregularities and altered gonadotropin pattern are observed. This indicates that thyroid hormones play an important role in reproductive physiology.

**Index Terms-** hypothyroidism, hyperthyroidism, polycystic ovarian syndrome.

## I. INTRODUCTION

The function of thyroid hormones include modulation of carbohydrates, proteins and fat metabolism, gene expression and also sexual and reproductive function,<sup>[1]</sup> thus when the thyroid hormone gets out of balance, many body functions are affected. This is why hypothyroidism can mimic many other diseases.

Hypothyroidism is caused by insufficient production of thyroid hormones by the thyroid gland. Hypothyroidism has many effects on reproductive system development and function. The reproductive tract appears to develop normally in cretins, thus hypothyroidism during fetal life does not appear to affect the

normal development of the reproductive tract<sup>[2]</sup>. Hypothyroidism beginning before puberty causes a delay in onset of puberty followed by an ovulatory cycle in women. In some cases juvenile hypothyroidism, precocious puberty and galactorrhoea have been reported<sup>[3]</sup>.

In women hypothyroidism is associated with delay in the onset of puberty, anovulation, amenorrhoea, polymenorrhoea, menstrual irregularities, infertility and increased frequency of spontaneous abortions. It was suggested that these alterations may be caused by decrease in gonadotropin secretion, due to hyper prolactinemia (prolactin levels are directly correlated with TSH levels).

In hypothyroid women changes in menstrual cycle suggests that thyroid disorders are associated with ovarian hyperactivity like hyperestrogenemia, hyper prolactinemia, impaired fertility. The effects of thyroid hormones on the impaired function of reproductive and to great extent is thought to be due to changes in TSH level, whose secretion overlaps with FSH, LH and prolactin and thus it may have overlapping function<sup>[4]</sup>.

Hyperthyroidism is due to overproduction of thyroid hormones. The most common underlying cause of hyperthyroidism is Graves's disease. Children born with neonatal Graves disease have no defects in the reproductive system that can be related to this disease. Hyperthyroidism occurring prior to puberty has been reported to delay the onset of menses<sup>[5]</sup>.

Similar to hypothyroidism, hyperthyroidism may also result in menstrual abnormalities in adult women. The more common manifestations are hypo, poly and oligomenorrhoea; moreover hyperthyroidism in women has been linked to reduced fertility. Reported studies indicate that menstrual disturbances in hyperthyroidism are 2 times more frequent than in normal population.

## II. MATERIALS AND METHODS

The present study is carried out in the department of Biochemistry, S.V.S Medical College, Mahabubnagar. The relevant data is gathered from the Department of medicine, S.V.S medical college and Hospital during the year 2014-2015

The present studies include 36 women patients between the age group 18-35 years out of which 10 are control, 26 are with thyroid disorders. In this 26 thyroid disorder patients 16 are hypothyroid cases and 10 are hyperthyroid cases.

The hypothyroid cases have shown the symptoms like

- Enlargement of thyroid,
- Hair loss,

- Menstrual irregularities,
- Weight gain,
- Dry skin,
- Cold intolerance etc..

The hyperthyroid cases have shown the symptoms like

- Weight loss,
- Weakness,
- Menstrual irregularities,
- Depression,
- Vomiting etc...

In all the cases following hormones are estimated and confirmed the thyroid abnormality.

- Tri iodothyronine (T3)
- Tetraiodothyronine (T4)
- Thyroid stimulating hormone (TSH)
- Follicle stimulating hormone(FSH)
- Luteinizing hormone (LH)
- Prolactin.

Sample collection: - sample was collected from women patients between the age group 18 – 35years, during 2<sup>nd</sup> or 3<sup>rd</sup> day of menstrual cycle for the estimation of FSH and LH. All investigations are done by Two-site immunoenzymatic assay (AIA) method. By using TOSOH automated immunoassay system.

### III. RESULTS

The present study was done by taking blood samples from 36 women patients who attended to S.V.S Hospital for thyroid hormone estimation as per their physician’s advice. In all these

cases T3, T4 and TSH levels are estimated. All patients belonged to the Age group 18- 35 years. Careful history regarding their menstrual history, number of children, age of the lost child, signs and symptoms of Hypo/Hyperthyroidism if any, were also recorded. Depending up on their results of T3, T4 and TSH they are categorized into 3 groups.

Group I: - In this group subjects with normal T<sub>3</sub>, T<sub>4</sub> and TSH levels are included, and served as control group. Number of subjects 10.

Group II: - In this group subjects with decreased T3, T4 and increased TSH levels are included. Number of subjects 16.

Group III: - In this group subjects with increased T3, T4 and decreased TSH levels are included. Number of subjects 10.

Again in these 3 groups FSH, LH and Prolactin levels are also estimated.

In Group I patients the values of FSH, LH and Prolactin of thyroid hormones profile are with in the reported normal levels.

Group II patients have shown hypothyroid profile. The prolactin and LH levels are increase significantly (<0.001) with normal FSH levels. All 16 patients have shown hypothyroid symptoms and menstrual irregularities. Out of 16 patients 7 patients had oligomenorrhoea, 3 patients had amenorrhoea, 3 patients had polymenorrhoea, 2 patients had menorrhagia, and one patient had normal menstrual cycle.

Group III patients have shown hyperthyroid profile. FSH levels though normal, it is significantly lowered, as compared to group II and have very high LH values with normal Prolactin levels. All the 10 patients have shown hyperthyroid symptoms and menstrual irregularities. Out of 10 patients, 2 patients had oligomenorrhoea, 1 patient had amenorrhoea, 2patients had polymenorrhoea, 3 patients had hypomenorrhoea and 2 patients had normal menstrual cycle.

### IV. SUMMARY OF RESULTS

Biochemical parameters	Values of	Group I	Group II	Group III
FSH <u>Normal values</u> NonmiDcycle -<20 mIU/ml, Midcycle - <40 mIU/ml,	<i>Mean</i>	4.86	6.2	2.15
	<i>SD ±</i>	1.86	2.7	0.92
	<i>SED</i>		0.9	0.65
	<i>t' value</i>		1.4	4.16
	<i>P' value</i>		NS	<0.01
LH <u>Normal values</u> BaselineLevel:-5- 20 mIU/ml, Serum Level :- 40 - 200 mIU/ml,	<i>Mean</i>	6.9	40.0	55.95
	<i>SD ±</i>	1.12	8.11	8.64
	<i>SED</i>		2.6	2.76
	<i>t' value</i>		12.7	17.77
	<i>P' value</i>		<0.001	<0.001

<b>PROLACTIN</b> <u>Normal values</u> Females :- 8.39 – 20.15 ng/ml	<i>Mean</i>	10.46	23.5	11.79
	<i>SD ±</i>	1.88	2.93	2.52
	<i>SED</i>		1.04	0.99
	<i>'t' value</i>		12.5	1.34
	<i>'P' value</i>		<0.001	NS
<b>TSH</b> <u>Normal values</u> :- 0.3 – 6.0 µIU/ml	<i>Mean</i>	2.22	25.3	0.14
	<i>SD ±</i>	1.28	3.25	0.084
	<i>SED</i>		1.08	0.40
	<i>'t' value</i>		21.3	5.2
	<i>'P' value</i>		<0.001	<0.001
<b>T3</b> <u>Normal values</u> :- 0.9 – 1.9 ηg/ml	<i>Mean</i>	1.44	0.58	2.21
	<i>SD ±</i>	0.21	0.23	0.33
	<i>SED</i>		0.09	0.12
	<i>'t' value</i>		9.5	6.41
	<i>'P' value</i>		<0.001	<0.001
<b>T4</b> <u>Normal values</u> :- 52 – 156 µ/ml	<i>Mean</i>	144.8	49.25	167.1
	<i>SD ±</i>	17.03	26.54	15.05
	<i>SED</i>		4.37	22.7
	<i>'t' value</i>		21.8	0.9
	<i>'P' value</i>		<0.001	NS

## V. DISCUSSION

Review of literature and clinical evidence show that thyroid disorders in women are associated with frequent menstrual disturbances, impaired fertility and unsuccessful pregnancy [6, 7, and 8]. Animal studies have shown that hypothyroidism may lead to serious disturbances not only in development of the ovarian follicles but also their activity [9, 10, and 11].

According to the result obtained in the present study, in hypothyroid women, enhanced basal levels of prolactin and LH, normal levels of FSH are obtained. It results in alteration of LH: FSH ratio from 1: 1 to 6: 1.

This study confirms the published observations on elevated LH and prolactin levels on hypothyroid women, experimental studies on rats that suggest that formation of poly cystic ovaries in hypothyroid rats is associated with high levels of prolactin and LH. The present study also indicates that altered hormonal status of gonadotropins may be responsible for the irregular menstrual cycle, and also may predispose to development of polycystic ovarian syndrome in hypothyroid women.

According to Zahringers et al [12], LH secretion was increased in all hyperthyroid patients, while FSH secretion was increased in hyperthyroid men only. No changes in prolactin secretion were shown.

In the present study, the mean LH levels in hyper thyroid women are significantly higher than in euthyroid women, where as prolactin levels are normal. FSH levels though normal (<20mIU/ml), is significantly lower than in hypothyroid women. The mechanism of increase in serum LH and fall in FSH in

hyperthyroid women and the causes of menstrual irregularities in hyperthyroid women are not very clear.

## VI. CONCLUSION

From the present study it is concluded that there is increased levels of prolactin and LH with normal FSH in hypothyroid cases, indicating their susceptibility for the development of polycystic ovarian syndrome. There is a normal level of prolactin and FSH along with increase LH levels in hyperthyroid cases. In both hypo and hyperthyroidism menstrual irregularities and altered gonadotropin patterns are observed, indicating that the thyroid hormones play an important role in reproductive physiology.

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