

## Gonadotropin Levels in Hypothyroid Women of Reproductive Age Group

Acharya Neema · Acharya Sourya · Shukla Samarth ·  
Inamdar S. A. · Khatri M. · Mahajan S. N.

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### Abstract

**Objective** To study serum gonadotropin (FSH, LH) levels in cases of subclinical and overt hypothyroid women in reproductive age group.

**Material and Method** Female patients of reproductive age group attending thyroid clinic of Acharya Vinoba Bhave Hospital were included in the study. Detail menstrual history was taken, and serum FSH and LH levels were estimated by radio immuno assay method.

**Result** Eighty patients were included in the study, out of whom 46 (57.5%) had subclinical hypothyroidism and 34 (42.5%) had overt hypothyroidism. In subclinical

hypothyroidism group the menstrual dysfunction which dominated in our study was oligomenorrhea (28.2%) followed by menorrhagia (17.39%). 39.13% had normal menstruation. In overt hypothyroidism group again it was oligomenorrhoea (23.5%) which was the principal menstrual abnormality followed by menorrhagia (17.64%). The percentage of females with normal menstruation was 47.05%. The levels of serum FSH and LH were significantly low in cases of both subclinical and overt hypothyroid women. They were significantly low when done between day 2 and 5 of the cycle.

**Conclusion** Hypothyroidism decreases levels of serum FSH and serum LH. Subclinical hypothyroidism is one of the major etiological factors of infertility. Autoantibodies against thyroid should be searched for in cases of female patients with infertility.

**Keywords** Serum gonadotropins · Follicular stimulating hormone (FSH) · Luteinizing hormone (LH) · Hypothyroidism

Acharya N., Associate Professor · Inamdar S. A., Professor Head ·  
Khatri M., Professor  
Department of Obstetrics and Gynaecology, Datta Meghe  
Institute of Medical Sciences, Wardha 442004, India

Acharya S., Associate Professor · Mahajan S. N., Professor Head  
Department of Medicine, Datta Meghe Institute of Medical  
Sciences, Wardha 442004, India

Shukla S., Associate Professor  
Department of Pathology, Datta Meghe Institute of Medical Sciences,  
Wardha 442004, India

Acharya N. (✉), Associate Professor  
Department of Obstetrics and Gynaecology,  
Acharya Vinoba Bhave Rural Hospital, Sawangi Meghe,  
Wardha 442002, Maharashtra, India  
e-mail: neemadk@hotmail.com

### Introduction

The thyroid hormones affect function of almost all the organs in the body. It plays a major role in the “milieu interior” of the body by bringing about changes in other organ systems, like sympathetic system, reproductive system or other endocrine glands. It is of common knowledge

that patients suffering from hypothyroidism have various abnormalities ranging from menorrhagia, polymenorrhoea, oligomenorrhoea, anovulatory cycle and infertility. Hypothyroidism leads to increase levels of thyroid releasing hormone (TRH), TRH in turn stimulates secretion of TSH and PRL (prolactin) and PRL inhibits gonadotrophins. Numerous studies have also documented abnormal menstrual patterns in hypothyroidism. But it was found that very little work has been done about the relationship of thyroid dysfunction and serum gonadotrophins. Hence we conducted a study of serum gonadotrophins in hypothyroid females in reproductive age group.

## Materials and Methods

The study was carried out in Acharya Vinoba Bhave Rural Hospital attached to Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha. Patients were selected from the thyroid clinic of our institute. All female patients in reproductive age group with definite symptoms and signs of hypothyroidism were selected.

Subclinical hypothyroidism was diagnosed when thyrotropin (TSH) levels are elevated but thyroxine ( $T_4$ ) and triiodothyronine ( $T_3$ ) levels are normal. In primary hypothyroidism, TSH levels are high and  $T_4$  and  $T_3$  levels were low. TSH usually increases when  $T_4$  and  $T_3$  levels drop. TSH prompts the thyroid gland to make more hormones.

As in subclinical hypothyroidism, TSH is elevated but below the limit representing overt hypothyroidism. In this condition the levels of the active hormones are within the laboratory reference ranges.

A detailed menstrual history was obtained. Then they were subjected to medical and gynaecological examination to rule out any other cause for menstrual abnormality. Patients with history of infertility and abortions were also subjected to detailed evaluation for any other cause for the same.

After exclusion of other significant causes for menstrual abnormalities and infertility these patients were then subjected to estimation of serum  $T_4$ , TSH, FSH & LH levels. Twenty-five female patients without any thyroid dysfunction and having no menstrual abnormality were taken as control.

## Exclusion Criteria

1. All hypothyroid female patients who were already on L-thyroxine supplementation.
2. Female patients with other significant pathologies for menstrual dysfunctions.

## Methods

Serum  $T_4$  and TSH were estimated by radio immuno assay (RIA) and serum gonadotrophins (FSH and LH) were estimated by enzyme linked fluorescent assay (ELFA) method. The test was done preferably within first 5 days of menstrual cycle as the levels of gonadotrophins are lowest in this phase of cycle and thereby the interpretations are more sensitive in postmenstrual phase. Some patients could not come again for the test within first 5 days of menstruation as they lived in rural area far away from hospital.

Normal values of gonadotropins

Gonadotropin	Normal range (mIU/ml)
FSH	4.23–20.42
LH	4.11–2.01

## Result

Out of 80 patients included in the study, 46 (57.5%) had subclinical hypothyroidism and 34 (42.5%) had overt hypothyroidism. In subclinical hypothyroidism group the menstrual dysfunction which dominated in our study was oligomenorrhoea (28.2%) followed by menorrhagia (17.39%). 39.13% had normal menstruation. In overt hypothyroidism group again it was oligomenorrhoea (23.5%) which was the principal menstrual abnormality followed by menorrhagia (17.64%). The percentage of females with normal menstruation was 47.05%. Percentage of infertility in subclinical and overt hypothyroidism group was 21.73 and 5.88% respectively, suggesting that infertility was more common in subclinical hypothyroid females (Tables 1, 2, 3).

In the subclinical hypothyroid group the serum FSH & LH levels were decreased in females who had menorrhagia and infertility. The serum LH levels were also low in patients with oligomenorrhoea and also in patients with eumenorrhoea. This decrease was statistically significant as shown in Table 4. In overt hypothyroid group the serum FSH levels were low in females with menorrhagia, amenorrhoea and eumenorrhoea as shown in Table 6. As far as serum LH levels were concerned, LH levels were also decreased in females having menorrhagia

**Table 1** Showing range and mean of FSH and LH levels in controls

Control	Range (mIU/ml)	Mean
FSH	4.23–20.42	10.676
LH	4.11–2.01	11.155

**Table 2** Showing range, mean, standard deviation, *P* value of serum FSH levels in different menstrual patterns in subclinical hypothyroidism

Menstrual patterns	Range of values (μIU/ml)	Mean	Standard deviation	<i>P</i> value	Significance ( <i>P</i> <0.05)
Menorrhagia	1.71–9.29	5.666	2.157	0.0037	Significant
Oligomenorrhoea	2.55–24	7.493	5.319	0.0575	Insignificant
Irregular period	4.91–16.35	8.251	3.921	0.224	Insignificant
Normal period	2.78–29.5	8.350	7.367	0.208	Insignificant

**Table 3** Range, mean, standard deviation, *P* value of serum FSH levels in infertility and abortion in subclinical hypothyroidism

Patterns	Range of values (mIU/ml)	Mean	Standard deviation	<i>P</i> value	Significance ( <i>P</i> <0.05)
Infertility	1.71–9.5	6	2.187	0.002	Significant
Abortion	6.95–24	10.235	7.987	0.873	Insignificant

**Table 4** Range, mean, standard deviation, *P* value of serum LH levels in different menstrual pattern in subclinical hypothyroidism

Menstrual patterns	Range of values (μIU/ml)	Mean	Standard deviation	<i>P</i> value	Significance ( <i>P</i> <0.05)
Menorrhagia	0.04–13.1	6.391	3.948	0.020	Significant
Oligomenorrhoea	2.81–13	4.991	3.114	0.0002	Significant
Irregular period	2.55–21.52	8.501	6.787	0.295	Insignificant
Normal period	0.83–21.5	5.581	4.937	0.0008	Significant

**Table 5** Range, mean, standard deviation, *P* value of serum LH levels in infertility and abortion in subclinical hypothyroidism

Patterns	Range of values (mIU/ml)	Mean	Standard deviation	<i>P</i> value	Significance ( <i>P</i> <0.05)
Infertility	0.04–12	5.316	3.431	0.001	Significant
Abortion	3.4–13.1	7.015	4.224	0.132	Insignificant

oligomenorrhoea, amenorrhoea and eumenorrhoea as shown in Table 6. The overall serum FSH & LH levels, which were ideally estimated in the initial 5 days of menstrual cycles, were also significantly low. The LH level in cases of abortion with subclinical hypothyroidism was not significantly low as shown in Table 5. In cases of overt hypothyroidism the FSH levels were significantly low in cases of menorrhagia and amenorrhoea as shown in Table 6. Those patient in whom the FSH value was obtained between day 2 and 5 (postmenstrually) in cases of overt hypothyroidism, the levels were significantly lower as shown in Table 7.

## Discussion

In our study 46 (57.5%) out of 80 patients had subclinical hypothyroidism and 34 (42.5%) overt hypothyroidism consistent with other studies [1]. Thirty-five (42.5%) patients had normal periods and remaining 45 (57.5%)

patients had different menstrual irregularities suggesting that menstrual abnormalities do occur in hypothyroidism. Dominant menstrual abnormalities found in our study in hypothyroid patients were menorrhagia, oligomenorrhoea, as reported in other studies [2, 3]. Unique feature of our study was that we divided patients into two groups, subclinical hypothyroidism and overt hypothyroidism. In both groups the dominant menstrual abnormality was oligomenorrhoea followed by menorrhagia.

Patients in whom the test could be done postmenstrually within 5 days, one patient having subclinical hypothyroidism and oligomenorrhoea as main complaint had low FSH and LH levels. It could be due to pituitary failure which could have been confirmed by LHRH infusion test which was not done as patient was not willing for it. One patient of infertility had elevated day 3 FSH level, this was may be due to associated ovarian failure because of auto-antibodies which are commonly targeted against ovary, thyroid and adrenals. Hence auto antibodies should be tested in such patients. One patient had abnormally high

**Table 6** Range, mean, standard deviation, *P* value of serum FSH levels in different menstrual patterns in overt hypothyroidism

Menstrual patterns	Range of values (μIU/ml)	Mean	Standard deviation	<i>P</i> value	Significance ( <i>P</i> <0.05)
Menorrhagia	4.37–9.26	5.946	2.119	0.015	Significant
Oligomenorrhoea	0.522–16.7	7.86	4.409	0.125	Insignificant
Irregular period	4.44–5.45	4.945	0.505	0.075	Insignificant
Normal period	0.52–15.11	7.181	3.970	0.013	Significant
Amenorrhoea	1.22–5.9	3.395	2.195	0.028	Significant

**Table 7** Range, mean, standard deviation, *P* value of serum FSH and LH levels in second to fifth day of onset of menstrual cycle

	Range of values (mIU/ml)	Mean	Standard deviation	<i>P</i> value	Significance ( <i>P</i> <0.05)
Serum FSH	2.55–14.1	6.521	2.850	0.00062	Significant
Serum LH	1.58–12	5.627	3.730	0.0001	Significant

LH: FSH ratio who presented with subclinical hypothyroidism and oligomenorrhoea and infertility. She had polycystic ovarian disease (PCOD) in ultrasound examination. Hence patients with PCOD should be investigated for associated thyroid abnormality as has been mentioned in one study [4]. In this study decrease in serum FSH and LH levels were also statistically significant in hypothyroid patients with infertility as found in one study [5]. Decrease in serum LH levels was also significant with oligomenorrhoea in both overt and subclinical hypothyroidism.

## Conclusion

This study entitled a study of serum gonadotropin levels in hypothyroid women in reproductive age group was conducted in Acharya Vinoba Bhave Rural Hospital over a period of 3 years. 80 Hypothyroid patients were included in the study and 20 age matched controls were included for comparison. We divided the study group under the following headings,

1. Patients with overt hypothyroidism
2. Patients with subclinical hypothyroidism

To conclude, hypothyroidism does cause different types of menstrual irregularities.

Subclinical hypothyroidism is one of the major etiological factor of infertility and it should be kept in mind while treating such patients with infertility.

Occult ovarian failure should be suspected in hypothyroid patients with elevated serum FSH levels especially with patient presenting with infertility.

Autoantibodies against thyroid should be searched for in cases of females with infertility when they have subclinical hypothyroidism.

Hypothyroidism decreases levels of serum FSH and serum LH. If serum gonadotropin levels are estimated in the early follicular phase of the menstrual cycle (second to fifth day menstrual cycle) then in all the patients the above conclusion will be held true.

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