



A REVIEW ON EFFECTS OF APHRODISIAC PLANTS IN MALE INFERTILITY:

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KEYWORDS :

Introduction:

Infertility is defined as the inability to conceive after one year of intercourse without Contraception.[1]

Infertility influences up to 15% of the sexually dynamic populace, and in 50% of cases, a male variable is included, either as an essential issue or in blend with an issue in the female accomplice. Concern is developing that male sexual improvement and proliferation have changed for the more regrettable in the course of the last 30 to 50 years.[2] There has been expanding worry about the capability of substances in the earth to upset endocrine frameworks in people and untamed life.[3]

The process of human conception is completely depends on chance. Out of billion sperm, there is only one sperm got the chance to encounter with egg. And if one sperm finally completes the journey, it may or may not have the energy left for fertilization. Different forms of male infertility includes erectile dysfunction, reduction in sperm density and semen volume and abnormal sperm morphology.[4] In mammals, the success of fertilization largely depends on gamete fertility potential and consequently on what concerns sperm and oocyte quality they are both equally important. Sperm contribution to fertilization is usually estimated through evaluation of semen parameters. Assessment of sperm quality conventionally relies on microscopic evaluation of sperm parameters including total sperm count, sperm concentration and percentage of motile sperm. Energy metabolism is a key-factor in sperm function. It is supported by ATP pathway, which is found in the background of the most important sperm events, such as hyper-activation, capacitation and protein phosphorylation of the acrosome reaction [5].

The causes of oligospermia or azoospermia can be divided into three distinct stages:

Pre-Testicular, Testicular, and Post-Testicular, depending on the stage of spermatogenesis which is altered or impaired. Pre-testicular stage azoospermia results from the pituitary gland, part of the hypothalamic-pituitary-gonadal (HPG) axis, not producing proper hormones to stimulate the testes to produce sperm and is often due to an underlying endocrinologic abnormality. Testicular stage azoospermia is a failure of testicular function and Post-Testicular azoospermia is due to physical causes such as obstruction.[6]

Several potential approaches for infertility have been investigated for a long period of time, including hormonal, immunological and chemical approaches. The extremely high cost of imported drugs coupled with the inadequacy of modern health care personal and infrastructure excluded a very large majority of the third world population from any modern health care programme.[7]

Effective natural treatments are therefore still in demand. Even if many of the plants or natural products claim to prove their effectiveness without scientific evidence, a number of them are active and possess biological activity, proven by scientific data.

Moreover, there is a dearth of systematic review of scientific literature on experimental evidence generated for medicinal plants useful in treating male infertility and there is a need for in depth pharmacological evaluation.[8] Advancement in the understanding of pharmacological basis of erectile and sexual functions at molecular levels is turning out to be stepping stones towards isolating the crucial physiologic factors involved in sexual arousal, thus helping to narrow down the search for aphrodisiac substances of choice. Many people do

not believe in aphrodisiacs, but countless numbers of men and women have used them down through the centuries, and there is clear proof that they are still in use today. The skepticism towards the concept of aphrodisiac is not unjustified, although a systematic evaluation and compilation of scientific information may provide a basis for the evidence-based utilization of herbal drugs for treatment of sexual dysfunction in general. The present study is an attempt to consummate the available scientific information on herbal drugs, which have been evaluated for their effect on sexual performance and functionality.[9]

Modern life style changes and certain environmental exposures have resulted in male infertility. The causative factors produce different types of derangements that results in sexual dysfunctions.[4]

Modern medicines provides nutritional, physiological and psychopharmacological treatments, however many of them produces negative impact on physiological processes. Herbal aphrodisiac provides a safer way to fight with various problems associated with male infertility.[4]

Vajikaran (a speciality in Ayurvedic system of medicine) possess rejuvenative and revitalizing properties for improving sexual dynamics.[4] Spark capsule is having contents which are having rejuvenative and revitalizing properties which may help to treat male infertility.



Figure-1 : Action of vaji(horse)karan rasayana[9]

APHRODISIAC PLANTS:

According to the Oxford Learners Dictionary, aphrodisiac means substance or drug arousing sexual desire, while Encyclopedia of Medicinal plants explained aphrodisiac as the one which excites libido and sexual activity. Foods itself is considered as an aphrodisiac in the Ayurveda because after nourishing different tissues of the body (muscles, fat, nerves) it nourishing the reproductive fluids; and promote vigor. In general "Aphrodisiac" are the substance which are ingested, applied topically, smoked snorted or otherwise delivered in to body for improving their sex potentials. Ayurveda realized the problem of male sexual dysfunction thousands of years ago it realized, among other thing, the role of nervous system, cardiovascular system, and psychological aspect of fertility and male sexual performances. **Vajikaran** is a speciality in Ayurvedic system of medicine, possessing rejuvenative and revitalizing properties for improving sexual

dynamic. [10] It fundamental principle of repletion and depletion, consisting of radical and conservation treatments apply to therapy for male sexual dysfunction. Radical therapy adopts techniques to drain the waste materials of different body compartment through the nearest channel in a system – friendly manner. Radical therapy, followed by repletion and reproduction medicine therapy, can probably improve the male reproductive function by creating an optimal environment for spermatogenesis and improving intratesticular availability of nutrients. In Ayurvedic texts aphrodisiacs have been classified into five categories.[11]

1. Drugs, which increase the quantity of semen or stimulate the production of semen

e.g. *Microstylis wallichii*, *Roscoea procera*, *Mucuna pruriens* and *Asparagus racemosus*

2. Drugs, which purify and improve the quality of semen

e.g. *Saussurea lapa*, *Sesamum indicum*, *Vetiveria ziznoides* and *Anthocephalus cadamba*

3. Drugs, which help sexually and in ejaculation

e.g. *Strychnos nux-vomica*, *Cannabis sativa*, *Myristica fragrans*, *Cassia occidentalis* and *musk*.

4. Drugs delaying the time of ejaculation

e.g. *Sida cordifolia*, *Asparagus racemosus*, *Cinnamomum tamala*, *Anacyclus pyrethrum*, *Mucuna pruriens*

5. Drugs arousing sexual desire

e.g. *Withania somnifera*, *Datura stramonium*, *Hibiscus abelmoschus* [4]

REPORTED ACTIVITIES:

Hanssens et al in 2008 have reported that all antipsychotic medications have the potential to cause hyperprolactinaemia, as the inhibition of dopamine release effectively removes the negative feedback loop for prolactin secretion from the anterior pituitary gland.[12]

K. Maeda et al, in 2010 reported The pulse mode of GnRH secretion which stimulates tonic luteinizing hormone (LH) and follicle-stimulating hormone (FSH) secretion which drives folliculogenesis, spermatogenesis and steroidogenesis and is negatively fine-tuned by estrogen or androgen.[13]

A.V.Mcgrady et al, In 1984 noted that Evidence exists that mild-to-severe emotional stress depresses testosterone and perhaps interferes with spermatogenesis in the human.[14]

Jay Prakash et al, in 2013, demonstrated that *Mucuna pruriens* (MP) seed extract contains L-DOPA, the dopamine precursor that is used as a therapeutic agent against Parkinson's disease. Although the antioxidative properties of *Mp* are well reported.[15]

Patil R.B. et al, in 2012 reported that Reproductive failure is observed to be a common problem in young generation due to stress. Sterility and impotence in males is characterized by dramatic change in seminiferous epithelium that leads to decrease in spermatogenesis and steroidogenesis and regression of testis. This is termed as reproductive aging which is caused by increase in oxidative stress, due to overproduction of Reactive Oxygen Species (ROS). Many Ayurvedic plants like *Shatavari*, *Brahmi*, *Amla*, *Ashwagandha* are widely used for their antioxidant properties.[16]

Mohammad kaleem ahmed et al, in 2007 Treatment with *Mucuna pruriens* significantly inhibited lipid peroxidation, elevated spermatogenesis, and improved sperm motility. Treatment also recovered the levels of total lipids, triglycerides, cholesterol, phospholipids, and vitamin A, C, and E and corrected fructose in seminal plasma of infertile men.[17]

Tajuddin et al, in 2005 by using mating behavior method in rats demonstrated that sustained increase in the sexual activity of normal male rats without any conspicuous adverse effects indicates that the 50% ethanolic extract of nutmeg possesses aphrodisiac activity, increasing both libido and potency, which might be attributed to its nervous stimulating property.[18]

Thakur and Dixit, in 2007 reported Vajikaran is a speciality in

Ayurvedic system of medicine, possessing rejuvenative and revitalizing properties for improving sexual dynamics. It's Fundamental principle of repletion and depletion, consisting of radical and conservation treatments apply to therapy for male sexual dysfunction.[19]

Nagendra singh chauhan et al, in 2013 have demonstrated that Increases in LH, FSH, and testosterone levels also indicate an effect of *Pueraria tuberosa* on gonadotropin release hormone GnRH. GnRH agonist effect may be the mechanism involved in the androgenic and estrogenic activities evidenced in male rats. It is via the same mechanism that the antifertility activity in female rats can be explained via the overproduction of estrogen where a feedback mechanism for overproduction of GnRH may be a guiding principle. The present study provides evidence for the role of phytoestrogenic compounds from *Pueraria tuberosa* in improvement of sexual function and testosterone production in male rats and thus adds to the evidence for its ethnopharmacological utilization as an Ayurvedic herb for improvement of sexual performance and fertility.[20]

Raghav Kumar Mishra et al, in 2012 reported that Shilajit increases serum testosterone level and sperm number in rat and man.[21]

Arun Dadhich et al, in 2013 reported that **Chitrak**, **Guduchi** and **Gokshur** having antibacterial properties which acts against the infectious condition and improvement was seen in reduced values of WBC and pus cells in semen after treatment. **Bhallatak** shows Kamouttejaka property which helps in erection & rigidity of penis. **Shunthi** having good quantity of carotene which helps in formation of vitamin A and it is essential for spermatogenesis. Since **vata** is controlling force for the erectile response and the rigidity is also dependent **bala** or strength of the dhatus. **Vidarikand** is specially indicated in oligospermia and Tila having vitamin A & folic acid, which help in spermatogenesis. This therapeutic study proven that "**Narsingh Churna**" increases semen volume, sperm motility and significantly sperm count. It also gives physical and mental well being to the patients and gives hope to childless couples.[22]

Table – 1 : characteristics of aphrodisiacs.

Sr. No.	Name	Characteristic
Extracts of :		
1	<i>Withania somnifera</i> (aswagandha)	Anti oxidant ^[16]
2	<i>Mucuna pruriens</i> (kauncha)	L-Dopa precursor, Anti oxidant ^{[15][17]}
3	<i>Tribulus terrestris</i> (gokshur)	Aphrodisiac activity, ^[23] antibacterial ^[22]
4	<i>Asparagus racemosus</i> (shatavari)	Anti oxidant ^[16]
5	<i>Pueraria tuberosa</i> (vidarikand)	Improvement of sexual function and testosterone ^[20]
6	<i>Myristica fragrans</i> (jatiphala)	Aphrodisiac activity, Helps in ejaculation ^[4]
7	<i>Sida cordifolia</i> (bala)	Free radical scavenging property ^[24] , delaying ejaculation time ^[4]
Powders of:		
8	Narsinh churna	Increases men sperm volume, sperm motility and significantly sperm count ^[25]
9	<i>Chlorophytum tuberosum</i> (shwet musali)	Increase testosterone level ^[21] Rejuvenate body ^[25]
10	Shuddha shilajit	Increase testosterone level ^[21]
11	<i>Piper nigrum</i> (marich)	Antioxidant activity ^[26]
12	<i>Zingiber officinale</i> (shunthi)	Formation of vitamin A and it is essential for spermatogenesis ^[22]
13	<i>Piper longum</i> (pippali)	Adjuvant (Digest toxins) ^[27]

CHARACTERISTICS OF APHRODISIASACS:

1. Withania somnifera (Solanaceae)[8]

Withania somnifera, also known as Indian ginseng, has been described in folk medicine as an aphrodisiac and geriatric tonic. Different investigators have reported that *W. somnifera* possesses antiserotogenic, anticancer, and anabolic activity and is

beneficial in the treatment of arthritis, geriatric problems, stress, and male sexual dysfunction. It also possesses adaptogenic, cardiotropic, cardioprotective, and anticoagulant properties.[28] *W. somnifera* has been shown to inhibit lipid peroxidation in stress-induced animals.[29] Earlier studies have shown that aqueous extract of this plant elicits changes in pituitary gonadotropins coupled with an enhancement in epididymal sperm pattern in adult male rats and folliculogenesis in immature female rats.[30] *W. somnifera* induced testicular development and spermatogenesis in immature wistar rats by directly affecting the seminiferous tubules.[31]

2. *Mucuna pruriens* Linn. (Mp) (Fabaceae)

commonly known as Kapikacho or Kevach in Hindi, is used as a therapeutic drug in Ayurveda, the traditional medical system of India.[32] It is a climbing legume native to southern China and eastern India.[33] The seed, root and stem of Mp possess valuable medicinal properties.[34] It has been reported to contain analgesic, anti-neoplastic anti-inflammatory, anti-epileptic, anti-microbial and learning and memory enhancing properties.[35, 36]

3. *Tribulus terrestris* (Zygophyllaceae)[9]

The plant *Tribulus terrestris* Linn.(Zygophyllaceae) popularly known as puncture vine is a perennial creeping herb with a worldwide distribution. Since ancient times it is regarded as an aphrodisiac in addition to its beneficial claims on various ailments such as urinary infections, inflammations, leucorrhoea, oedema, and ascites.[37] *T. terrestris* has long been used in the traditional Chinese and Indian systems of medicine for the treatment of various ailments and is popularly claimed to improve sexual functions. Administration of *T. terrestris* to male lambs and rams improves plasma testosterone and spermatogenesis.[38] It also found to increase the levels of testosterone, luteinizing hormone,[39] dehydroepiandrosterone, dihydrotestosterone, and dehydroepiandrosterone sulphate.[40,41]

4. *Asparagus racemosus* (Liliaceae)[9]

Asparagus racemosus is an important medicinal plant of tropical and subtropical India. Its medicinal usage has been reported in the Indian and British Pharmacopoeias and in indigenous systems of medicine. The genus *Asparagus* includes about 300 species around the world. The genus is considered to be medicinally important because of the presence of steroidal saponins and sapogenins in various parts of the plant. Out of the 22 species of *Asparagus* recorded in India; *Asparagus racemosus* is the one most commonly used in traditional medicine.[42] Traditionally, the plant has been in use as a galactagogue which stimulates the secretion of breast milk. The other uses of plant are in aphrodisiacs, demulcent, rheumatism, diarrhoea, dysentery, tuberculosis, diabetes, antioxidant, antitussive, nervous disorders, hyperacidity, general debility, habitual abortion and safe delivery. [43]

5. *Pueraria tuberosa* (Fabaceae)[9]

Pueraria tuberosa DC (Fabaceae) is a plant widely used in traditional Indian medicine as tonic, aphrodisiac, antirheumatic, diuretic, and galactagogue.[44] *Pueraria tuberosa* is an important constituent of Ayurvedic medicines including Chyawanprash, a popular tonic.[45] Study provides evidence for the role of phytoestrogenic compounds from PT in improvement of sexual function and testosterone production in male rats and thus adds to the evidence for its ethnopharmacological utilization as an Ayurvedic herb for improvement of sexual performance and fertility.[20]

6. *Myristica fragrans* (Myristicaceae)[9]

Myristica fragrans Houtt (nutmeg) has been mentioned in Unani medicine to be of value in the management of, male sexual disorder due to the presence of sterols, phenols, alkaloids and amino acids. The suspension of the extract shows resultant significant and sustained increase in the sexual without any adverse effects. The 50% ethanolic extract of nutmeg possess aphrodisiac activity. Thus it provides a scientific rationale for the traditional use of nutmeg in the management of male sexual disorders.[18]

7. *Sida cordifolia* (Malvaceae)[24]

Family Malvaceae is largely represented and some of these plants as *Sida cordifolia* L. (Malvaceae). A decoction of this Malvaceae is locally used in the treatment of coughs, rheumatic and abdominal pain, and diarrhea while the leaf decoction is used in the treatment of fever and to prevent miscarriage.[46]

8. Narsingh Churna [22]

Maximum ingredient in the Narsingh Churna had the properties like

Madhur rasa, Madhur vipaka, Guru, Snigdha guna and Shit virya. Rest of drugs had the properties like katu, tikta, kashaya rasa, katu vipaka, ushna virya and leghu, tikshna, Ruksha Guna. Maximum ingredients were having the properties of vrisya vajikara and shukrala along with madhura rasa and mahdura vipaka but ingredient bhallatak had the property of vajikar, vrisya as well as rasayan also. Vajikarna drugs are capable to enhance the production of shukra dhatu only and give nourishment to that. So they increase the sperm count and semen volume and give strength to the body. But rasayan drugs are capable to enhance the complete dhatu utpatti karma and dhatu doshan karma. Thus the final product is more better qualitatively as well quantitatively.[22]

9. *Chlorophytum tuberosum* (Liliaceae)[25]

Safed musli, a very potent ayurvedic aphrodisiac herb, has been proven to be extremely beneficial in treating low libido and erectile dysfunction. Safed musli is also an excellent remedy for several other male conditions, including infertility, oligospermia or low sperm count, premature ejaculation, and physical weakness. It has the ability to increase sperm count and semen motility, and thereby improves fertility. It seems to be effective to raise energy levels, boost physical power, improve stamina, relieve fatigue, and enhance immunity system. They help rejuvenate body and health, build muscle mass, and improve blood circulation. Safed musli basically works by unleashing a man's testosterone, which is the key player in achieving a good erection. Testosterone release can increase a person's sex drive and endurance in bed. This herbal Viagra is also known to be adaptogen a component that can effectively regulate one's level of enzymes and hormones making the male genitalia to function properly.[25] Experimental studies reaffirm its role in sexual behavior, spermatogenic activity,[47,48] immunomodulatory activity,[49] anti-stress and anti-oxidant activities.[50] Clinical trials also confirm its positive impact on sexual behavior, sperm count, and so on.[50,51]

10. *Shuddha shilajit*

Shilajit is a pale-brown to blackish-brown exudation, from layers of rocks in Himalayan ranges of the Indian subcontinent at altitudes between 1000 and 5000 m. Shilajit is a compact mass of humus (60–80%) along with other components such benzoic acid, hippuric acid, fatty acid, ichthyol, ellagic acid, resin, triterpenes, sterol, aromatic carboxylic acid, 3, 4-benzocoumarins, amino acids and phenolic lipids.[84] The major physiological action of shilajit was found to be due to the presence of the bioactive dibenzolapharyones along with humic and fulvic acids which acted as carrier molecules for the active ingredients.[85] In oriental medicines, Shilajit is well known rejuvenator and prescribed to treat genitourinary disorder, digestive disorders, nervous disorder, chronic bronchitis, anemia, diabetes, and kidney stones.[52] Modern scientific research has systematically validated a number of properties and has proven that Shilajit is truly a panacea in oriental medicine.[52] According to recent reports, Shilajit was found to have significant anti-inflammatory activity,[53] free radical elimination functions,[54] and anxiolytic effects.[55] In oriental medicines of Asian countries, Shilajit has also been ascribed as a potent aphrodisiac and used to treat male sexual dysfunction.[52,56] It has been reported that Shilajit increases serum testosterone level and sperm number in rat and man.[56,57]. Further, in a study it is found that shilajit improves the reproductive indices in cadmium-induced infertile Parkes (P) strain mice. Shilajit reverted back the adverse effects of cadmium on motility and density of cauda epididymal spermatozoa, testicular daily sperm production, and on serum testosterone level and seminiferous tubules.[21]

11. *Piper nigrum* (Piperaceae)[58]

Piperine (1-piperoylpiperidine) is an alkaloid present in the fruits of black pepper (*Piper nigrum*). Piperine is the major pungent substance present in these plants and is commonly used as a spice all over the world for seasoning and flavoring food. Piperine is known to possess pharmacological properties, such as antipyretic, analgesic and anti-inflammatory activities,[59] and has been used in Ayurvedic medicine (a traditional Indian system of medicine) for the treatment of various diseases for thousands of years.[26]

12. *Zingiber officinale* (Zingiberaceae)[60]

The plant is a knotted, thick, beige underground stem (rhizome) that has been used in traditional medicine to aid digestion and treat stomach upset, diarrhea, nausea, and arthritis for centuries. In addition to these medicinal uses, ginger continues to be valued around the world as an important cooking spice and is believed to help the common cold,

flulike symptoms, headaches, and even painful menstrual periods.[60] Ginger is used as support in inflammatory conditions such as arthritis,[61] and may even be used in heart disease,[62] or cancer.[63] The important active components of the ginger root are thought to be the volatile oils and pungent phenol compounds such as gingerols, shogaols, zingerone, and gingerols.[64,65] It is reported that *Zingiber officinale* possess androgenic property.[66]

13. *Piper longum* (Piperaceae)[58]

Long pepper contains aromatic oil, piperine, alkaloids, sesamin and pipalestrol. The roots of this plant contain piperin, pippalartin, piperleguminin, sterols and glycosides, piperlongumine or pipartine and dihydrostigmasterol.[67] *Piper longum* or Pipali which was mostly used for household cooking purposes as a spice and as seasoning now is a component of medicine as attested by several studies. It is reported as good remedy for treating gonorrhoea, menstrual pain, tuberculosis, sleeping problems, respiratory tract infections, chronic gut-related pain and arthritic conditions.[68] Since a long time *P. longum* has been used to possess immunomodulatory and antitumor activity.[69] Pharmacological and clinical studies have revealed that piperine, a compound isolated from *P. longum* act as CNS depressant, antipyretic, analgesic, anti-inflammatory,[70] antioxidant,[71] and possess hepatoprotective activities.[72] In addition piperine has also shown to enhance the bioavailability of several drugs, for example sulfadiazine, tetracycline, streptomycin, rifampicin, pyrazinamide, ionized, thambutol, and phenytoin.[73] Considering its significant effect on the bioavailability enhancing capability of drugs, it has potential to be used as an adjuvant with therapeutic drugs in chronic ailments, to reduce the effective dose of the drug intake thus reducing the subsequent adverse effects.[27]

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