

From Hope to Healing: Addressing the Hidden Struggles of Infertility and the Power of Early Prevention

Prachi S. Patil^{1,*}, Azam Z. Shaikh², Sunil P. Pawar³

Abstract

Female gravidity is a major issue that has affected numerous people because of difficulties in getting pregnant and having children. This problem is caused by several factors like a stressful life, too important exposure to radiation, not enough healthy food, inheritable issues, changes in diurnal habits, and increased use of electronic bias. The process of releasing an egg from the ovaries depends on hormones from the brain, pituitary gland, and ovaries. Problems can be at any of these ways. Fallopian tubes can become damaged or blocked due to conditions like endometriosis or infections. As women get aged, the quality of their eggs and the chance of getting pregnant naturally go down. There are drugs that can help with releasing eggs, and bestowed eggs can also be used. Scientists are also looking into ways to indurate eggs or ovarian towels. It is easier to diagnose serious causes, and surgery called laparoscopy is still the stylish way to check for problems like blocked tubes or endometriosis. In vitro fertilization (IVF) is the main treatment, but other traditional styles are still important. Still, IVF is not extensively available because it can be precious. Around 10 to 15 percent of couples face some kind of fertility challenge. results can include seeing an introductory croaker, learning further about when to try to conceive, or turning to specialists for help with the whole process.

Keyword: Infertility, IVF, female fertility, tubal disorders, female gravidity

INTRODUCTION

Over the past decade, the practice of infertility counseling by both mental health and medical professionals has evolved significantly. It has become more structured, evidence-based, and accessible to those undergoing fertility treatment. This article highlights crucial aspects of infertility counseling and outlines the key challenges that both couples and practitioners encounter during various stages of the infertility journey.

The recommendations and guidelines presented in this paper were derived from the second campus workshop organized by the Special Interest Group (SIG) of Psychology and Counselling under the European Society of Human Reproduction and Embryology (ESHRE). This SIG is devoted to improving patient care in the field of infertility by promoting better coordination and collaboration between medical professionals and mental health practitioners. The primary theme of the workshop was “Raising Competence in Psychosocial Care,” with the objective of equipping care providers with better tools and knowledge to address the emotional and psychological needs of infertility patients.

*Author for Correspondence

Prachi S. Patil
E-mail: pp7907449@gmail.com

¹Student, Department of Pharmaceutics, P.S.G.V.P. Mandals's College of Pharmacy, Shahada, Maharashtra, India

²Assistant Professor, Department of Pharmaceutics, P.S.G.V.P. Mandals's College of Pharmacy, Shahada, Maharashtra, India

³Principal, Department of Pharmaceutics, P.S.G.V.P. Mandals's College of Pharmacy, Shahada, Maharashtra, India

Received Date: March 27, 2026

Accepted Date: April 25, 2026

Published Date: April 26, 2026

Citation: Prachi S. Patil, Azam Z. Shaikh, Sunil P. Pawar. From Hope to Healing: Addressing the Hidden Struggles of Infertility and the Power of Early Prevention. Research & Reviews: A Journal of Pharmacology. 2026; 16(2): 48–63p.

The workshop brought together a diverse and experienced faculty comprising four psychologists, two social workers, one marriage and family therapist, and one medical doctor. These experts

represented an international perspective and collaborated to ensure that the proceedings of the workshop would reach a wider audience through this article. The content is rooted in contemporary research and clinical practices in the area of infertility counseling.

The article is organized into five key sections, each addressing a critical area of infertility counseling:

- *Assessment and Screening Tools*: The first section discusses various psychological assessment and screening instruments that both mental health and medical professionals can use. These tools help identify emotional distress, anxiety, depression, and other psychological concerns that may affect patients undergoing infertility treatment.
- *Tailoring Counseling to Patient Needs*: The second section emphasizes the importance of customizing counseling approaches based on the specific emotional, relational, and cultural needs of each patient or couple. It outlines how different stages of treatment and individual responses require different types of support.
- *Gender Issues in Counseling*: The third section explores common gender-specific responses to infertility. Understanding these patterns can be helpful in couple's therapy, as partners may process and cope with infertility in significantly different ways based on their gender.
- *Sexual Relationship Dynamics*: The fourth section focuses on how infertility can affect a couple's sexual relationship. It discusses how fertility-focused intercourse and stress can lead to emotional and physical disconnects between partners and offers strategies to address these challenges.
- *Third-Party Reproduction Counseling*: The final section deals with the emotional complexities and ethical considerations involved when couples explore options like egg donation, sperm donation, or surrogacy. Counseling in these cases must be handled with great

sensitivity and professionalism to support informed, ethical, and emotionally sound decisions [1]. Infertility in humans means a couple is unable to get pregnant or keep a baby growing until it is born. There are many reasons why infertility happens, and some can be treated with medical help [2]. In 1997, it was estimated that between 3% to 7% of all heterosexual couples had a problem with infertility that was not solved. However, more couples than that might face difficulty in getting pregnant, with estimates ranging from 12% to 28% [3]. About 20–30% of infertility cases are because of issues with the male partner, 20–35% are due to issues with the female partner, and 25–40% involve problems with both partners. In 10–20% of cases, no exact cause is found [4]. A common reason for female infertility is when the body does not release eggs regularly, which shows up as irregular or missed periods [5]. For men, infertility is often linked to problems with their semen, and the quality of the semen is used to check how well a man can make a baby [6]. Couples who are young and healthy but have trouble getting pregnant should talk to a healthcare provider as soon as possible [7]. Treatment depends on the reason for infertility and may include counseling and fertility treatments like in vitro fertilization [8].

REASONS

Female Reason

a woman to conceive naturally, several biological processes must occur in harmony. First, vaginal intercourse must happen around the time of ovulation – when an egg is released from the ovary. Additionally, the reproductive system must be functioning efficiently, and the woman's hormonal levels must be balanced [9].

In women, infertility often results from two major causes: structural issues in the reproductive organs (especially the fallopian tubes or uterus) and problems related to the release of eggs (ovulation). One common reason is blockage in the fallopian tubes. These blockages can occur due to congenital malformations, infections such as Chlamydia, or scar tissue formation. A condition called endometriosis is a significant cause of infertility. It occurs when tissue – like the uterine lining – grows in abnormal locations like the fallopian tubes or around the ovaries. Endometriosis is more common in women in their mid-20s or older, especially when childbirth is delayed [10].

Another major cause of female infertility is failure to ovulate. Sometimes, the eggs themselves are not properly formed, making conception difficult. A common disorder is polycystic ovarian syndrome (PCOS), where eggs only partially develop, and there is an overproduction of male hormones (androgens) [11].

Male Reason

Male infertility means a man is unable to help a woman who can have babies become pregnant. It is called “male factor” infertility when there is a problem with the number, movement, or shape of sperm in at least one of two sperm tests done one week apart [12], and then again four weeks later. In humans, this type of infertility is responsible for about 40 to 50% of all infertility [13] cases and affects roughly 7% of all men [14]. Male infertility is usually linked to issues with semen, and the quality of semen is used to estimate a man’s ability to father a child [15]. Men whose sperm levels fall below the standards set by the World Health Organization are considered to have male factor infertility. The most common problems include having too few sperm (oligospermia), poor sperm movement (asthenospermia), and abnormal sperm shape (teratospermia). Other issues, like semen volume and other markers of gland function, are less closely linked to infertility. As much as 90% of male infertility problems are related to the number of sperm, and there is a link between abnormal semen tests and low sperm counts. Problems with sperm count, movement, and shape often come from issues in the body’s control system, including before the testes, in the testes, and after the testes. Because of this, semen analysis is the most important and basic test, with a sensitivity of 89.6%, which means it can find about 9 out of 10 men who actually have male infertility [16]. It is a simple test that checks the development and maturity of sperm, how sperm behave in semen, and gives information about both sperm production (count) and the quality of sperm (movement and shape).

Key Points

- Fertility is not all-or-nothing.
- A person or couple is not just “fertile” or “infertile” – there are many levels of fertility. A couple’s ability to have children depends on both partners’ fertility combined. If one partner has low fertility, the other partner’s higher fertility might make up for it.
- Infertility usually has more than one cause.
- Most infertility cases involve multiple problems, and these problems can be present in both the man and the woman.

For example, the woman might have:

- A cervical erosion (a problem in the opening of the uterus), and A retroflexed uterus (a uterus that tilts backward).
- Meanwhile, the man might have:
- Low sperm count or Poor sperm quality.
- So, it is often not clear who is mainly responsible, and both partners may contribute to the Infertility [17].

FEMALE HORMONES

FSH

Follicle-stimulating hormone (FSH) plays a crucial role in female fertility. High FSH levels in women can indicate diminished ovarian reserve or early menopause, potentially making it harder to conceive. Conversely, low FSH levels can also indicate issues with the pituitary gland and its ability to stimulate the ovaries (Figure 1).

- *Role FSH in Female:* When FSH levels are normal, it helps the egg mature and get ready for ovulation (release of the egg).
- *High FSH Level:* May mean poor ovarian reserve, which means the ovaries have fewer eggs or eggs of poor quality. High FSH means the body is trying hard to make the ovaries work, but they are not responding well.

- *Low FSH Levels:* May be caused by problems in the pituitary gland or hypothalamus the ovaries do not get the signal to grow eggs.

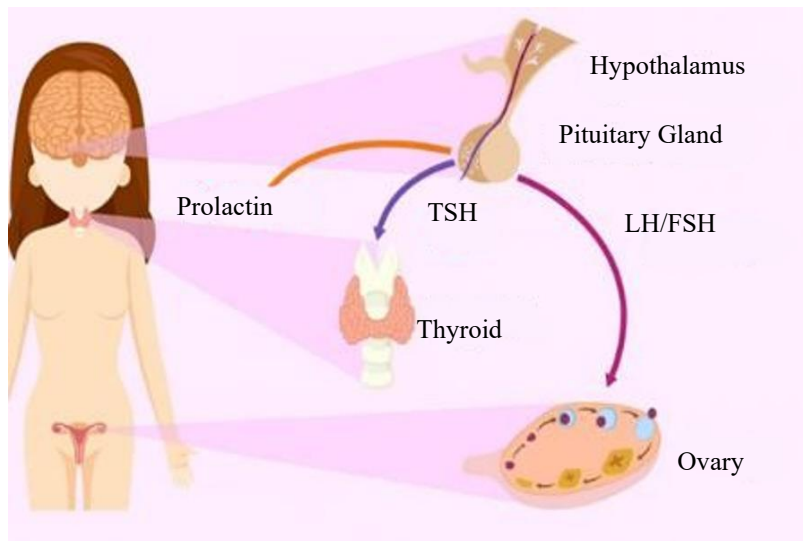


Figure 1. FSH hormones.

Common in women with hypogonadotropic hypogonadism or extreme stress, low weight, or eating disorders [18].

Importances of FSH

- *Essential for Fertility:* FSH is essential for fertility, as it helps regulate the menstrual cycle and supports ovulation.
- *Indicator of Ovarian Reserve:* FSH levels can indicate ovarian reserve, with high levels potentially indicating diminished ovarian reserve or premature ovarian failure.

LH

LH stands for Luteinizing Hormone. It is a hormone produced by the pituitary gland in the brain (Figure 2).

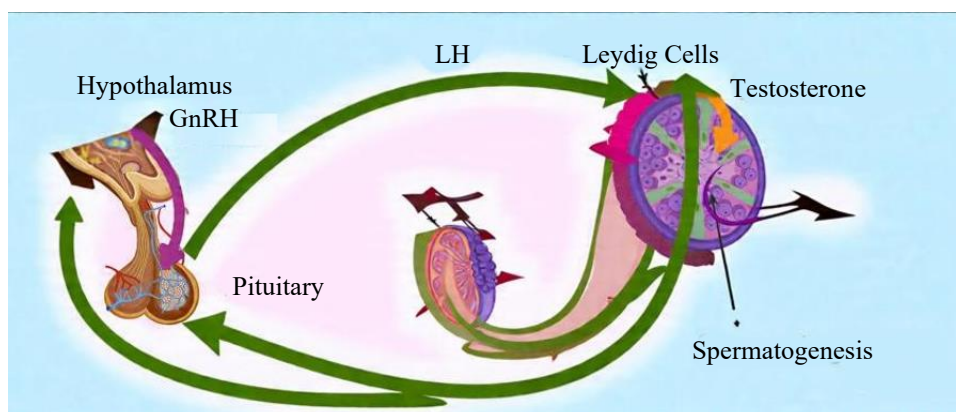


Figure 2. LH hormone.

Role of LH in Female

- *Ovulation Trigger:* LH is responsible for triggering ovulation, the process where a mature egg is released from the ovary.
- Around the middle of the menstrual cycle, there is a sharp increase in LH, known as the LH surge,

which causes ovulation.

- *Corpus Luteum Formation:* After the egg is released, LH supports the formation of the corpus luteum, a temporary structure that produces progesterone, needed to prepare the uterus for pregnancy. After the egg is released, LH supports the formation of the corpus luteum, a temporary structure that produces progesterone, needed to prepare the uterus for pregnancy.

LH and Female Infertility

- *Low LH Levels:* Can lead to anovulation (no ovulation), making it difficult for a woman to become pregnant. Low in hypogonadotropic hypogonadism (a condition where the pituitary does not produce enough LH).
- *High LH Levels:* Common in Polycystic Ovary Syndrome (PCOS). Women with PCOS often have a high.
- *LH: FSH ratio,* which disrupts normal ovulation. This hormonal imbalance can cause irregular periods and infertility.
- *LH Testing in Infertility:* LH levels can be tested through blood tests or urine ovulation predictor kits (OPKs) helps doctors diagnose ovulation disorders or plan fertility treatments like IUI or IVF [19].

ESTROGEN

Estrogen is a very important hormone for a woman to get pregnant. It helps the uterus get ready to receive a fertilized egg by making the inner lining (called the endometrium) thick and healthy. This thick lining is needed so the baby can grow there. Estrogen also helps control the menstrual cycle. If the level of estrogen is too high or too low, it can disturb this process and make it difficult for a woman to get pregnant (Figure 3).

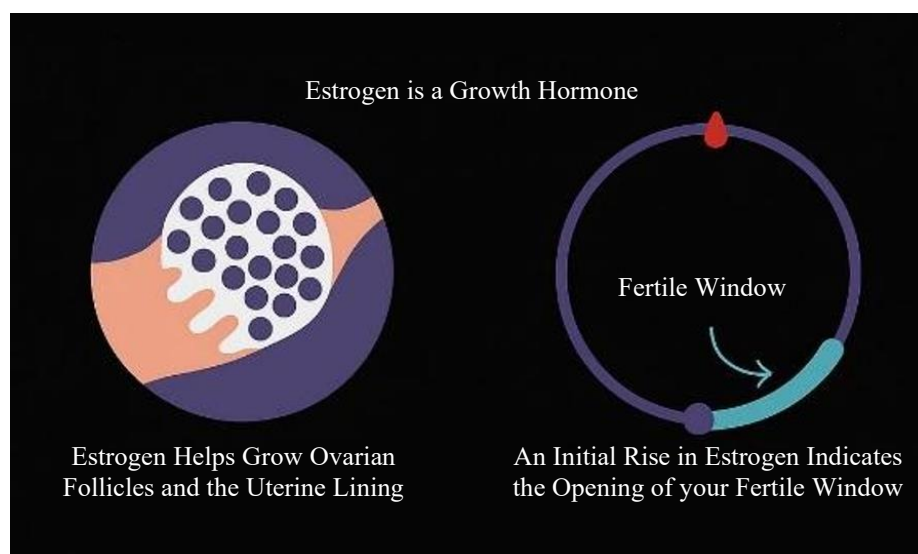


Figure 3. Estrogen hormones.

Role of Estrogen in Female

Primarily, estrogen is concerned with making the uterus receptive for the embryo to be implanted therein. It makes the endometrial tissue thicker so that it can support the embryo for pregnancy to take place. Too much or too little of the hormone can have a negative impact on the window of opportunity during which the embryo implantation takes place and thus can reduce the chances of pregnancy.

Key Roles of Estrogen

- *Endometrial Growth:* Estrogen stimulates the proliferation of the endometrial lining during the follicular phase of the menstrual cycle. This prepares the uterus for possible embryo implantation.

- **Ovulation Regulation:** Estrogen rises sharply before ovulation and works with luteinizing hormone (LH) to trigger the release of a mature egg. Low estrogen can result in anovulation or lack of ovulation.
- **Cervical Mucus Production:** Estrogen helps produce thin, stretchy cervical mucus, which is essential for sperm to travel and fertilize eggs.
- **Feedback to the Brain:** It provides feedback to the hypothalamus and pituitary gland to control the release of other hormones, like FSH and LH, essential for the menstrual cycle.

Estrogen Imbalance and Infertility

- **Low Estrogen:** Leads to thin endometrial lining, poor egg development, or lack of ovulation. Causes irregular or absent periods.
- **High Estrogen:** May indicate estrogen dominance, which can result in PCOS, poor egg quality, or implantation failure [20].

Progesterone

Progesterone is very important in early pregnancy. Scientists have known this for many years. In the 1970s, studies showed that if the corpus luteum (a part of the ovary that makes progesterone) is removed before the 7th week of pregnancy, it can cause a miscarriage. But if progesterone is given from outside (as medicine), it can prevent miscarriage. On the other hand, mifepristone, a medicine that blocks progesterone, can cause abortion in the early weeks of pregnancy (Figure 4) [21].

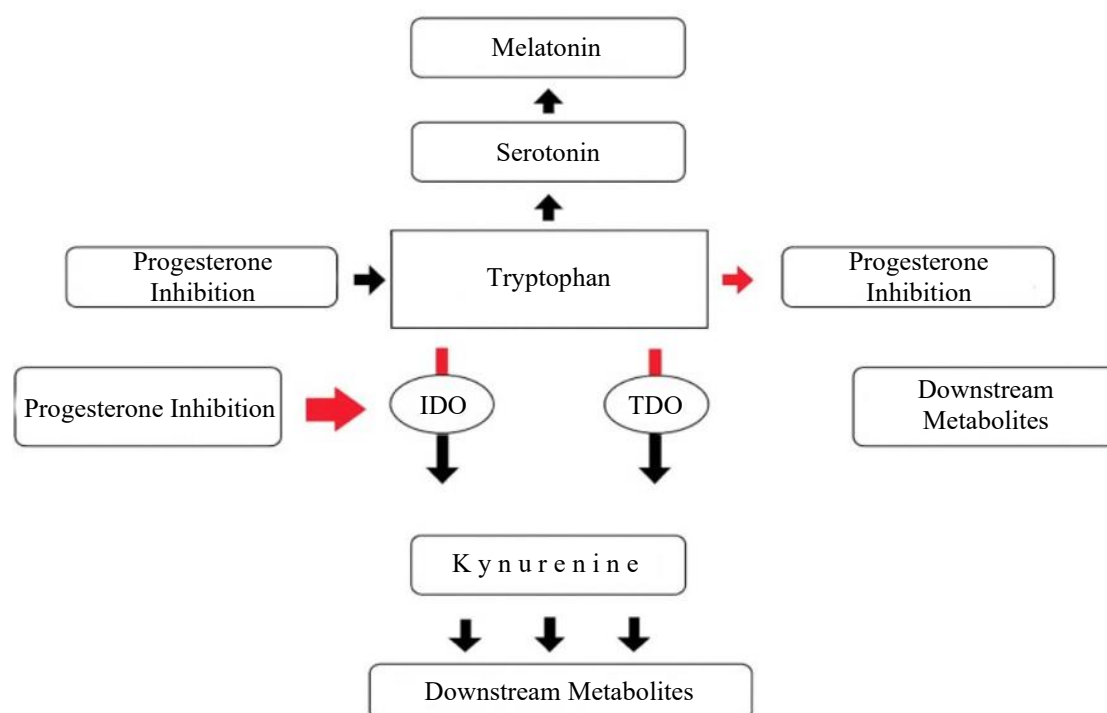


Figure 4. Progesterone hormones.

Role of Progesterone in Female

- **Menstrual Cycle & Ovulation:** Before ovulation, progesterone is produced in small amounts by the ovary and helps prepare the follicle for release. It supports follicle growth and reduces cell death. After ovulation, the corpus luteum (a temporary gland) produces more progesterone, which helps maintain the uterus lining for a possible pregnancy [22].
- **Premenstrual Syndrome (PMS):** Progesterone may play a role in PMS. It affects the brain by converting to calming substances that influence mood and behavior. Some women with PMS may have low progesterone levels or are less responsive to it. Hormone therapy or antidepressants may

help in some cases [23].

- **Luteal Phase (Post-Ovulation):** Progesterone levels rise and peak mid-luteal phase. If pregnancy does not happen, levels drop, triggering menstruation. Low or falling levels during this phase may be linked to PMS [24].
- **Endometrial Changes:** Progesterone prepares the uterus lining (endometrium) to support a fertilized egg. It helps switch the uterus from the growth phase (due to estrogen) to the secretory phase, making it ready for implantation [25].
- **Pregnancy:** Progesterone is essential for pregnancy. It helps the embryo attach to the uterus and prevents the immune system from rejecting it. Initially made by the ovary, later the placenta takes over progesterone production. It also reduces uterine contractions and supports immune tolerance [26].
- **Immune Protection:** Progesterone stimulates a special protein (PIBF) that protects the fetus by calming immune cells and promoting a healthy pregnancy. Women with low PIBF levels may be at risk of miscarriage [27].
- **Tryptophan Metabolism:** Progesterone helps regulate how the body breaks down tryptophan – an important amino acid needed for making serotonin and other pregnancy-supporting substances [28].
- **Follicular Fluid:** During the menstrual cycle, progesterone builds up in the fluid around the egg. This hormone-rich fluid is vital for the egg's maturity, fertilization, early embryo development, and successful implantation [29].

Prolactin

Prolactin (PRL) is a hormone made by the pituitary gland (a small gland in the brain). It has many jobs in the body, but its most well-known role is to help produce breast milk after a woman gives birth.

During pregnancy, prolactin levels go up. This causes the breasts to grow and get ready to make colostrum (the first milk). After the baby is born, high levels of prolactin help the body keep making milk while the mother is breastfeeding. During pregnancy, prolactin levels go up. This causes the breasts to grow and get ready to make colostrum (the first milk). After the baby is born, high levels of prolactin help the body keep making milk while the mother is breastfeeding. Prolactin is made and released by special cells called somatomammotrophic cells in the front part of the pituitary gland. Its release is mainly controlled by a brain chemical called dopamine, which usually prevents too much prolactin from being made. Some immune cells also make prolactin-like substances that help control the immune system (Figure 5) [30].

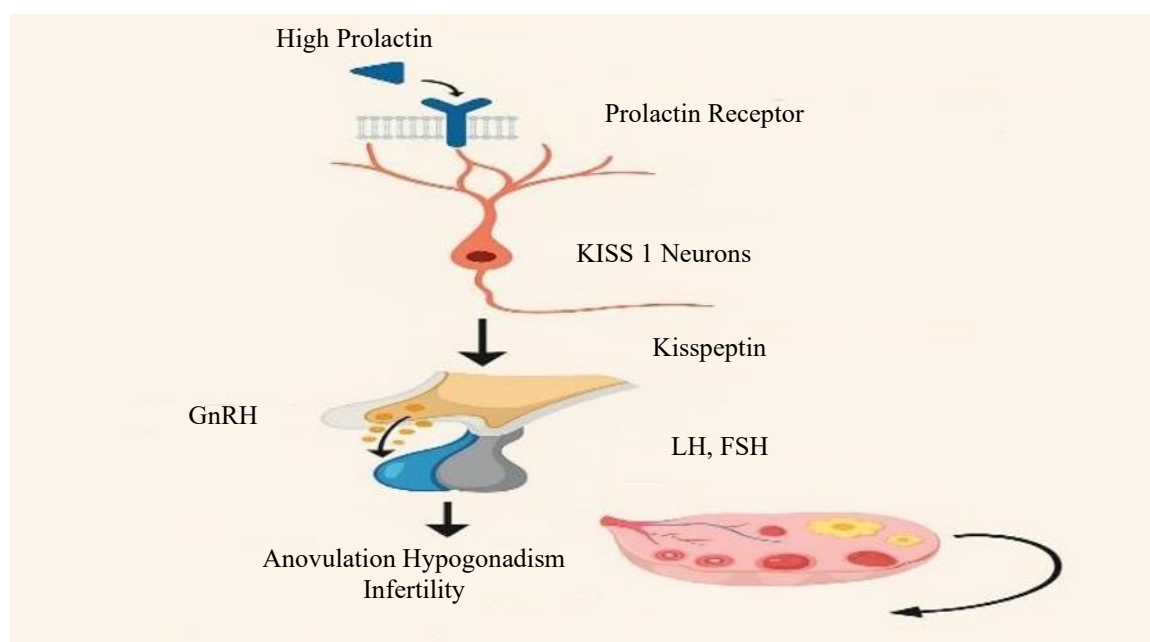


Figure 5. Prolactin hormones.

Role of Prolactin in Female

Prolactin roles in female fertility. Prolactin has several roles in female fertility by influencing oocytes maturation and fertilizability early corpus luteum formation and survival, improvement of blastocyst implantation potential, decidualization, embryo–endometrial synchrony and acting as a pro-survival factor for low-motile sperm [31].

- *Normal Roles:* In addition to its supportive functions in oocyte maturation, corpus luteum creation, endometrial receptivity, and potentially implantation, prolactin is crucial for women's breast growth and breastfeeding [32].
- *Hyperprolactinemia (Highprolactin):* GnRH production is inhibited by hyperprolactinemia, or excessive prolactin. This lowers the synthesis of FSH and LH (luteinizing hormone), which in turn suppresses the production of estrogen and causes irregular menstrual cycles, anovulation (absence of ovulation), and infertility [33].
- *Clinical Signs:* Infertility, galactorrhea (unexpected milk production), and amenorrhea (lack of periods) are typical symptoms in women [34].
- *Prevalence:* A prevalent screening cause for reproductive dysfunction, hyperprolactinemia is considerably more common in infertile women than in the general population [35].

Anti-Mullerian Hormones (AMH)

AMH is a hormone produced by the ovaries, and its levels reflect the number of eggs remaining in the ovaries, also known as ovarian reserve. This hormone is a key indicator of fertility potential.

Role of (AMH) Fertility

- *Ovarian Reserve Indicator:* AMH levels indicate the number of eggs left in the ovaries. Higher levels suggest a greater number of eggs, while lower levels indicate fewer eggs remaining.
- *Predicting Response to Ovarian Stimulation:* AMH levels help predict how well a woman will respond to fertility medications, such as those used in IVF.
- *Fertility Treatment Guidance:* AMH testing guides treatment options and expectations for women trying to conceive.

AMH Levels and Fertility

- *Normal AMH Levels:* Normal AMH levels vary with age, but typically fall within the following ranges:
 - o Age 20–24: 8.7–13.6 ng/mL (p mol/L may vary)
 - o Age 25–29: 6.4–70.3 ng/mL
 - o Age 30–34: 4.1–58.0 ng/mL
- *Low AMH Levels:* May signal a reduced ovarian reserve, impacting fertility, with levels below 1 ng/mL indicating fewer eggs.
- *High AMH Levels:* May suggest polycystic ovary syndrome (PCOS), which affects ovulation and fertility, with levels above 3 ng/mL suggesting a high ovarian reserve.

Impact on Fertility Treatments

- *VF Success Rates:* Higher AMH levels often correlate with a better response to ovarian stimulation and higher chances of successful fertilization and pregnancy.
- *Treatment Planning:* AMH levels help fertility specialists tailor treatments plans, adjusting medications dosages and products to optimize eggs production.

Male Hormones

- *FSH:* In men, FSH (Follicle-Stimulating Hormone) and LH (Luteinizing Hormone) work together to develop and maintain proper testicular function [36]. During fetal and newborn stages, FSH helps Sertoli cells (cells in the testis that support sperm production) grow in number. Later, during puberty, FSH helps spermatogonia (immature sperm cells) divide and mature through meiosis until they become round spermatids (Figure 6) [37].

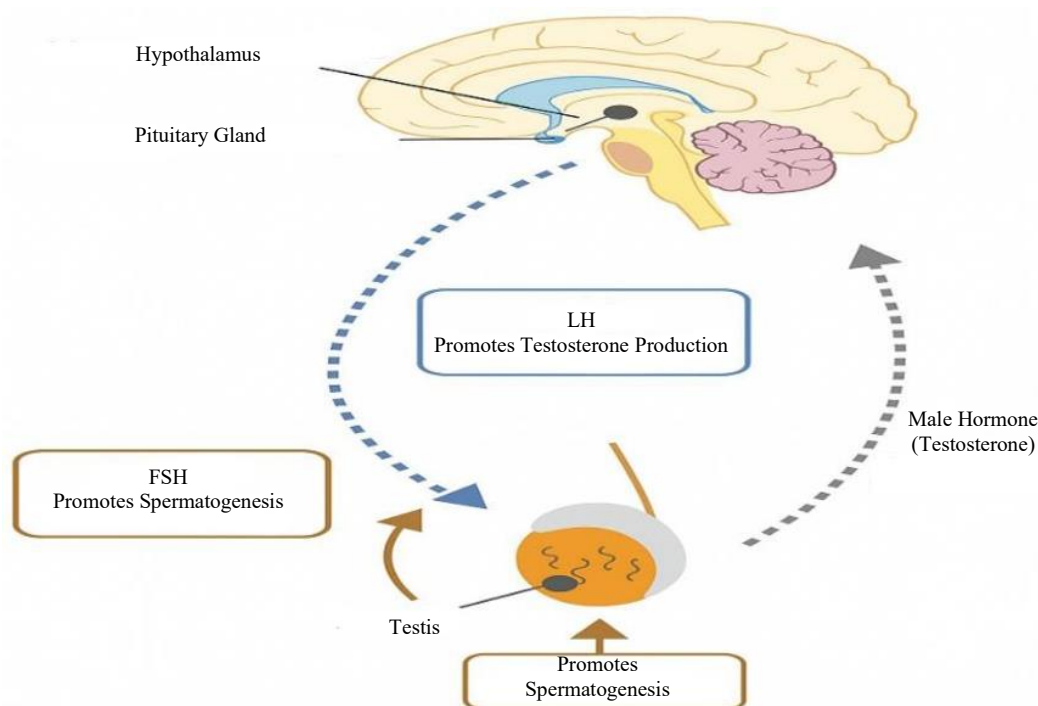


Figure 6. FSH hormones.

Normal FSH Function

- **Spermatogenesis:** FSH stimulates Sertoli cells to support sperm production and maturation.
- **Sperm Quality:** FSH helps regulate sperm quality, morphology, and motility. Abnormal FSH Levels and Male Infertility:
 - **High FSH Levels:** May indicate testicular failure or damage, leading to impaired sperm production.
 - **Low FSH Levels:** May indicate hypogonadotropic hypogonadism (HH), a condition where the testes do not produce enough testosterone and sperm [38].

FSH Therapy in Male Infertility

- **Hypogonadotropic Hypogonadism (HH):** FSH therapy, often combined with human chorionic gonadotropin (HCG), can stimulate spermatogenesis and improve fertility.
- **Idiopathic Male Infertility:** FSH therapy may benefit some men with normal gonadotropin levels, improving sperm parameters and fertility outcomes.

FSH and Male Infertility Diagnosis

- **Diagnostic Marker:** FSH levels can help diagnose the underlying cause of male infertility.
- **Predictive Value:** FSH levels can predict the likelihood of successful fertility treatment [39].

LH:

LH Function: Testosterone Generation

Leydig cells in the testes are stimulated by LH to create testosterone, which is essential for the development and generation of sperm. The production of healthy sperm is ensured by the regulation of spermatogenesis by LH and Follicle-Stimulating Hormone (FSH).

Male Fertility Affected by LH Imbalance

- **Low LH Levels:** May cause less testosterone to be produced, which will lower the number and motility of sperm.
- **High LH Levels:** May be a sign of hypogonadism or testicular malfunction, which can lead to infertility [40].

TESTOSTERONE

Role of Testosterone in Male Fertility

- *Normal Function:* Spermatogenesis depends on the testosterone generated in the testes. Long-term low testosterone, or hypogonadism, can reduce sperm production and sexual desire, which can lead to infertility. However, low blood testosterone does not always indicate low fertility because testicular levels are sometimes enough [41].
- *Hormonal Regulation:* FSH promotes the growth and well-being of sperm, whereas LH from the pituitary gland increases the creation of testosterone in the testicles. Fertility can be decreased by abnormally high prolactin or by disruptions in LH or FSH.
- *Testosterone Supplementation:* Exogenous testosterone, which is obtained by drugs or steroids, inhibits the pituitary gland's production of LH and FSH. This can cause or exacerbate infertility by significantly lowering intratesticular testosterone and halting sperm production. Sperm recovery is typically the result of stopping testosterone pills, however this is not always the case and could take months or even years [42].
- *Low Testosterone:* Male hypogonadism, or low testosterone, can manifest as erectile dysfunction, low libido, low energy, lower sperm counts, and decreased hair development. Although many men with low testosterone still generate enough sperm for fertility, some see a decline in sperm quality or quantity, which can impact the likelihood of pregnancy [43].
- *High Testosterone:* Male infertility with elevated testosterone There is a widespread misperception that males with higher testosterone levels are more virulent. However, hormones must maintain a balanced equilibrium to work as intended. Therefore, excessive testosterone levels can potentially cause infertility in males [44].

Precaution

Precaution Male Infertility

- *Quit Smoking:* It is strongly linked to poor sperm quality and count if you smoke.
- *Limit or Stop Drinking Alcohol:* drinking too much can drop testosterone levels, hurt the quality of sperm, and make it hard to get an erection.
- *Maintain a Healthy Weight:* Keep your weight in a healthy range. Being overweight is linked to fewer and lower-quality sperm [45].
- *Avoid Recreational Drugs:* Cannabis, cocaine, anabolic steroids, and other illegal drugs can make it harder to get pregnant.
- *Prevent Sexually Transmitted Diseases (STIs):* To avoid chlamydia and gonorrhoea, which can lower fertility, use condoms and restrict the number of sexual partners [46].
- *Prevent Testicular Overheating:* Steer clear of hot tubs, saunas, extended hot baths and tight pants to prevent testicular hyperthermia. Avoid sitting with a laptop on your lap for extended amounts of time and try to wear loose-fitting clothing.
- *Consume a Healthy Diet:* Sperm health is supported by a well-balanced diet high in fruits, vegetables, and nuts, particularly walnuts [47].
- *Regular Exercise:* Three times a week, spend at least 20 to 30 minutes doing moderate exercise.
- *Minimize Exposure to Toxins:* Steer clear of industrial chemicals, heavy metals, and pesticides that might damage sperm.
- *Examine Your Prescription Medications:* If you are taking any that may affect your ability to conceive, speak with your doctor.
- *Respond Quickly to Medical Concerns:* For testicular damage, infections, or other issues pertaining to reproductive health, get medical help [48].

Precaution Female Infertility

- *Diet:* Women may become infertile if they consume foods with a high glycaemic index, which indicates how your blood sugar (glucose) level increases after consuming a particular food item. Additionally, fried, processed, and packaged meals increase the risk of diabetes and obesity, two conditions that are known to be associated with infertility in women [49].

- *Smoking*: Smoking increases the chance of ectopic pregnancy, which occurs when a fertilized egg implants and grows outside the uterus, and miscarriage in women.
- *Drinking Too Much Alcohol*: Women who consume too much alcohol may have a reduced fertility rate. The American Cancer Society advises against alcohol consumption. Women who wish to use alcohol should keep their daily consumption to one drink [50].
- *Keep Your Weight in Check*: Ovulation abnormalities are less likely to occur when a healthy weight is maintained. You can achieve this by eating a nutritious, well-balanced diet and exercising frequently.
- *Control Your Stress Everybody Experiences Stress Occasionally*: However, persistent stress can interfere with ovulation. Furthermore, infertility can unavoidably lead to stress, and stress might impede the effectiveness of infertility treatment. Among other stress-coping strategies, you can efficiently control your stress by exercising, reading, and practicing meditation [51].
- *Treatment*: Treatment for infertility depends on what is causing it and may involve counseling or fertility treatments, which include in vitro fertilization. According to ESHRE recommendations, couples who have a 40% or higher chance of having a live birth each year are encouraged to keep trying for a natural pregnancy [52]. The methods used to treat infertility can be divided into medical treatments and complementary or alternative treatments. Sometimes, these methods are used together. Both men and women may be given certain drugs such as clomiphene citrate, human menopausal gonadotropin (HMG), follicle stimulating hormone (FSH), human chorionic gonadotropin (HCG), gonadotropin releasing hormone (GnRH) analogues, aromatase inhibitors, and metformin. Medical treatment of infertility usually involves fertility medication, medical devices, surgery, or a combination of these. If the sperm is of good quality and the woman's reproductive system is working properly (patent fallopian tubes, no blockage or scarring), medication to stimulate the ovaries might be used. The doctor or WHNP might also advise using a cervical cap, which the patient can place at home by inserting sperm into the cap and putting it on the cervix, or intrauterine insemination (IUI), where the doctor or WHNP puts the sperm directly into the uterus. If these treatments don't result in pregnancy, the doctor or WHNP may suggest in vitro fertilization (IVF). IVF along with other techniques – like ICSI, ZIFT, and GIFT – are called assisted reproductive technology (ART) techniques. ART usually starts by stimulating the ovaries to produce more eggs. Fertilization happens outside the body, and the fertilized egg is placed back into the woman's uterus in a process called embryo transfer. Other medical procedures include things, like tuboplasty, assisted hatching, and preimplantation genetic diagnosis, IVF is the most common ART method. It has been shown to help with infertility issues like blocked or damaged tubes, endometriosis, repeated IUI failure, unexplained infertility, poor ovarian reserve, or low or no sperm count. ICSI is used when the semen quality is poor, sperm count is low, or fertilization did not work in previous IVF cycles. This method involves injecting a single healthy sperm directly into a mature egg. The fertilized embryo is then transferred into the womb. Fertility tourism refers to traveling to another country for fertility treatments. People often do this because of strict laws in their home country or because of lower costs. In vitro fertilization and donor insemination are two of the most common procedures involved (Table 1) [53].

Table 1. Hormones female levels infertility.

Hormone	Normal range	Abnormal range	Potential impact on fertility
FSH	3–20 IU/L	20 IU/L	Diminished ovarian reserve premature ovarian failure.
Estrogen	20–750 pg/mL	<20 pg/mL or >750 pg/mL	Ovulation disorders irregular periods.
progesterone	10 ng/mL	<10 ng/mL	Implantation issues difficulty maintaining pregnancy.
Prolactin	2–29 ng/mL	29 ng/mL	Hyperprolactinemia ovulation disorders.
LH	2–12 IU/L	12 IU/L	POCS, ovulation disorders.
TSH	0.5–4.5 U/mL	<0.5 U/mL or >4.5 U/mL	Thyroid disorders ovulation disorders.

HORMONES FEMALE LEVELS INFERTILITY

Treatment Male

Treatments for male infertility may include medication, surgery, lifestyle modifications, and assisted reproductive technology. These choices are meant to address the root reasons of infertility, which may include sperm abnormalities, structural problems, or hormone imbalances. Depending on the diagnosis, specific treatments may involve hormone therapy, assisted reproductive technologies – such as IVF or ICSI, or surgery – to remove obstructions.

- *Lifestyle Changes:* Your health care team may recommend that you take the following steps. Have sex more often and closer to the time of ovulation. Get regular exercise. Drink less alcohol or give up harmful substances such as tobacco. Stop taking medicines that can affect fertility, but only if your health care team.
- *Hormone Treatments:* Hormonal imbalances, such as low testosterone or other hormone deficits, that may be causing infertility can be treated with medication. When there are hormonal imbalances, drugs – such as gonadotropins or clomiphene citrate – can be used to increase sperm production.
- *Treatment of Infections:* A reproductive tract infection may be resolved with antibiotic treatment, although fertility is not always restored.
- *Addressing Sexual Dysfunction:* Erectile dysfunction and other sexual problems that interfere with reproduction can be treated with medications or therapy.
- *Surgery:* For instance, an obstructed vas deferens or a varicocele can frequently be surgically rectified. It is possible to reverse previous vasectomies. Using sperm retrieval procedures, sperm can frequently be extracted straight from the testicles or epididymis when there are no sperm in the ejaculate [54].

Surgical Treatment

- *Vasectomy Reversal:* A vasectomy reversal reconnects your vas deferens to enable pregnancy if you have a vasectomy to stop sperm from entering your semen.
- *Vasopididymostomy:* This operation eliminates a barrier in your epididymis (the coiled tube that rests against your testicle where sperm mature) that stops sperm from entering your semen.
- *Sperm Retrieval:* A healthcare provider will perform a biopsy to retrieve sperm from your testicles or epididymis.
- *Varicocelectomy:* Varicocele is a condition in which there's blood pooling in the testicles due to varicose veins in the scrotum. It may have a negative effect on sperm quality. Surgery removes varicose veins, and this can increase the chance of pregnancy, in some cases, of sperm. To extract sperm from your testicles or epididymis, a medical professional will do a biopsy. Varicocelectomy. Varicocele is a disorder where varicose veins in the scrotum cause blood to pool in the testicles. The quality of sperm may suffer as a result. In certain situations, having varicose veins removed surgically may enhance the likelihood of becoming pregnant.
- *Assisted Reproductive Technology:* Assisted reproductive technology (ART) procedures involve removing an egg from your partner's ovaries and combining it with your sperm in a lab.
- *Intracytoplasmic Sperm Injection [ICSI]:* During ICSI, a single sperm cell is manually injected into an egg.
- *In Vitro Fertilization [IVF]:* Your partner will receive injections of fertility drugs during the IVF procedure, which will cause several eggs to develop in their ovaries. When the eggs are ready, a provider will gather them and expose them to sperm in a laboratory. An embryo will be placed inside a uterus by a provider once the egg has been fertilized by a sperm cell [55].

Treatments of Female Infertility

- *Allopathic Treatment:* Allopathic Treatment: Different types of fertility medicines are commonly used to help women who have trouble ovulating. It is important to discuss the good and bad sides of these medicines with your doctor. You should know about the possible risks, benefits, and side effects. In some cases, doctors also use surgery to fix certain causes of infertility. Issues with a

woman's ovaries, Fallopian tubes, or uterus can sometimes be treated with surgery.

- *Intrauterine Insemination (IUI)*: Intrauterine insemination, or IUI, is another method used to treat infertility. Many people know it as artificial insemination. During the process, a woman receives an injection of specially treated sperm. In some cases, she may also take medications to help her release eggs before the procedure.
- *Assisted Reproductive Technology (ART)*: Intrauterine insemination, or IUI, is another method used to treat infertility. Many people know it as artificial insemination. During the process, a woman receives an injection of specially treated sperm. In some cases, she may also take medications to help her release eggs before the procedure [56].

Method's Modern Infertility

- *In Vitro Fertilization [IVF]*: In vitro fertilization, or IVF, is a very successful assisted reproductive technique that entails fertilizing eggs in a lab environment using sperm outside of the body. After fertilization, the embryos are placed inside the uterus, where they may implant and grow into pregnancy. Male factor infertility, obstructed fallopian tubes, and unexplained infertility are among the infertility conditions for which IVF is appropriate (Figure 7).

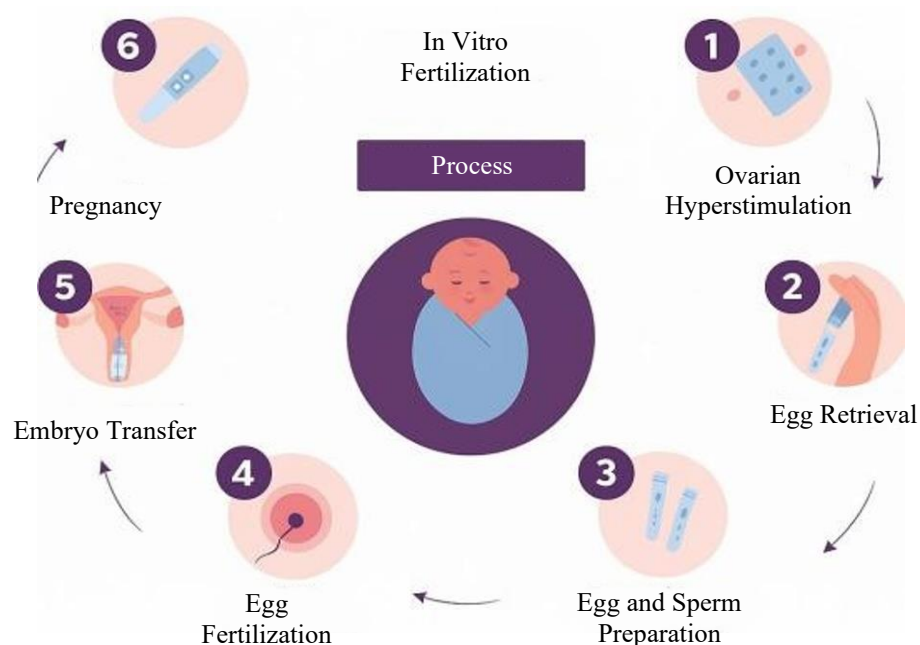


Figure 7. In vitro fertilization.

- *Intracytoplasmic Sperm Injection [ICSI]*: ICSI is a specialized type of IVF that is very helpful for couples who are struggling with male factor infertility. To aid in fertilization, a single sperm is delivered straight into the egg during ICSI. By using this method, sperm defects can be resolved and the likelihood of a successful embryonic development increase.
- *Preimplantation Genetic Testing [PGT]*: PGT is a state-of-the-art technique that is used in combination with in vitro fertilization (IVF) to check embryos for genetic defects prior to implantation. This can lower the chance of miscarriage and genetic problems in kids by assisting in the detection of chromosomal abnormalities, genetic disorders, and other hereditary conditions.
- *Eggs Donation and Sperm Donation*: These options provide a different route to motherhood for people who are unable to produce viable eggs or sperm. To get pregnant, IVF might be combined with donor eggs or sperm. By utilizing genetic material from a donor, this method enables people with reproductive problems to enjoy the benefits of motherhood.
- *Gestational Surrogacy*: is a choice for people who cannot carry a pregnancy because of medical issues like problems with the uterus or repeated miscarriages. In this process, an embryo is made

through in vitro fertilization using the genetic material of the intended parents and then placed in a surrogate mother, who carries the baby to birth. Besides medical treatments, changing your lifestyle can also help with fertility. Keeping a healthy weight, not smoking or drinking too much alcohol, managing stress, and eating a nutritious, balanced diet can all improve reproductive health and boost fertility. Infertility can be very tough emotionally for individuals and couples. It is important to get emotional support from family, friends, support groups, or mental health experts to deal with the challenges. Talking to a counsellor, therapist, or practicing mindfulness can help people manage the ups and downs of fertility treatments [57].

CONCLUSION

Female infertility is the main reason why couples have trouble getting pregnant. About 25% of couples face this issue. Many causes of female infertility have been found, but the only hope for treatment comes from proper diagnosis and counseling. A review covers all the main reasons and causes of infertility. All these problems can be solved with the right approach. Female infertility can be treated with medicines, small surgeries, laparoscopic procedures, hormone therapy, and preventing issues before pregnancy. This review is helpful for scientists and medical researchers who want to find ways to end female infertility.

REFERENCES

1. Covington SN, Burns LH, editors. Infertility counseling: A comprehensive handbook for clinicians. 2nd ed. New York: Cambridge.
2. Makar RS, Toth TI. The evaluation of infertility. *Am J Clin Pathol*. 2002;(Supply):S05–103.
3. Hammel W, Ittner E, Kochen MM, et al. Voluntary Practice. 1997;47(415):111–5.
4. ART fact sheet. *Eur Soc Hum Reprod Embryol*. 2014. Archived 4 Mar 2016.
5. Causes of infertility. National Health Service.
6. Cooper TG, Noonan E, von Eckardstein S, et al. World Health Organization references for human semen characteristics. *Hum Reprod Update*. 2010;16(3):231–45.
7. Infertility Help: When & where to get help for fertility treatment. Failures (with some successes) of assisted reproduction and gamete donation programs. *Hum Reprod Update*.
8. Failures (with some successes) of assisted reproduction and gamete donation programs. *Hum Reprod Update*. 2013;19(4):353–65.
9. About infertility (802.htm). Human Fertilisation and Embryology Authority.
10. Lessey BA. Medical management of endometriosis and infertility. 2000;1089–95.
11. Are You at Your Optimal Weight. Chelsea Fertility NYC. Retrieved 6 Mar 2015.
12. Hamblen EC. *Endocrinology of Woman*. Springfield: Charles C. Thomas; 1945.
13. Sabra SM, Al-Harbi MS. An influential relationship of seminal fluid microbial infections and infertility, Taif Region, KSA. *World J Med Sci*. 2014;10:32–7.
14. World Health Organization. WHO Laboratory Manual for the Examination of Human Semen and Semen-Cervical Mucus Interaction. 4th ed. Cambridge: Cambridge University Press; 1999. p. 1–86.
15. Men's Health – Male Factor Infertility. University of Utah Health Sciences Center. 2003 Jan 4. Archived from the original on 2007 Jul 4 [Last retrieved on 2007 Nov 11].
16. Lotti F, Maggi M. Ultrasound of the male genital tract in relation to male reproductive health. *Hum Reprod Update*. 2015;21:56–85.
17. Hamblen EC. *Endocrinology of Woman*. Springfield: Charles C. Thomas; 1945.
18. Practice Committee of the American Society for Reproductive Medicine. Diagnostic evaluation of the infertile female: A committee opinion. *Fertil Steril*. 2021;116(2):396–407.
19. Norman RJ, et al. Ovulation induction for anovulatory infertility with polycystic ovary syndrome. *Cochrane Database Syst Rev*. 2007;(4):CD0004.
20. Fritz MA, Speroff L. *Clinical Gynecologic Endocrinology and Infertility*. 8th ed. Philadelphia: Lippincott Williams & Wilkins; 2010.
21. Baulieu EE. Contragestion and other clinical applications of RU 486, an antiprogestosterone at the receptor. *Science*. 1989;245(4924):1351–1357.

22. Stouffer RL. Progesterone as a mediator of ovarian function and female reproduction. *Endocr Rev.* 2006;27(4):398–417.
23. Rapkin AJ, Winer SA. Premenstrual syndrome and premenstrual dysphoric disorder: Quality of life and burden of illness. *Expert Rev Pharmacoecon Outcomes Res.* 2009;9(2):157–170.
24. Filicori M, et al. Luteal phase defects: Diagnostic and therapeutic aspects. *Obstet Gynecol Clin North Am.* 1987;14(4):909–932.
25. Gellersen B, Brosens JJ. Cyclic decidualization of the human endometrium in reproductive health and failure. *Endocr Rev.* 2014;35(6):851–905.
26. Csapo AI, et al. The significance of the human corpus luteum in pregnancy maintenance. *Am J Obstet Gynecol.* 1972;112(8):1061–1067.
27. Szekeres-Bartho J. The immunological pregnancy protective effect of progesterone is mediated by PIBF. *Am J Reprod Immunol.* 2002;48(5):342–349.
28. Widner B, et al. Tryptophan degradation and immune activation in pregnancy. *Obstet Gynecol.* 2000;95(4):571–574.
29. Revelli A, et al. Follicular fluid content and oocyte quality: From single biochemical markers to metabolomics. *Reprod Biol Endocrinol.* 2009;7:40.
30. Andersen J. Studies of decidual and amniotic prolactin in normal and pathological pregnancy. *Dan Med Bull.* 1990;37:154–165.
31. Bernard V, Young J, Chanson P, Binart N. New insights in prolactin: Pathological implications. *Nat Rev Endocrinol.* 2015;11:265–275. doi: 10.1038/nrendo.2015.36.
32. Lee M, Ben-Rafael Z, Meloni F, Mastroianni L, Flickinger GL. Relationship of human oocyte maturity, fertilization, and cleavage to follicular fluid prolactin and steroids. *J In Vitro Fert Embryo Transf.* 1987;4:168–172.
33. Reinthaller A, Deutinger J, Riss P, Müller-Tyl E, Fischl F, Bieglmayer C, Janisch H. Relationship between the steroid and prolactin concentration in follicular fluid and the maturation and fertilization of human oocytes. *J In Vitro Fert Embryo Transf.* 1987;4:228–231. doi: 10.1007/BF01533761.
34. Lindner C, Lichtenberg V, Westhof G, Braendle W, Bettendorf G. Endocrine Parameters of Human Follicular Fluid and Fertilization Capacity of Oocytes. *Horm Metab Res.* 1988;20:243–246. doi: 10.1055/s-2007-1010803.
35. Wyse BA, Fuchs WN, Defer M, Montbriand J, Szaraz P, Librach C. The follicular fluid adipocytokine milieu could serve as a prediction tool for fertility treatment outcomes. *Reprod Biomed Online.* 2021;43:738–746. doi: 10.1016/j.rbmo.2021.07.001.
36. Men's Health - Male Factor Infertility. University of Utah Health Sciences Center. 2003 Jan 4. Archived from the original on 2007 Jul 4. Last retrieved on 2007 Nov 11.
37. Brugh VM 3rd, Lipshultz LI. Male factor infertility: Evaluation and management. *Med Clin North Am.* 2004;88:367–85.
38. Lotti F, Maggi M. Ultrasound of the male genital tract in relation to male reproductive health. *Hum Reprod Update.* 2015;21:56–83.
39. Cooper TG, Noonan E, von Eckardstein S, Auger J, Baker HW, Behre HM, et al. World Health Organization reference values for human semen characteristics. *Hum Reprod Update.* 2010;16:231–45.
40. Butt F, Akram N. Semen analysis parameters: Experiences and insight into male infertility at a tertiary care hospital in Punjab. *J Pak Med Assoc.* 2013;63:558–62.
41. Khourdaji I. Frontiers in hormone therapy for male infertility. *PMC.* 2018.
42. European Association of Urology. Guidelines on Male Infertility. 2025.
43. Dabaja AA. Medical treatment of male infertility. *TAU.* 2014.
44. Leslie SW, et al. Male Infertility. *StatPearls.* 2024.
45. American Academy of Family Physicians. Infertility. Last updated 2021 Feb. Accessed 2024 Jan 25.
46. Centres for Disease Control and Prevention (U.S.). Multiple pages reviewed for the article. Accessed 2024 Jan 25.

-
47. Merck Manual, Professional Version. Sperm Disorders. Last reviewed 2022 Sep. Accessed 2024 Jan 25.
 48. National Institute of Child Health and Human Development (U.S.). How Common Is Male Infertility, and What Are its Causes. Accessed 2024 Jan 25.
 49. James JE. Maternal caffeine consumption and pregnancy outcomes: A narrative review with implications for advice to mothers and mothers-to-be. *BMJ Evid Based Med*. 2021;26(3):114–115.
 50. Sharma A, Shrivastava D. Psychological Problems Related to Infertility. *Cureus*. 2022;14(10):e30320.
 51. Dou L, Zheng Y, Li L, Gui X, Chen Y, Yu M, et al. The effect of cinnamon on polycystic ovary syndrome in a mouse model. *Reprod Biol Endocrinol*. 2018 Oct 19;16(1):99.
 52. Failures (with some successes) of assisted reproduction and gamete donation programs. *Hum Reprod Update*. 2013;19(4):353–65.
 53. Edmuds, Sabanegh Jr. Male Infertility: Problems and Solutions. Springer Science & Business Media. p. 82–83. ISBN 978-1-60761-193-6. Paul Mc Fedries. Fertilitytourism. Word Spy.
 54. Anawalt BD, et al. Treatments for male infertility. Accessed 2020 Nov 5.
 55. Yao DF, et al. Male infertility: Lifestyle factors and holistic, complementary, and alternative therapies. *Asian J Androl*. 2016.
 56. O'Moore AM, O Moore RR, Harrison RF. Psychosomatic aspects in idiopathic infertility: Effects of treatment with autogenic training. *J Psychosom Res*. 1983;27:145–151.
 57. Modern Paths Through Infertility Treatment. *J Fertil In Vitro IVF World W Reprod Med Genet Stem Cell Biol*. 2024 May 10;12:366. doi: 10.35248/2375-4508.24.12.366.