

Review on Spermatogenic Activity of *Gokshuradi Churna*

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Abstract

Infertility is an important and growing health problem affecting nearly 15% of couples worldwide. It is estimated that male factors contribute to 20-70% of cases depending on the latitude. Male reproductive system is highly sensitive to many factors such as environmental, lifestyle as well as numerous physical and chemical factors which leads to infertility. In 40 to 50 % of cases, a semen analysis can rule out the cause of the infertility. Many drugs in the market are available but they might produce various side effects that cannot be ignored. *Vajikarana* is one among the eight branches of Ayurveda. In Ayurveda, there are various herbal and herbomineral formulations that take place in *Vajikarana chikitsa* owing to their aphrodisiac property. *Gokshuradi Churna* is one of such versatile formulation that possesses *Vajikarana* properties and is used in male infertility. This formulation consists of five herbal ingredients i.e. Gokshura (*Tribulus terrestris* Linn.), Ikshura (*Asteracantha longifolia* Nees.), Mash (*Phaseolus Mungo* Linn.), Atmagupta (*Mucuna prurita* Hook.) & Shatavari (*Asparagus racemosus* Wild.). It is a polyherbal formulation illustrated in the classical text of Ashtanga Hridaya. Many formulations are available in various texts under the same name *Gokshuradi Churna* with different contents and different *Rogadhikara* (indications). This article compiles probable mode of action and Spermatogenesis activity of each ingredient of *Gokshuradi Churna*.

Keywords: *Gokshuradi Churna*, Infertility, spermatogenesis activity.**Copyright © 2023 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

According to the International Committee for Monitoring Assisted Reproductive Technology (WHO), Infertility is defined as the inability of a sexually active, non-contraception couple to achieve pregnancy in one year [1]. In our society, having children is highly valued, infertility has psychological, financial, and physical repercussions that cause anguish and stress [2]. Male infertility is reported mainly due to low sperm count, poor sperm motility along with obstructions that limit sperm delivery. It can also be manifested by illnesses, accidents, chronic health issues, stress, anxiety and depression as well as materialistic life style etc. [3]. Nearly 10-15% of the individuals belonging to the reproductive age group are affected by infertility. The rate of infertility is steadily increasing due to changes in life style, high pollution, socioeconomic

cause, an enormous amount of stress and dietary factors etc. [4].

As per Ayurvedic literature, *Shukra Dhatu* is the Seventh *Dhatu* in the hierarchy of the *Sapta Dhatus* that comprises the human body [5]. This *Dhatu* is regarded as the *Sara* (essence) of all the *Dhatus*. In Ayurveda, four fundamental elements are responsible for reproduction i.e., *Ritu*, *Beej*, *Kshetra* and *Ambu*. Here only the *Beej* element can be correlated with sperm. The Characteristics of *Shuddha Shukra*, according to the Acharyas are *Sphatikabha Madhugandhi*, *Drava*, *Picchila*, *Avisra*, *Madhura* and *Snigdha*. There are mainly eight types of seminal diseases referred to as *Shukra Dushti* in the classics [6]. Ayurveda, a holistic branch of Indian system of medicine, has also explained in detail about infertility, its cause, pathophysiology and treatment under the

heading of *Vajikarana* which is mainly concerned with aphrodisiacs, virility and improving health of progeny.

Although there are many contemporary medications in the market which may have undesirable side effects. As a result, different formulations utilised as *Vajikarana Aushadhi* in Ayurveda are something to look forward to. One such adaptable remedy with

Vajikarana characteristics is *Gokshuradi Churna*. It is a polyherbal formulation depicted in *Ashtang Hridaya* [7], contains five ingredients i.e. Gokshura, Ikshura, Mash, Atmagupta and Shatavari. All the ingredients of this *Churna* possess aphrodisiac property which accounts for its spermatogenesis activity.

Drug Review:

Table 1: Ingredients of Gokshuradi Churna

Contents	Botanical name	Family	Part used
Gokshura	<i>Tribulus terrestris</i> Linn.	Zygophyllaceae	Seeds
Ikshura	<i>Asteracantha longifolia</i> Nees.	Acanthaceae	Seeds
Mash	<i>Phaseolus Mungo</i> Linn.	Leguminosae	Seeds
Atmagupta	<i>Mucuna prurita</i> Hook.	Leguminosae	Seeds
Shatavari	<i>Asparagus racemosus</i> Wild.	Liliaceae	Roots

Table 2: Raspanchak of Gokshuradi churna

Drug	Rasa (taste)	Guna (qualities)	Veerya (potency)	Vipaka (Post digestive state of drugs)	Karma (Pharmacological actions)
Gokshura [8]	Madhura (sweet)	Guru (heavy), Snigdha (unctuousness)	Sheeta (cold)	Madhura (sweet)	Vatapitta shamak, Vrishya Garbhasansthapak,
Ikshura [9]	Madhura (sweet)	Snigdha (unctuousness), Pichhila	Sheeta (cold)	Madhura (sweet)	Vatapitta shamak, Mutral, Vrishya, Rasayana
Mash [10]	Madhura (sweet)	Guru (heavy), Snigdha	Ushna (hot)	Madhura (sweet)	Vatashamak, Vrishya, Stanyajanana, Mutral
Atmagupta [11]	Madhura (sweet), Tikta (bitter)	Guru (heavy), Snigdha (unctuousness)	Ushna (hot)	Madhura (sweet)	Vata Shamak, Vrishya, Mutral,
Shatavari [12]	Madhura (sweet), Tikta (bitter)	Guru (heavy), Snigdha (unctuousness)	Sheeta (cold)	Madhura (sweet)	Vatapitta shamak, Shukral, Stanyajanana

Table 3: Pharmacological Properties of Drugs

Drug	Phyto-constituents	Pharmacological Actions
Gokshura [13]	Saponins, Polyphenolic compounds, alkaloids, Furostanol, Spirostanol, Kaempferol	Aphrodisiac, anti-inflammatory, analgesic, antispasmodic, antibacterial
Ikshura [14]	Alkaloids, Saponins, Steroids, Phenolic compounds, Tannins, Flavonoids, Terpenoids, Protein & Amino acids, Anthraquinones	Aphrodisiac, Balya (stamina booster), Shukrashodhaka (purify the semen anomalies), Vatraktahara (useful in gout), Ashmarihara (lithotropic), Shothahara (anti-inflammatory)
Mash [15]	Genistein, Glycinil Kievitone, Eugenol, Beta-sitosterol, Phloretin	Vrishya (Aphrodisiac), Diuretic, Balya, Brumhana (bulk promoting), Stanyajanana (galactagogue)
Atmagupta [16]	Steroids, Flavonoids, Tannins-dopa, mucunine, prurienine, palmitic, oleic, linoleic, stearic	Balya (stamina booster) Shukrala (aphrodisiac), Vatavyadhikar (useful in disorder of vata humor)
Shatavari [17]	Steroid, saponins, Quercetin, Rutin Polysaccharides	Vrishya (Aphrodisiac activity), Balya (stamina booster), Rasayana (rejuvenation), Anti-stress activity

SPERMATOGENIC ACTIVITY OF INGREDIENTS OF GOKSHURADI CHURNA

Tribulus Terrestris Linn.

It is prostrate, annual or biennial herb, up to 90 cm in length. Leaves paripinnate; leaflets 5-8 pairs, subequal, oblong to linear-oblong, mucronate, pubescent on both surfaces. Flowers axillary or leaf opposed, pale yellow to yellow, solitary on peduncles shorter than leaves. Fruits globose, consisting of 5

woody mericarps with 2 long and 2 short spines. Seeds many in each coccus. Part used is whole plant.

Synonyms: *Gokshura*, *Swadukantaka*, *Vanashringata*, *Chanadruma*, *Ikshugandhika*, *Kshuraka*, *Gokantaka*, *Gokshuraka*, *Palankasha*, *Shwadanshtra* [13].

Spermatogenic Activity of *Tribulus Terrestris* Linn.

Tribulus terrestris (TT) is a traditional Unani medicine used to enhance sexual activities. In the treated addicted group, TT significantly increased

hormone levels, and oral TT use may significantly counteract a decrease in sex hormones and gonadotropins [18]. Another study revealed that the administration of Tribestans a commercial product containing 250 mg of TT to humans and animals for a period of 60–90 days was found to improve testosterone levels, libido and promote spermatogenesis. Clinical studies showed TT improved reproductive function, including increased concentration of hormones such as estradiol with testosterone being very slightly influenced, thereby improving reproductive function, libido and ovulation [19]. Another study evaluated the hormonal effects of *Tribulus terrestris* (TT) in primates, rabbits and rats to identify its effectiveness in managing erectile dysfunction (ED). They found that TT may be useful in mild to moderate cases of ED as it increases some of the sex hormones, possibly due to the presence of protodioscin in the extract. Protodioscin is a phytochemical agent derived from *Tribulus terrestris* L plant, which has been clinically proven to improve sexual desire and enhance erection via the conversion of protodioscin to DHEA (De-Hydro-Epi-Androsterone) [20].

Another study investigated the effect of *T. terrestris* extract on the primary spermatocyte in rat. The researchers found that *T. terrestris* can probably balance the functions of the male reproductive system and can be used in treatment of male infertility, while affecting the testis spermatocyte. The study showed that *T. terrestris* plant increases secretion of luteotropic hormone from the pituitary gland due to containing saponins. Luteotropic hormone is also a special stimulant for the production of testosterone and hence can improve sexual function in the forms of increased sperm production, improved erectile function and increased libido. Furostanol is one of the saponins in *Tribulus terrestris* with a stimulant effect on spermatogenesis. This material significantly improves the quality and quantity of sperm [21].

***Mucuna Prurita* Hook.**

It is widely known as “velvet bean,” a vigorous annual climbing legume. “Cowitch” and “cowhage” are common English names. The plant has long, slender branches; alternate, lanceolate leaves; and white flowers with a bluish-purple, butterfly-shaped corolla. The pods or legumes are hairy, thick, and leathery; averaging 4 inches long; are shaped like violin sound holes; and contain four to six seeds. They are of a rich dark brown color, and thickly covered with stiff hairs.

Synonyms: *Kapikacchu, Guptapala, Svagupta, Atmagupta, Markati, Kandura, Shukashimbi* [22].

Spermatogenic Activity of *Mucuna Prurita* Hook.

The traditional aphrodisiac property of this plant is scientifically analysed and proved by several experiments using seeds of *M. pruriens*. A study was performed which revealed that *M. pruriens* stimulates

sexual function in normal male rats which was observed by increase in mounting frequency, intromission frequency and ejaculation latency [23].

***Asparagus Racemosus* Wild.**

It belongs to the family Liliaceae which means “who has a hundred husbands or is liked by many.” It is regarded as both a general tonic and a tonic for female reproduction. The name “100 spouses” of the plant shatavari may allude to its capacity to boost fertility and life. This extraordinary herb is referred to as the “Queen of herbs” in Ayurveda since it fosters attachment and affection. The dried roots of the plant are used as drug. It is also known as *Satawar, Satamuli, Satavari, Shatamuli, Bahusuta, Vari, Narayani, Shatapadi, Pivari, Indivari, Bhiru, Shatvirya* [24].

Spermatogenic Activity of *Asparagus Racemosus* Wild.

A study was performed that illustrated the systemic use of extracts of *Shatavari* has sexual behavior-enhancing effect in male rats. The extracts of the *Shatavari* were found to stimulate the mounting behaviour of male rats and significantly increase their mating performance [25].

***Asteracantha Longifolia* Nees.**

Asteracantha longifolia Nees, Acanthaceae, is a source of the ayurvedic drug, ‘*Kokilaaksha*’ and the Unani drug, *Talimakhana*. The seeds are acrid, bitter, aphrodisiac, tonic, and sedative, used for diseases of the blood. It is a spiny, stout, annual herb, common in waterlogged places. Leaves subsessile, oblong-lanceolate or linear-lanceolate, spines yellowish brown, 2-3 cm long, Flower yellowish brown, fruit two-celled, linear-oblong, compressed about 8 cm long, pointed, 4-8 seeded. Seed ovate, flat or compressed, 0.2-0.25 cm long and 0.1-0.15 cm wide, hairy but appearing smooth; when soaked in water immediately gets coated with mucilage, light brown: taste slightly bitter and odour not distinct [26].

Spermatogenic Activity of *Asteracantha Longifolia* Nees.

An *in vivo* study of the ethanolic extract of seeds of *Asteracantha longifolia* Nees was conducted to evaluate its effect on sexual behaviour of male rats. The ethanolic extract exhibited pronounced anabolic effects in treated animals, as evidenced by gains in the body weight and reproductive organ too. Increased spermatogenesis due to treatment with extracts was also witnessed in the transverse section. The treatment further markedly affected the sexual behaviour of the animals, as reflected by the reduction of ML (Mount Latency), increase in MF (Mount Frequency) and enhanced attractability towards females. A significant increase in the sperm count along with fructose levels of seminal vesicles was noted [27].

Phaseolus Mungo Linn.

It is suberect or erect, diffusely spreading hairy herb, 30 to 90 cm high. Leaves alternate, trifoliate, leaflets elliptic-ovate or oblong-lanceolate, apex acute to acuminate, 5-10 cm long. Flowers yellow, bisexual, terminal, usually 8- 12 or 10-15 cm long peduncle. Pods 3-5 cm long, cylindrical, hairy, terete with a short-hooked beak. Seeds 10-15, oblong with square ends, about 3 mm long, black with white hilum. Flowering and fruiting: August-November. Parts used are seeds, roots or whole plants.

Synonyms: *Baladhay, Bhuktiprada, Hayananda, Kuruvinda, Mamshala, Pitrijoultam, Pttiya, Rasottama, Supashreshtha, Suphala, Vajibhojana, Varnarha, Vrishakar* [28].

Spermatogenic Activity of Phaseolus Mungo Linn.

An *in vivo* study was performed to evaluate the effects of alcoholic extracts of the *Vigna mungo* Linn. seeds on general mating behavior, libido, and potency of normal male Wister albino rats. The results revealed that the extract administered PO significantly increased the mounting frequency and intromission frequency and decreased the mounting latency, intromission latency, post-ejaculatory interval, and inter-intromission interval. The male reproductive organ weight increased along with an increase in sperm count and is supported in histopathology slides of testies. Therefore, the study indicated that the alcoholic extracts of *Vigna mungo* Linn. seed produced a significant and sustained increase in the sexual activity of normal male rats at a particular dose (500 mg/kg) [29].

Probable Mode of Action of Gokshuradi Churna

Whatever is *Madhuram* (sweet), *Snigdham* (unctuous), *Jeevanam* (vitalizer), *Brihanam* (bulk-promoting), *Guru* (heavy) and *Harsana* (exhilarating) is known as *Vrishya* (Aphrodisiac) [30]. *Gokshuradi Churna* consist of five ingredients i.e. *Gokshura, Ikshura, Mash, Atmagupta* and *Shatavari*. *Madhura Rasa* and *Vipaka* have the *Shukra Vardhaka* property, *Guru Guna* is helping to generate *Shukra* based on *Saamaanya Visessa Siddanta*. Whereas *Sheeta Virya* leads to the production of *Shukra* and protects it from *Pitta* vitiation. All the constituents have *Madhura Rasa, Guru* and *Snigdha Guna, Sheet Virya* (except *Mash* and *Atmagupta*) and *Madhura Vipaka* which accounts for the *Vrishya* property of *Gokshuradi Churna*. *Kshina Shukra* is a *Vata-Pitta* predominant disorder. *Vatapittahara Karma* performs the *Samprapti Vightana* in the *Kshina Shukra* property.

DISCUSSION

As the current scenario is changing, the human population is facing a lot of challenges due to hectic, busy and sedentary lifestyle. Around 10-15% of couples in the reproductive age range experience infertility, which is a global health issue. Infertility is defined as the inability of a sexually active, non-contraception couple to become pregnant within a year. Acharyas

have recommended *Vajikarana* or *Vrishya Chikitsa* as a solution to such kind of issues. *Vajikarana* or *Vrishya Chikitsa* is one of the eight branches of Ayurveda which is concerned with aphrodisiacs, virility and improving the health of progeny.

There are numerous *Vajikarana* formulations in different classical texts. *Gokshuradi Churna* is a polyherbal formulation comprising of five ingredients i.e., *Gokshura, Ikshura, Mash, Atmagupta* and *Shatavari*, used for spermatogenesis activity. *Tribulus terrestris* contains three groups of active phytochemicals. They are Dioscin, protodioscin, and diosgenin. Protodioscin is a potent natural precursor of the testosterone enhancer. It also increases the production of Testosterone in another natural way. *Tribulus terrestris* leads to the production of the luteinizing hormone (LH). When the LH levels are increased, the natural production of testosterone also increases. LH is a hormone that also deals with sex drive. LH has been used to increase fertility and helps to relieve impotence. *Asparagus racemosus* Wild. aids in the enhancement of spermatogenesis by providing the regeneration of seminiferous tubules. *Phaseolus Mungo* Linn. improves strength, the bulk of feces, and fertility quickly. It contains a small amount of isoflavones, an excellent source of B-complex vitamins such as B6, thiamin (B1), pantothenic acid (B5), riboflavin (B2), niacin (B3), and folates (B9). Folates along with vitamin B12, is one of the essential factors for DNA synthesis and cell division. It is also an incredible source of minerals like iron, calcium, copper, magnesium, zinc, and phosphorus. *Astercantha longifolia* Nees. results in a rise in fructose content in seminal vesicles, which is a suggestion of an increase in testosterone synthesis in the body. The seminal vesicles provide fructose substances to the seminal pathway, which is necessary to generate normal sperm motility. These phytochemicals enhance spermatogenesis activity by improving the production of Testosterone, luteinizing hormone (LH), the regeneration of seminiferous tubules, and provide essential nutrients for testosterone synthesis.

With the above properties, all the constituents of *Gokshuradi Churna* have *Madhura Rasa, Guru* and *Snigdha Guna, Sheet Virya* (except *Mash* and *Atmagupta*), and *Madhura Vipaka* which results in *Shukra Vridhi*. Thus, it indicates the *Vajikarna* property of *Gokshuradi Churna*.

CONCLUSION

Men's reproductive health & infertility is one of the unexplored areas of research which has a lot of potential. Ayurveda has been used in this field for ages, but due to a lack of scientific validation, these are not well established. By reviewing all Ayurvedic literature along with various research work it is accomplished that all the constituents of *Gokshuradi Churna* have spermatogenesis activity. Therefore, *Gokshuradi*

Churna can be used in improving men's reproductive health. This article provides a platform for researchers to further explore this formulation and other potent formulations related to men's reproductive health.

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