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Review Article

**DIAGNOSIS AND MANAGEMENT OF MALE AND FEMALE
INFERTILITY: A COMPREHENSIVE REVIEW**¹SWATI S. BARVE*, ²RAGINI D. PATIL, ³JAGRUTI J. PANSARE, ⁴MADHURI R. NIKAM¹* Assistant Professor, Department of Pharmaceutical Chemistry, ²Assistant Professor Department of Pharmaceutical Chemistry, ³Assistant Professor, Department of Pharmaceutics, ⁴Assistant Professor, Department of Pharmaceutics, Matoshri College of Pharmacy, Eklahare, Nashik**Article Received:** October 2021**Accepted:** November 2021**Published:** December 2021**Abstract:**

Infertility is a disease of the male or female reproductive system characterized by the inability to accomplish a pregnancy after 12 months or more of regular unprotected sexual intercourse. Almost all the people are having a strong desire to conceive a child at some point during their reproductive lifetime. Understanding what defines normally infertility is crucial to help a person or couple to know when it is time to seek help. Factors like advanced maternal age, weight, diet, smoking, other medical conditions, such as ovulation disorders, hormonal disturbances, psychological factors, environmental pollutants, medications that hamper the ovulation, positive family history and infections might have an effect on conception in couples. Female infertility is caused due to blocked fallopian tubes, defect in cervical canal, uterine fibroid or polyps. Ayurveda has several medicinal plants which has the potential to treat causes of infertility and effective in achievement of conception without an adverse effect. The medicinal plants mostly used are anti-microbial, anti-inflammatory, wound healing and rejuvenators in actions. These medicinal plants will restore the normal physiology of the reproductive system of women and finally achievement of the conception. The medicinal plants referenced in Ayurvedic texts have the potential to correct the etiopathogenesis identified with infertility and works on the physical, psychological and social health of an individual and along these lines better option in contrast to hormonal treatment.

KEYWORDS: Vandhyatva, Ayurvedic treatment, Medicinal drugs, Plant based remedies, Diet**Corresponding author:****Swati S. Barve***,

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INTRODUCTION:

Infertility is characterized as inability to conceive within one or more years of regular unprotected coitus. Infertility is faced worldwide affecting 8-10% of all the couples. As per WHO data, the estimated prevalence of primary infertility among reproductive age group women in India is 11.8%. [1]

Fertilization is viewed as a simple notion, wherein sperm and ova join and the result is a new life, but the process is actually a series of long and complex events that must take place in a certain order. Infertility occurs in 8% to 12% of the world's couples because of genetic, psychological, anatomical, endocrinological, and immunological problems that affect both female and male reproductive health.[2, 3]

Environmental stress and pollution are important parameters that can reduce hormonal profiles that stimulate spermatogenesis.[4] recently, infertility rates have been growing throughout the world, and the need for infertility treatments and assisted reproductive technologies (ARTs) has increase. [5, 6]

CAUSES OF FEMALE INFERTILITY:

According to the Centre of Disease Control (CDC, 2013) [7].The reasons for female Infertility can be isolated into three general classes including defective ovulation, transport and implantation. These classes are additionally talked about beneath exhaustively.

Defective Ovulation: Defective ovulation occurs because of the following reasons:

Endocrine disorders: The dysfunction of nerve center and pituitary organ can lead to an excess amount of prolactin, this may prevent ovulation. In addition, other endocrine organs including adrenals and thyroid may likewise defer ovulation. At the point when the corpus luteum, neglects to deliver sufficient progesterone needed to thicken the uterine coating, the treated egg will most likely be unable to embed, thus leading to infertility.

Physical disorders: Some physical problems like weight, anorexia nervosa, and extreme exercise might prompt overweight or hunger, and later the period, consequently make the couple infertile.

Ovarian disorders: Polycystic ovarian disease (PCO) can lead to infertility because of an increased amount of testosterone and LH and reduction take-up of glucose by muscle, fat and liver cells resulting in the production of large amounts of insulin by the pancreas. Low FSH levels also hinder the production of eggs from the ovarian follicles, and lead to form fluid-filled ovarian cysts that in the end cover the entire ovaries and prevent conception

Endometriosis: It is a condition in which sections of the uterine lining implant in the vagina, ovaries, fallopian tubes or pelvis. These implants form fluid-filled cysts that grow with each menstrual cycle, and eventually turn into blisters and scars. These scars then, at that point, block the section of the egg and postpone pregnancy.

Defective Transport

The following can lead to defective transport of ovum and sperm:

Ovum: Occurrence of Pelvic Inflammatory Disease (PID), gonorrhea, peritonitis, previous tubal surgery, and fimbrial adhesions can lead to tubal obstruction; as a result the egg is not released or trapped, therefore, delaying conception.

Scar tissue after abdominal surgery: After abdominal surgeries, presence of scar tissue might change the development of the ovaries, fallopian tubes, and uterus, resulting in infertility

Sperm: Presence of psychosexual issue like vaginismus, or dyspareunia may ruin preparation and make the couple barren

Cervix: Trauma, surgery, infection, anti- sperm antibodies in the cervical bodily fluid may likewise defer pregnancy

Defective Implantation

Defective implantation can happen because of the following causes

Congenital anomaly and fibroids: Congenital uterine irregularity for example, bicornuate uterus and uterine fibroids near the fallopian tubes or cervix may alter implantation of the zygote and cause infertility.

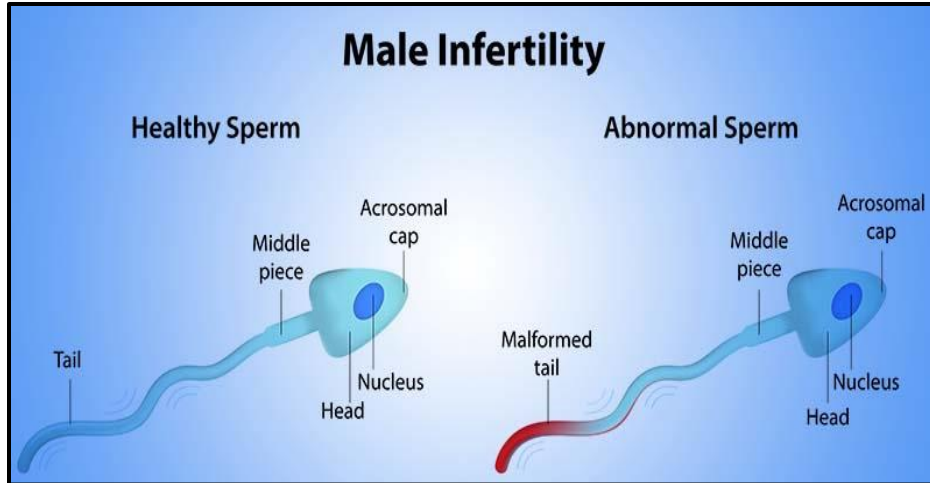


Figure 1: Male Infertility

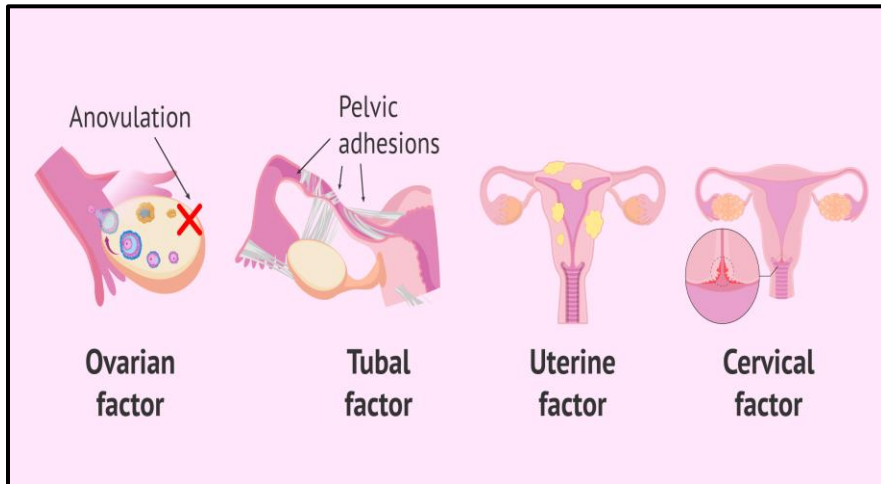


Figure 2: Causes of female infertility

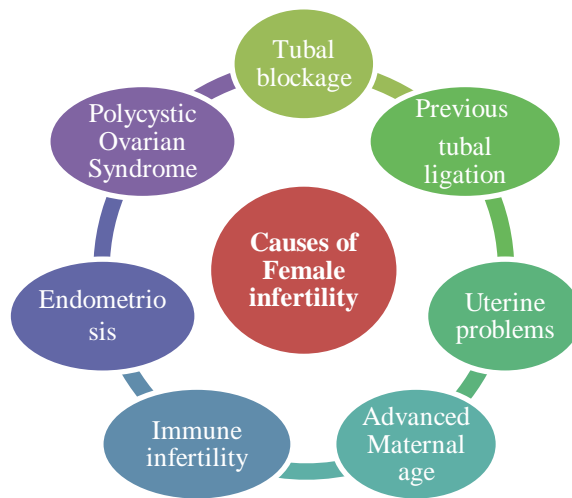


Figure 3: Causes of female infertility

CAUSES OF MALE INFERTILITY:

According to the CDC (2013), male causes of infertility are categorized into the following four main principle classes:

Defective Spermatogenesis: Some endocrine disorders such as diabetes mellitus and hyperthyroidism responsible for azospermia or the formation of faulty sperms that are not capable to fertilize the ovum. Moreover, some testicular disorder like undescended testis can also affect fertility.

Defective Transport: Obstruction of the seminal vesicles or absence of the seminal ducts may affect the mobility of the sperms, as well as in infertility.

Ineffective Delivery: Some psychosexual problems like impotence, ejaculatory dysfunction, physical disability, hypospadias, and epispadias can affect fertility of male.

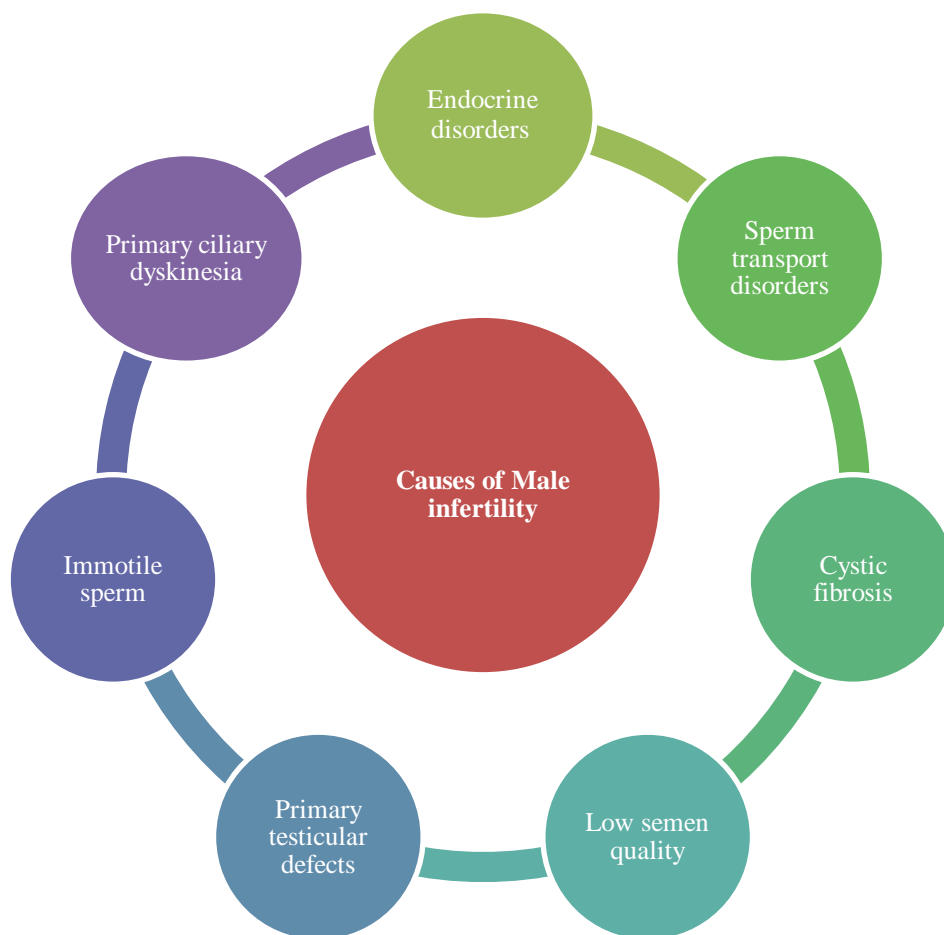


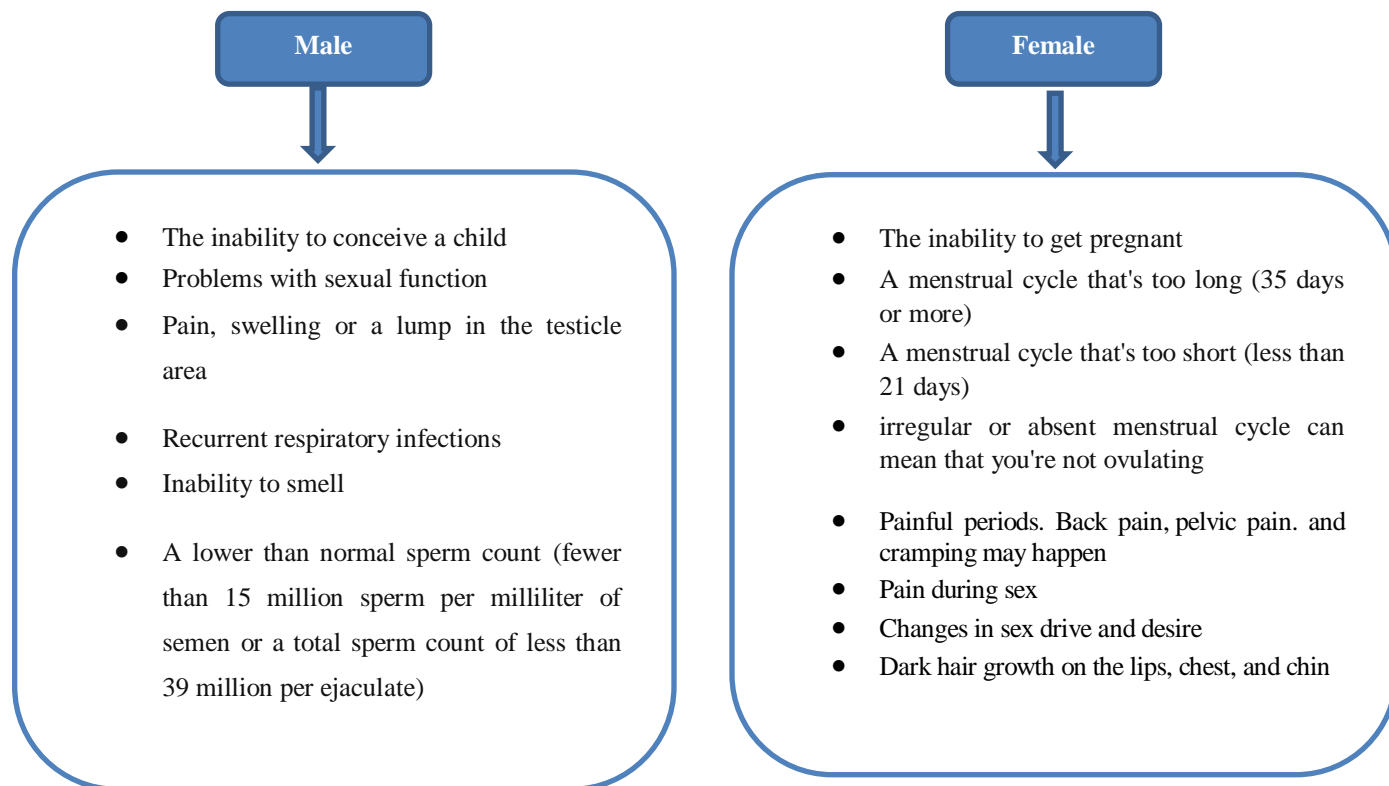
Figure 4: Causes of Male infertility

Primary vs. secondary infertility

Primary infertility is defined as the absence of a live birth for women who desire a child and have been in a union for at least 12 months, during which they have not used any contraceptives. The World Health Organisation also adds that 'women whose pregnancy spontaneously miscarries, or whose pregnancy results in a still born child, without ever having had a live birth would present with primarily infertility'.

Secondary infertility is defined as the absence of a live birth for women who desire a child and have been in a union for at least 12 months since their last live birth, during which they did not use any contraceptives.

Thus the distinguishing feature is whether or not the couple have ever had a pregnancy that led to a live birth. [8].

SYMPTOMS OF INFERTILITY:**Figure 5: Symptoms of infertility in male and female [9,10]****Table 1: Significance of medicinal plants used to cure female infertility**

Common name	Botanical name	Family	Parts used	Activities
Guyebabla	Acacia farnesiana Willd. (T)	Mimosaceae	Bark	To cure leucorrhea and menorrhagia [11]
Satamuli	Asparagus racemosus Willd.(H)	Liliaceae	Root	To cure leucorrhea and abnormal discharges of semen[11,12]
Neem	Azadirachta indica A.Juss (T)	Meliaceae	Stem, bark and fruit	To control menstrual cycle and also help in follicular[11,13]
Bhuikumra	Ipomoea paniculata L.R.Br	Convolvulaceae	Root	To cure menorrhagia, gonorrhoea, and syphilis. It also acts as an aphrodisiac

TREATMENT:

Various Treatment of Female Infertility: Fertility Drugs

Fertility drugs are frequently utilised alone as primary treatment to induce ovulation. If they fail as sole therapy, they might be utilised with assisted reproductive procedures, for example in vitro fertilization, to deliver various eggs, an interaction called superovulation. As per the American Society for Reproductive Medicine, fertility drugs can be categorized into three primary classes:

• **Medications for Ovarian Stimulation:** Clomiphene (Clomid, Serophene); letrozole

(Femara), follicle stimulating hormone (FSH) [Follistim, Gonal-F, Bravelle]; human menopausal gonadotrophin (hMG) [Humegon, Repronex, Menopur]; luteneizing hormone (LH) [Luveris]

• **Medications for Oocyte Maturation:** Human chorionic gonadotropin(hCG) [Profasi, APL, Pregnyl, Novarel, Ovidrel)

• **Medications to Prevent Premature Ovulation:** GnRh agonists (Lupron and Synarel); Gn RH antagonists (Antagon, Cetrotide). [14,15]

Female infertility accounts for 35-40 % of overall infertility. Treatment relies on the particular recognizable reason.

Table 2: Ayurvedic Treatment for Female Infertility

Premature ovarian failure (POF)	Ashoka, Dashmool, Chandraprabha, Shatavari, Guduchi, and Jeevanti (Leptadania reticulata). These medicines can be given in addition to hormone replacement therapy[16]
Ovulation disorder	Chandraprabha Vati, Yograj Guggulu, Ashokarishta and Dashmoolarishta. Herbal medicines useful in this disorder are: Ashoka (Saraca indica), Dashmool (Ten Roots), Shatavari (Asparagus racemosus), Aloes (Aloe vera), Guggulu (Commiphora mukul), Hirabol (Commiphora myrrha) and Harmal (Paganum harmala)[17]
Blocked fallopian tubes, adhesions (scar tissue) and pelvic inflammatory disease	Kaishor Guggulu, Triphala Guggulu, Guduchi, Kutki (Picrorrhiza kurroa) and Punarnava can be used in these conditions[16]
Cervical mucus	Vata (Ficus bengalensis), Ashwatha (Ficus religiosa), Udumbara (Ficus glomerata), Plaksha (Ficus infectora), Shirisha (Albizia lebec), Haridra (Curcuma longa), Yashtimadhuk (Glycerrhiza glabra), Saariva and Manjishtha (Rubia cordifolia)
Women who are underweight or have a small, undeveloped uterus or cervix	Shatavari, Ashwagandha (Withania somnifera), Vidarikand (Pueraria tuberosa), Ksheeridari (Ipomoea digitata), Bala (Sida cordifolia), Samudrashok (Argyria speciosa), Nagbala (Grewia hirsuta), Shrungatak (Trapa natans) and Yashtimadhuk [18]

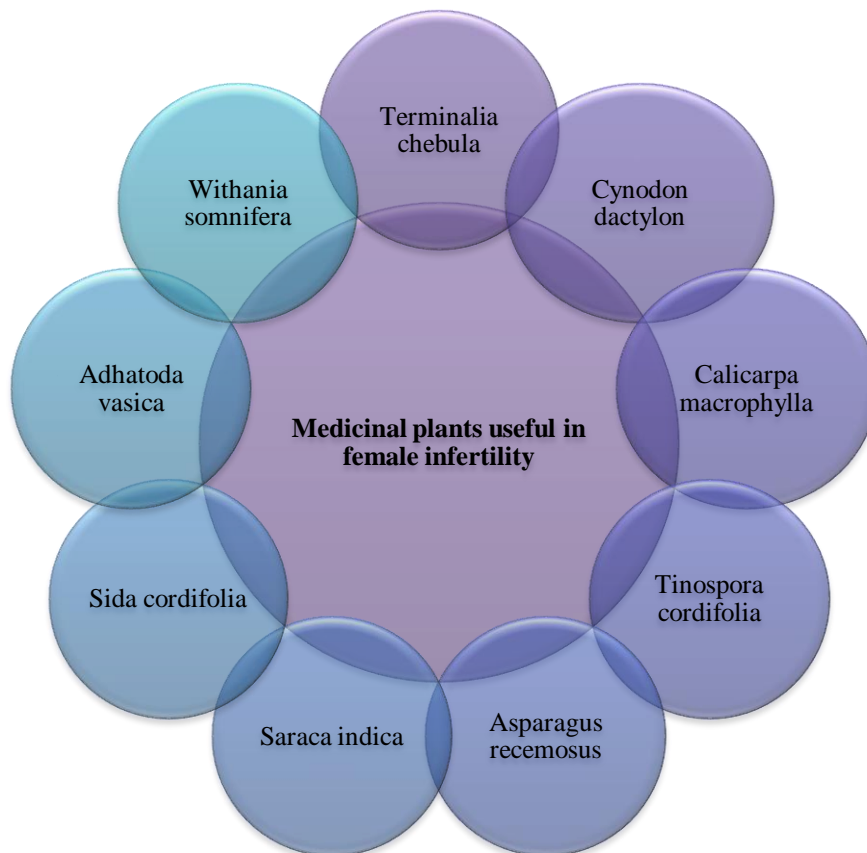


Figure 6: Medicinal plants useful in female infertility

1. **Cynodon dactylon:** - The plant checks uterine bleeding, strengthen the uterus, avert abortion and augment fetal growth.[19] - Marked antioxidant activities of ethanol extract of aerial parts.[20] It has potent aphrodisiac and male fertility activity. Methanolic extract has shown effect in overcoming stress induced sexual dysfunction, performance and semen concentration. [21]
2. **Calicarpa macrophylla:** leaves of calicarpa macrophylla shows anti-inflammatory activity. [22]
3. **Tinospora cordifolia:** It has an anti-inflammatory, analgesic and spasmolytic activities which will be helpful in management of various painful conditions during menstruation. It regularizes the menstrual flow. [23]
4. **Asparagus recemosus:** Its useful in menorrhagia and threatened abortion.[24] Shatavari is antiabortifacient, anti-inflammatory, antiviral and galactogogue and has positive influence on Hypothalamus- Pituitary- Ovarian axis.[25]
5. **Saraca indica:** It has stimulatory effect on the ovarian tissue, which may exhibit an estrogen-like activity that enhances ovulation and repair of the endometrium. [26] Tannins and other glycosides which is present in Saraca indica make it useful in menorrhagia, dysmenorrhoea, Postpartum hemorrhage and leucorrhoea. [27]
6. **Sida cordifolia:** sida cordifolia shows analgesic & anti-inflammatory activities. [28]
7. **Adhatoda vasica:** Vasicine has shown uterotonic activity in different species including human beings and the effect was influenced by the degree of priming of the uterus by estrogens. In both pregnant and non-pregnant human uteri vasicine initiate rhythmic contractions of myometrial strips. . It is used in various bleeding disorders, due to its styptic action. [29]
8. **Withania somnifera:** It has anti-stress activity which helps to improve libido and sexual desire. Withania somnifera helps to increase libido, better sexual performance, antioxidant and anti-stress activity. [30]
9. **Terminalia chebula:** terminalia chebula shows anti-fungal & anti-bacterial activity. [31] It also shows anti-microbial activity against some microorganism such as, Bacillus substils, Staphylococcus aureus, Staphylococcus

epidermis, Escherchia coli, Staphylococcus flexineria and Pseudomonas aeruginosa. [32]

DIETARY MANAGEMENT:

Diet plays a vital role in the maintenance of good health and in the prevention and cure of diseases. In ancient Indian scriptures, food has been compared with the God, (Annam Brahman) since it is the main factor, which sustains and nourishes life. [33] Dietary management involves strict compliance and adherence to Ojas-constructing ingredients and to avoid the materials which diminish the Ojas. This is crucial because it regulates ovulation and compliments fertilization. [34] Eating whole foods not only provide fibre that influences hormonal levels but also provides all nutrients for the health of the

body. Processed carbohydrates, antibiotic and hormone laden meat and milk, excess starch, and canned products destroy fertility. [35] Food such as ghee, milk, nuts, dates, sesame seeds, pumpkin seeds, saffron, honey, and avocados help to replenish and build Ojas.[36] Fresh, organic fruits and vegetables, whole grains, protein from plant sources like beans, and peas, sweet, juicy fruits such as mangoes, peaches, plums, and pears, asparagus, broccoli, spices such as Ajwain powder, cumin (purifies the uterus in women and the genitourinary tract in men), turmeric (to improve the interaction between hormones and targeted tissues), and black cumin boost fertility. Root vegetables, grains, arugula, watercress, onions, garlic, chives improve circulation and nourish the blood. [37]

MARKETED PRODUCTS FOR TREATMENT OF MALE AND FEMALE INFERTILITY:

Table 3: Marketed formulations used in the treatment of infertility

Sr. no	Marketed Formulation	Uses
1	Ovaboost	<ul style="list-style-type: none"> Helps with egg quality & egg health , fertilization Aids in preparing the body for pregnancy
2	Shudhhi Powder	<ul style="list-style-type: none"> Balance hormones & fight infection Boost fertility & maintains reproductive health
3	Elements Wellness Cyclova Capsule	<ul style="list-style-type: none"> Used in PCOS management Normalize the ovary function Helps to balance the hormone level
4	Hashmi Spermia Capsule	<ul style="list-style-type: none"> Used to increase the sperm motility & improves semen quality & quantity
5	Overnix Capsule	<ul style="list-style-type: none"> Used to cure sexual debilities in women
6	Divya Artav Shodhak Vati	<ul style="list-style-type: none"> Helps in increasing the fertility of women Used in regulation of periods in women
7	Nashtapushpantak Ras	<ul style="list-style-type: none"> Used to treat male & female infertility Used to relive menstrual pain
8	Subhalin	<ul style="list-style-type: none"> Promote female fertility Support egg quality & ovarian function
9	Infert-O-Care M G ₁	<ul style="list-style-type: none"> Used to boost male fertility, increase sperm count & semen volume
10	Fertilex	<ul style="list-style-type: none"> Used to increase sperm quality, fertility, stamina & ejaculation
11	Concepta Solution (Male Fertility Booster)	<ul style="list-style-type: none"> Used to promote healthy sperm count Optimize vitality & motility Enhances sexual health

CONCLUSION:

Infertility has increased tremendously in the past decade and this is because of the consequence of a combination of social, ecological, psychological, and nutritional factors. Infertility is managed by looking at the reproductive system components. Ayurveda pays attention to each individual body types, enhances the body systems participating in the process of fertilization and therefore serves as an excellent alternative for reaching fertilization. Medicinal plants have the potential to correct the etiopathogenesis related to infertility and improves the physical, psychological and social health of an individual. These drugs have been effective to enhance the conception and are devoid of any adverse effect and better alternate to hormonal therapy.

CONFLICT OF INTEREST:

The authors report no conflicts of interest.

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