

Study of Thyroid Profile in Infertile Women

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Abstract: Infertility is the inability of a couple to conceive for more than a year of having regular unprotected intercourse. It can be divided into two broad categories – primary and secondary infertility. Primary infertility refers to the inability to ever have a child. Secondary infertility refers to those cases where people have had children but fail to conceive after that. An average estimate suggests that 60-80 million couples suffer from infertility, out of which 15-20 million couples belong to India. Thyroid hormones are essential for normal growth, sexual development and reproductive function. Thus thyroid dysfunctions may have a great impact on fertility in females.

Aim: To study the thyroid profile in infertile women.

Materials and Methods: A total of 216 subjects comprising of 116 infertile women as cases and 100 age matched healthy euthyroid fertile women as controls were included in the study.

Results: Mean serum T3 and T4 were significantly increased ($p < 0.01$), while TSH levels were significantly decreased ($p < 0.01$) in hyperthyroid and reverse was happened in hypothyroid cases when compared to controls.

Conclusion: The study indicates association of thyroid dysfunction in infertility. Subclinical thyroid dysfunction was dominant thyroid disease in infertile women. Thyroid profile should be kept in consideration during the diagnosis and management of infertility.

Keywords: Infertility, thyroid dysfunction, thyroid profile, subclinical hypothyroidism.

I. Introduction

Infertility is the inability of a couple to conceive for more than a year of having regular unprotected intercourse. It can be divided into two broad categories – primary and secondary infertility. Primary infertility refers to the inability to ever have a child. Secondary infertility refers to those cases where people have had children but fail to conceive after that. An average estimate suggests that 60-80 million couples suffer from infertility, out of which 15-20 million couples belong to India. It is estimated that 1 out of 3 times, infertility of a couple is due to a problem with woman's fertility. Many couples could have more than one cause of infertility and therefore require a number of tests to determine the underlying cause.

Undiagnosed and untreated thyroid disease can be a cause for infertility. This condition has important medical, economical, and psychology implications in our society. Thyroid dysfunction can affect fertility in various ways resulting in anovulatory cycles, luteal phase defect, high prolactin (PRL) levels, and sex hormone imbalances. Therefore, normal thyroid function is necessary for fertility, pregnancy, and to sustain a healthy pregnancy, even in the earliest days after conception. Thyroid evaluation should be done in any woman who wants to get pregnant with family history of thyroid problem or irregular menstrual cycle or had more than two miscarriages or is unable to conceive after 1 year of unprotected intercourse.

Prevalence of thyroid dys-function in the reproductive age group is 2–4% and has been shown to be the cause of infertility and habitual abortion. This can be easily detected by assessing T₃, T₄, and TSH levels in the blood. A slight increase in TSH levels with normal T₃ and T₄ indicates subclinical hypothyroidism whereas high TSH levels accompanied by low T₃ and T₄ levels indicate clinical hypothyroidism. Subclinical hypothyroidism is more common. A slight decrease in TSH levels with normal T₃ and T₄ indicates subclinical hyperthyroidism whereas two TSH levels accompanied by low T₃ and T₄ levels indicate clinical hypothyroidism. Subclinical hyperthyroidism is more common. Sub-clinical condition cause infertility and miscarriages . It can cause anovulation directly or by causing elevation in Prolactin levels. It is extremely important to diagnose and treat the subclinical cases for pregnancy and to maintain it unless there are other independent risk factors.

II. Materials And Methods

The study was conducted for four months duration i.e. from Jan'14 to April'14. For this study women of age group 20–40 years were taken. Nearly 116 cases of thyroid dysfunction were compared with 100 normal individuals. Out of 116 cases, 58 were hypothyroid and 58 were hyperthyroid cases. In our study, both sub-clinical hypothyroid and sub-clinical hyperthyroid were predominant.

Infertile women having tubular blockage, endometriosis on diagnostic laparoscopy, pelvic inflammatory disease, or hysteroscopy and with genital TB, with liver, renal or cardiac diseases; those already on treatment for thyroid disorders or hyperprolactinemia; or cases where abnormality was found in husband's semen analysis also were excluded from the study.

Thyroid status was evaluated by measuring serum T3, T4 and TSH by immunoassay method. Normal T3, T4, and TSH levels were 0.8–1.90 ng/ml, 5-13µg/dl and 0.4-5.5µIU/ml respectively, as per kit supplier's instruction.

III. Results

The present study includes 116 infertile women as cases and 100 age matched healthy fertile women as controls. Most of the patients were in the age group of 24 – 28 years and the average duration of infertility was 5 years or less.

Table 1, shows comparison of sub-clinical hypothyroid cases with controls. Serum T3 and T4 levels were found to be normal and serum TSH levels were found to be significantly increased in sub-clinical hypothyroid cases compared to controls (p<0.01).

Table 2, shows comparison of clinical hypothyroid cases with controls. Serum T3 and T4 levels were found to be significantly decreased and serum TSH levels were found to be significantly increased in clinical hypothyroid females compared to controls (p<0.01).

Table 3, shows comparison of sub-clinical hyperthyroid cases with controls. serum T3 and T4 levels were found to be normal and serum TSH levels were found to be significantly decreased in sub-clinical hyperthyroid females compared to controls (p<0.01).

Table 4, shows comparison of clinical hyperthyroid cases with controls. serum T3, T4 levels were found to be significantly increased and serum TSH levels were found to be significantly decreased in sub-clinical hyperthyroid females compared to controls (p<0.01).

Table 5, summarizes the percentage prevalence of thyroid dysfunction. Out of 116 patients, 58(50 %) infertile women had increased TSH (>5.5µIU/ml) and 58(50 %) infertile women had decreased TSH levels (<0.4µIU/ml). Depending on the T3 and T4 levels, all the 116 thyroid dysfunction cases were further subdivided into clinical or subclinical thyroid dysfunction, which showed 21 % clinical hypothyroidism, 29 % subclinical hypothyroidism, 13 % clinical hyperthyroidism while 37 % were of subclinical hyperthyroidism.

Table 1Thyroid profile in sub-clinical hypothyroid case and control group

Parameter	Sub-clinical hypothyroid Cases (n = 34)	Controls (n = 100)
T3(ng/ml)	1.04 ± 0.31	1.347 ± 0.366
T4(µg/dl)	8.644 ± 1.939	10.8 ± 1.304
TSH(µIU/ml)	13.076 ± 6.4747	2.2 ± 1.4

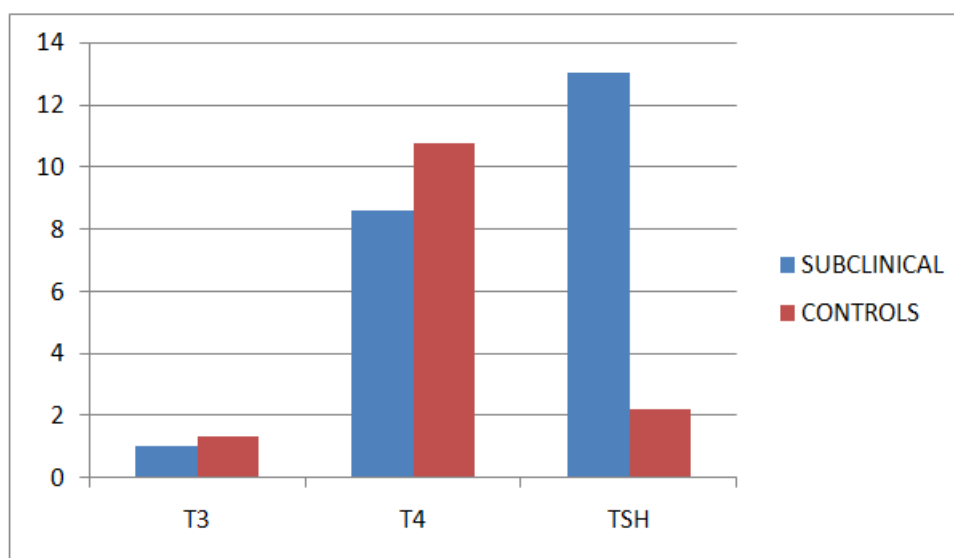


Table 2 Thyroid profile in clinical hypothyroid case and control group

Parameter	Clinical hypothyroid Cases (n = 24)	Controls (n = 100)
T3(ng/ml)	0.44 ± 0.48	1.347 ± 0.366
T4(µg/dl)	2.634 ± 2.711	10.8 ± 1.304
TSH(µIU/ml)	32.683 ± 10.909	2.2 ± 1.4

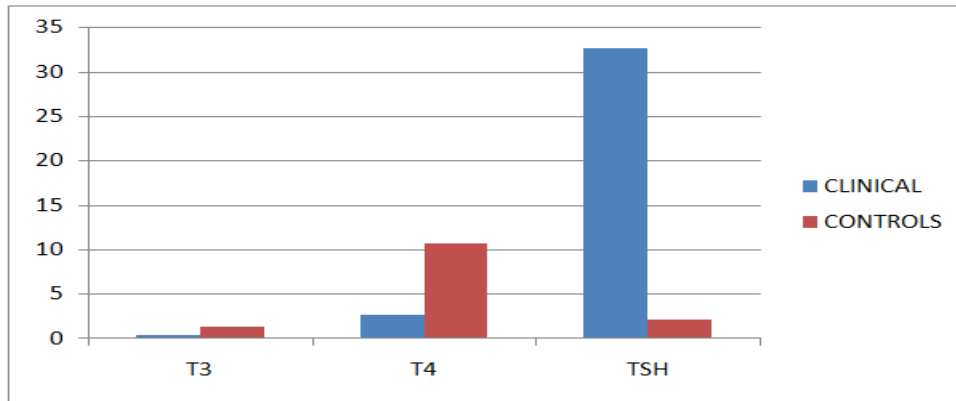


Table 3 Thyroid profile in sub-clinical hyperthyroid case and control group

Parameter	Sub-clinical hyperthyroid Cases (n = 43)	Controls (n = 100)
T3(ng/ml)	1.26 ± 0.4	1.347 ± 0.366
T4(µg/dl)	10.37 ± 1.533	10.8 ± 1.304
TSH(µIU/ml)	0.2107 ± 0.0948	2.2 ± 1.4

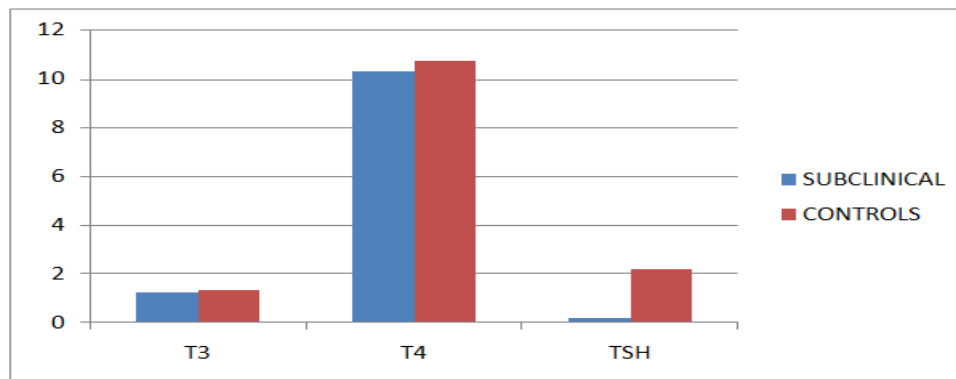


Table 4 Thyroid profile in clinical hyperthyroid case and control group

Parameter	Clinical hypothyroid Cases (n = 15)	Controls (n = 100)
T3(ng/ml)	2.33 ± 0.32	1.347 ± 0.366
T4(µg/dl)	14.48 ± 1.047	10.8 ± 1.304
TSH(µIU/ml)	0.106 ± 0.0783	2.2 ± 1.4

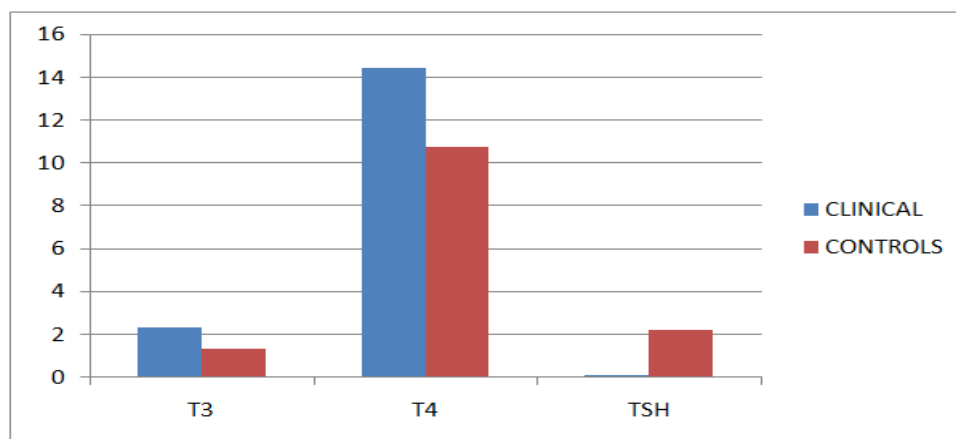


Table 5 Percentage prevalence of thyroid dysfunction in infertile group

Type of the cases	No of cases	Percentage
Clinical hypothyroidism	24	21
Subclinical hypothyroidism	34	29
Clinical hyperthyroidism	15	13
Subclinical hyperthyroidism	43	37

IV. Discussion

Female infertility occurs in about 37% of all infertile couples and ovulatory disorders account for more than half of these. Thyroid hormone have profound effects on reproduction and pregnancy. Both subclinical hyperthyroidism and subclinical hypothyroidism are increasingly being recognized as having significant health implications. In both the conditions, the serum concentration of circulating thyroid hormones, T3 and T4 are within the normal reference ranges. TSH levels are low or suppressed in subclinical hyperthyroidism and elevated in subclinical hypothyroidism .

In the present study, there is statistically significant increase in mean serum T3 and T4 and decrease in TSH levels in infertile women when compared to controls. Sub-clinical hyperthyroidism (37%) was more prevalent than sub-clinical hypothyroidism (29%) in our study. This is in accordance with the report of Singh et al . The prevalence of thyroid dysfunction in infertile women was found to be 33.3% in a study by Rahman et al, and 23% by Sharma et al.

In our study, thyroid dysfunction was present in 53% of the infertile women. It is obvious from the observation that fertility of female reproductive system is hampered by altered thyroid hormone levels. In our study, 29 % infertile women were suffering from subclinical hypothyroidism. Subclinical hypothyroidism was more common than clinical hypothyroidism in the present study, which is in accordance with Verma et al.

TSH levels in the narrower range should not be ignored in infertile women who are otherwise asymptomatic for clinical hyperthyroidism. This group of infertile women carefully diagnosed and treated. For better management of infertility case, we should plan further studies with the large sample size and investigate the beneficial effect of drug treatment by long-term follow-up, which are necessary to validate the variation in T3, T4 and TSH levels. In addition to thyroid profile other endocrine hormones like prolactin should be considered in infertility.

V. Conclusion

Our study reveals that subclinical thyroid dysfunction is more prevalent than overt thyroid dysfunction in infertile women. Hyperthyroidism seems to be dominant thyroid dysfunction in infertile women. These disorders may lead to menstrual irregularities and anovulation resulting in infertility. Hence, estimation of serum T3, T4 and TSH levels should be included in the infertility workup. The patient may be treated accordingly with medications and can revert back to the fertile state.

Acknowledgment

We would like to thank Dr. Sudheer babu, Sri M.S.V. Chalam and the technical staff for their co-operation.

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