Research Article

A study of thyroid profile in primary infertility

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Abstract

Infertility is defined as inability of a couple to achieve conception after 1 year of unprotected coitus. 10 to 15% of marriages contracted by men and women prove to be childless. Hormonal conditions like hypothyroidism are one of the etiological factors responsible for female infertility. The aim of the present study was to determine the incidence and prevalence of thyroid dysfunction in patients seeking treatment of infertility. 50 women subjects and 50 controls were selected for the study in the age group 19 years to 35 years. Serum T_3, T_4 and TSH levels were estimated in both population. It was found that the levels of serum TSH were increased significantly and serum T_4 levels were decreased significantly in the study group compared to the controls.
Keywords: Primary infertility, Hypothalamic- pituitary gonadal axis, T_3, T_4, TSH.

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INTRODUCTION

The desire of women for children is sometimes stronger than self-interest in beauty and figure and may be stronger than dreams of career. Childlessness may severely affect the couples psychological harmony, sexual life and social function. Infertility is defined as inability of a couple to achieve conception after 1 year of unprotected coitus.[1] Primary infertility due to female etiology is much more (40-55%) compared to male etiology.[2] The intactness of Hypothalamic- pituitary gonadal axis is must for fertility. The complex processes of reproduction might be affected at a variety of sites on which thyroid function has an influence.[3] Hormonal conditions like hypothyroidism is one of the etiological factors responsible for female infertility.[4] The cycle is anovulatory in patients of hypothyroidism which may be due to[5,6]

1. Absent midcycle gonadotropin surge.
2. Progesterone is low throughout the cycle.
3. Estrogen levels are low.
4. Reduction in sex hormone binding globulin (SHBG).
5. Increased metabolic estradiol clearance and increased estriol formation.
6. Enhancement of conversion of androstenendione to testosterone.

MATERIALS AND METHODS

The present study was carried out in the department of biochemistry, Government medical college, Nagpur from January 2004 to March 2005. Patients were selected from those attending the OPD at gynaecology department, Government medical college, Nagpur. 50 women subjects were selected for the study in the age group 19 years to 35 years. 50 controls were selected as same. The study was approved by the Institutional ethics committee. Inclusion criteria consisted of known patients of infertility of age group 19 to 35 years, having H/o infertility of duration more than one year after the marriage, women staying with husband and not using any contraceptives. Patients having history of tubal blockage, gross cervicouterine anomaly, history of tuberculosis or any chronic illness, patients whose husband was either oligospermic or azospermic were excluded from the study. Serum levels of TSH, T_3 and T_4 were estimated in both groups by using kit manufactured by TECO diagnostics.

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OBSERVATIONS AND RESULTS

Table 1: Distribution of study subjects according to age

Age in years	Number of study subjects			
	Controls	Percentage (%)	Patients	Percentage (%)
≤ 20	2	4	7	14
21 to 25	31	62	23	46
26 to 30	14	28	12	24
31 to ≤ 35	3	6	8	16
Total	**50**	**100**	**50**	**100**

Table 2: Studies showing the values of T_3, T_4 and TSH in study subjects (T_3 values are expressed in ng/ml, mean ±SD, T_4 values are expressed in μg/ml, TSH values are expressed in μIU / ml)

Study Subjects	T_3 Mean ± SD	T_4 Mean ±SD	TSH Mean ± SD
Controls	0.83 ±0.18 (0.6 to 1.86)*	7.18 ±2 (4.8 to 12)*	2.20 ± 1.59 (0.4 to 6.0)*
Patients	0.75 ±0.38 (0.6 to 1.86)*	6.00 ±2.88 (4.8 to 12)*	4.91 ± 4.22 (0.4 to 6.0)*
p value	0.1791	0.0197	0.0000

*Normal range as given by M/s Teco Diagnostics, USA in the literature of their reagent kits.
p value< 0.05- Statistically significant
p value<0.001- Statistically highly significant
p value>0.05- Not significant.

Table No.2 shows that though there is not a much pronounced difference between the circulating serum levels of T3 in control and in infertile women, they vividly and drastically differ in their T4 and TSH levels. The circulating mean TSH levels in infertile women was found to be significantly increased i.e. more than double that of the controls; while the mean T4 levels were significantly less in the infertile women as compared with that of the controls. Thus a relationship between the thyroid function and the infertility is definitely established.

Table 3: Distribution of infertile women according to thyroid status

Thyroid status	Percentage of total cases studied	T3 Mean ± SD	T4 Mean ±SD	TSH Mean ± SD
Controls (n=50)	100	0.83 ±0.18	7.18 ±2	2.20 ± 1.59
Cases Euthyroid (n=30)	60	0.86 ±0.16 #(0.75 to 0.36)	7.12 ±1.91 (6.00 to 2.88)	2.30 ± 1.41 (4.91 to 4.22)
P value	-	p>0.05	p>0.05	p>0.05
Controls (n=50)	100	0.83 ± 0.18	7.18 ± 2	2.20 ± 1.59
Cases Hypothyroid (n=18)	36	0.46 ±0.26** #(0.75 to 0.38)	3.52 ±2.12** (6.00 to 2.88)	4.80 ± 2.83** (4.91 to 4.22)
P value		0.000	0.001	0.000
Control		0.83 ±0.18	7.18 ± 2	2.20 ± 1.54
Cases Hyperthyroid (n=2)	4	1.64 ± 1.37** #(0.75 to 0.38)	11.52 ± 3.75** (6.00 to 2.88)	0.19 ± 2..83** (4.91 to 4.22)
P value		0.000	0.005	0.08

** Highly significant change, * Significant change, # The values in parentness are the figures found in total number of subjects.

Table No. 3 shows that 36% of infertile women had significantly lowered values of both T3 and T4 as compared to normal control and at the same time they had significantly increased TSH values. This shows that the decreased thyroid function does play a role in the total evaluation of infertility of the affected subjects. Amongst the total cases studied only 4% were found to have increased T3 and T4 with significantly decreased TSH values. These results show that hyperthyroidism has profound effect as that of hypothyroidism in the resulting conception of affected women. However incidence of infertility in hyperthyroid patients seems to be much low as compared to the hyporthyroid patients.

DISCUSSION

Infertility may severely affect the couples psychological harmony, sexual life and social function. For diagnosing this disorder it is desirable to establish the functional state of hypothalamic pituitary ovarian (H-P-O) axis. As any thyroid disorder can lead to the defect in reproductive function leading to anovulation, it is essential to do thyroid hormone levels in these patients. In the present study it was found that serum levels of TSH were increased significantly and T_4 were found to be decreased significantly in study group. While there was a non significant reduction in serum T_3 levels. 70% of the infertile women with normal menstruation had abnormal thyroid function as observed during the study. It was seen that 38% of the oligomenorrhic patients were also suffering hypothyroidism. As reported by Nath *et al*[7], 75% of infertile women studied by them having secondary amenorrhea were hypothyroid. Whereas, in our study we have found that 55% of infertile patients with amenorrhea were found to be hypothyroid and 33% were found to be euthyroid while only 12% were found to be hyperthyroid. Results obtained in our study correlated with the studies conducted by Lakshmi Singh *et al*[8], Thomas R *et al*[9] and Lerman *et al*[10].

CONCLUSION

During the present study we found that there is a significant increase in TSH level and decrease in T4 level in the patients of infertility compared to controls. Thus a relationship between the hypothyroid function and infertility is definitely established. We found only 4% cases of hyperthyroid infertile females. Thomas R *et al* have also observed that, except for few severe cases, most patients of hyperthyroidism are ovulatory and fertile. We can conclude from this study that treatable endocrine abnormalities identifiable by direct hormonal assay may occur in a high proportion of female partners of infertile relationship. Considering this medical and social implications of infertility in the society and limited reproductive health resources in the developing country like India, direct hormonal evaluation should be an important part of work up of infertile females.

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