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Evaluation of thyroid and prolactin levels and its correlation in patients with Infertility

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Abstract
Aims and Objectives: To find out the incidence of hyperprolactinemia and hypothyroidism in infertile women and to determine the correlation between hyperprolactinemia and thyroid dysfunction in infertile women.
Material: 100 infertile women attending the outdoor Department of Obstetrics &Gynaecology of Era's Lucknow Medical College and hospital were enrolled and those fulfilling the inclusion criteria and giving consent were included in the study.
Results: Out of 100 women 52 women belonged to primary infertility and 48 belonged to secondary infertility. Oligomenorrhoea was the commonest menstrual complaint in 52.6% of the women .Galactorrhea was present in only 5% of the infertile women. The incidence of hyperprolactinemia in the infertile women was 26% and the incidence of hypothyroidism was 22%.
Conclusion: There is a high incidence of hyperprolactinemia in infertile women. A positive correlation was found between hypothyroidism and hyperprolactinemia. Women having hyperprolactinemia were 5.48 times as likely to suffer from hypothyroidism compared to those having normal prolactin level.

Keywords: infertility, hyperprolactinema, hypothyroidism, galactorrhea

Introduction

Infertility is a relatively common problem that affects the couples involved. It is clearly a major event and is often perceived as a crisis. Infertility threatens many aspects of a couple's life.

A majority of the women with hyperprolactinemia are women in reproductive age seeking health age for menstrual disorders or infertility. Hyperprolactinemia results in secondary hypogonadism and usually presents in a dimorphic fashion in females. Estimation of serum prolactin level is recommended in women with unexplained infertility, any menstrual irregularity with or without hirsutism, galactorrhea, with or without amenorrhea, luteal phase defects, anovulation and delayed puberty. Infertile women with regular menses may also have hyperprolactinemia. While hyperprolactinemia may be suspected in women with reproductive dysfunctions or galactorrhea, the diagnosis is essentially based on the estimation of serum prolactin level. The normal level of prolactin is 3-25 ng/ml. The increase in prolactin secretion can be physiological or pathological. Hyperprolactenimia with serum prolactin level 100mcg/l is due to pituitary disorder [1].

Thyroid dysfunction is known to reduce the likelihood of pregnancy. Hypothyroidism can affect fertility in a number of ways. It can lead to anovulatory cycles, luteal phase defects, elevated prolactin levels and a cascade of hormonal problems like decreased sex hormone binding globulin (SHBG), estrogen dominance and progesterone deficiency. Some of the women with galactorrhea and hyperprolactinemia may also present with hypothyroidism. The disease is characterized by low serum levels of thyroxin and decreased negative feedback on the hypothalamo-pituiatry axis. The resulting increased secretion of thyrotropin releasing hormone stimulates thyrotrophs and lactotrophs, thereby increasing the level of both TSH and prolactin [2].

Hypothyroidism and hyperprolactinemia are found to be closely interrelated. In hypothyroidism the decreased feedback of thyroid hormone on the hypothalamus results in elevated thyrotropin releasing hormone (TRH) level. TRH then binds to the lactotroph and it further stimulates the release of prolactin. Subclinical hypothyroidism associated with hyperprolactinemia is also frequently reported. It has also been noted that once patient's hypothyroidism is treated, the increased prolactin level also tends to decrease.

Methods

This study was conducted over duration of 18 months in the year 2016, 2017 on 100 infertile women who came in out-patient Department of Obstetrics and Gynecology at Era's Lucknow Medical college and hospital Lucknow.

Inclusion Criteria

Infertile female, age between 20-40 years

Exclusion Criteria

Male infertility

Those already on medication for hypothyroidism, hyperthyroidism and hyperprolactinemia

A detailed history was taken as per the Proforma which included the patient's obstetric, menstrual, drugs, surgical and medical history. A detailed physical examination was conducted which included general physical examination, examination of the thyroid gland and the breasts, examination of external female genitalia and a per speculum and per vaginal examination. Following these preliminary examination the following investigations were done.

Estimation of Serum prolactin and thyroid level by ELISA method was done in the Biochemistry laboratory of Era's Lucknow medical college and hospital.

Five milliliters of fasting venous sample was obtained for serum biochemical analysis. Serum was separated and stored for further analysis at college and hospital. The normal range of serum Prolactin levels in women of the reproductive age group is between 3.0— 25 ng/ml. All women with serum prolactin levels above 25ng /ml were considered to be hyperprolactinemic.

The normal range of serum TSH, T3 T4 levels to be considered in our study are TSH (0.4-4.2), T3 (0.52-1.85), T4 (4.8-11.6). Hypothyroidism was considered to be present in women with high TSH levels of more than 4.2 mIU/L (3)

Other investigations which were done were

- LH, FSH
- TLC,DLC,
- ESR, Chest X-ray
- HSG
- Husband's semen analysis
- Ultrasonography of pelvic organs to rule out any pathology or anomaly of female genital tract.
- Diagnostic laparoscopy and CT-Scan/MRI done when indicated.

Results

Out of total 100 infertile women, 52 belonged to primary infertility and 48 belonged to secondary infertility. Majority of the infertile women (45%) were in the age group of 28-32 years whereas only 4 were in the age group of 38-42 years(Table 1). 55% of the infertile women had duration of infertility of less than 3 years. The incidence of hyperprolactinemia in the infertile women of our study is 26% while 74 % of women had prolactin levels within the normal range. (Table 2). Table 3 shows serum prolactin levels in primary and secondary infertility. In primary infertility 38(73.07%) women had normal serum prolactin levels whereas 14 women (29.92%) presented with hyperprolactinemia. In the secondary infertility group 12(25%) had hyperprolactinemia whereas 36975%) women had normal serum prolactin levels. The incidence of hypothyroidism in infertile women in our study is 22%; 77 % of the infertile women were euthyroid, and 1 % of the women presented with hyperthyroidism (Table 4). 42 (80.7%) women in the primary infertility group and 35 (72.9%) women of the secondary infertility group had serum TSH level between 0.2-4.2ng/ml.12% percent of the infertile women had both hyperprolactinemia and hypothyroidism. 12 out of 26 hyperprolactinemic women had hypothyroidism and 12 out of 22 hypothyroid women had hyperprolactinemia (Table 5). It means the women having hyperprolactinemia were 5.48 times (odd s ratio – 5.48) as likely to suffer from hypothyroidism compared to those having normal prolactin levels.

Table 1: Distribution of cases according to age

Age (in years)	No.of cases	% percentage
18-22	20	20
23-27	9	9
28-32	45	45
33-37	22	22
38-42	4	4
Total	100	

Table 2: Distribution of cases according to Serum Prolactin levels

Sl. No.	Serum Prolactin Level	Number (n=100)	Percentage (%)
1	Normal prolactin	74	74%
2	Hyperprolactinemia	26	26%

Table 3: Distribution of cases according to serum prolactin level and type of infertility

Sl. No	Total no. of cases	Serum prolactin level	Type of infertility			
			Primary n=52	%	Secondary n=48	%
1	74	Normal	38	73.07	36	75
2	26	Hyperprolactinemia	14	26.92	12	25
		Total	52		48	

Chi SQ =0.048, p=0.827

Table 4: Distribution of cases according to TSH level and infertility

Thyroid status	No.of cases	Type of infertility			
		Primary n=52		Secondary	
		no of cases	%	no of cases	%
Hyperthyroid	1	1	1.9	0	0
Euthyroid	77	42	80.8	35	72.9
Hypothyroid	22	9	17.3	13	27.1
Total	100	52	100	48	100

Table 5: Distribution of cases showing correlation of thyroid and prolactin level in infertile women

Serum prolactin level	Thyroid status	
	Euthyroid n= 78	Hypothyroid n=22
Hyperprolactinemia n=26	14	12
Normal prolactin N=74	64	10

Chi SQ=11.9453

A highly significant association was found between the serum prolactin level and thyroid status (p=0.000548). (odd s ratio - 5.48) (Highly significant)

Discussion

Hormonal imbalance is one of the important causes of infertility. There are several health conditions that are specific to the endocrine system of the body. Hyperprolactinemia and hypothyroidism are common endocrine abnormalities that are related to infertility in previous studies.

Hyperprolactinemia induces suppression of the hypothalamic-

pituitary-gonadal axis which results in amenorrhea and lack of ovulation [4]. Our study design consisted of 100 women with complaints of infertility (both primary and secondary) that were included in the study after excluding women with male factor infertility and those already on medication for hypothyroidism, hyperthyroidism and hyperprolactinemia.

In the present study, the maximum numbers (45%) of infertile women (both primary and secondary infertility) were in the age group of 28-32 years followed by 22% of the women who belonged to the age group of 33-37 years. Such findings have also been reported by I Chaudhary. (2015) [5].

In our study design, maximum number of women had duration of infertility of less than 3 years. The mean duration of infertility in case of the primary infertility group was 3.06 ± 0.99 years and the mean duration of infertility in the secondary infertility group was 6.42 ± 2.44 years ($p < 0.001$; high significant). Madhupita Agrawal (2013) [6]. in her study concluded that in primary infertility group, 2 cases had duration of infertility greater than 15 years and in secondary infertility group 3 cases had greater than 15 years duration of infertility.

Majority of the infertile women seeking treatment of infertility also complained of abnormal menstrual patterns. 57% of the infertile women complained of abnormal menses whereas the remaining 43% had no menstrual complaints which is similar to the study conducted by Priyanka Sharma (2017) [7]. subjects in her study 56% had menstrual irregularities.

We detected galactorrhea in 5% of the infertile women. All these women belonged to the primary infertility group. The incidence of galactorrhea in hyperprolactinemic women of our study group (n=26) was 19.2%. priyanka Sharma (2017) in her study concluded Galactorrhoea was seen in 58.53% hyperprolactinemic subjects.

Out of 26 patients with hyperprolactinemia 14 were found in primary infertility group and 12 were found in secondary infertility group. The mean prolactin level in hyperprolactinemic women in our study is 27.83 + 6.71ng/ml. Kaliki Hymavathi (2016) [8] in her study concluded mean Prolactin levels in the Study group 21.84±15.65. In our study out of the 22 women diagnosed with hypothyroidism, 12 that is (54.5%) of the women were found to be hyperprolactinemic whereas 10 (45.4%) women had normal prolactin levels. In the study conducted by Singh *et al*. 57% of the women with hypothyroidism had hyperprolactinemia and hyperprolactinemia in 46.1 % of the infertile women with hypothyroidism [9] In our study, out of 26 women with hyperprolactinemia, 12 (46.15%) were found to have hypothyroidism whereas in women with normal prolactin level, 10 (13.5%) had hypothyroidism.

Shikha Saxena *et al*. (2016) [10] noted a strong positive correlation between serum TSH and prolactin in infertile women. A positive correlation was found between hypothyroidism and hyperprolactinemia in the women of our study design. In fertile women having hyperprolactinemia were 5.48 times as likely to suffer from hypothyroidism compared to those having normal prolactin level.

Conclusion

There is a higher prevalence of hypothyroidism and hyperprolactinemia in the infertile women. Both hypothyroidism and hyperprolactinemia may result in menstrual disorders and ovulatory dysfunctions. Hypothyroidism is commonly associated with hyperprolactinemia and such women exhibit ovulatory failure. Measurement of serum prolactin and TSH level is an important screening procedure in all infertile women particularly with abnormal menstrual patterns. The relatively high occurrence of abnormal TSH and prolactin levels in women with ovulatory dysfunction and oligomenorrhoea emphasizes the importance of their screening in these women.

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