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TSH & prolactin versus LH & FSH: a dialemma in hormone assay for patients with primary or secondary infertility in a tertiary care hospital in Bangladesh

Abstract

Objectives: To evaluate hormonal profile of infertile women those who undergone diagnostic laparoscopy.

Materials and Methods: This prospective observational study was carried out in the Centre for Assisted Reproductive Technique (CARE), Department of Obstetrics and Gynaecology, BIRDEM General Hospital, Dhaka, Bangladesh over the period of two years from July 2010 to July 2012. This study included 200 patients suffering from infertility and needed diagnostic laparoscopy for further management.

Results: All patients were divided in 2 groups with 100 in each group. 85 (45.2%) patients were found to have altered LH: FSH ratio. Polycystic ovarian syndrome (PCOS) was found almost equal in number in both groups. Mean±SD in case of serum TSH was 2.42±2.18 in primary infertility and 12.13±38.79 in secondary infertility patients. S. TSH was significantly higher in secondary in fertility patients. P-value was 0.003 which was statistically significant. Ninteen (11.5%) patients had raised TSH among PCOS patients. Hyperprolactinemia was detected in 21 (14%) patients with PCOS.

Conclusion: Apart from measuring serum FSH and LH, it is useful to measure serum TSH and prolactine in a patient with infertility, so that any other hormonal disorders can be detected early and treated effectively.

Keywords: infertility (primary, secondary), PCOS

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Introduction

Infertility is defined as inability of a couple to conceive within a certain period of time one to two years of frequent unprotected intercourse.[1] It is seldom a physically debilitating disease, but couple's psychosocial harmony is severely affected. The important causes of infertility in female are tubal and peritoneal factors (25-35%), ovulatory factors (30-40%), endometriosis (1-10%).[2] Among the ovulatory factors polycystic ovarian syndrome is an important cause of infertility. Polycystic ovarian syndrome (PCOS) affects 4% to 12% of women of reproductive age.[3] This syndrome can result from abnormal function of the hypothalamic-pituitary-ovarian (HPO) axis. It is associated with important reproductive morbidity including infertility, secondary amenorrhoea and increased pregnancy loss.

Hypothyroidism comprises 2–4% of reproductive age group and has been shown to be the cause of infertility and habitual abortion.[4,5] Moreover, hypothyroidism can initiate, maintain or worsen PCOS. Hence, many studies are done from various parts of the world regarding thyroid disorders in PCOS patient. They have tried to explore the PCOS and thyroid co-relation. Mostly, the results showed higher incidence of elevated Thyroid Stimulating Hormone (TSH) levels and four times higher prevalence of autoimmune thyroiditis in PCOS patients [6]. Again, it is also evident from different study that routine screening for thyroid dysfunction in hyperandrogenic patient is of little value since the incidence of these disorders is not higher in hyperandrogenic patients than in normal women of child bearing age.[7]

Another hormonal dysfunction such as hyperprolactinemia is frequently reported with PCOS are two main diagnostic criteria of PCOS are oligomenorrhea and clinical or biochemical hyperandrogenism but for confirmation of diagnosis other causes such as hyperprolactinemia should be ruled out.[8–11] Hyperprolactinemia is common in women with clinical presentation of hyperandrogenic symptoms as well as menstrual disturbances and the diagnosis of PCOS cannot be worthwhile in these women.[11–13]

With this view, our study has been scrutinized to investigate the prevalence of thyroid and Prolactine hormone abnormalities in PCOS patients besides doing hormone-profile of infertility patients attending a tertiary care hospital.

Materials and methods

This prospective observational study was carried out in the Centre for Assisted Reproductive Technique (CARE), Department of Obstetrics and Gynaecology, BIRDEM General Hospital, Dhaka, Bangladesh over the period of two years from July 2010 to July 2012. This study includes 200 patients suffering from infertility undergoing diagnostic laparoscopy. Women with endometriosis, bilateral tubal block, uncontrolled diabetes mellitus, diagnosed cases of thyroid disorders and male factor infertility were excluded from the study. 100 patients were belonging to both primary and secondary infertility group. Verbal consent from each patient was obtained. Ethical issues were taken into account. After taking history with particular attention

to aspects relevant to this study, clinical and pelvic examination was done. Ultrasonography(USG) of lower abdomen and serum level of leutinizing hormone(LH), follicular Stimulating hormone (FSH), thyroid stimulating hormone (TSH), prolactine were done. Fasting blood samples were collected and fresh samples were centrifuged. Serum hormones were evaluated using chemiluminescent microparticle immunoassay. The diagnosis of PCOS was fulfilled when two of the following three clinical features were present: clinical or biochemical evidence of hyperandrogenism, chronic anovulation, and USG imaging of polycystic ovaries.

Results

The total number patients were 200 with mean age of 27.0±5.6 years. From Table 1 we can see most of the patients are within age range of 20-30 years. In Table 2, it is evident that altered LH: FSH level was found in 85(45.2%) patients. PCOS was found to have almost equal distribution among both primary and secondary infertility patients. Mean level of serum LH was 10.66±18.90 in primary infertility patients and 10.92±18.98 in secondary infertility patients. Serum FSH had a mean level of 13.74±63.07 in primary and 9.74±18.50 in secondary infertility patients. Mean± SD in case of serum TSH was 2.42±2.18 in primary infertility and 12.13± 38.79 in secondary infertility patients. Serum TSH was significantly higher in secondary infertility patients. 19(11.5%) patients were hypothyroid among PCOS patients. Mean level of serum TSH was 5.58±21.7 among the PCOS patients. Hyperprolactinemia was detected in 21 (14%) patients with PCOS.

Table 1 Age distribution in study subjects (n=200)

Age	Primary infertility	Secondary infertility
20-30	63(31.5%)	56(28%)
>30	35(17.5%)	44(22%)

Table 2 Hormone level in study subjects (n=200)

Hormones	Primary infertility	Secondary infertility	P value
Serum LH	10.66±18.90	10.92±18.98	0.919NS
Serum FSH	11.17±18.74	9.74±18.50	0.656NS
Serum TSH	2.42±2.18	12.13±38.79	0.001*
Serum Prolactin	232.13±178.90	257.77±172.30	0.501NS

Discussion

In this study, we have aimed to determine the hormonal profile of infertile women undergoing diagnostic laparoscopy as well as the presence of other hormonal abnormalities associated with PCOS. Measurement of hormone level is an essential part of investigation of infertility. Measurement of serum LH and serum FSH is done invariably in all infertile patients especially those with irregular menstruation. Most common hormonal disorder observed in female infertile patient is polycystic ovarian syndrome (PCOS). The findings of one large series of 1700 women with PCOS shown to have serum LH concentration was significantly higher in primary infertility women than those of secondary infertility.[14] In our study, mean level of serum LH was 10.66±18.90 in primary infertility patients and 10.92±18.98 in secondary infertility patients, which was almost equal in both groups.

In this study of 200 infertile women, among them, LH: FSH level was found to be altered in 85 (45.2%) patients. PCOS was found to have almost equal distribution among both the groups. Ramanand et al.[15] has shown in their study of 102 Indian PCOS women had high LH: FSH ratio, about in 39.21% of women.[15] Also the occurrence of low levels of FSH and higher LH: FSH ratio was very frequent. The pulse frequency of gonadotrophins releasing hormone (GnRH) signifies the preferential production of LH via high frequency pulses and FSH via low frequency pulses in normal adult women. Progesterone is the regulator of pulse frequency in presence of estradiol. Increased progesterone production by corpus luteum slows LH pulse frequency to favor FSH production. This in turn is responsible for follicular development for the next menstrual cycle. Women with PCOS have abnormally rapid LH pulses with reduced response to progesterone feedback, which in turn leads to elevations in LH:FSH ratios.[16] Hayes et al.[17] concluded that the data of their study on the assessment of neuroendocrine and androgen dynamics showed that the enhanced pituitary sensitivity is responsible for the elevated LH amplitude in PCOS.[17]

Hypothyroidism can be easily detected by assessing TSH levels in the blood. When TSH level is slightly increased with normal T3 and T4, it indicates subclinical hypothyroidism whereas when high TSH levels accompanied by low T3 and T4 levels indicate clinical hypothyroidism.[18] Increased production of thyroid releasing hormone (TRH) in hypothyroidism stimulates pituitary to secrete TSH and Prolactine (PRL). Hyperprolactinemia adversely affects fertility by interfering with GnRH pulsatility and thereby ovarian function.[19–21] Gynecologists mostly check TSH and PRL levels in every infertile female, regardless of their menstrual rhythm. Table 1 shows mean serum TSH was 2.42±2.18 in primary infertility and 12.13±38.79 in secondary infertility patients. Serum TSH was significantly (P value<.0001) higher in secondary infertility patients. Verma et al.[22] shown in their study the prevalence of hypothyroidism was 23.9%.[22] Sinha et al.[23] has shown in her study that PCOS patients have higher mean TSH level than control group (4.547±2.66 and 2.67±3.11 respectively; $P<0.05$).[23] In our study we found only 19 patients had raised TSH level.

Raised Prolactine level is often associated with hypogonadism and menstrual irregularities in women. In our study, most of our patients had normal Prolactine level. Mean Serum Prolactine level was 232.13±178.90 in primary infertile women and 257.77±172.30 in secondary infertile women. Hyperprolactinemia was depicted in 41% of the infertile women while it was only 15% in the control group in a study of Binita et al.[24]

Mild hyperprolactinemia has been reported in 5% to 30% of patients with PCOS.[25,26] Rittmaster[27] showed in his study prolactine is generally only 50% above the upper limit of normal.[27] Furthermore, hyperprolactinemia is most often transient, with almost 3% to 7% of hyperprolactinemic PCOS patients having persistently elevated prolactine levels.[28] In our study we found hyperprolactinemia in 21 (14%) patients. Though it is now felt that PCOS and hyperprolactinemia are independent disorders, if normalization on re-sampling does not occur, then an assessment for other causes should be undertaken (including pituitary magnetic resonance imaging).

Conclusion

Though theoretically in regards to infertility due to PCOS, LH, FSH or prolactin are important biochemical parameters for the diagnosis of PCOS. Now a days it is said that hypothyroidism has got

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no association with PCOS but even then it seems that it is a front-liner particularly for the patients with secondary infertility and its raised level alone with clinical suspicion marks another check in favor of PCOS.

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None.

Conflicts of interest

The authors declare there is no conflict of interests.

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