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Review of *Viparit lajjalu* (*Biophytum sensitivum* Linn.) and its Effect on Sperms

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ABSTRACT

Medicinal plants are commonly used by traditional medical practitioners to treat different illnesses in their everyday practices. In various diseases such as stomach ache and burning sensation, inflammation, arthritis, wounds, gonorrhoea, amenorrhoea and dysmenorrhoea, asthma, cough, degenerative joint disease, urinary calculus, diabetes, snake bite, *Viparit Lajjalu* (*Biophytum sensitivum* Linn) of the family *Oxalidaceae* is one of those used as traditional folk medicine. It is a small, flowering, annual herb with sensitive leaves in the opposite direction. It grows in the warmer parts of India and in tropical Africa & Asia. Several ethano-botanical reviews illustrate the same plant's aphrodisiac activity and sterility activity. An aphrodisiac is a drug or food that activates sexual instinct, induces desire, or enhances sexual enjoyment or efficiency.

Key Words: *Viparit Lajjalu*, Sperm, *Vajikaran*

INTRODUCTION

Folklore herbal medicines are getting more attention now a day. Folklore medicines are a more important source of knowledge for research and development.¹ The traditional therapist more often carries the traditional philosophies, civilisations, and stories of a community, which they receive from the previous generations.² There is scope to encourage the new idea, manner and treatment modalities from older healing procedure.³ The traditional medical practitioner provides health maintenance by using herbal plants, inorganic and organic materials and certain other approaches based on the societal, ethnic and spiritual backgrounds as well as the fundamental knowledge.^{4,5} Traditional practitioner used different medicinal formulas from various natural substances (herbal plants, inorganic and organic materials). They have wide knowledge based on herbal plants for treatment and dietary purposes. Currently, traditional therapists have their area of expertise. There are different types of medicinal plants that are known to traditional therapists, *Biophytum sensitive* Linn is one of the tremendous effect, variety of uses even though not into the lumen of research.

There are so many therapeutic myths on different types of traditional medicine but lacking scientific study on them.⁶ Most of the folklore medicines are given without doing any ethical, well-mannered research even in this era of science. Single herbs have so many qualities, activity on different diseases in so many types of permutation and combinations.

Infertility is emerging as one of the embarrassing problems in the present world. But now the male infertility of a day is unexpectedly raising & putting up a major concern for both patients and doctors. Infertility affects around 1 in 7 reproductive-age couples, frequently causing significant psychological distress. In men, infertility may results from impaired sperm quality, quantity and abnormality. Azoospermia or Oligospermia is usually idiopathic but may be a consequence of hypogonadism.¹ Male infertility is commonly due to deficiency in the semen and semen quality is used as a surrogate measure of male fecundity.² It may cause due to y-chromosomal microdeletions, varicocele, hypogonadism, previous vasectomy, previous sexually transmitted infection and others.³ To verify the number, shape and movement of sperm in the ejaculate, the diagnosis should require a medical history of the individual and a physical examination along

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with a semen analysis. To verify the levels of hormones that regulate the development of sperm, blood tests may also be performed. Genetic investigations and testicular biopsies are sometimes done. For this there are some treatments, today doctors will advise that the couple take Reproductive Assisted Technologies (ART), such as IVFF (in vitro fertilisation). The cause of infertility is not healed or treated by ART but may help couples achieve pregnancy even if the man's sperm count is very low.^{4,6,7}

All these treatments may be expensive, prolonged which cannot possible for every couple and there is no reassurance about fertility after these treatments. It ultimately results that some men have to deal with the reality that nothing can be done about their infertility. In *Bhavaprakash* about *Laxmana* as *Putrajanani* means ability to produce healthy progeny. *Viparit Lajjalu* (*Biophytum sensitive*) is one drug under the category of *Laxmana* in *Bhavaprakash*⁵. *Laxmanamula Strivandhyatvanashana* and *Vandhyatva* in *Shushrutasamhita*, which improves the consistency, quantity and abnormality of the female reproductive system, have also been described by Acharya Shushruta.⁶

B. sensitive Linn. has been liberally used all over India. Even in Folklore in West Africa and Mali region it is used for Aphrodisiac activity, wound healing and malaria.⁷ *B. sensitive* Linn the whole plant is also eaten to induce sterility in man.⁸ Due to different opinion on the activity of sperm of *B. sensitive* Linn., the proper scientific study should be done for an accurate conclusion of the effect on sperms.

AYURVEDIC REVIEW

Shukra is considered as the last of the seven *Dhatu*s which are responsible for maintaining and providing strength to the human body. Ingested food material after digestion "*Rasa Dhatu*" is produced which after the action of *Agnis* of different *Dhatu*s produces *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja* while these *Dhatu*s are formed different types of waste products are produced and are thrown out of the *Dhatu* resulting into the *Mala Rahit* (devoid of waste products) Last *Dhatu* i.e. *Shukra*.⁹

As the function described to *Shukra Dhatu* is to produce "*Garbha*" (Fetus) it must be the cleanest *Dhatu*. Being cleanest of the *Dhatu*s it is also one of the "*Ten Pranayatanani*" i.e. one of the ten body parts where the "*Jiva*" i.e. life resides¹⁰. Any harm to these ten parts costs the life of the person who is hurt at those places. *Shukra Dhatu* is formed or produced in the body from the *Rasa Dhatu* i.e. an absorbed form of the digested food material from the Gut. *Rasa Dhatu* then produced *Rakta* and then *Mansa* & so on till the *Shukra* the last of the Seven *Dhatu*s is produced. *Acharyas* consider that it requires 3 day nights to produce the next *Dhatu* thus it takes 21 days for producing *Shukra*. Some *Acharyas* believe

that after one month *Shukra Dhatu* is produced. There are interesting theories to explain the formation of these *Dhatu*s one of which is denoted by giving an example of a canal that irrigates the farm turn by turn, this theory is known as "*Kedar kullya nyay*".

The second theory indicates that as the milk is turned into curd and so on likewise *Rasa* turns to *Rakta* and *Rakta* to *Mansa* and so on, this theory is known as "*ksheer dadhi nyay*".^{11,12}

The third theory explains that as the pigeon collects grain from the field where grains are extracted, pigeons whose nest is nearby will reach earlier whereas whose nest is faraway will take more time to reach likewise *Rakta* being the next *Dhatu* will be formed earlier; *Mansa* being third in line will take more time. *Shukra* being the farthest will be the last to be formed. This theory is known as "*khale kapot nyay*".¹¹ When these theories are seen collectively it becomes clear that *Rasa* contains raw material to produce different *Dhatu*s. It flows in the body continuously providing raw material to different manufacturing systems of the *Dhatu*s, which after receiving the suitable raw material produces particular *Dhatu* with help of *Dhatawagnis* which converts them properly and the waste material ready to be thrown out of the body.

There are many opinions regarding the production of *Dhatu*s particularly that of *Shukra*. Some *Acharyas* consider that it takes one day and one night (i.e. 24 Hrs) to produce the next *Dhatu* likewise at the end of the seventh day after ingestion of food *Shukra* is produced.

The digested and absorbed *Rasa* contains the raw material required for the formation of different *Dhatu*s which are processed by different *Agnis* and next *Dhatu* have formed including *Shukra* and *oja* there after. When these processes go wrong due to various reasons including heredity, to dietary deficiencies, the previous history of the diseases, deficient *Dhatawagnis*, abnormalities of the system concerned whether congenital or acquired, the *Dhatu* produced is not normal or optimum. Such abnormal or deficient *Dhatu* is also deficient in its performance. The same is the case of *Shukra Dhatu*; if the production of the *Shukra Dhatu* is deficient due to any reasons mentioned above or any other reason it cannot produce "*Garbha*". The production of "*Garbha*" is the prime function of *Shukra Dhatu*.^{13,14,15}

According to *Kashyap Samhita*, though *Shukra* is present in the body it remains dormant and becomes *vyakta* at the age of 16 years. As it becomes *Sampurna* i.e. Complete hence becomes visible. Of these, the *Sarvdehik Shukra* produces secondary sex characters and the *Sthanik Shukra* is ready for ejaculation and producing *Garbha*. The "*Garbhotpatti*" is possible only if a good "*Shonit*" i.e. *Stribija* and good healthy *Shukra* unite to form a *Garbha* i.e. Zygote. This Zygote when reaches the healthy uterus it's implanted and

grows normally in a well-nourished mother. But, if any of these four factors are deficient the formation of “*Garbha*” i.e. Zygote or its implantation is hampered causing *ApatyaKamana* or “*Vandhyatwa*” i.e. Infertility. Ayurvedic literature describes the *lakshan* of “*ShuddhaSukra*” and “*AshuddhaSukra*”. Facilities of microscopic examinations were lacking for ancient physicians who were aware of the fact that the “*Vikrities*” abnormalities of the semen cause infertility.¹⁶⁻¹⁸

MODERN VIEW

With the advancement of Teratozoospermia, the physics and tools offered by it for medical usage the microscopic examination of the semen reveal abnormalities of the semen particularly of the sperms and their viability. The sperm with abnormalities in its anatomy and physiology is unable to fertilize the ovum. In cases where the number of such abnormal sperms is high ovum cannot be fertilized causing infertility. Many such abnormalities of the sperm ranging from semen without sperm (Azoospermia), Dead sperms (Necrospermia), Fewer sperms (Oligozoospermia), sperms with pus cells (Pyospermia) & abnormalities of its head, body, tail are now encountered. Amongst these abnormalities, Teratozoospermia is one such abnormality where the head, body or tail of the sperm is abnormal separately or collectively.^{19,20}

MODERN DRUG REVIEW

There is a generic medicine that affected sperm quality and quantity. Clomiphene is the licensed medicine for female infertility, but clomiphene can also be administered to males by physicians.¹² It will decrease hyperandrogenic (low testosterone) symptoms, increase sperm count, and potentially help boost non-obstructive azoospermia, a blockage that prevents semen from entering the sperm.¹³

Originally designed for breast cancer, Anastrozole or Arimidex has become a viable off-label treatment for particular groups of infertile men. Anastrozole inhibits the enzyme, aromatase, which prevents testosterone from transforming into estradiol, unlike most fertility medications.¹⁴ This process helps increase the level of testosterone and reduces the level of estrogen. Anastrozole was found to decrease symptoms of male hypoandrogenism, such as low energy, decreased muscle mass, low libido, and erectile dysfunction. It has also been shown in males who are azoospermic or have a low sperm count to increase sperm production and sperm recovery rates.¹⁵

By directly stimulating the testes, human chorionic gonadotropin acts to produce its testosterone and increase sperm production. In hypogonadism men, research has found HCG to improve energy, libido, strength, and mood.

This was observed in men who are hypogonadism due to unknown reasons, as well as in men with lower production of testosterone due to long-term replacement therapy with testosterone. The improvement in testosterone output from HCG can also increase the chance of successful sperm retrieval in men with non-obstructive azoospermia, according to another study.¹⁶ One of the declines in sperm motility and seminal vesicle secretions, irregular sperm morphology, is also methadone hydrochloride.^{17,18} Spermatogenic arrest/decreased sperm count by nitrofurantoin (in high doses).^{19,20}

AYURVEDIC DRUG REVIEW

Taxonomical Description

Botanical name – *Biophytum sensitive* Linn.

Synonyms

Sanskrit: *Jhullipuspa*, *Lajjaluka*, *Panktipatra*, *Pitapushpa*, *Vipareetalajjaalu*²⁰

Common name: Life plant, little tree plant, sensitive plant²¹

Hindi: Lajalu, Lajjaalu, Lakshmana, Zarer²²

Marathi: Jharera, Lajwanti, Lahanmulaka²³

Family: Oxalidaceae

Genus: *Biophytum*

Species: *sensitivum*²⁴

It has been used in traditional medicine, especially in Indian medicine, for different ailments.^{25,26} In the tradition and culture of the state of Kerala in India, the flower of this plant is regarded as one of the ten sacred plants called *Dasapushpam*²⁷

Botanical description

It is an annual herb that looks like a miniature palm, with 2.5 to 25 cm of unbranched, erect, glabrous or hairy stems. Leaves, with 6-12 pairs of leaflets, are sensitive, pinnately compound, crowded into rosette at the top of the stem, and 5-12 cm long. The leaflets are opposite, the petiole is short, and the size increases upwards steadily, being 1.5 cm long, oblong and apiculate at the apex. Flowers are dimorphic, numerous, and up to 10 cm long, 8 mm across the yellow peduncle. With parallel nerves, sepals are 5, lanceolate, imbricate, and acute. Petals are 5, red-marked gold, connate into a salver-shaped corolla and rounded lobes far exceeding the sepals. The fruit is a capsule that is apiculate, ellipsoid, slightly exceeding the sepals. Seeds are ovoid and striate transversely. There are 10 stamens, free of separate filaments, five inner ones are longer, and five styles.²⁸

Movement of plant leaves

B. sensitivum displays nastic movement in the leaves in response to touch, contact with the foreign body, rainfall, wind, vibration, heat, and closing of its leaflets, and the movement is independent of the direction of the stimulus. Depending on the stimulus intensity applied, the degree of motion varies. When the sensitive plant's leaf apex is gently touched, only a few pairs of leaflets close up, and when roughly touched, all the leaflets respond in the same way from the apex downward. A motor structure formed by a rod of collenchyma surrounded by sclerenchyma is the pulvinus. In their extended location, the cells of the entire collenchyma are distended with water, and the cells in the lower half of the pulvinus react by expelling potassium and chlorine ions and taking up calcium ions upon receipt by contact of the action potential signal. This results in an osmotic gradient that pulls water out of the affected cells. The lower pulvinus cells temporarily shrink due to water depletion. In the manner of a fan, this causes the entire structure to bend down. The pulvinus no longer acts as a support in this contracted role and the petiole droops.²⁹ Furthermore, botanists have found a signalling molecule called turgorin, which is known to be a new phytohormone class that regulates all leaf motions by regulating the turgor of plant cells. A highly acidic, free sulphuric acid group is included in the turgorin molecule and it was found that diluted sulphuric acid-induced leaf closing as strongly as turgorin. Therefore it was concluded that turgorin's leaf-closing activity is due to its sulphuric acid group's high acidity.³⁰

Properties of Vipareeta lajjalu(*Biophytum sensitivum* Linn) -

Guna: Laghu

Rasa - Tikta, Madhur, Kashaya,

Veerya – Sheeta

Vipak - Katu

Gana:-Guduchyaadivraga B.H.P.

Chemical composition: There are different chemical components in the whole plant, such as phenolic and polyphenolic compounds, saponin, essential oil, polysaccharides and pectin. The key constituent was found to be amentoflavone in methanolic extract of roots, stems and leaves.³¹

Other therapeutic utilities of the plants:-

1. In Urine calculus Quath of the root of *B. sensitivum* administered.
2. In piles Roots powder paste applied.
3. The root of *B. sensitivum* is tied on Hydrocele patient on locally.^{32,33}

Safety profile

Acute toxicity for *B. Sensitivum* extracts has been tested in rodents. Aqueous plant leaf extract was tested and found to

be non-toxic at 100, 200 and 300 mg/kg dose levels by oral route in mice.³³ Methanol extract *B. Sensitivum* whole plant is well tolerated up to an oral dose of 4000 mg/kg as no mortality was observed within 24 h.³⁴ The median dose (LD50) of plant in hexane, chloroform, ester, N-butanol and ethanol extracts found to be greater than 1 g/kg when intraperitoneally administered to rats.³⁵

Clinical Studies

B. sensitivum is used for the treatment of diabetes traditionally said to have an insulin-like compound. The mechanism of action is not well understood, but tropical insulin properties appear to be present. Clinical studies on the *B. Sensitivum* containing formulation have been published.³⁶ Since 2002, DB14201 has been sold under an *Ayurvedic* license granted under the trade name Diabedrink by the Drug Controller of the State of Kerala.

In *Ayurveda*, it is a mixture of 16 herbs used including *B. sensitivum*. Blinded, placebo-controlled, randomized clinical trials have been reported in 30 patients with type 2 diabetes aged 29-71 with single oral diabetes in both sexes. It is confirmed that when administered along with glibenclamide, the herbal formulation DB14201 is safe in T2DM patients and enhances the efficacy of glibenclamide in providing improved glycemic control. Compared to the addition of placebo, it also offers a substantial increase in fasting and postprandial blood sugar levels and also significantly decreases HbA1c levels.³⁶

Herbal emulsifying creams and gels are prepared by adding the dry methanolic extract of the whole plant *B. Sensitivum* has been assessed for in-vitro antibacterial efficacy against four distinct bacterial strains (*Salmonella typhi*, *Staphylococcus aureus*, *Escherichia coli* and *Bacillus subtilis*). The findings revealed that when formulated as cream and gel for topical use *B. sensitivum* has a high potential as an antibacterial agent.³⁷

B. sensitivum was prepared with an optimized tablet formulation by using the methanolic extract from the dried whole plant. Their antioxidant properties were evaluated in vitro based on their total flavonoid content (TFC) against the regular flavonoid, Quercetin, and also in vivo for the antidiabetic activity of Streptozotocin (STZ)-induced diabetic rats against the anti-diabetic drug Glibenclimide.³⁸⁻³⁹ The drug with the formulations showed antioxidant and anti-diabetic properties^{37,40} anti-inflammatory anti-cancerous,⁴¹⁻⁴³ Immunomodulatory effect and Radioprotective.

CONCLUSION

It has historically been recognized that parts of the plant have a broad range of medicinal properties, including antiseptic

properties, including beneficial effects on a variety of skin infections and diabetes care. Scientific study has shown that anti-bacterial, anti-fungal and anti-diabetic practices have been carried out. The plant has been extensively assessed and confirmed to have anti-inflammatory, antipyretic, anti-microbial, anti-obesity, antioxidant, anti-diabetic, anti-fungal, anti-cancer, larvicidal, anti-obesity, anti-hypertensive, anti-epileptic, wound healing and anti-fertility activity for various pharmacological activities. In the treatment of different diseases, the entire plant is often traditionally used. *B. sensitivum* has been traditionally recommended for Diabetes treatment in the Ayurvedic Philosophy of Medicine. After critical review, no clinical work has been done previously and the conclusions of existing studies are contradictory to each other in therapeutic uses. One article is suggesting Aphrodisiac activity and the other one sterility activity of *B. sensitivum*. Whereas the drug is used for infertility by tribal people. Previous evidence search on *B. sensitivum* no fact has been generated to prove the exact mechanisms on sperm by *B. sensitivum*. To generate the evidence regarding specific action *B. sensitivum*, it is necessary to overcome the confusion about the activity of *B. sensitivum* on sperm in a scientific manner.

Conflict of interest: Nil

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