

# A study of evaluation of thyroid function in patients with reproductive failure

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## Abstract

**Background:** Early diagnosis of thyroid disorder before pregnancy is of utmost importance to prevent infertility due to thyroid disorder, to prevent complications during gestation and to have improved outcome at delivery and proper development of the fetus.

**Objective:** To evaluate of thyroid function in patients with reproductive failure and to study conception rate after treatment of the thyroid disorder.

**Methods:** This clinical prospective study was conducted in Department of Obstetrics and Gynecology, Owaisi Hospital and Research Centre, Hyderabad from November 2011 to September 2012. Total 117 patients with thyroid disease with infertility were studied. A study questionnaire was designed to record relevant history, examination findings and investigations report of each patient after proper counselling and consent.

**Results:** Out of 381 women who were found to have infertility, 117 (30.7%) were found to have infertility as well as thyroid disorder. Majority of the cases with primary infertility were found out to be in the age group of 20-25 years. There were a total of 91 cases that were having thyroid disorder as well as primary infertility. Out of these cases, majority cases were having sub clinical hypothyroidism (65.9%). Majority of the cases with hypothyroidism in infertile women were found to have oligomenorrhea in 39 cases (34.7%). The conception rate for hypothyroid women was very high (71.6%) compared to those women who were having hyperthyroidism (25%).

**Conclusion:** Thyroid profile has to be carried out in all infertile women before any invasive procedure, as they can be corrected and cured medically.

**Key words:** Evaluation, thyroid function, reproductive failure

## Introduction

“Reproductive failure has been defined as sterility or infertility.”<sup>[1]</sup> Thyroid disease which is not diagnosed or which is not treated may lead to infertility. It can also cause sub fertility. Fertility can be affected by the thyroid disease in a variety of ways, like it may cause an-ovulatory cycles. It may lead to defect in the luteal phase. It can also lead to increased prolactin levels. It can also lead to imbalances in the sex hormones. This is because for normal fertility, normal thyroid function is required. This normal level is required not only before conception but also after conception. Evaluation of thyroid function is required and recommended in women with family history of thyroid disease or having bad obstetric history.

T<sub>3</sub>, T<sub>4</sub>, and TSH should be done as a part of thyroid evaluation.<sup>[1]</sup>

It has been estimated that in women with reproductive age group hypothyroidism prevalence is around 2-4%. The studies have shown that hypothyroidism leads infertility and not only that; it can also lead to habitual abortion. It is not very difficult to diagnose hypothyroidism. Simple thyroid stimulating hormone test can tell us the status of the thyroid in the person. Hypothyroidism is subclinical when the T<sub>3</sub> and T<sub>4</sub> levels are normal but TSH is slightly increased. Hypothyroidism is said to be clinical when the TSH levels are very high along with T<sub>3</sub> and T<sub>4</sub> levels that are sufficiently decreased. More common is the subclinical form of hypothyroidism. It may lead to

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anovulation. Hence it should be recognized before the pregnancy. So that it can be treated for successful results. Hyperprolactinemia has been found to be associated with hypothyroidism coupled with infertility. This is because of the fact that the levels of thyrotropin releasing hormones are increased.<sup>[2]</sup>

For proper maternal health during gestation, it is important that thyroid evaluation should be done. It is also required for good obstetric outcome. It is also important for appropriate development of the child. Maternal hypothyroidism is the most common thyroid disorder seen during pregnancy. It may cause variety of problems like loss of the fetus, abruptions of the placenta, preeclampsia, preterm delivery and it can also affect the intellectual function in the offspring.<sup>[3]</sup>

It has been observed that the prevalence of hypothyroidism during pregnancy is not the same across the geographical areas. In western countries it has been estimated at around 2.5% while reports from India say that it is around 11%. Overall it has been observed that the prevalence is more in countries from Asia and less in the western countries. At around 12 weeks of gestation, there is beginning of the thyroid function in the fetus, but before that it has to be dependent upon the thyroid hormones from mother for appropriate development.<sup>[4]</sup>

If the mother is deficient in the thyroid hormones it leads to increased incidence of still birth and abortions, the development in the fetus gets affected; also the death rate during the perinatal period may be increased. Hypothyroidism is more common than hyperthyroidism.<sup>[5]</sup>

Present study was carried out to evaluate of thyroid function in patients with reproductive failure.

### Material and Methods

This clinical prospective study was conducted in Department of Obstetrics and Gynecology, Owaisi Hospital and Research Centre, Hyderabad from November 2011 to September 2012.

Total 117 patients with thyroid disease with infertility were studied. A study questionnaire was designed to record relevant history, examination findings and investigations report of each patient after proper counselling and consent. Institution Ethics Committee permission was obtained and informed consent was taken from all study participants.

### Inclusion criteria:

1. Reproductive age women (18-35 years)
2. Cases of primary infertility
3. Cases of secondary infertility

### Exclusion criteria:

1. Polycystic ovarian disease
2. Endometriosis
3. Tubal pathology
4. Other endocrine abnormalities

Detailed history pertaining to age, occupation, and marital status, thorough evaluation of fertility status, chief complaints, and details pertaining to family history, menstrual history, personal history and past history was taken and recorded in the study questionnaire designed for the present study.

General physical examination like height, weight, skin and appendages, presence of warm and moist extremities, dry skin, rough, non sweaty skin, facial appearance and myxoedema was carried out.

Local examination including inspection like examination of neck, any scars on neck, asymmetry, any neck swelling erythema over the neck. Palpation of thyroid gland, any nodularity and consistency of the thyroid gland was assessed on palpation. Cervical lymph nodes were also palpated to complete the thyroid gland examination.

Thyroid stimulating hormone levels were assessed by immune-radiometric assay using the fasting blood samples.  $T_3$  was assessed by quantitative measurement of  $T_3$  in human serum / plasma by radio immune assay. Quantitative measurement of  $T_4$  in human serum plasma was done by radio immune assay. All samples were processed in the same laboratory of the Institute at the place of the study. The analyzer used for estimation of  $T_3$ ,  $T_4$  and TSH was Chemi-Luminescence-Immuno-Assay (CLIA). In this laboratory the normal range for  $T_3$ ,  $T_4$  and TSH used was 0.7-1.9 ng/ml; 4.6-12 mcg/dl and 0.35-5.5 IU/litre respectively. Subclinical hypothyroidism was TSH levels between 5.6-10 IU/litre with normal  $T_3$ ,  $T_4$  levels; clinical hypothyroidism was TSH levels > 10 IU/litre with abnormal  $T_3$ ,  $T_4$  levels; hyperthyroidism was TSH levels < 0.35 IU/litre and raised  $T_3$ ,  $T_4$  levels.

Other investigations included were blood grouping typing, complete blood picture, erythrocyte sedimentation rate, renal function tests, liver function test, post-prandial blood sugar, HIV, HBsAg, VDRL, Complete urine examination, culture sensitivity of urine.

Specific investigations included were hormonal study, endometrial biopsy, USG scan (trans-vaginal/trans abdominal), hysteron-salpingography for tubal patency, laparoscopy whenever necessary, Mantoux test, chest X - ray if ESR is raised and tuberculosis is suspected in cases where it was needed. The data was analyzed using proportions.

## Results

**Table 1: Incidence of gynaecological problems, infertility and infertility with thyroid disorders**

Attribute	Number	%
Total OBGy cases in the study period	7904	100
Patients with gynaecological problems	2490	31.5
Patients with gynaecological problems	2490	100
Number of infertile patients	381	15.3
Number of infertile patients	381	100
Infertile patients with thyroid disorders	117	30.7

Table 1 shows occurrence rate of cases of hypothyroidism with infertility in the present study. There were a total of 7904 women who attended the Obstetric and Gynecology department during the study period. Out of them, 2490 (31.5%) were found to be having some or the other gynaecological problems. Out of 2490 women having some or the other gynaecological problem, 381 (15.3%) were found to have infertility. Out of 381 women who were found to have infertility, 117 (30.7%) were found to have infertility as well as thyroid disorder. These 117 cases formed the study population for the present study

**Table 2: Distribution of infertility according to age in patients with thyroid problems**

Age (years)	Primary infertility		Secondary infertility	
	Number	%	Number	%
20-25	42	46.3	3	11.5
26-30	32	35.3	6	23
31-35	15	16.4	14	53.8
> 35	2	2.2	3	11.7
Total	91	100	26	100

Table 2 shows distribution of infertility according to age in patients with thyroid problems. Majority of the cases with primary infertility were found out to be in the age group of 20-25 years. Almost half of the patients were in this age group. While for secondary infertility majority of the cases were in the age group of 31-35 years (53.8%). The second most common age group affected with primary infertility was 26.30 years (35.3%). The second most common age group affected with secondary infertility was 26-30 years (23%).

**Table 3: Relation between primary infertility and thyroid disorders (N = 91)**

Thyroid disorders	Primary infertility		Secondary infertility	
	Number	%	Number	%
Subclinical hypothyroidism	60	65.9	14	53.8
Hypothyroidism	27	29.6	12	46.2
Hyperthyroidism	4	4.5	0	0
Total	91	100	26	100

Table 3 shows relation between primary infertility and thyroid disorders. There were a total of 91 cases that were having thyroid disorder as well as primary infertility. Out of these cases, majority cases were having sub clinical hypothyroidism (65.9%). Next most common was hypothyroidism which was found in 27 cases (29.6%). There were four cases with primary infertility having hyperthyroidism (4.5%). There were a total of 26 cases that were having thyroid disorder as well as secondary infertility. Out of these cases, majority cases were having sub clinical hypothyroidism (53.8%). Next most common was hypothyroidism which was found in 12 cases (46.2%). There were no cases with secondary infertility with hyperthyroidism.

**Table 4: Relation between menstrual pattern and hypothyroidism in infertile women**

Menstrual pattern	Number	%
Regular cycles	38	33.6
Amenorrhea	8	7
Polymenorrhea and menorrhagia	28	24.7
Oligomenorrhea	39	34.7
Total	113	100

Table 4 shows relation between menstrual pattern and hypothyroidism in infertile women. Majority of the cases with hypothyroidism in infertile women were found to have oligomenorrhea in 39 cases (34.7%). Regular cycles were found in 38 women (33.6%) of the cases. Eight Women with hypothyroidism in infertile women (7%) were found to have amenorrhea. Twenty eight women with hypothyroidism with infertility were (24.7%) were found to have polymenorrhea and menorrhagia. Thus majority of the women (66.4%) having hypothyroidism as well as infertility was found to have menstrual disturbances.

**Table 5: Relation between menstrual pattern and hyperthyroidism in infertile women**

Menstrual pattern	Number	%
Regular cycles	3	75
Irregular cycles	1	25
Total	4	100

Table 5 shows relation between menstrual pattern and hyperthyroidism in infertile women. There were a total of four women who were found to have hyperthyroidism as well as infertility. Menstrual pattern was studied among these women who were found to have hyperthyroidism as well as infertility. It was found that majority (75%) of such women were having normal regular menstrual cycles. Only one woman (25%) was found to have irregular menstrual cycle

**Table 6: Conception rate following treatment of thyroid disorders with infertility**

Conceived	Hypothyroidism		Hyperthyroidism	
	Number	%	Number	%
Yes	81	71.6	1	25
No	36	28.4	3	75
Total	117	100	4	100

Table 6 shows conception rate following treatment of thyroid disorders with infertility. The conception rate for hypothyroid women was very high (71.6%) compared to those women who were having hyperthyroidism (25%). Out of 117 cases of hypothyroidism with infertility it was found that after treatment, 36 women (28.4%) of the cases could not conceive. But majority after the treatment 81 women (71.6%) conceived. Out of four cases of hyperthyroidism with infertility only one case (25%) conceived. But majority women (75%) could not conceive in spite of treatment.

### Discussion

We found that the incidence of infertility in the present study was found out to be 15.3%. Globally the incidence of infertility was estimated to be about 13% to 18% in the human population, regardless of race and ethnic group.<sup>[6]</sup>

Infertile women in the present study (N=381) were evaluated for serum T<sub>3</sub>, T<sub>4</sub> and TSH out of which 117 patients (30.7%) were diagnosed to have thyroid disorders. Similar results were shown in the study carried out by Rehman D et al at Bangabandhu Sheikh Mujib Medical University, Dhaka in 2007 which was 33.3%.<sup>[7]</sup>

Out of 117 patients of thyroid problems, 91 patients had primary infertility (77.7%) and 26 patients had secondary infertility (22.3%). Similar results were

shown in the study conducted by Sharma D et al that 80% with primary infertility and 20% with secondary infertility in infertile patients with thyroid disorders.<sup>[8]</sup>

Out of 91 patients with thyroid problems with primary infertility majority of the patients (46.3%) belonged to the age group of 20-25 years and out of 26 patients with thyroid problems with secondary infertility, majority of the patients (53.8%) belonged to 31-36 years of age group. Similar results were shown in the study conducted by Sharma D et al that 44.2% with primary infertility with thyroid disorders belonged to the age group of 20-25 years and 46.15% with secondary infertility in infertile patients with thyroid disorders belonged to the age group of 31-35 years.<sup>[8]</sup>

Out of 91 patients of primary infertility with thyroid problems, 60 patients were with sub clinical hypothyroidism (65.9%). Twenty seven patients were hypothyroid (29.6%) and four patients were hyperthyroid (4.5%). Similarly Lakshmi S et al demonstrated that 32.6% were hypothyroid, 3.8% women had hyperthyroid and 63.4% had sub clinical hypothyroidism.<sup>[9]</sup>

Out of 26 patients with secondary infertility with thyroid problems, 14 patients were sub clinical hypothyroid (53.85%), 12 patients were hypothyroid (46.15%) and hyperthyroid patients were zero. Similar opinion (52.15%) was sub clinical hypothyroid, 47.85% were hypothyroid and none were hyperthyroid was given by Lakshmi S et al and Strickland DM et al and other experts.<sup>[9,10]</sup>

Out of 113 patients with hypothyroidism, 38 patients had regular cycles (33.6%). Eight patients had amenorrhea (7%), 28 patients had polymenorrhea and menorrhagia (24.7%). Oligomenorrhea was seen in 39 cases (34.7%). This study is in consistent with Joshi JV et al which demonstrated that 68.2% had menstrual irregularities.<sup>[11]</sup>

Out of four patients with hyperthyroidism, three patients had regular cycles (75%) and one patient with irregular cycles (25%). This is similar to the recent study done by Krassas GE et al showing 21.5% patients with irregular cycles and none had amenorrhea.<sup>[12]</sup>

Out of 113 hypothyroid patients 81 patients have conceived (71.6%) after the treatment for six weeks to one year. Similarly Verma I et al had demonstrated 76.6% conception rate in hypothyroid infertile patients.<sup>[13]</sup>

**Conclusion:** We conclude that irrespective of any cause, thyroid profile has to be carried out in all infertile women before any invasive procedure, as they can be corrected and cured medically which is

boon to low socio economic group, as the most of our population belong to low socio economic group.

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