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Original Research Article

# Hormone Marker-Sexual Behavior Correlation in Female Infertility

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**Abstract**

**Background:** When a female partner is the source of the infertility, it is referred to as female infertility. Women may have inherited or acquired infertility. Acquired factors are those that are not derived from genetic mutations. Injuries to the uterus or fallopian tubes, problems with the cervix, and ovulation disorders are the most common causes of infertility in women. Age is another factor that leads to infertility because a woman's fertility generally decreases with age. The American Society for Reproductive Medicine (ASRM) states that factors that can affect fertility include age, smoking, STDs, being overweight or underweight, and being physically or mentally unwell.

**Material and Method**: A case control research with a clinical focus was carried out at the Department of Obstetrics and Gynecology. 100 female patients with infertility were compared to 100 fertile females in the control group. It has 100 patients with closely matched age groups of controls (100), including PCOS (28), Endometriosis (22), OI (30), and BOH (20). Among the metrics were indicators of oxidative stress as total proteins, lipid peroxides (LPO), and superoxide dismutase (SOD). The endocrine profiles included measurements of ovarian hormones (estradiol, testosterone, and progesterone) as well as protein hormones (FSH and LH).

**Results:** The data indicated that the antioxidant/oxidant ratio had changed and that the free radical status (ROS/RNS) had increased, indicating a change in the oxido-redox state of the cells. The endocrine profiles of gonadotropins (LH/FSH) and ovarian hormones (Estradiol, Testosterone, and Progesterone) showed alterations in all PCOS, endometriosis, OI, and BOH patients, suggesting a modified HPO axis. Gynecological events such irregular menstruation, uterine fibroids, and other structural issues with the uterus and oviduct, like stillbirth and miscarriage, were observed in BOH patients.

**Conclusion:** The impact of medicalization on Indian women's values is multifaceted. While some of them have been able to control their infertility issues, others have been significantly impacted by infertility treatment and ART. In the realm of biomedical sciences, the research the researcher did on reproductive diseases associated with infertility in Indian women is highly significant. In addition, impacted cases in India are provided with genetic testing and counseling, as well as therapy and management of these issues using assisted reproductive technologies.

**Keywords**: Sexual Behavior, SOD, IVF, IUI, FSH, LH and estradiol.



## Introduction

It should be possible for every woman to exercise her right to sexual and reproductive health. Women who are infertile run the risk of losing their ability to procreate. Though some couples decide against having children, having a child is one of the most significant methods to feel entirely pleased from a human perspective. Despite being one of the most essential topics in sexual health, the relationship between sexual health and infertility appears to be overlooked in poor nations when it comes to reproductive therapy. In addition to the support provided by the International Conference on Population and Development (ICPD) for sexual health services, many nations restrict their sexual health services to the prevention, diagnosis, and

treatment of STDs as well as advice on the use of condoms and contraceptives. [1]

In 1995, one in six women who were of reproductive age reported having at some point in their lives sought out professional assistance for infertility.The need for infertility treatments increased significantly in 1981. The number of visitors increased from approximately 600,000 in 1968 to approximately one million in the early 1970s and over two million in the early 1980s. The percentage of women of reproductive age who reported using an infertility service increased from 12% (6.8 million women) in 1988 to 15% (9.3 million women) in 1995. [2]

48 million women worldwide suffer from infertility, with South Asia, Sub-Saharan Africa, North Africa/Middle East, Central/Eastern Europe, and Central Asia having the greatest prevalence. [3] It's a worldwide health issue that impacts 8–10% of couples worldwide. Women may have inherited or acquired infertility. Women's infertility can be caused by a variety of causes, including genital TB, alcoholism, smoking, and obesity. Infertility will affect at least half of women over 40 and one-third of women who put off having children until their mid- to late-30s. The delivery rates of women over 40 in assisted reproductive technology programs are between one-third and half that of younger women. Successful pregnancies in women over 40 are uncommon in many programs. [4]

Infertility in women can also result from other causes, including smoking, chemotherapy, STDs, and other acquired illnesses. Smoking is among the worst since it lowers the quality of eggs. The remaining variables include ovarian, tubal, uterine, cervical, and vaginal factors, as well as hypothalamic-pituitary-adrenal and ovarian factors. [5] Among these are gonadal dysgenesis, early menopause, hypothalamic dysfunction, polycystic ovary syndrome, ovarian cancer, and pelvic inflammatory disease. Among the conditions to be aware of are uterine fibroids, uterine abnormalities, and tubal dysfunction. If all reasons of infertility have been identified, alternatives include expectant care, clomiphene citrate with or without IUI, gonadotropins with or without IUI, and in vitro fertilization (IVF). [6]

Examining the endocrine, biochemical (stress factors), age, and other clinical features in a few aberrant reproductive disorders of affected women in India is crucial after evaluating the previously mentioned data. These indices would help the Vidharbha region understand some infertile cases that have endometriosis, PCOS, BOH, and gonadal dysgenesis (ovarian insufficiency).

## Material and Methods

A case control research with a clinical focus was carried out at the Department of Obstetrics and Gynecology. The study comprised 100 patients with diagnoses of ovarian insufficiency (30), BOH (20), endometriosis (22) and PCOS (28), along with matched healthy controls. The research group was contrasted with a control group consisting of one hundred volunteers who appeared to be in good health. To gather data on medical, reproductive, and personal histories, a special proforma was prepared. The following hormones were measured in the research participants: progesterone (P), testosterone (T), luteinizing hormone (LH), estradiol (E2), and follicle stimulating hormone (FSH).

**Selection of Participants:** The samples used in the quality content analysis were specifically chosen, and the procedure was repeated until all the data had been entered. Intentional samples were used to enroll infertile women who were sent to the Clinical Center for Infertility for this study. Depending on the length of interest, the reasons for the selection, the kind of birth (main or secondary), and the age, participants were chosen to be significantly diverse. Data completeness was obtained in 12 interviews; however, 3 further interviews were undertaken. Furthermore, from Key Informant Interviews (KIIs), three female physicians, a nurse, a midwife, a psychologist, a urologist, and a psychiatrist were chosen.

**Statistical Analysis:** The information gathered in this analysis was statistically analysed. The standard deviations and mean were determined. The significance and non-significance of each parameter is determined using students t' values to draw probabilities. The research subjects and healthy control subjects were compared statistically. The values in the tables and figures are mean + standard error.

## Result:

Together with 100 age-matched healthy controls, the study comprised 100 people who were infertile because of conditions such endometriosis, bad obstetric history (BOH), ovarian insufficiency (OI), or polycystic ovarian syndrome (PCOS). The study was conducted once the infertile cases gave their assent. General data, personal history, including age, marriage age, menstrual cycle details, number of children, and medical history of the family, were all documented. After that, blood was extracted and tested in order to conduct biochemical analyses.

**Table No 1: Anti stress indices in control and study groups**

| | | Study Groups | | | |
|---|---|---|---|---|---|
| **Parameters** | **Control (n=100)** | **PCOS (n=28)** | **Endometriosis (n=22)** | **BOH (n=20)** | **OI (n=30)** |
| LPO (nmol/ml) | 3.98±0.35 | 6.25±0.33 | 5.96±0.41 | 5.78±0.48 | 6.12±0.58 |
| SOD activity (U/mg protein) | 1.95±0.32 | 3.45±0.24 | 4.87±0.28 | 4.57±0.22 | 2.55±0.18 |
| Protein levels (mg/100µl) | 0.28±0.41 | 0.48±0.056 | 0.43±0.052 | 0.38±0.043 | 0.42±0.058 |

Table 1 shows the anti-stress indices of PCOS, Endometriosis, BOH, and OI patients. Oxidative stress was seen in four types of individuals, and it seemed to get worse as they got older. In all cases, oxidative stress was exacerbated by a decrease in SOD activity, a rise in lipid peroxides, and changes in protein levels and oxidation. This suggested that cells' oxido-redox state had changed, with free radical status (ROS/RNS) growing and the antioxidant/oxidant ratio altering.

**Table No-2 Hormones levels in control and study groups.**

| | | Study Groups | | | |
|---|---|---|---|---|---|
| **Parameters** | **Control (n=100)** | **PCOS (n=28)** | **Endometriosis (n=22)** | **BOH (n=28)** | **OI (n=30)** |
| FSH (mIU/ml) | 6.78±1.88 | 8.56±1.98 | 5.64±0.64 | 34.21±12.24 | 6.72±1.68 |
| LH (mIU/ml) | 25.58±10.27 | 18.98±2.78 | 4.82±1.65 | 7.82±2.18 | 13.74±7.38 |
| E2 (pg/ml) | 134.7±49.57 | 91.41±21.61 | 92.84±16.93 | 105.6±22.09 | 168.7±65.67 |
| T (ng/dl) | 42.68±16.29 | 78.40±14.52 | 87.42±18.59 | 62.95±20.18 | 75.53±12.88 |
| P (ng/ml) | 5.87±1.77 | 3.58±0.65 | 0.45±0.19 | 4.58±1.18 | 1.25±0.47 |

Hormone levels in patients and healthy controls were assessed. It was discovered that PCOS women had much higher levels of testosterone (T) and LH than did healthy women. Gonadotropin and T levels were significantly greater in PCOS cases than in controls. This group's levels of estradiol (E2) were noticeably greater than those of the control group. T levels were likewise greater in patients of all ages than in controls. Endometriosis patients had much lower levels of LH and E2 than healthy controls, whereas their T levels were significantly greater than those of fertile women. The gonadotropin and E2 levels of the patients were found to be statistically greater than those of the healthy controls. While LH levels were lower in young OI cases compared to healthy controls, E2 and T levels were greater in OI women than in healthy controls. Progesterone (P) and FSH levels in BOH women were significantly higher than in healthy controls.

**Discussion**

When a female partner is the source of the infertility, it is referred to as female infertility. Women may have inherited or acquired infertility. Injuries to the uterus or fallopian tubes, problems with the cervix, and ovulation disorders are the most common causes of infertility in women. The American Society for Reproductive Medicine (ASRM) states that factors that can affect fertility include age, smoking, STDs, being overweight or underweight, and being physically or mentally unwell. In our study, we included 140 patients and 100 suitable controls. Four categories were created from the subjects. The following patients were selected for this investigation and given the necessary information: those with endometriosis (22), PCOS (28), ovarian insufficiency (OI) (30), and bad obstetric history (BOH) (20).

Polycystic ovarian syndrome/disease is a common yet complex endocrine illness that is a leading cause of infertility and ovulation failure. It primarily affects women in their reproductive years, with a 15% prevalence rate Fauser et al., 2012. [7] Its prevalence in India ranges from 2.2 percent to 26 percent, depending on lifestyle Shirsath et al., 2015. [8] In PCOS, elevated oxidative stress causes genomic and mitochondrial DNA damage, resulting in infertility Zuo et al., 2016. [9] These findings matched those of Zhang et al 2008. [10] Who advocate for a systemic decrease in SOD activity, which results in OS and contributes to this dysfunction. The majority of women with PCOS have ovarian dysfunction, which manifests as oligomenorrhoea and amenorrhoea Teede et al., 2010. [11] When it comes to glucose metabolism, hyperandrogenism is a predictor of hyperinsulinemia and vice versa. Insulin resistance, as a result, has disrupted metabolic effects Duleba, 2012; Speroff and Fritz, 2005 [12] to back up our findings.

Endometriosis has been linked to infertility in women Olive and Pritts, 2001. [13] It has been shown that oxidative stress may play a role in the development and progression of endometriosis Farquhar, 2000. [14] A increased content of LPO in bodily fluids is evidence of this. A growing body of evidence supports a profile of progesterone resistance in the pathophysiology of endometriosis, in addition to estrogen dependency Bulun et al., 2006. [15] Progesterone receptor expressions are reduced in endometriotic lesions compared to

eutopic endometrium, and progesterone receptor-B is absent Attia et al., 2000. [16]

Ovarian insufficiency (OI) is the most common ovarian problem. It is defined by the absence of menarche (primary amenorrhea) or the premature follicular depletion before the age of 40. Physiologically, it is linked to endocrinological changes, such as low estrogen levels and suppresses, as well as high levels of gonadotropins (LH and FSH) Speroff and Fritz, 2005, Guidelines of ESHRE, 2016. [17] SOD levels were lowered in these situations, showing that it plays a role in preventing oxidative stress (OS). Further, an increase in lipid peroxidation (LPO) levels indicates that stress may have a role in clinical issues such as night sweats, menstrual disorders, anxiety, irritability, decreased libido, hormonal disruptions, and infertility in these patients Covington et al., 2011. [18]

In women, BOH is linked to a variety of issues, including reproductive abnormalities. It is well known that the HPO axis experiences alterations as a result of changing hypothalamic neuron secretion, which leads to altered LH and FSH levels, which in turn leads to altered steroid hormone levels. The HPO axis has been shown to vary with age Speroff and Fritz, 2005. [17]

## Conclusion

The impact of medicalization on Indian women's values is multifaceted. While some of them have been able to control their infertility issues, others have been significantly impacted by infertility treatment and ART. They might benefit from sexual counseling before treatment to enhance their sexual health. Together with improving the quality and outcomes of reproductive care, better coordination between obstetricians, psychiatrists, and sex therapists will surely help these couples maintain a healthy and fulfilling sexual life overall.

Within our study group, it became evident that a wide range of factors, including age, body weight, endocrinology, genetics, and gynecological events, influenced aberrant reproductive states that resulted in infertility. These are responsible for women's BOH diseases, endometriosis, ovarian insufficiency, and PCO illnesses in Vidharbha. By putting the right technology in place, these anomalies can be handled and rectified to benefit the suffering society.

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