

## Status of FSH, LH, and Prolactin Hormones in Female Infertility: A Tertiary Care Teaching Hospital Study

Debasis Debadatta Behera<sup>1</sup>, Amita Kumari Mahapatra<sup>2</sup>, Biswajit Pradhan<sup>3\*</sup>

<sup>1</sup>Associate Professor, Department of Biochemistry, Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India

<sup>2</sup>Associate Professor, Department of Physiology, Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India

<sup>3</sup>Assistant Professor, Department of Biochemistry, Acharya Harihar Post Graduate Institute of Cancer, Cuttack, Odisha, India

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### Abstract

**Background:** Infertility is a complicated problem that involves substantial medical, emotional, and financial issues of unprotected sexual activity. Infertility is estimated to affect 10-15% of couples worldwide. Infertility is projected to impact 50 to 80 million people worldwide, with India accounting for 8-10 million infertile couples. **Materials and Methods:** Total of 72 subjects between the age of 21 to 42 years were enrolled in the study. They were divided into two groups: 36 women with Infertility as cases and 36 women in fertile group as control. **Results:** We observed that average serum Prolactin level is  $22.93 \pm 9.71$  ng/ml, which is statistically significant in cases ( $p=0.001$ ), above the mean serum prolactin level of  $12.86 \pm 4.67$  ng/ml in control group. In infertile women, the mean serum FSH level is  $8.97 \pm 4.76$  mIU/ml, higher than in control group ( $6.89 \pm 4.31$ ), which is statistically significant ( $p=0.01$ ). The average serum level of LH for the infertile women was  $7.54 \pm 5.28$  mIU/ml greater than the mean serum level of LH in the fertile women ( $p=0.01$ ) of  $5.42 \pm 3.27$  mIU/ml. Statistically significant differences were found among infertile and fertile women in the serum levels of Prolactin, FSH and LH. **Conclusion:** The prolactin, FSH and LH, and levels were shown to be higher in infertile women compared to the control group. The causes of increased FSH, LH, and Prolactin levels should be investigated. Increased hormone levels have been linked to infertility and other clinical symptoms.

**Keywords:** Follicle Stimulating Hormone, Infertility, Luteinizing Hormone, Prolactin.

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### Introduction

Infertility is a complicated problem that involves substantial medical, emotional, and financial issues of unprotected sexual activity.[1] Infertility is estimated to affect 10-15% of couples worldwide. Infertility is projected to impact 50 to 80 million people worldwide, with India accounting for 8-10 million infertile couples.[2] The most common reproductive hypothalamic axis endocrine disease with a prevalence rate from 0.4 percent to as high 17 percent in women with reproductive disorders is hyperprolactinemia, which is the abnormally high prolactin in the blood.[3] Excessive prolactin secretion causes reproductive malfunction and infertility by reducing the pulsatile release of Gonadotropin releasing the hormone (GnRH) and other disorders, such as amenorrhea and galactorrhoea, which impair the pituitary production of follicle stimulating hormone (FSH) and luteinizing hormone (LH).Blockage of the Fallopian tubes, pelvic inflammatory illness, age factors, chromosomal defects, Amenorrhoea, and endocrinological dysfunctions are all common reasons of female infertility.[4] Infertility has been linked to a variety of anthropometric measurements and socioeconomic factors.[5]

\*Correspondence

**Dr. Biswajit Pradhan**

Assistant Professor, Department of Biochemistry, Acharya Harihar Post Graduate Institute of Cancer, Cuttack, Odisha, India.

E-mail: [drbiswajitpradhan369@gmail.com](mailto:drbiswajitpradhan369@gmail.com)

Several studies have found a link between age and infertility. Women's fertility decreases as they get older.[6] Female infertility has been linked to hormonal abnormalities. Infertility can be caused by increased or decreased levels of the hormones FSH, LH, and Prolactin. FSH and LH are glycoprotein hormones that play a vital role in follicular growth and oestrogen production.[7,8] The purpose of the study was to assess serum levels of follicle stimulating hormone, luteinizing hormone and prolactin in infertile women.

#### Materials and Methods

This present study was conducted in the Department of Biochemistry, Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha during the period from .01.9.19 to 20.02.2020. A total of 72 subjects between the age of 21 to 42 years were enrolled in the study. They were divided into two groups: 36 women with Infertility as cases and 36 women in fertile group as control. This study was approved by the ethical committee of the HMCH, BBSR and obtained written consent from all the subjects.

**Inclusion Criteria:** Married women with marital length of more than three years with age group of 21 to 43 years complaining of infertility were recruited as infertile subjects.

**Exclusion Criteria:** Infertility due to male factor, tubal factor, urogenital tract anatomy, and any organic lesions were the criteria of exclusion. The study also eliminated participants with sexually transmitted illnesses.

**Methodology:** 5ml of whole blood was collected from individuals in the mid cycle i.e 14-16 days, aseptically from the antecubital veins. The entire blood was coagulated and serum was then decanted and

used for testing. The serum was maintained in  $-18^{\circ}\text{C}$  and the test was performed in three days.[9] The immunoenzymatic assay of ELISA Reader using standard kits examined the levels of FSH, LH, and prolactin hormones.[10]

**Statistical Analysis:**The data was analyzed in the Statistical Package for the Social Sciences (SPSS Inc, Chicago, Illinois, USA version 22). For statistical analysis, the student t-test method had been utilized and the findings were displayed as a tabular form.

**Observations and Results**

This present study was conducted in the Department of Biochemistry, Hi-Tech Medical College and Hospital, Bhubaneswar. Thirty-six infertile women participated in this research in total.

Between the age group 21-28 years the greatest infertile population of women was found (fig.1). The ratio of patients to control was 1:1. The exact hormone levels in the fertile and infertile groups are shown in Table I. We observed that average serum Prolactin level is  $22.93 \pm 9.71$  ng/ml, which is statistically significant in cases ( $p=0.001$ ), above the mean serum prolactin level of  $12.86 \pm 4.67$  ng/ml in control group. In infertile women, the mean serum FSH level is  $8.97 \pm 4.76$  mIU/ml, higher than in control group ( $6.89 \pm 4.31$ ), which is statistically significant ( $p=0.01$ ). The average serum level of LH for the infertile women was  $7.54 \pm 5.28$  mIU/ml greater than the mean serum level of LH in the fertile women ( $p=0.01$ ) of  $5.42 \pm 3.27$  mIU/ml. Statistically significant differences were found among infertile and fertile women in the serum levels of Prolactin, FSH and LH as demonstrated by [Table 1 and Fig.2].

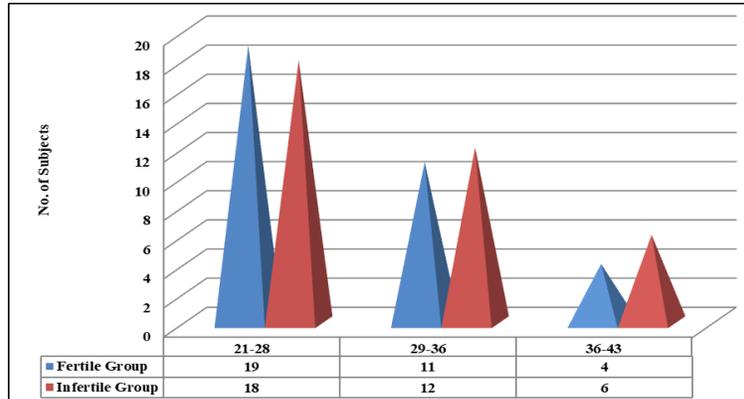


Fig 1: Shows the distribution of Subjects according to age group

Table 1: Shows the Fertile and infertile women's levels of hormones

Variables	Fertile Group (Mean ± S.D.)	Infertile Group (Mean ± S.D.)	P-value
Prolactin (ng/ml)	$12.86 \pm 4.67$	$22.93 \pm 9.71$	0.001
FSH (mIU/ml)	$6.89 \pm 4.31$	$8.97 \pm 4.76$	0.01
LH (mIU/ml)	$5.42 \pm 3.27$	$7.54 \pm 5.28$	0.01

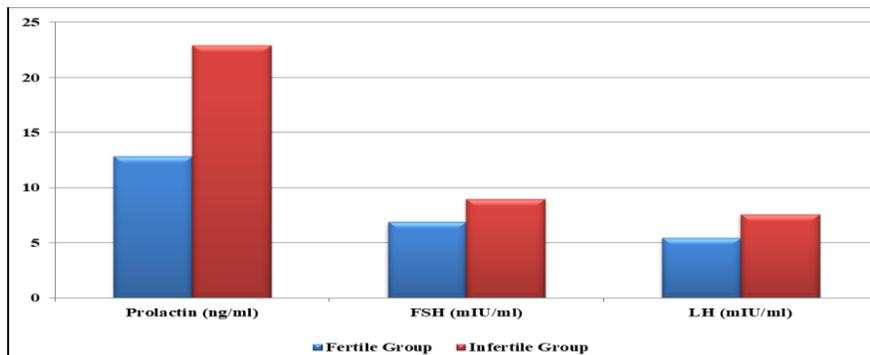


Fig 2: Shows the Fertile and infertile women's mean levels of hormones

**Discussion**

The purpose of this study was to examine the levels of prolactin, FSH, and LH in patients with infertility and compare the results to those obtained from fertile participants. For a substantial number of people, infertility is a serious life issue, affecting them as individuals, married couples, and members of families and society.[11] Anovulation and female infertility are both caused by hyperprolactinemia, which is a common finding in reproductive diseases.[12] Because it is now known that prolactin hypersecretion not only causes abnormalities such as galactorrhoea and amenorrhea, but also

contributes to infertility, prolactin levels are measured in patients seeking help with infertility. Female infertility has several causes, but the most common include ovulation problems, Fallopian tube blockage, uterine disorders, stress, obesity, viral disease, and hormonal imbalance.[13] The researchers Scott et al. and Ban et al. discovered a link between hormonal imbalance and female infertility.[14] Fertility has been linked to a variety of anthropometric factors as well as socioeconomic status. In this study, the levels of FSH, LH, and Prolactin in infertile women were determined. When compared to the control group, the infertile group had higher levels

of FSH, LH, and Prolactin. Ban et al., and Aroma et al., found similar results[15] Infertile women had much higher amounts of Prolactin hormone than fertile women, according to Scott MG et al., (1989) and Choudhury et al.[16] In the current study, infertile women had considerably higher FSH levels than fertile women. In women, FSH is the most common circulating gonadotropin hormone. It stimulates the growth of ovarian follicles and the secretion of the dominant follicle during the ovulation cycle. Infertile women's LH levels were found to be substantially higher than fertile women's. Increased LH levels are commonly linked to ovarian dysfunction.[14] Increased FSH, LH, and Prolactin levels are substantially related with infertile women, according to Aroma et al., [15] Infertile women had higher levels of Prolactin in their blood than fertile women. Prolactin is primarily responsible for the establishment and regulation of lactation in females. Amenorrhea, unexpected lactation, hypoestrogenism, and anovulation are all symptoms of elevated Prolactin levels. Hyperprolactinemia was found to be a cause of infertility in women in this investigation. Increased Prolactin levels have also been found by Parijatham and Saikumar, Goswami et al., and Kumkum et al., respectively.[17,18] In the growth of follicles and the generation of oestrogen, luteinizing hormone plays a critical role. Infertility in women has been linked to hormonal imbalance. Ovulation and menstruation are affected by the increased or lowered levels.[19,20] Hormonal imbalance has been linked to not just chronic disease, but also infertility, according to numerous research.[21] Infertile women had higher levels of FSH, LH, and Prolactin, according to the findings. Infertile women had higher amounts of prolactin than fertile women. These findings are consistent with those of Ban et al., and Aroma et al., who observed elevated FSH, LH, and Prolactin levels in infertile women.[14,15] To determine the cause, more research with large samples is required. Instead of the criteria for exclusion that exclude all other causes of infertility, such as male factor and urogenital tube anatomic abnormalities that affect fertilization and implantation, the study found most of the subjects to be representative of women with an infertility due to hormonal causes that gave more reliable results on infertility.

### Conclusion

These findings suggest that the prolactin, FSH and LH, and levels were shown to be higher in infertile women compared to the control group. The causes of increased FSH, LH, and Prolactin levels should be investigated. Increased hormone levels have been linked to infertility and other clinical symptoms. The clarification of such investigations contributes to a better knowledge of female infertility. Infertility prevention and management will benefit greatly from this research. For those who are affected by reproductive dysfunction, this can help to build counselling solutions. To identify all infertile women, endocrine tests should be conducted.

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