The study of thyroid profile in primary infertile women

Dr. Shilpa Sunil Shende, Dr. Vishakha Vivek Mahajan, Dr. Chandrashekhar M. Iyer, Dr. Sucheta V. Ghule, Dr. Mangesh L. Tekade

Department of Biochemistry, Indira Gandhi Government Medical College, Nagpur, Maharashtra (India)

E mail: drvishakha17@gmail.com, suchetaghule@rediffmail.com, drmangeshtekade@yahoo.com

Name of corresponding author:
Dr. Shilpa Sunil Shende
Mobile: 9372128381

E mail: dr.shilpasshende@yahoo.com

Received 27 August 2015; accepted 23 September 2015

Abstract

Background: Primary infertility is a health issue among women over the world. Thyroid hormones have profound effects on reproduction and pregnancy. Thyroid dysfunction is a condition known to reduce the likelihood of pregnancy and to adversely affect pregnancy outcome. Aim: To assess the incidence and prevalence of thyroid dysfunction in primary infertile women. Materials and methods: A total 100 subjects comprising of 50 primary infertile females as cases and 50 healthy age matched fertile females as controls were included in the study. Serum T3, T4 and TSH levels were estimated in both population. Results: Mean serum T3 and T4 levels were significantly decreased (p<0.05) while serum TSH levels were significantly increased (p <0.05) in primary infertile females when compared to controls. 38% of infertile women were having thyroid dysfunction, out of which 32% were having hypothyroidism while 6% were having hyperthyroidism. Conclusion: The results of present study indicates association of thyroid dysfunction with infertility. Hypothyroidism is the most common thyroid dysfunction found in primary infertile females. Hence assessment of thyroid function should be considered as an important component in infertility work up of women.

© 2015 Universal Research Publications. All rights reserved

Key words: primary infertility, hypothyroidism, hyperthyroidism, thyroid profile.

1. Introduction

Infertility is a complex disorder with significant medical, psychosocial and economic aspects recognized as a public health issue by the World Health Organization (WHO) [1]. About 8-10% of all married couple's worldwide are infertile [2]. Infertility is defined as the inability to conceive after one year of regular intercourse without contraception [3]. The causes of infertility among couples can broadly be subdivided into four categories: female infertility (35%), male infertility (30%), a combination of both (20%), and unexplained or 'idiopathic' infertility (15%) [4,5]. Female causes of infertility comprise of endometriosis, tubal damage, fibroids and ovulatory dysfunction [6,7]. Thyroid dysfunction itself is a condition interfering with normal ovarian function.

There is known association of hyperthyroidism and hypothyroidism with menstrual disturbance and fecundity. Prevalence of hypothyroidism in the reproductive age group ranges from 2% to 4% [8]. Thyroid dysfunction can affect fertility in various ways resulting in anovulatory cycles, luteal phase defect, high prolactin (PRL) levels, and sex hormone imbalances. Several studies have indicated the association of hyperthyroidism or hypothyroidism with delayed onset of puberty, menstrual abnormalities, anovulatory cycles, miscarriages and infertility [9,10]. Therefore assessment of thyroid dysfunction has been considered as an important component in infertility work up of women. Thyroid evaluation should be done in any woman who wants to conceive with family history of thyroid problem or irregular menstrual cycle or had more than two abortions or unable to conceive after 1-year of unprotected intercourse.

Evaluation of thyroid status in the infertile couple is not only important because it is significant and most common but also its treatment is very simple and often has reversible or preventable effect on infertility [11,12]. Hence this study was undertaken to evaluate the role of thyroid profile which includes measurement of serum T3, T4 and TSH in primary...
infertility females.

2. Material and Methods
The case control study was carried out in department of Biochemistry, Indira Gandhi Government Medical College and Hospital, Nagpur from June 2014 to June 2015. The study protocol was approved by the institutional ethical committee. An informed written consent was obtained from all the study subjects who were enrolled in the study. Females which are being examined by the gynaecologist and diagnosed as primary infertility were included in this study. The study included 50 cases which are females between age group 20-35 years, diagnosed as primary infertility and compared with 50 age matched fertile females. The females having tubular blockage, pelvic inflammatory disease, endometriosis, genital TB and those with a history of thyroid disease or a previous thyroid surgery or those who were currently on thyroid medication were excluded from this study.

2.1 Sample Collection and Analysis
Five millilitre fasting venous blood sample was drawn from the subject on day 2 or day 3 of menstrual cycle using standard venipuncture techniques. Sample was allowed to clot for 30 minutes and then centrifuged to obtain clear, transparent serum. The separated serum was analysed for serum T3, T4 and TSH estimation or stored at 2-8°C for maximum period of 5 days if not tested immediately. Serum T3, T4 and TSH levels were estimated by immunoenzymatic method. Before processing the samples, each method was calibrated.

The normal ranges for serum T3, T4 and TSH are as follows:
- T3 = 0.51-1.58 ng/ml
- T4 = 4.7-12.8 ug/dl
- TSH = 0.39-3.45 uIU/ml

To calculate the prevalence of hyperthyroidism and hypothyroidism serum TSH level was considered. When serum TSH was <0.39 μIU/ml hyperthyroidism was diagnosed. When serum TSH was >3.5 uIU/ml hypothyroidism was diagnosed.

2.2 Statistical Analysis
The statistical analysis was done by using the graph pad prism software. The data was presented as Mean ± SD and analyzed by using the unpaired “t” test. p value of <0.05 was considered to be statistically significant.

3. Results
The present study includes 100 subjects comprising of 50 primary infertile females as cases and 50 age matched healthy fertile females as control. Most of the patients were in the age group of 25-30 years. As shown in table 1 serum T3 and T4 levels were found to be significantly decreased in infertile females as compared to controls (p<0.05). Serum TSH levels were found to be significantly increased in infertile females as compared to controls (p<0.05).

Table 1: Thyroid profile in cases and control

<table>
<thead>
<tr>
<th>Thyroid status</th>
<th>T3 (ng/ml)</th>
<th>T4 (ug/dl)</th>
<th>TSH (uIU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertile females(control)  (n = 50)</td>
<td>1.18±0.34</td>
<td>9.29 ± 2.14</td>
<td>2.27 ± 1.32</td>
</tr>
<tr>
<td>Primary infertile females (cases) (n = 50)</td>
<td>0.64 ± 0.23</td>
<td>5.93 ± 3.18*</td>
<td>8.36 ± 2.13*</td>
</tr>
</tbody>
</table>

*p value <0.05 is considered as highly significant

Table 2: Percentage prevalence of thyroid dysfunction in infertile females

<table>
<thead>
<tr>
<th>No. of cases</th>
<th>Hypothyroidism</th>
<th>Hyperthyroidism</th>
<th>Euthyroidism</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>16(32%)</td>
<td>3(6%)</td>
<td>31(62%)</td>
</tr>
</tbody>
</table>

4. Discussion
The common endocrine disorders resulting in infertility are hyperprolactinemia, hypothyroidism, hyperthyroidism, polycystic ovary syndrome, diabetes mellitus, cushings syndrome and inadequate corpus luteum. Among these thyroid disorders are very important as incidence of subclinical hypothyroidism in ovulatory dysfunction women is 11.3% [13]. Thyroid hormones have profound effects on reproduction and pregnancy. Thyroid dysfunction is implicated in a broad spectrum of reproductive disorders, ranging from abnormal sexual development to menstrual irregularities and infertility [14,15].

In the present study serum T3 and T4 levels were found to be significantly decreased in infertile females as compared to controls (p<0.05) and serum TSH levels were found to be significantly increased in infertile females as compared to controls (p<0.05). These results are in accordance with Sharma et al [16], Lakshmi et al [17], Rijal et al [18], Munghate et al [19]. In our study we also observed that out of 50 primary infertile females, 16(32%) women had hypothyroidism, 3(6%) women had hyperthyroidism and 31(62%) women had euthyroid state. This is similar to observation made by Sharma et al [16]. The prevalence of hypothyroidism in this age group was about 2-4 %[8] which is found to be 26% by Sharma et al[16], 23.9% by verma etal[20], 18% by Nemade et al[21], 20% by Rijal et al[18] while in our study this prevalence is found to be 32%. Hypothyroidism is commonly associated with ovulatory dysfunction due to numerous interactions of thyroid hormones with the female reproductive system. It is associated with increased production of TRH, which stimulates pituitary to secrete TSH and PRL. Hyperprolactinemia adversely affects fertility potential by impairing GnRH pulsatility and thereby ovarian function [12,22]. Another pathway through which hypothyroidism may impact on fertility is by altering the peripheral metabolism of oestrogen and by decreasing SHBG production.

Overall prevalence of hypothyroidism in our study was found to be 6%. This prevalence was found to be 3.1% by Sharma et al[16], 8% by Goswami et al[23], 5.8% by Joshi et al[24] and 5.4% by Rijal et al[18]. Hyperthyroidism considered as Euthyroid.
causes change in serum sex hormone binding globulin (SHBG), that results in change in sex hormone concentration. Changes in sex hormone concentration including LH and FSH results in menstrual disturbances such as oligomenorrhea, hypomenorrhea and anovulation [24-26]. Majority of patients (31(62%)) were in euthyroid state which shows that in these females infertility may be due to other causes. This result is also in accordance to Sharma et al[16]and Goswami et al[23]. Thyroid dysfunction is a common cause of infertility which can be easily managed by correcting the appropriate levels of thyroid hormones. This group of infertile women, if only carefully diagnosed and treated can benefit a lot rather than going for unnecessary battery of hormone assays and costly invasive procedures.

5. Conclusion
Our study reveals that hypothyroidism is an important emerging cause of primary infertility. Proper management of hypothyroidism can result regain of fertility. Therefore assessment of thyroid function should be considered as an important component in screening of infertile patients.

6. References
25. Benson RC, Dailey ME. The menstrual pattern in hyperthyroidism and subsequent post therapy hypothyroidism. Surg Gynecol Obstet1955;100:19-26