



An Updated Overview on Causes, Diagnosis and Management of Infertility

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ABSTRACT

Infertility is the disorder which can alter the mankind and also the man mind to cause major problems. Infertility i.e. childlessness causes physical and mental worries which can obstruct the family happiness. Male and female fertility can be limited or diminished by number of factors such as hormone imbalance, illness and infections on reproductive organs, obstruction or sexual dysfunction. In this scientific era, infertility is also caused by lack of healthy food, stressful world, excess radiation, changing lifestyle, exposure to various toxins, smoking, addiction to alcohol and drugs. This review deals with fertilization, implantation and infertility. It also deals with the factors which cause infertility and diagnosis and management of infertility in both male and female. This review will be more useful not only to the scientific people and also normal peoples.

Keywords: Fertilization, Implantation, Infertility, Causes, Diagnosis, Treatments.

INTRODUCTION

Pregnancy is the most intimate and heart-warming experience in the life of married couples. Not only are the events which lead up to it very personal, but the actual incident represents a merging of the essential features of both partners.

Becoming pregnant and giving birth to a child is the climatic point in the life of every couple. Now a day's more and more couples are showing up at fertility centre for attaining fertility in their married life. Due to childlessness many couples are socially isolated and thus emotionally distressed in many part of the world. Many childless couples are applying for divorce. It may be due to male or female infertility.

Knowledge of infertile couples about sex education is a fundamental parameter to optimize infertility. This review reveals about Fertilization, Implantation, Infertility and the factors which cause infertility and Diagnosis of infertility in both male and female. It will be very useful to all kinds of people.

"THINK RIGHT AND ACT RIGHT"

Reproduction

It is the process by which a living entity or organism produces a new individual of the same kind. The gonads or sex glands – on the ovaries in the female & the testes in the male- produces the germ cells that unite & grow into a new individual. Reproduction begins when the germ cells unite and the process is called fertilization¹.

Fertilization typically occurs only at the average of four days in every menstrual cycle. The mature ovum lives only one or two days after ovulation & the sperm have only about the same amount of time before they perish in the female reproductive tract.

To fertilize the ovum, coitus must take place within the period that begins one or two days before ovulation & lasts until one or two days after ovulation. Most women ovulate between the twelfth and sixteenth days after beginning of the last period².

Fertilization

In human reproduction, the process by which the male's sperm unites with the females ovum, is called conception. By this event, a new life is created. This is accomplished through the act of intercourse or coitus during which the erect penis helps in the deposition of spermatozoa into the vagina³.

The spermatic fluid is a combination of sperms mixed with secretions of the seminal vesicles and prostate gland. These secretions are necessary to keep the sperms in a viable and motile state.

Once inside the vaginal tract, the sperms move with the help of tail. Out of nearly 300 million spermatozoa in a single ejaculation, only one is needed for the fusion with the egg. The act of fertilization or the union of sperm and egg takes place in the oviduct.

The act of fertilization fulfills at least four requirements⁴,

- ✓ It combines the characters of two parents.
- ✓ Restores the diploid number of chromosomes.
- ✓ Determines the sex of offspring.
- ✓ Initiates the process of development of the zygote after establishing pregnancy.

Development of embryo & fetus

Soon after conception (the fertilization of an ovum by a sperm), the cells begin to divide. The fertilized ovum moves slowly down the fallopian tube to the uterus,



floats freely in the uterus and is implanted in the uterine wall. Fetal membranes begin forming. First is the amnion, which surrounds the embryo and attaches to the chorion that will ultimately carry nutrients to the embryo from the mother. Differentiation is occurring rapidly. At two weeks of age the embryo has attached to the uterine wall, developed membranes and organized the germinal layers – the endoderm, the ectoderm and the mesoderm.

Endoderm: The gastrointestinal tract & its appendages & the respiratory organs will develop from the endoderm.

Ectoderm: The brain, nervous tissue, sense organs & skin develops.

Mesoderm: The gonads, kidneys, adrenal cortex, the abdominal cavity lining develop and further differentiation produces the connective, vascular, skeletal, muscular and hematopoietic tissues⁵.

The uterine lining becomes enlarged and is prepared for implantation of the embryo in the trophoblast layer. Twelve days after fertilization, the trophoblast has formed a two-layered chorion. Human chorionic gonadotropin (hCG) is secreted by the chorion, and it prolongs the life of the corpus luteum until the placenta begins to secrete estrogen and progesterone⁶.

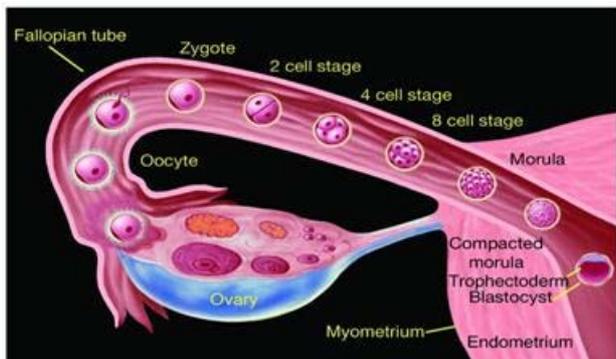


Figure 1

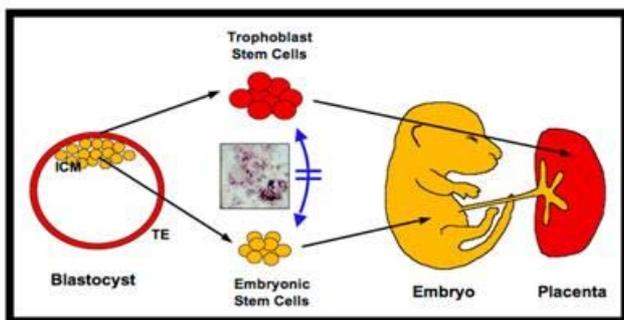


Figure 2

By three weeks, the embryo's heart appears & a vascular system develops. By the fourth week, circulation occurs within the embryo. The embryo becomes fetus by the end of the second month, with the heart beating in a regular rhythm. Skeletal muscles are present & arms, legs are forming. Viscera are formed & beginning to function. Organization is beginning for face, tongue, mouth, eyes & ears. Fetal size is about an inch. By the third month, the

fetus is about three inches in size & the neuromuscular system is developing rapidly. By this point, the basic structure of the human is formed; the remainder of pregnancy is a period of further differentiation, growth & refinement to prepare the fetus for life outside the uterus. Figure 1 shows the sequences that takes place from ovulation to implantation. Figure 2 shows conversion of trophoblast stem cells into placenta, embryonic stem cells in to embryo.

INFERTILITY

The term Infertility refers to the biological inability of a person to contribute to conception. The term Infertility may also refer to the state of woman who is unable to carry a pregnancy to full term⁷. However, the definition of the term Infertility differs depending on the context. For example, The WHO defines the term as follows:

“Infertility is the inability to conceive a child. A couple may be considered infertile, if after two years of regular sexual intercourse, without contraception, the woman has not become pregnant (and there is no other reason, such as breastfeeding or postpartum amenorrhea). Primary infertility is infertility in a couple who have never had a child. Secondary infertility is failure to conceive following a previous pregnancy.

According to Med lexicon’s medical dictionary, the term ‘Infertility’ means diminished or absent ability to produce off spring; in either the male or the female, not as irreversible as sterility. Figure 3 shows causes of infertility.



Figure 3

Infertility in women

Female infertility usually occurs when there is a problem with ovulation, a damaged fallopian tube or uterus or a problem with the cervix. Age may also contribute to fertility struggles because as a woman ages, her fertility decreases⁸.

When a woman is not able to become pregnant after one year of trying, or six months or if a woman is 35 or older, it is a case of female infertility. Infertility in women may be caused by variety of conditions.

Two major causes of infertility in women are⁹:



- Failure to ovulate (about 60% of cases)
- Obstruction of fallopian tube (about 40% of cases)

Figure 4 shows two major causes of female infertility. Figure 5 shows two major causes that are interrelated. Figure 6 shows the causes due to hormonal imbalance.

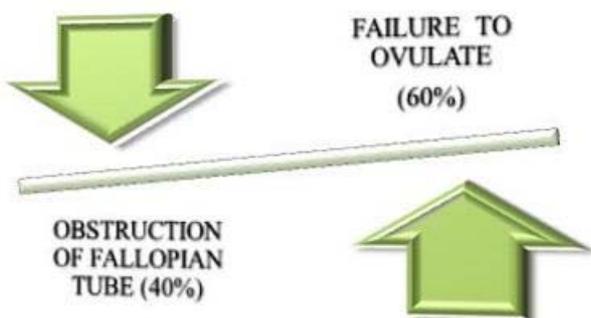


Figure 4

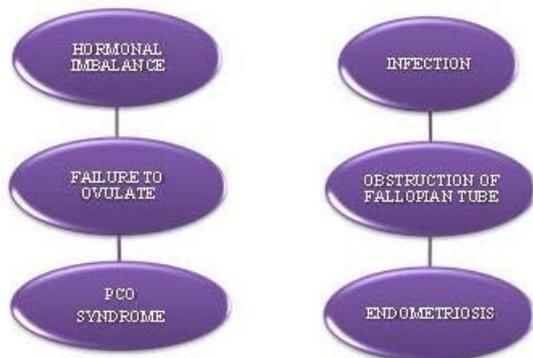


Figure 5



Figure 6

Hormonal imbalance is the most common causes of anovulation. The process of ovulation depends upon a complex balance of hormones and their interactions to be successful, and any disruption in this process can hinder ovulation.¹⁰⁻¹²

Hyperprolactinemia - Failure to ovulate arise from the over secretion of hormone prolactin i.e. Hyperprolactinemia, nearly 30% menstrual abnormalities are due to this, which suppress ovulation.

Malfunction of the hypothalamus - The hypothalamus is the portion of the brain responsible for sending signals to the pituitary gland, which, in turn, sends hormonal stimuli to the ovaries in the form of FSH and LH to initiate egg maturation. If the hypothalamus fails to trigger and control this process, immature eggs will result. This is the cause of ovarian failure in 20% of cases.

Malfunction of the pituitary gland - The pituitary's responsibility lies in producing and secreting FSH and LH. The ovaries will be unable to ovulate properly if either too much or too little of these substances is produced. This can occur due to physical injury, a tumor or if there is a chemical imbalance in the pituitary.

Female hypogonadism - This means that production of the normal sex hormones is deficient.

Early menopause – “cessation of menses,” and refers to that period in a woman’s life when reproductive function has come to an end, there is a decline in hormonal secretion by the ovary.

Ovarian virilism – The normal ovary does not secrete a significant amount of androgen. In the presence of enzyme defects in the ovary, considerable amount of androgen causing not only menstrual disorders but also varying degree of hirsutism.

Figure 7 shows the causes due to infections.

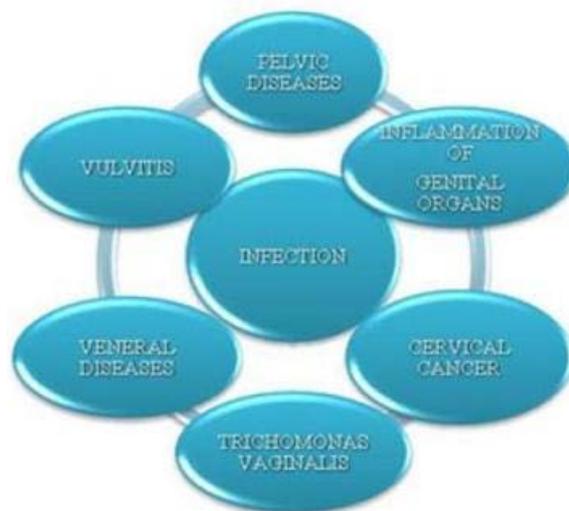


Figure 7

Infections^{13,14}

Pelvic diseases – may cause infertility. The most common of these are appendicitis and lead to scarring and blockage.

Inflammation of genital organs – it is responsible for the production of mucus that is considered toxic or poisonous to sperms. The mucus also tends to obstruct passage of male germ cells into the uterus.

Cervical cancer – when cancer develops in the cervix, it is at first confined to this organ. But, depending on the type of growth, spreads at different rate to the adjacent organs.

Trichomonas vaginalis – a parasitic protozoan, may infect the vagina, producing an irritative discharge. Moniliasis, a fungus infection caused by *Candida albicans*, may affect the vaginal wall causing white discharge or white patches.

Veneral disease – it can damage the fallopian tube.

Vulvitis – inflammation of vulva may be caused by number of factors. It occurs in obese and diabetic patients, produces irritation and provides favorable environment for the growth of fungi.

Figure 8 shows the factors associated with PCO syndrome.¹³⁻¹⁵



Figure 8

Endometriasis – the lining (endometrium) of the womb sometimes behave abnormally. Growth occurs not only in the uterus but also elsewhere in the abdomen, such as in the fallopian tubes, ovaries and the pelvic peritoneum. The patient with this condition may suffer irregularities in the menstrual cycle. Approximately 10% of infertile couples are affected by endometriosis.¹⁶

Amenorrhea – absence of menstruation.

Increased level of testosterone – in PCO syndrome, symptoms reflect an excess of testosterone, including increased body hair with balding and deepening of voice.

Cyst and tumors in reproductive organs:

Ovarian tumors – the extensive growth of tumors of the ovary can be prevented only by early discovery and removal.

Infection and tumors of the fallopian tube – infection of fallopian tubes frequently cause permanent sterility.

Uterine tumors – it is one of the most frequent sites of tumor formatgan. Tumor develops in any part of the organ. The patient may have a group of small fibroids. In early stages, many of these growths can be treated successfully either surgically or radiologically.

Thus, for a woman to get pregnant,

- ✓ She must release an egg from one of her ovaries (ovulation).
- ✓ The egg must go through a fallopian tube toward the uterus (womb).
- ✓ A man's sperm must join with the egg along the way (fertilization).
- ✓ The fertilized egg must attach to the inside of the uterus (implantation).

Infertility in men

Infertility in married life may be due to the problem with husband or wife. If the problem is with husband, it is called male infertility. The main cause of male infertility is low semen quality. Another possible cause is a low sperm count. Infertility in men may be caused by variety of conditions². Figure 9 shows two major causes of male infertility. Figure 10 shows the causes for impotence.

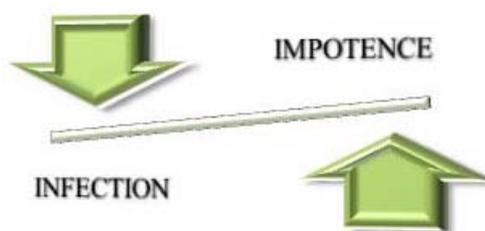


Figure 9

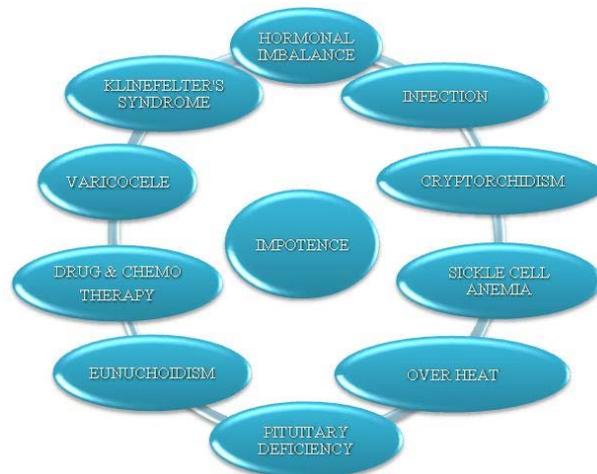


Figure 10

IMPOTENCE¹⁷⁻²⁰

Impotence means an absence of normal spermatozoa and therefore failure of reproduction. It is considered as a major clinical problem of adult man.

Hormonal imbalance – it is the most common causes of impotence. The process of spermatogenesis i.e. formation of spermatozoa depends upon a complex balance of hormones.

Pituitary deficiency – it also disturb the sexual function in the male.



Eunuchoidism – primary failure of testicular development.

Cryptorchidism – undescended testicles, failure of one or both testicles to descend from the abdomen, and it can impair spermatogenesis.

Sickle cell anemia - may cause hypogonadism; a decreased functionality of the testicles.

Over heat - very hot baths, or working in extremely hot environments can raise the temperature of the testicles. Tight clothing may have the same effect on some people.

Drug and chemotherapy – addiction to alcohol and other addictive drugs and the side effects of using various drugs used for hypertension, depression and antipsychotic drugs. Chemotherapy can impair the sperm production.

Varicocele - Varicocele is defined as a dilation of the veins of the pampiniform plexus allowing for excessive blood flow, secondary to deficient venous valves, leading to increased scrotal temperatures and thus an adverse influence on spermatogenesis

Klinefelter's syndrome – in these patients are found to have an extra chromosome complex is composed of 47 instead of 46, it leads to absence of sperm.

Infections:^{18,19}

Prostatitis - Inflammatory infections of the prostate (prostatitis), epididymis (epididymitis) and testicles (orchitis), can cause irreversible infertility if they occur before puberty.

Testicular cancer - Can limit or destroy the ability for spermatogenesis.

Restrograde ejaculation - This occurs when impairment of the muscles or nerves of the bladder neck prohibit it from closing during ejaculation, allowing semen to flow backwards into the bladder. It may result from bladder surgery, a developmental defect in the urethra or bladder, or a disease that affects the nervous system, including diabetes.

Ductal obstruction - This is most often caused by a vasectomy, but may also be due to repeated infection, inflammation, or a developmental defect that prohibits sperm transport.

Spinal cord injury - these injuries occur in healthy men of reproductive age, producing sexual and reproductive difficulties. Many factors may predispose spinal cord injured men to infertility. Ejaculatory dysfunction, abnormalities of sperm production, chronic infections and blockage of sperm within the male reproductive tract are all potential factors.

STD'S – Sexually Transmitted Diseases can cause obstruction, infection, and scarring.

Genitourinary tract infection – it producing sexual and reproductive infection.

Obstruction of vasdeferens - may be due to repeated infection, inflammation, or a developmental defect that prohibits sperm transport.

Testicular Trauma - An injury, surgery, or infection can cause testicular trauma and trigger an immune response in the testes that may damage sperm. Though the effects are not fully understood, antibodies can impair a sperm cell's ability to swim through cervical mucus or to penetrate a female egg.

Orchitis – when the testes are involved in a case of mumps, the infection is known as orchitis.

Figure 11 shows causes due to infection.

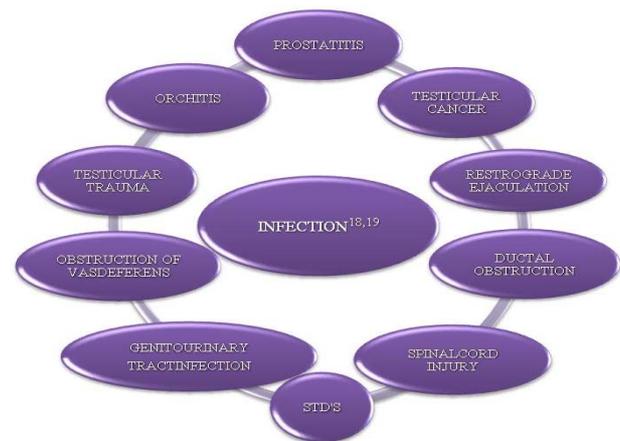


Figure 11

DIAGNOSIS OF FEMALE INFERTILITY²¹⁻²³

General Physical exam – woman has to undergo a complete medical check up including a gynecological examination to understand her medical history, medications, menstruation cycle, and sexual habits.

Blood test – several things will be checked, for example, whether hormone levels are correct and whether the woman is ovulating (progesterone test).

Hysterosalpingography – fluid is injected into the woman's uterus which shows up in X-ray pictures. X-rays are taken to determine whether the fluid travels properly out of the uterus and into the fallopian tubes. If the doctor identifies any problems, such as a blockage, surgery may need to be performed.

Laparoscopy – a thin, flexible tube with a camera at the end (laparoscope) is inserted into the abdomen and pelvis to look at the fallopian tubes, uterus and ovaries. A small incision is made below the belly button and a needle is inserted into the abdominal cavity; carbon dioxide is injected to create a space for the laparoscope. The doctor will be able to detect endometriosis, scarring, blockages, and some irregularities of the uterus and fallopian tubes.

Ovarian reserve testing – this is done to find out how effective the eggs are after ovulation.

Genetic testing – this is to find out whether a genetic abnormality is interfering with the woman's fertility.



Pelvic ultrasound – high frequency sound waves create an image of an organ in the body, which in this case is the woman's uterus, fallopian tubes, and ovaries.

Chlamydia test – if the woman is found to have Chlamydia, which can affect fertility, she will be prescribed antibiotics to treat it.

Thyroid function test – according to the National Health Service (UK) between 1.3% and 5.1% of infertile woman have an abnormal thyroid.

DIAGNOSIS OF MALE INFERTILITY²³

General Physical exam – the man has to undergo a complete medical checkup by a doctor to understand his medical history. The testicles will be checked for lumps or deformities, while the shape and structure of the penis will be examined for any abnormalities.

Semen analysis – They will be analyzed in a laboratory for sperm concentration, motility, color, quality, infections and whether any blood is present. As sperm counts can fluctuate, the man may have to produce more samples.

Blood test – level of testosterone and other male hormones.

Ultrasound test – to determine whether there is any ejaculatory duct obstruction, retrograde ejaculation, or other abnormality.

Chlamydia test – if the man is found to have Chlamydia, which can affect fertility, he will be prescribed antibiotics to treat it.

Scrotal ultrasound - This test uses high-frequency sound waves to produce images inside the body. A scrotal ultrasound can help the doctor look for evidence of a varicocele or obstruction of the part of the testicle that stores sperm (epididymis).

INFERTILITY TREATMENTS

Before any infertility treatment begins, a woman and her partner should undergo an infertility evaluation. This evaluation may include a complete history and physical examination, blood test and other tests depends upon the individual situation.

Figure 12 shows categories of infertility treatment.

Allopathy:

The preliminary treatment begins with weight loss or weight gain²⁴:

Weight loss: It is an inexpensive and low risk treatment with no side effects that has been proven to improve the chances of ovulation and pregnancy in women who are overweight.

Weight gain: Women, who are under weight, have eating disorders or who participate in strenuous exercise regimens may ovulate irregularly or not at all. These women may be advised to gain weight, increase calorie intake and modify exercise habits.



Figure 12

Medicines:

Various fertility medicines are used to treat women with infertility conditions.

Clomiphene²⁴ - It is an estrogen like hormone that acts on the hypothalamus, pituitary gland and ovary to increase the levels of FSH and LH which is also in the process of ovulation. In women who ovulate irregularly, approximately 80% who take clomiphene will ovulate and 30-40% of all women who take clomiphene become pregnant. These numbers apply to women who have taken up to three cycles of clomiphene.

hCG - Some women do not have an increase in their LH level at mid cycle and don't ovulate. Treatment with human chorionic gonadotropin triggers ovulation.

hMG, FSH, Gn-RH²⁵ - Human menopausal gonadotropin is used for women who don't ovulate due to problems with their pituitary gland hMG acts directly on the ovaries to stimulate ovulation. Follicle Stimulating Hormone works much like hMG. It causes the ovaries to begin the process of ovulation. Gonadotropin releasing hormones are used for women who don't ovulate regularly each month. It acts on the pituitary gland.

Metformin - Doctors use this medicine for women who have PCOS. This drug helps lower the high levels of male hormones in women with these conditions. This helps the body to ovulate women.

Bromocriptine - It is used for women with ovulation problems due to high levels of prolactin. It suppresses the lactation.

Urofollitrophin, Somatropin²⁶ - It is prescribed for amenorrhea, delayed puberty, anovulatory infertility.

Antibiotics - In case of infection, infertility is treated by antibiotics. Prostatitis causes decrease motility of the sperms and decrease the levels of zinc and acid phosphatase. Treatments are usually with broad spectrum antibiotics for prolonged periods like 8-12 week

hCG and rFSH²⁷ - rFSH stimulated follicular development and induced significant increases in serum oestrodiol. Clinical experience with rFSH has shown it is more effective at stimulating ovarian follicle growth than

urinary gonadotropins. It is also effective at initiating spermatogenesis when given together with hCG.

α - Sympathomimetics²⁸- These drugs are useful in the treatment of retrograde ejaculation, as they improve the contractibility of the bladder.

When the above treatments are unsuccessful ART may be suggested²⁹.

ART – Assisted Reproductive Technologies

- Artificial Insemination with Husband's semen (AIH)
- Artificial Insemination with Donor semen (AID)
 - Non obstructive azoospermia
 - Hereditary 19 genetic defect in the husband
 - Rh incompatibility
 - Severe oligozoospermia
- Intra-Uterine Insemination with either Husbands Or Donor semen (IUI-H or IUI-D)
 - Hostile uterine cervix
 - Oligozoospermia
 - Unexplained infertility
- In Vitro Fertilization (IVF) and Embryo Transfer (ET)
 - Irreversible pathology of the fallopian tubes, resulting from an inflammatory process or from previous surgery
 - Infertility due to subnormal male factor
 - Idiopathic infertility
 - Endometriosis
 - Infertility of immunological origin
- IVF- Associated Techniques
 - Gamete Intra-Fallopian tube Transfer (GIFT) or Tubal Embryo Transfer (TET) has been recommended for patients with healthy fallopian tube
 - Intra Cytoplasmic Sperm Injection (ICSI) has been recommended for patients with ejaculated, epididymal or testicular spermatozoa
- Oocyte Donation (OD)
- Embryo Donation (ED)
- Cryopreservation
 - Involves freezing of semen or embryo, oocyte cryopreservation and ovarian tissue preservation.

ART³⁰ (Assisted Reproductive Technologies) - This is a term that describes several different methods used to help infertile couples. ART involves removing eggs from a woman's body, mixing them with sperm in the laboratory and putting the embryos back into a woman's body.

IUI (Intra-Uterine Insemination) - In this treatment, the sperm are transferred into the uterus via the cervix, is commonly used in cases of low sperm count and quality.

IVF (In vitro fertilization) - Means fertilization outside of the body. IVF is the most effective ART. It is often used when a woman's fallopian tubes are blocked or when a man produces too few sperm. Doctors treat the woman with a drug that causes the ovaries to produce multiple eggs. Once mature, the eggs are removed from the woman. They are put in a dish in the lab along with the man's sperm for fertilization. After 3 to 5 days, healthy embryos are implanted in the woman's uterus.

Figure 13 shows categories of ART treatment.

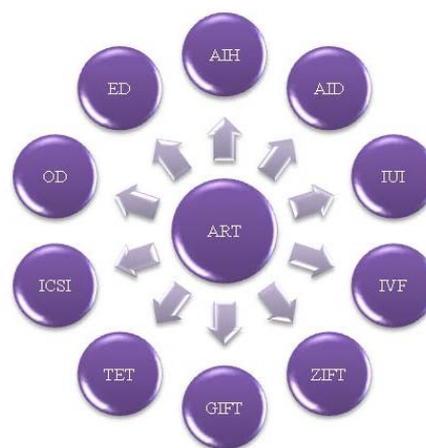


Figure 13

ICSI (Intra Cytoplasmic Sperm Injection) - It is a technique developed to achieve fertilization for couples with severe male factor infertility or couples who have failure to fertilize in a previous IVF attempt. This technique involves very precise maneuvers to pick up a single live sperm and inject it directly in to the centre of human egg. The specialist picks up the single live sperm in a glass needle and injects it directly in to the egg

ZIFT (Zygote intrafallopian transfer) - or Tubal Embryo Transfer is similar to IVF. Fertilization occurs in the laboratory. Then the very young embryo is transferred to the fallopian tube instead of the uterus.

GIFT (Gamete intrafallopian transfer) - involves transferring eggs and sperm into the woman's fallopian tube. So fertilization occurs in the woman's body. Few practices offer GIFT as an option.

ICSI (Intracytoplasmic sperm injection) - is often used for couples in which there are serious problems with the sperm. Sometimes it is also used for older couples or for those with failed IVF attempts. In ICSI, a single sperm is injected into a mature egg. Then the embryo is transferred to the uterus or fallopian tube.

Herbal treatment^{31, 32}

Botanical name	Family	Parts used	Mode of application
Dalbergia sisoo Roxb.	Fabaceae	Leaf	4-5 crushed leaves were poured for overnight in a glass of water. Next morning the decoction is mixed with sugar and was given to the women in empty stomach for 15 days.
Withania somnifera Dun.	Solanaceae	Root, Leaf.	One cup of the juice of root and stem were mixed with milk. Seven such doses were given from the 5th day of the menstrual cycle.
Asparagus recemosus Willd.	Liliaceae	Root.	10 g of the root powder was used to prepare the decoction with one cup of water. The dose was prepared with this decoction mixed with honey. This dose was given to both the partners suffering from infertility for 7 days.
Tamarindus indica Linn.	Caesalpiniaceae	Flower.	5 numbers of flowers were crushed to make a paste and mixed with one cup of milk and that dose was continued for 7 days.
Mucuna pruriens Linn.	Fabaceae	Seed	10-15 g of seed juice is mixed with one cup of goat milk and this dose is prescribed to take for one month.
Tylophora indica(Burm.f.)Merr.	Asclepiadaceae	Root.	Equal amount of root of T.indica, W.somnifera and leaf of Ocimum gratissium are mixed and make a juice. Half a cup of this juice is given daily for 15 days.
Dioscorea villosa Linn.	Discoreaceae	Leaf	The leaves are boiled in water and the decoction is given at bed time daily for 21 days.
Ipomea aquatica. Forssk.	Convolvulaceae	Leaf	Decoction of the leaves is given for 14 days after the menstrual flow.
Enhydra fluctans Lour.	Astaraceae	Root Leaf.	One tea spoon of juice of root and stem is mixed with one cup of fresh goat milk for 21 days.
Mangiera indica Linn.	Anacardiaceae	Seed	10 gms of dry seed cotylodns is grinded and mixed with goat milk.
Centella asiatica(L.) Urban.	Apiaceae	Leaf	Leaves of C asiatica, fruit of Allium sativum and seeds of Nigella sativa in equal amounts are mixed to make a paste. One tea spoon of the paste is given as one dose for three days.
Vitex negundo Linn.	Verbenaceae	Leaf	Fumigation from the dried leaves is given daily at night to increase libido.
Amaranthus viridis Linn..	Amaranthaceae	Root.	Juice of the root is made by grinding and one tea spoon of such juice is given orally for twenty five days.
Paederia scandens (Lour.) Merr.	Rubiaceae	Leaf and stem.	Juice of stem and leaf is used to recover the post pregnancy related problems.
Ocimum americanum Linn.	Lemiaceae	Leaf and root	Half a cup of the fresh leaf juice mixed with honey. The dose is given at morning time in empty stomach for 14 days after the fifth day of menstrual cycle.
Polygonum hydropiper Linn.	Polygonaceae	Leaf.	One cup of the leaf juice is given daily to enhance fertility in women. The dose is continued for 15 days.
Musa balbisiana Colla	Musaceae	Body.	The tree trunk is cut at about 3 feet height from the base and a portion at the upper end is removed to make a hole. Then the hole is covered with the leaf for overnight. In the morning, the liquid deposited in the hole is collected and taken in empty stomach. This will increase the total no of sperm and thus helps in overcoming impotency.
Musa velutina Wendl.& Drude	Musaceae	Root.	From the third day of menstrual cycle till the eighth day the root juice with water is given in the morning in empty stomach. This helps in inducing the ovulation process.
Sida cordifolia Linn.	Mulvaceae.	Leaf.	One cup of root juice is given for seven days.
Mesua ferrea linn.	Clusiaceae	Bark and root	Juice of fresh root and stem bark is mixed with goat milk in equal volume to make a final volume of one cup.21 such dose is given at bed time daily.
Diplocyclos palmatus	Cucurbitaceae	Fruits	Fruits are used in the treatment of impotency.
Terminalia arjuna (DC) W.& A.	Combretaceae	Bark.	Half a cup (50 ml) of the juice of stem bark is mixed with honey to make a dose. One such dose is given orally daily for 15 days
Achyranthus aspera Linn.	Amaranthaceae	Leaf	One half cup of the leaf juice is given for 15 days to cure the problem.
Bauhinia purpurea L.	Caesalpiniaceae	Bark	One tea spoon of the bark juice is mixed with honey and is given from the fifth day of menstrual cycle three months.
Acacia arabica	Mimosaceae	Bark	Pill prepared from fresh stem bark is given for seven days.
Alstonia scholaris R.Br.	Apocynaceae	Bark	Stem bark decoction is mixed in equal volume with goat milk and given for 15 days.
Lawsonia alba Lamb.	Lythraceae	Leaf	10-15 leaves are soaked in a glass of water overnight. Next morning the decoction is given in empty stomach and the dose is continued for three days.
Ziziphus jujube Lamk.	Rhamnaceae	Leaf	Young leaves are mixed with the young leaves of Psidium guajava ,Punica granatum, Centella asiatica and Allium sativum in equal amounts are mixed to make a paste. One tea spoon of such past is given orally in empty stomach from the last day of menstrual flow and continued for seven days.
Carmona retusa	Boraginaceae	Leaf	Juice of leaves is taken internally for 3 days before or after the menstrual period for 3 or 4 months to induce fertility.
Pimpinella anisum	Apiaceae	Seed	Beneficial in the treatment of impotence.



Acupuncture:³³

It is most popular and alternative therapy for infertility. Acupuncture along with herbal medicine has been used for centuries to treat infertility. It can elevate FSH. Enhances egg quality, enhances the quality of uterine lining, reduces the risk of uterine contraction after IVF procedures and treats menstrual cycle disorders.

Yoga:^{34, 35}

Take yoga poses such as the supported headstand (Salamba Sirsasana), the bridge pose (Setu Bandha Sarvangasana), the child's pose (Balasana), the bound angle pose (Baddha Konasana), the lotus pose (Padmasana) which increase the supply of blood to the perineum and aid in curing infertility. Yoga and meditation can help women experiencing the challenges of infertility. The practice of meditation and relaxation can help to increase the clarity of mind and to maintain healthy body chemistry. Yoga is a scientific system to overcome general problem of infertility. Fertility Yoga Poses for Hormonal Stimulation

Alternative remedies:

Nutritional supplements³⁶: According to American Dietetic Associations, antioxidants can help to prevent and repair cell damage.

Antioxidants like N-acetylcysteine, vit C, vit E and selenium are used as antioxidants which help to improve sperm function. The amino acid called L-carnitine turns fat into suitable energy. L-carnitine is very important agent for sperm metabolism. The university of Maryland medical centre says that sperm cells are one of the locations where the body stores carnitine and that low levels of amino acid may negatively impact sperm count and motility.

CoQ10 is a fat soluble antioxidant made by human body. Researchers from Italy concluded that oral CoQ10 supplement increase the amount of the substances in semen and improves sperm cell movement.

Folic acid is a micronutrient which helps in DNA and RNA synthesis. Supplementation with zinc is known to improve male infertility as it improves spermatogenesis and also the motility of sperm. Low levels of folate have been linked with birth defects.

Zinc is a cofactor in some enzyme which plays an important role in conversion of testosterone into its more active form, 5 α -dihydro testosterone which improves male fertility. Zinc was found to be a key to the final development of egg cells. It is important for male sexual health, since very high levels are found in the seminal fluid. Inadequate zinc may lower male fertility; a recent study found that men who consumed 1.4mg daily produced fewer sperm and had lower levels of testosterone than men whose daily zinc intake was 10.4mg – the zinc Recommended Dietary Allowance (RDA) for adult men is 11mg.

Healthy diet³⁷ plays an important role in boosting fertility. It comprise of fresh and organic juicy fruits such as mangoes, peaches, plums and dried fruits dates, figs, raisins, green leafy vegetables such as asparagus racemosus, legumes, broccoli, garlic, dairy proteins including milk, butter milk, paneer, curd, cheese, nuts like soaked almonds, walnuts sprouts, beans and whole grains, and spices like clove, cumin seed, cinnamon, cardamom. Nutritional supplement containing chaste berry, green tea extracts, L-arginine, vitamins (including folate) and minerals that could be an alternative option for the optimization of reproductive health in some women. Good nerve function, healthy hormone levels and an unobstructed blood flow to the pelvic area are essential to sexual performance. To keep these systems in working order, a diet should be based on legumes, grain products and plenty of fruits and vegetables.

Drink Plenty of Water: Keeping your body hydrated at all times is important for every aspect of fertility including aiding in vitamin absorption, cleansing the body from fertility-inhibiting toxins, and warding off dehydration. It's also necessary for optimizing cervical mucus which is what protects and nourishes sperm until it reaches the egg.

Avoid: should not drink coffee, tea, soft drinks, fried and spicy foods. Also stay away from smoking and drinking alcohol.

CONCLUSION

Childbearing and family are considered as a right of every human being. Infertility is a health disorder that requires appropriate treatment strategy. Modern medical science has developed advanced therapies to assist reproduction. The main causes of infertility are the problems of fallopian tubes, hormonal imbalance, ovarian failure and impotence. Many reasons are sorted out for female infertility, but through proper diagnosis and counseling for treatment of infertility can be only ray of hope. Review reveals extensively all the major causes, diagnosis and infertility treatments. This review will be helpful to all the scientific, medical researchers who can put efforts to put an end to infertility.

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