

HORMONAL EVALUATION OF INFERTILE WOMEN IN BORDER GUARD HOSPITAL, PEELKHANA, DHAKA

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Abstract

Introduction: Infertility is very often observed in women. It is the failure to conceive after one year of regular unprotected coitus. Data from population based studies suggest that 10-15% couples in the western world experience infertility. Infertility can be caused by a number of factors. Hormonal problems are amongst the important factors contributing to female infertility.

Aim: The aim of this study was to ascertain the FSH(Follicle Stimulating Hormone), LH(Leuteinizing Hormone), Prolactin, Testosterone, FT₃(Free Triiodothyronine), FT₄(Free Thyroxine), TSH(Thyroid Stimulating Hormone) and Oestradiol levels in infertile women.

Methods: This observational study was carried out over a period of 1 year from June 2012 to May 2013 on 110 infertile women who reported to Gynae OPD(Out-Patient Department) in Border Guard Hospital, Dhaka. Blood samples of the subjects were taken on 2nd day of menstruation of regular menstrual cycle and on first visit of women having irregular menstrual cycle. Different hormonal studies were done by IMMULITE immunoassay. Semen analyses of their husbands were found to be normal. The results obtained were compared with the reference levels.

Results: Among 110 infertile women, 86.37% cases were of primary infertility and 13.63% were

of secondary infertility. In this study on infertile women majority (34.54%) of the cases of infertility were having PCODs(Polycystic Ovary Disease), others were of hypothyroidism (23.6%) and hyperprolactinaemia was found in 19.09% cases. Both PCODs and hypothyroidism were found in 6.36% cases and no abnormality was detected in 16.36% cases. The Mean \pm SD of different hormonal levels were: FSH 2.58 \pm 1.63, LH 10.20 \pm 4.36, prolactin 61.17 \pm 1158 and testosterone 140 \pm 34.22 respectively. The mean \pm SD of measured hormone levels were compared with reference levels of different hormones by using student t test. In case of FSH, LH, TSH, prolactin, testosterone, FT₄ and Oestradiol the difference were statistically significant (P<0.01) but for FT₃ was not statistically significant.

Conclusion: In this study, PCOD was found to be the most common cause of infertility and other causes found were hyperprolactinaemia and hypothyroidism.

Key-words: Infertility, PCODs(Polycystic Ovary Disease) and hormones.

Introduction

Infertility is defined as the inability of a couple to conceive after one year of regular unprotected coitus; primary infertility applies to those who have never conceived, whereas secondary infertility

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designates those who have conceived at some time in the past¹. The prevalence of infertility in women is approximately 13%, with a range from 7-28%, depending on the age of women. Conception normally is achieved within 12 months in 80-85% of couples who use no contraceptive measures. Females presenting after this time should therefore be regarded as possibly infertile and should be evaluated. Data available over the past 20 years reveal that in approximately 30% of cases, pathology was found in women alone and in another 20% of cases both the men and women had abnormal findings². The perception of people about infertility differs from culture to culture. In the African society where high premium is placed on procreation, infertility is an object of social stigma. The added emotional, psychological, cultural and social burdens drain the couple of self belief and esteem³. Polycystic Ovarian Syndrome (PCOS) is one of the most common causes of an-ovulation and endocrine infertility in women. Several studies have clearly demonstrated that menstrual abnormalities are more frequent in obese than normal weight PCOS women⁴. The diagnosis of PCOS was previously based on a combination of clinical and endocrine features, including raised serum concentrations of luteinizing hormone (LH), Testosterone (T) and Androstenedione and reduced level of sex hormone binding globulin⁵. At a recent joint ESHRE/ ASRM (European Society for Human Reproduction and Embryology/ American Society for Reproductive Medicine) consensus meeting a refined definition of the PCOS was agreed upon: namely the presence of two out of the following three criteria⁶:

1. Oligo - and/ or anovulation;
2. Hyperandrogenism (clinical and / or biochemical);
3. Polycystic ovaries (The Rotterdam ESHRE/ ASRM-Sponsored PCOS consensus workshop group, 2004).

Thyroid hormones are essential for normal growth, sexual development and reproductive functions. Undiagnosed and untreated thyroid disease can be a cause for infertility as well as sub-fertility. 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 effects on infertility⁷. Infertility can be due to pathology in either partner or both. Overall an etiology for infertility can be found in 80% of cases with an even distribution of male and female factors. A primary diagnosis of male factor is made in approximately 25% of cases. Ovulatory dysfunction and tubal peritoneal factors comprise the majority of female factor infertility. In 15-20% of infertile couples, the etiology cannot be found and a diagnosis of unexplained infertility is made¹.

In women, reproductive years begin when she starts her menstrual cycle during puberty (about the age of 13 yrs) and the ability to have a child usually ends around the age of 45 years, although it is potentially possible for a woman to be pregnant until her periods end with menopause at about the age of 51 years. A girl at birth already carries in her body about 400000 immature eggs or oocytes. The development and release of the egg depends largely on a delicate balance of hormones. Some of these hormones are produced in the ovaries, others come from the hypothalamus and the pituitary².

WHO (World Health Organization) in 1991 estimated that between 8 and 12% of couples experienced some forms of infertility during their reproductive lives, thus affecting 50 to 80 million worldwide, out of which 20 to 35 million couples in Africa were expected to experience this problem. This can be extrapolated to 3-4 million Nigerian couples suffering from infertility. Available evidence from community based data suggests that up to 30 percent of couples in some parts of Nigeria are infertile⁸.

Materials and Methods

This observational study was carried out in the Department of Obstetrics and Gynaecology, Border Guard Hospital, Peelkhana, Dhaka during the period of June 2012 to May 2013. This study was carried out on 110 infertile women within the reproductive age group. Clinical examination revealed that the infertile women had normal

genitalia, uterus and adnexae and the semen analyses of their husband were normal. Informed consent was obtained verbally from all participants. All participants were carefully screened to exclude evidence of congestive heart failure, hepatic and renal failure. Five (5) ml of venous blood was withdrawn from the cubital vein of each participant using disposable syringe. Blood samples were taken on 2nd day of menstruation from women having regular menstrual cycle and also during the first visit of women having irregular menstrual cycle. The serum levels of LH, FSH, oestradiol, testosterone FT₃, FT₄, TSH and prolactin were determined by immulite 2000 (Auto immune assay)⁸:

Name of Hormones	Reference Level
LH	1.2-12.5 m IU/ml
FSH	3.2-10.0 m IU/ml
Estradiol	24-195 pg/ml
Testosterone	80 ng/dl
FT ₃	2.3-6.3 P mol/L
FT ₄	10.3-24.5 P mol/L
TSH	0.4-4.0 μ IU/ml
Prolactin	3.4-25 ng/dl

Mean ± SD of serum levels of different hormones of the study group of infertile women were obtained and the result was compared with the reference level for each hormone. Comparison was done by student-t test and P-value was observed.

Results

Table-I shows the distribution of infertile women by the type of infertility. Out of 110 infertile women 86.37% had primary infertility and 13.63% had secondary infertility.

Table-I: Distribution of infertile women by type of infertility (n-110).

Type of Infertility	Frequency	Percentage
Primary	95	86.37
Secondary	15	13.63
Total	110	100.00

Table-II shows age distribution of infertile women of the study group. Those of the age range between 26-37 years represented the highest percentage (80.90%).

Table-II: Age distribution of infertile women (n-110).

Age (yrs)	Frequency	Percentage
22-25	11	10.00
26-37	89	80.90
38-40	10	09.09
Total	110	100.00

Table-III shows the duration of infertility. Most of the infertile women (72.72%) reported within 5-10 years of marriage. 18.18% reported before 5 years of marriage.

Table-III: Distribution of infertile women by duration of infertility (n-110).

Duration	Frequency	Percentage
2-4 Yrs	20	18.18%
5-10 Yrs	80	72.72%
>10 Yrs	10	09.09%

Table-IV shows the Mean±SD serum levels of LH, FSH, prolactin, testosterone, oestradiol and also FT₃, FT₄ and TSH levels of infertile women of the study group. There was a significant difference between Mean±SD levels of hormone of infertile group and the reference levels. The results also indicated highly significant differences (P<0.001) in mean serum levels of all hormones; but in case of FT₃ the result is not statistically significant.

Table-IV: Mean±SD of serum levels of LH, FSH, Prolactin, Testosterone, Estradiol, FT₃, FT₄, TSH.

Parameters	Reference level	Level of infertile group	t-value	p-value
LH	1.2-12.5	10.20±4.36	9.35	<0.001**
FSH	3.2-10.0	2.58±1.63	-7.109	<0.001**
Prolactin	3.4-25 ng/dl	61.17±11.58	25.16	<0.001**
Testosterone	80 ng/ml	140±34.22	10.042	<0.001**
Estradiol	24-195 pg/ml	22.57±4.52	-5.48	<0.001**
FT ₃	2.3-6.3 ng/dl	4.72±3.42	0.087	<0.93*
FT ₄	10.3-24 ng/dl	8.71±5.85	0.527	<0.001**
TSH	0.4-4.0 ng/dl	17.19±20.21	6.05	<0.001**

p value measured by independent student t-test (** significant, *nonsignificant).

Table-V shows the distribution of infertile women according to hormonal abnormality. Majority of infertile women of the study group were diagnosed as cases of PCOD (34.54%), others were having hyperprolactinemia (19.09%) and hypothyroidism (23.60%). Both hypothyroidism and PCOD were found in 6.56% of cases. Among all women, no cause was found in 16.36% of cases.

Table-V: Distribution of infertile women according to hormonal abnormality.

Status	Number	Percentage
Normal	18	16.36
Hypothyroidism	26	23.6
Hyperprolactinaemia	21	19.09
PCOD	38	34.54
Thyroid disease + PCOD	07	6.36
Total	110	100

Discussion

In this study, among 110 infertile women, majority were within the age range of 26-37 years. This result is similar with another study among 410 infertile women; where the age range between 24-37 years comprised the highest percentage². One study in Combined Military Hospital, Comilla done among 100 infertile women reported that the majority of the cases were within the age range of 30-39 years (65%)⁹.

In this study, among 110 infertile women, POD (Polycystic Ovarian Disease) was found to be the most common cause of infertility (34.54%). The condition now known as polycystic ovarian syndrome (PCOS) was first described by stein and Leventhal. It is one of the most common human endocrinopathies, affecting 5-10% of women within the reproductive age group⁵.

The highest reported prevalence of PCOs has been 52% among South Asian immigrants in Britain, of whom 49.1% had menstrual irregularity. In one study among 1741 women with ultrasound detected polycystic ovaries reported that Mean FSH level was 4.5 IU/L, LH 10.9 IU/L, testosterone 2.6 nMOL/L and prolactin 342 nMOL/L.

In this study Mean±SD of FSH level is 2.58±1.63 and Mean±SD of LH is 10.20±4.36. Almost similar findings were found in another study done in Nigeria where Mean±SD of FSH⁷ was 3.66±1.35. Another study done in Iraq showed that LH level was 8.79±10.01 in infertile women². In this study, among 110 infertile women hypothyroidism was detected in 23.6% and hyperprolactinaemia was found in 19.09% of cases. The prevalence of thyroid dysfunction in infertile women was found in 33.3% of cases in one study by Rahman et al and 23% cases in one study by Sharma et al⁶.

In another study, it was found that out of 50 infertile patients, 16% infertile women had increased TSH level, (5.45 µiv/ml). Depending on the T₃ and T₄ levels, all the 21 thyroid dysfunction cases were further subdivided into cases of overt or subclinical thyroid dysfunction and showed that 4% had overt hypothyroidism and 12% subclinical hypothyroidism⁶. In one study in Punjab, India out of the 394 women enrolled for the study 76 (19.29%) infertile women had raised TSH levels only, 54 (13.7%) infertile females had raised PRL levels only and 18 (4.57) infertile female had raised levels of both TSH and PRL which may be due to hypothalamic or pituitary diseases. In 94 hypothyroid infertile females the mean TSH level was 8.34±10.52 µiv/ml and in 72 infertile women with hyperprolactinaemia the mean prolactin level was 53.26±47.17 ng/dl¹⁰.

In this study, mean TSH level was found to be 17.19±20.21, mean free T₄ was 8.71±5.85, mean prolactin was 61.17±11.58 and mean testosterone was 140±34.22. In one study, mean prolactin level (534.76±90.46) was found significantly higher (P<0.05) in infertile women which correlates with this study⁷. In another study the results indicated a significant (P<0.05) difference in the serum level of prolactin in infertile women compared to fertile women. The data obtained revealed also a significant increase in the serum level of testosterone in primary infertile women compared with that of fertile women².

In one study, the prevalence of hyperprolactinaemia ranged from 0.4% in an unselected normal adult population (10,000 normal Japanese adults working at a single factory) to as high as 9 to 17% in women with reproductive disorders. Its prevalence was found to be 5% in a family planning clinic population, 4% in a population of women with adult onset amenorrhoea and 17% among women with polycystic ovary syndrome¹¹. In this study no hormonal abnormalities were detected in 16.36% of cases of infertile women. Another study found that in 11.3% of couples the cause of infertility was unknown which is almost similar to this study⁹.

Conclusion

Infertility is a common reproductive health problem of great concern especially in the female population. Hormonal problems are amongst the important factors considered in the evaluation of female infertility. The present study evaluates the hormonal profile of infertile women. Here it is found that polycystic ovarian disease is the most common cause of infertility; hypothyroidism and hyperprolactinemia also play an important role. Hormonal levels in infertile women had been evaluated by many researchers. Infertility is one of the common medical, social and psychological burdens in this part of the world. For better management of infertility cases, we should plan further studies with large sample size and long term follow-up and that would be beneficial for treating these cases.

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