

**A REVIEW STUDY ON THE ROLE OF VARIOUS HERBS IN INDIA FOR FERTILITY
REGULATION**

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Article Received on 23/03/2022

Article Revised on 13/04/2022

Article Accepted on 03/05/2022

ABSTRACT

Plant and plant products are being used as a source of medicine since long. According to World Health Organization (WHO) more than 80% of the world's population, mostly in poor and less developed countries depend on traditional plant-based medicines for their primary health care needs.^[1] The development of new fertility regulating drugs from medicinal plants is an alternative proposition, the phytochemicals are more important resources for medicinal uses. Family planning has been promoted through several methods of contraception, but due to serious adverse effects produced by synthesis steroidal contraceptives, attention has now been focused on Indigenous plant for possible contraceptive effects.^[2] The purpose of this review study is to share policies of fertility regulation in India on traditional medicinal products and introducing measures for their regulation, and to facilitate information exchange on these subjects to the society with evidential aspects.

KEYWORDS: *Withania somnifera*, *Sesamum indicum*, *Terminalia chebula*, *Asparagus racemosus*, *Curcuma longa*.

INTRODUCTION

India is one of the most medico-culturally diverse countries in the world where the medicinal plant sector is part of a time-honored tradition that is respected even today.^[3] Medicinal plants are believed to be much safer and proved elixir in the treatment of various ailments, they are assuming greater importance in the primary health care of individuals and communities in many developing countries.^[4]

Fertility is the natural capability to produce offspring. As a measure, fertility rate is the number of offspring born per mating pair, individual or population. Infertility may be defined as failure to conceive by a couple after 12 months of unprotected sexual intercourse.^[5] Birth control and at the same time increasing the fertility in human beings are both become major problems now a days. There are a large number of studies which supports the anti-fertility effects of traditional herbal medicines.^[6] Medicinal plants, is a common word which can utter in every one's mouth that are helpful in treating many diseases which can't be done by even allopathic medicine.

The use of plant or plant-based products to stimulate sexual desire and to enhance performance and enjoyment is almost as old as the human race itself. The active, natural principles, and crude extracts of plants, which

have been useful in sexual disorders, have potential for improving sexual behaviour and performance, and are helpful in spermatogenesis and reproduction. Stressful life style has enhanced the number of subject suffering from one form of sexual dysfunction or the other.^[7]

The antifertility substance is deemed to be active in females when it prevents fertilization, prevents ovulation, implantation, and destroys the zygote or causes abortion. In males, it prevents spermatogenesis, inhibits testosterone, or affects the gonadotrophin of the organs or the mortality of sperm.^[8] The rationale for the use of therapies are based on the speculation that some forms of male infertility are caused by oxidative insult and hormonal imbalance, and the use of alternative therapies may improve male fertility potential and semen quality.^[9]

Aerobic metabolism of human sperm produces different reactive oxygen species (ROS), which are essential for sperm capacitation, acrosome reaction, and oocyte fusion.^[10] The imbalance between ROS production and ROS degradation has been hypothesized as a cause of oxidative stress in semen, with peroxidative injury to the sperm membrane and a consequent impairment of the related functional properties, such as sperm motility and morphology.^[11]

In Ayurveda and Unani systems of medicine practiced in India, several plants and plant products have been documented to fight against stress, impotence fertility and the aging process.^[12] The problem of infertility is closely related to psychological stress due to several other reasons as well. As a couple fails to achieve the expected goal of reproduction, the feelings of frustration and disappointment raise stress.^[13] Several other factors, such as environmental pollutants, infections, occupational exposure to various chemicals, lifestyle changes and increased workload due to enormous competition at work place and economic recession accelerate psychological stress.^[14]

Contraception is literally the prevention of conception, but generally is taken to mean the prevention of pregnancy. Family planning has been promoted through several methods of contraception, like contraceptive pills, Copper-T, Diaphragm Tubectomy, Condoms, and coitus interrupts. These methods are mostly female oriented. Contraceptive pills contain usually female sex hormone like estrogen, progesterone or their derivatives single or together. Various measures have been taken to minimize the side effects of these pills but there is little success. Due to serious adverse effects produced by synthetic steroidal contraceptives, attention has now been focused on indigenous plants for possible contraceptive effect.^[15] Although contraceptives containing estrogen and progesterone are effective and popular, the risks associated to the drugs have triggered the need to

develop newer molecules from medicinal plants. From the advancement of reproductive biomedicine, several hormonal contraceptive pills have been developed but no one is free from different side effects. For this purpose, the World Health Organization (WHO) has constituted a population control programme, which includes studies having traditional medical practices. At present global attempt has been taken to search out the effect of herbal product for contraceptive purposes. Search or survey of medicinal folklore that to in relation to birth control or contraception in particular is a herculiantask.^[16,17]

Legislative controls in respect of medicinal plants have not evolved around a structured control model. There are different ways in which countries define medicinal plants or herbs or products derived from them, and countries have adopted various approaches to licensing, dispensing, manufacturing and trading to ensure their safety, quality and efficacy.^[18] Despite the use of herbal medicines over many centuries, only a relatively small number of plant species has been studied for possible medical applications. Safety and efficacy data are available for an even smaller number of plants, their extracts and active ingredients and preparations containing them.^[19]

Here are some traditional methods by using herbs which can regulate the fertility in human being without any side effects and harm to the user.

Table 1: Plants used for fertility regulation.

Gender	Fertility Inducing	Antifertility
Male	<ul style="list-style-type: none"> • Withania somnifera • Sesamum indicum 	<ul style="list-style-type: none"> • Terminalia chebula
Female	<ul style="list-style-type: none"> • Asparagus racemosus 	<ul style="list-style-type: none"> • Curcuma longa

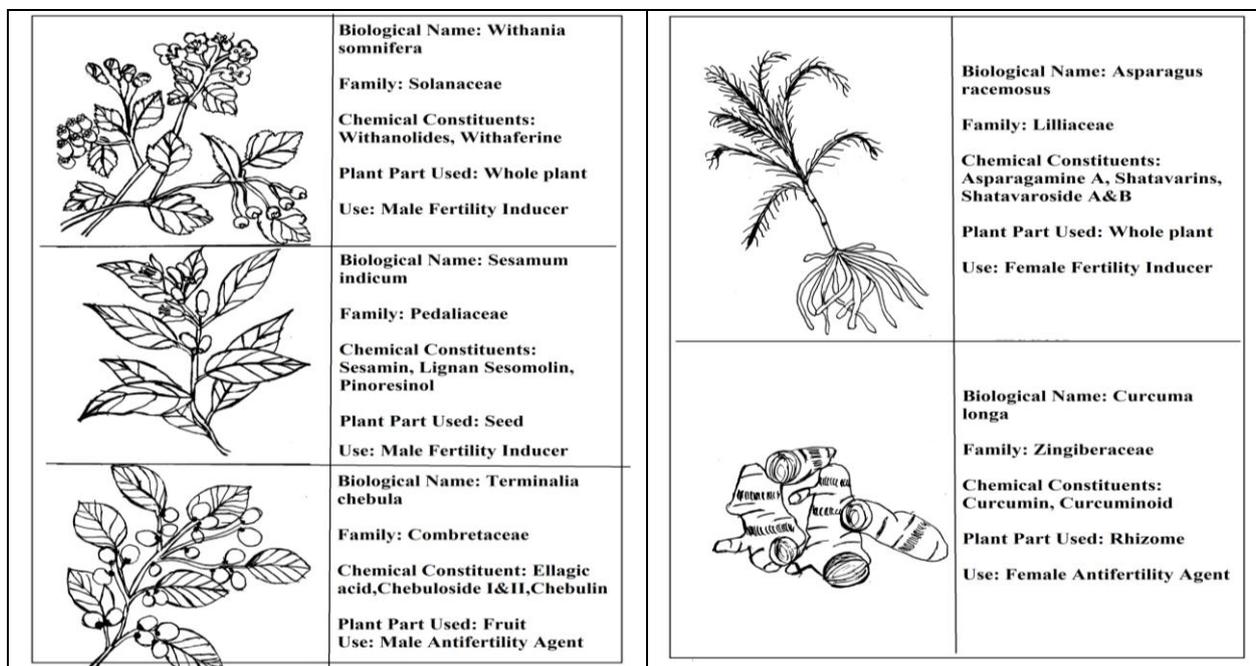


Figure 1: Plants lists and Descriptions.

I. Is Traditional Medication Is Better Than Modern Medication System?

For most diseases, conventional medicine treats symptoms alone, usually with drugs or surgery. While sometimes necessary, this can lead to long term management with an improvement in symptoms at the cost of side effects, which often require more drugs. Naturopathic medicine, on the other hand, attempts to treat the root cause of the health issue so that the body can ultimately heal itself. The results can be measured as a reduction or elimination of drugs, improved vitality and/or a complete reversal of disease.

Herbal medicines are either extracted from or manufactured from an entire plant. The most active ingredient is embedded within a host of other natural compounds that can help to lessen side effects and improve absorption of the active ingredients. For this reason, their effects tend to be more gentle and safe for long-term use.

Oral contraceptives are hormonal preparations that may contain combinations of the hormones estrogen and progestin or progestin alone. Combinations of estrogen and progestin prevent pregnancy by inhibiting the release of the hormones luteinizing hormone (LH) and follicle stimulating hormone (FSH) from the pituitary gland in the brain. LH and FSH play key roles in the development of the egg and preparation of the lining of the uterus for implantation of the embryo. Progestin also makes the uterine mucus that surrounds the egg more difficult for sperm to penetrate and, therefore, for fertilization to take place. In some women, progestin inhibits ovulation (release of the egg). In industrialized nations today, synthetic hormonal oral contraception (aka the birth control pill) is the most common practice for preventing pregnancy. Despite evidence suggesting that there are many possible dangers of birth control pills, millions of women choose to take these hormonal medications every year. In fact, 67 percent of all women who report “practicing contraception” currently use non-permanent birth control methods, primarily hormonal methods — which include the pill, patch, implant, injectables and vaginal ring — or IUDs and condoms. About 25 percent of these women rely on taking daily birth control pills, even though most are aware “the pill” affects their entire bodies.^[20]

According to the Food and Drug Administration, it's been found that the effects of continuously raised estrogen levels in the female body due to taking birth control pills may include

- Potential increased risk of breast cancer
- Potential increased risk of blood clotting, heart attack and stroke. The risk of blood clots is highest for very overweight women taking the pill.
- Headaches or migraines
- Gallbladder or liver problems, including benign tumors
- Increased blood pressure

- Weight gain
- Mood changes, with some women experiencing symptoms of depression or anxiety
- Nausea, cramping, irregular bleeding or spotting between periods
- Breast tenderness
- The pill also does not protect against sexually transmitted infections, including HIV. Therefore if not using another form of protection/contraceptive method, it's possible to get any type of sexually transmitted disease your partner might have.

Birth control pills are a synthetic form of the hormones progesterone and estrogen. They prevent ovulation by maintaining more consistent hormone levels. Without a peak in estrogen, the ovary doesn't get the signal to release an egg. Birth control pills, patches and shots promote continuously raised estrogen levels in a woman's body, something that's neither natural nor very safe. Birth control pills work by keeping estrogen at an unnaturally high level all month long-high enough to even fool the body into thinking it's already pregnant! Since the body perceives high estrogen levels as a sign of pregnancy, it stops ovulating, and therefore when taking the pill another pregnancy cannot occur. It's been found that dangers of birth control pills can include side effects like cystic acne, anxiety or moodiness, breast tenderness, weight gain, or for some difficulty getting pregnant after stopping the pill. Birth control pills may even cause depression.^[20]

II. Withania Somnifera (LINN.)

Withania somnifera (Linn.), commonly known as Indian Ginseng or Indian winter cherry, is recognized as the Queen of Indian herbs and has received similar admiration in Unani, Siddha, and Chinese systems of medicine. The roots are the most commonly used part and find enormous medicinal use. The plant extract and its bioactive compounds are used in the prevention and treatment of many diseases, such as arthritis, impotence, amnesia, anxiety, cancer, neurodegenerative and cardiovascular diseases, and others in India. The root powder and its preparations are consumed extensively as a functional food for promoting vitality and virility. The roots are reputed to promote health and longevity by augmenting defense against disease, arresting aging, revitalizing the body in debility, increasing resistance to adverse environmental factors, and creating a sense of well-being¹. Influence of Phytochemical composition on in vitro antioxidant and reducing activities of Indian ginseng.^[21]

The roots of the plant are categorised as rasayanas, which are reputed to promote health and longevity by augmenting defence against disease, arresting the ageing process, revitalizing the body in debilitated conditions, increasing the capability of the individual to resist adverse environmental factors and by creating a sense of mental wellbeing. It is in use for a very long time for all

age groups and both sexes and even during pregnancy without any side effects.

The pharmacological effects of the roots of *W.somnifera* are attributed to the presence of withanolides, a group of steroidal lactones. A number of withanolide steroidal lactones have been isolated from the leaves of *W. somnifera*. and exhibit antibacterial, anti-fungal and antitumor properties. Ashwagandha is used to calm the mind, relieve weakness and nervous exhaustion, build sexual energy and promote healthy sleep. The herb is termed a rasayana. in Ayurvedic practice, which means it acts as a tonic for vitality and longevity. It is also classified as an adaptogen.^[22]

The sexual benefit is not just from folk herbalism. A 2001 animal study confined that extracts of ashwagandha increased sex hormones and sperm production, presumably by promoting a testosterone-like effect. In a double blind clinical trial, ashwaganda (3 grams per day for 1 year) was applied for aging symptoms in 101 healthy male adults in their 50's. The herb produced significant improvements in hemoglobin, red blood cells, hair color and body height. It lowered blood cholesterol, calcium loss and 71.4% of those who received the herb reported improvement in sexual performance.

III.1 ACTIVITY

The Infertile men are unable to fertilize a woman despite sperm concentration in the range considered normal. Therefore, poor overall semen quality might be responsible for infertility in such individuals. Treatment of infertile men with *W.somnifera*, who were under psychological stress or were cigarette smokers, demonstrate improvement of their sperm count and motility significantly, along with reduction of stress and serum cortisol levels. *W.somnifera* possesses antioxidant, adaptogenic and aphrodisiac activities apart from having some neurotransmitters. It has the capability to improve male factor fertility in idiopathic cases.^[23]

The oxidative stress is associated with reduced antioxidant capacity along with derangement in hormone levels, and that these are negatively correlated with sperm concentration and motility in infertile men. The catecholamines and serotonin are biogenic amines that are produced under stress and may have direct effect on the hypothalamus promoting the release of hypothalamic-releasing hormones. Epinephrine and norepinephrine released from the adrenal medulla may also affect the testis by changing local blood flow, as these hormones are known to produce vasoconstriction in other target tissues.

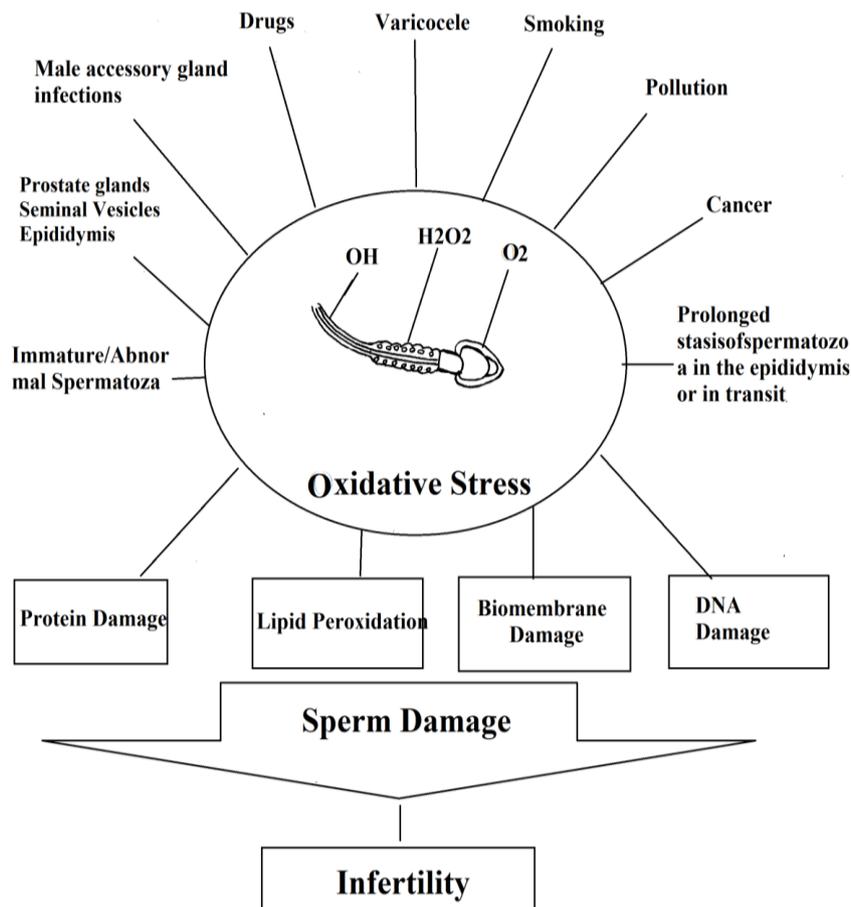


Figure 2: Association of increasing reactive oxygen species (ROS) production with infertility.^[36]

Psychological stress may affect brain function and biological clock resulting in disturbance of hypothalamo-pituitary control of hormone production. The effect on the brain is ultimately manifested in other organs owing to hormonal regulation through hypothalamo-pituitary axis. This disturbance in hypothalamo-pituitary-gonadal axis may adversely affect spermatogenesis. There have been several reports linking male infertility to stress. Cortisol is the hormone produced in response to stress and increased level of cortisol may reduce the functional activity of LH, thereby reducing testosterone level. Psychological stress leads to low testosterone levels due to reduction in LH pulse frequency. Reduced testosterone level in turn reduces libido, leads to oligospermatogenesis. The reduction of stress level and improvement in male factor fertility as a result of treatment with *W. somnifera*, offer direct evidence in favor of stress as a cause of male infertility.^[24]

The life style has a great deal to do with overall mental and general health. Life style factors such as smoking have been suggested to contribute to a number of diseases including male infertility. It has been reported that tobacco smoke contains some of the most deadly toxic chemicals. Smokers inhale directly and absorb the following substances: nicotine, carbon monoxide, nitrogen oxide, mutagenic pyrolysis derived compounds and cadmium. Most of them are known to be mutagens,

aneugens or carcinogens, directly affecting male and female gametes and embryos. Additionally, there is a correlation between cigarette smoking in infertile men and increased leukocyte infiltration into semen. The latter has been linked to significantly increased levels of seminal ROS. Under compromised conditions, such a stress may adversely affect reproductive health leading to infertility.^[23]

There is significantly reduced levels of vitamins A, C, and E in infertile men. Vitamin A is a biologic antioxidant which functions as a detoxifying agent, immunopotentiator, and immunoactivator. Similarly, vitamin E (a-tocopherol) contributes to the body's defense system against lipoprotein oxidation and may help in improving sperm motility. Healthy fertile men with normal sperm parameters contain adequate amounts of vitamins A and E. The impaired antioxidant activity in men with sperm dysfunction may be a reflection of low seminal levels of vitamins A and E. Ascorbic acid is a water soluble vitamin and possesses potent ROS-scavenging activity. Seminal plasma is very rich in ascorbic acid content, with a concentration reported to be tenfold higher than in serum, highlighting its importance for fertility. Earlier studies also have reported reduced levels of vitamin C in infertile men. Treatment with *W. somnifera* improved levels of vitamins A, C, and E, indicating the strength of this herb to protect against infertility due to vitamin loss.^[24]

Table 2: Role of Vitamins in fertility.^[24]

Nutrients	Their role in fertility
Vitamin D	Helps the body to create sex hormone which in turn affects ovulation and hormonal balance.
Vitamin E	Improves sperm health nad motility in men.
Lipoic Acid	Protects the female reproductive organs and improves sperm quality and motility.
Vitamin B6	Helps to regulate blood sugars and alleviates PMS.
Folic acid	Prevents heart defects, cleft lips, limb defects, and urinary tract anomalies in developing fetuses.
Iron	Prevents anovulation (lack of ovulation) and improves egg health.
Selenium	Helps to protect the egg and sperm from free radicals thereby prevents miscarriages and birth defects.

W.somnifera has the capability of combating stress-induced infertility. The effect was obvious given a significant number (14%) of pregnancy outcome (15% in normozoospermic men, 15% in men under psychological stress and 10% in cigarette smokers) upon treatment. This activity may be due to the presence of a number of alkaloids, ergostane steroids and amino acids, including tryptophan, central nervous system inhibitors, centrally acting hypotensive agents, GABA agonists and serotonin agonists in the roots of this herb. There are reports that *W.somnifera* is rich in neurotransmitters, besides having several other alkaloids and flavonoids. It has been earlier reported that the flavonoids of *W.somnifera* possess potent antioxidant activity and treatment with it may counteract the formation of ROS in infertile men. The active principles of *W.somnifera*, sitoindosides VII-X and withaferin A (glycowithanolides), have been shown to reactivate the major free radical scavenging enzymes in vivo. Treatment with *W. somnifera* in our study

presented a direct evidence for its anti-stress properties.^[24]

The treatment by *W.somnifera* indicates the presence of diverse active constituents in this herb. Among the major effects, it balances hormone levels, reduces oxidative stress and possibly improves detoxification processes in the body. Therefore, correction of this imbalance by *W. somnifera* could be one of the major factors contributing to fertility improvement.

III. Sesame Indicum

Sesame (*Sesamum indicum*), is a flowering plant in the genus "Sesamum", also called "benne". Numerous wild relatives occur in Africa and a smaller number in India. It is widely naturalized in tropical regions around the world and is cultivated for its edible seeds, which grow in pods or "buns".

Sesame seed is one of the oldest oil-seed crops known, domesticated well over 3000 years ago. Sesamum has many other species, most being wild and native to sub-Saharan Africa. *Sesamum indicum*, the cultivated type, originated in India and is tolerant to drought-like conditions, growing where other crops fail.

Sesame has one of the highest oil contents of any seed. The chief constituent of the seed is its fixed oil, which usually amounts to about 44 to 60 percent noted for its stability, the oil resists oxidative rancidity with a rich, nutty flavor, it is a common ingredient in cuisines across the world like other nuts and foods, it can trigger allergic reactions in some people.

IV.1 Activity

The effects of sesame on semen parameters, adding sesame to the patients diet for 3 months significantly improves sperm count and mobility. This is the first time, to our knowledge, that sesame effects on male factor infertility are evaluated in humans.

Sesame can improve epididymal sperm reserve, and increase spermatocyte size. Comparing to the control group, the study showed that epididymal lumens in the sesame treated rats were wider, had fewer irregular tubular formation and were significantly filled with spermatocytes. Then, concluded that This effect is considered to be through a complex hormonal interplay at the level of the male hypothalamic pituitary testicular axis and sesame improves epididymal sperm reserve, and leads to larger spermatocyte production in a dose related manner. estrogens receptors.^[25]

In addition, they reported that sesame treated group had significantly better sperm motility and morphology. The beneficial effects of sesame on semen parameters may be attributed to the reactive oxygen species (ROS) and free radical scavenging moiety of sesame lignans. Sesame has a powerful anti-oxidant effect which inhibits lipid peroxidases, carnitine oxidase and other enzymes such as dismutase, which inhibit sperm motility and maturation in the epididymis.^[26,27]

Sesame lignans have been shown to increase tissue tocopherol levels by inhibition of cytochrome P450 3A-dependent n-hydroxylase. Consequently, they potentiate the antioxidants activity of tocols in lipid peroxidation system. Therefore, sesame lignans improve the quality of the produced sperm. An imbalance between production of reactive oxygen species (ROS) and ROS scavenging by seminal antioxidants results in seminal oxidative stress (OS). It is believed that seminal OS is one of the major factors, which cause sperm dysfunction and sperm DNA damage in male infertility. Indeed, it is estimated that 25% of infertile men have high levels of semen ROS, whereas fertile men do not have high levels of semen ROS. Although a controlled production of these ROS is necessary for sperm physiology (sperm hyperactivation, capacitation and acrosome reaction) and

for natural fertilization, the production of high level of ROS by immature germ cells and leukocytes leads to sperm dysfunction (lipid peroxidation, loss of motility and sperm DNA damage). Therefore, improvement of sperm parameters may be caused by antioxidant properties of sesame.^[28]

Unfortunately, majority of patients refused using assisted reproductive techniques. The main contributing factor for noncompliance was high expense of the procedure and patients economic problems. The small number of patients who underwent assisted reproductive technologies (ARTs) including IUI, IVF and ICSI prevents us to conclude about the efficacy of sesame on fertility improvement; however, there were 2 cases (8%) of spontaneous pregnancy and 1 (4%) case of ART pregnancy – a total number of 3 (12%) pregnancies- which is a promising outcome. In order to make a more accurate estimation about sesame effects on fertility, it is necessary to investigate a larger number of patients, and provide them with economic support to undergo ARTs to assess the effects of sesame on male factor infertility.^[29]

In summary, we conclude that taking sesame improves sperm count and motility in infertile men, and can be prescribed for these patients as an effective and safe treatment for male factor infertility.

IV. Terminalia Chebula

Terminalia chebula commonly known as black- or chebulic myrobalan, is a species of *Terminalia*, (Combretaceae).

V.1 Activity

The aqueous extract of *T. chebula* have decreased sperm count and motility in rat. The lipid peroxidation increased and antioxidant enzymes showed significant changes. The sperm morphology, count and motility are highly associated with the production and activity of free radicals and antioxidant enzymes. The long term (45 days) administration of extract reduced the sperm count and induced the lipid peroxidation. It reveals that the extract or its component might be a toxic to the testis in the treated rats. This may be one of the factors responsible for the changes in sperm count, sperm motility, and broken head of the sperm. The extracts might have decreased the level of protective antioxidant enzymes.

The association of lipid peroxidation with mid-piece abnormality, decreased sperm count, motility. The increased lipid peroxidation activity is mainly due to the formation of highly reactive cytotoxic compounds like oxidative free radicals. The oxidative free radicals generated in living cells are superoxide anions (O_2^-) and derivatives like hydrogen peroxide (H_2O_2), which induce peroxidation of cell membrane lipids. The improper balance between reactive oxygen metabolites and antioxidant defence results in "oxidative stress", and the

severe oxidative stress gives the following negative effect.

The sperm DNA is vulnerable to oxidative stress impart, because semen has a weak antioxidant system. It also supports that due to the presence of weak antioxidant systems it is not able to tolerate the stress induced by the plant extract and its compounds. Oxidative stress at the testicular level has also been implicated in the disruption of spermatogenesis during cryptorchidism and exposure to genobiotics. Similarly, the oxidative damage is a possible cause of idiopathic male infertility involving disruption of spermatogenesis and high level of free radicals were reported in the seminal fluid of those that are infertile (87%) and fertile (55%) Reduction in the sperm count and motility may be associated with the increasing formation of free radicals. The spontaneous formation of free radicals has been associated with decreased sperm-egg interaction.^[30]

The reduced level of catalase and glutathione peroxide might be due to the excess production of anions in response to the extract of *T. chebula*. The most abundant oxidative free radicals generated in living cells are superoxide anions and derivatives, particularly the highly reactive and damaging hydroxyl radical which induces peroxidation of cell membrane lipids. Superoxide anions (O₂) itself directly affects the activity of catalase and peroxidase by affecting intracellular enzymes, creatine phosphokinase. Superoxide dismutase (SOD) was found to be increased in the treated animal's testis. The high level of SOD in the animal might be due to the oxidative stress caused by the extract. Similarly SOD is considered to be a stress protein which is synthesized in response to oxidative stress. Elevation of intracellular SOD increased the cell damage, allowing more H₂O₂ to be generated. Increase in the level of SOD activity leads to various diseases.^[30]

Glutathione (GSH) concentration was also reduced in the animals treated with the extract. It is suggested that the utilization of glutathione by glutathione peroxidase. The decreased level of protein concentration in the testis could be the change in the androgen production. The significant reduction in the levels of protein is due to the interference like atrophy of accessory organs in androgen production. The increasing testicular cholesterol might regulate the process of spermatogenesis, and it acts as precursor for androgen synthesis. It is evident that the protein concentration decreases and increases the concentration of cholesterol in treated testis.^[30]

It is concluded that the long term effect of the extract of *T. Chebula* may be toxic to the testis and it affects the spermatogenesis process by altering the antioxidant enzymes activities.

V. Asparagus Racemosus

Asparagus racemosus (*A. racemosus*) belongs to family Liliaceae and commonly known as Satawar, Satamuli,

Satavari found at low altitudes throughout India. It is an important plant in traditional medicine in tropical and subtropical India. Its medicinal use has been reported in the Indian and British Pharmacopoeias and in traditional systems of medicine such as Ayurveda, Unani and Siddha. The dried roots rhizomes and stem of the plant are used as drug.

Its habitat is common at low altitudes in shade and in tropical climates throughout Asia, Australia and Africa. Out of several species of *Asparagus* grown in India, *A. racemosus* is most commonly used in indigenous medicine. Shatawari has different names in the different Indian languages, such as shatuli, vrishya and other terms.

Shatawari is a traditional Ayurvedic antispasmodic; an aphrodisiac, demulcent, digestive, diuretic, galactagogue, and is often used for infertility and for women's health.^[31]

VI.1 Activity

Asparagus racemosus (family Asparagaceae) also known by the name Shatawari is one of the well known drugs in Ayurveda, effective in treating acceptable to many". It is considered both a general tonic and a female reproductive tonic. Shatawari may be translated as "100 spouses", implying its ability to increase fertility and vitality. In Ayurveda, this amazing herb is known as the "Queen of herbs", because it promotes love and devotion. Shatawari is the main Ayurvedic rejuvenative tonic for the female, as is *Withania* for the male. This herb is highly effective in problems related with female reproductive system. Charak Samhita written by Charak and Ashtang Hridayam written by Vagbhata, the two main texts on Ayurvedic medicines, list *Asparagus racemosus* as part of the formulas to treat women's health disorder.

A. racemosus is an Ayurvedic rasayana which prevent ageing, increase longevity, impart immunity, improve mental function, vigor and addvitality to the body and it is also used in nervous disorders, dyspepsia, tumors, inflammation, neuropathy, hepatopathy. Reports indicate that the pharmacological activities of *A. racemosus* root extract include antiulcer, antioxidant, and antidiarrhoeal, antidiabetic and immunomodulatory activities. A study of ancient classical Ayurvedic literature claimed several therapeutic attributes for the root of *A. racemosus* and has been specially recommended in cases of threatened abortion and as a galactagogue. Root of *A. racemosus* has been referred as bitter-sweet, emollient, cooling, nervine tonic, constipating, galactagogue, and aphrodisiac, diuretic, rejuvenating, carminative, stomachic, antiseptic and as tonic.^[31]

Asparagus racemosus is well known for its effects on the female reproductive system and used in all female related problems such as PMS and sexual debility. It also supports deeper tissue and builds blood and so it helps to remove infertility, prepare the womb for conception,

prevents miscarriage and acts as a post-partum tonic where it helps to increase lactation and normalize the uterus, prolapse of Uterus and the balancing reproductive hormones level.^[32]

Asparagus racemosus also works as stimulant of Endometrium and Ovarian Tissues, regulating menstruation and ovulation, balance hormonal level (TSH, Estrogen, FSH, LH) and improved the Conception rate (64% vs 28%) in women. It also nourishes, cleanses blood and different female reproductive organs thus enhancing the chances of fertility. It also nourishes the ovum and womb, reducing the danger of miscarriage. The alcoholic extract of *Asparagus racemosus* did not show any anti fertility effect and all treated animals delivered normal litter in rat.

The preparations based on *A. racemosus* roots are recommended in cases of threatened abortions, the activity is due to Shatavarin-I. Which blocks even oxytocin induced contractions in a dose dependent manner. Its rasayana as well as antioxidant activity helps in modulating various immune processes and also prevents lipid peroxides at the placental level. The polycyclic alkaloid asparagamine A is also reported to have an antioxytotic action, showing an antiabortifacient affect. It stimulates haemopoetic function and increase weight of accessory sex glands. it enhances folliculogenesis and ovulation, prepares the womb for conception, and prevents miscarriages. The energy source for the female reproductive system is oestrogen dependent glycogen. Estrogen increases the glycogen content in the uterus and any decrease in uterine glycogen would directly implicate estrogen deficiency.^[33]

From the above reviews it may reasonably be concluded, that *Asparagus* may be considered as a potential female fertility agent.

VI. Curcuma Longa

Curcuma longa is one of over 80 species belonging to the genus *Curcuma*, in the family Zingiberaceae. This species is native to the Indian subcontinent and is more commonly known as 'East Indian arrow root' or 'narrow-leaved turmeric' in English.

VII.1 Activity

The rhizome of *Curcuma longa* is a folk medicinal plant used as have antifertility potentials. The aqueous and ethanolic extract of rhizome of *Curcuma longa* used for testing antifertility activity in female rat. Aqueous and ethanolic extract of plants were administered orally to female rat for 30 consecutive days. Estrous cycle, reproductive hormones (LH, FSH and estrogen) and weight of reproductive organ were studied in both control and extract-administered groups by using standard methods. FSH and LH level was significantly decreased in both drugs while amount of estrogen in ethanolic extract of both the drugs treated animals was

found to be increased. The female albino rats after oral administration of different doses of aqueous and ethanolic extracts of *C. longa*, showed a significant antifertility activity.^[34]

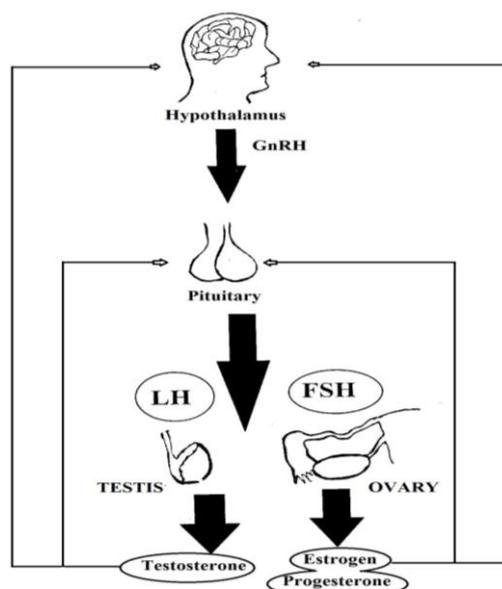


Figure 3: Hormone Regulation.

Curcumin, the active principle obtained from rhizome of the plant, *Curcuma longa* Linn has been studied for antioviulatory and antigonadotrophic effect to elucidate its antifertility effect. Oestrus cycles are predominantly controlled by the anterior pituitary gland through FSH and LH secretion. FSH is responsible for early maturation of graffian follicles that FSH and LH together are responsible for their final maturation and a burst of LH secretion i.e LH surge, mediated by positive feed back effect of oestrogen is responsible for ovulation and their initial formation of corpus luteum.^[35]

Estrogens are responsible for maturation and maintenance of the vagina and uterus, and are also involved in ovarian function, such as maturation of ovarian follicles. In addition, estrogens play an important role in regulation of gonadotropin secretion. For these reasons, estrogens are required for female fertility. Curcumin inhibit the oestrogen induced negative feedback effect on FSH either by occupying oestrogen receptors or by lowering oestrogen synthesis leading to increased release of FSH. Antioviulatory effect of curcumin was further confirmed by histological studies of the ovaries removed from the curcumin treated rats by the absence of ruptured graffian follicle and corpus luteum. It is presumed that antioviulatory action of curcumin may be due to its antioestrogenic property preventing oestrogen induced LH surge.^[36]

From the above reviews it may reasonably be concluded, that curcumin considered as a potential antifertility agent.

CONCLUSION

Finally, it was clear that the medicinal plants play an important role in fertility regulation. The herbal plants and their extracts have significant in both fertility and antifertility activity. Traditional medication consists of natural herbs and extracts of fruits, vegetables, spices, etc., which helps in curing diseases without any side effects and are mostly harmless to our body. While, most of the modern medicines are synthetically prepared and treats the ailments by offering a solution that may produce side effects. The active, natural principles, constituents and crude extracts of various plants, which have been discussed are useful in sexual disorders, contraception, have potential for improving sexual behaviour and performance, and are helpful in spermatogenesis, folliculogenesis without any side effects compare to modern steroidal medication system and thus the above detailed herbs could be considered as fertility regulating agents. Despite of various commercially available oral contraceptives in the market, herbal fertility regulating agents shows promising output by minimizing the number of adverse drug properties. In addition of rapid progress, spread of modern medicine and surgery, faith in and popularity of traditional methods has not decreased due to its safety and less cost consumption. There are a large number of studies which supports the fertility effects of traditional herbal medicines.

ABBREVIATIONS

ABBREVIATION	FULLFORM
LH	Luteinizing Hormone
HSG	Hysterosalpinogram
FSH	Follicle Stimulating Hormone
IUDs	Intra Uterine Device
IVF	Invitro Fertilisation
AI	Artificial Insemination
AIH	Artificial Insemination Husband
AID	Artificial Insemination Donar
GABA	Gamma Amino Butyric Acid
ROS	Reactive Oxygen Species
OS	Oxidative Stress
ARTs	Assisted Reproductive Technologies
GSH	Glutathione
PMS	PreMenstrualSyndrome

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