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International Journal of Pharmacognosy and Chinese Medicine
ISSN: 2576-4772

Phytopharmacognostic Review on *Bryonia laciniosa (Shivlingi Beej)*

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Mini Review

Volume 3 Issue 3

Received Date: July 12, 2019

Published Date: July 26, 2019

DOI: 10.23880/ipcm-16000170

Abstract

Infertility varies across the regions of the world and it has been estimated to affect 8 to 12% couples worldwide. *Bryonia laciniosa* Linn commonly called as shivlingi is a medicinal plant belongs to the family Cucurbitaceae. It is a uterine tonic and improves the chances of conception in women suffering from infertility. Main chemical constituent is 'Bryonin' and it is folk medicine, its traditional uses are also reported like adenopathy, ague, asthma, bronchitis, carbuncles, cholera, colic, consumption, convulsions, cough, delirium, fertility, headache, megalospleny, paralysis, phthisis, snake bite. Its pharmacological proven as antidiabetic, anti-inflammatory, for obesity and specially for treatment of infertility. According to literature it is fertility enhancer herb used in ayurveda along with Putrajeevak Beej.

Keywords: Shivlingi; Oligozoospermia; *Staphylococcus Aureus*; Serotonin

Introduction

India is one of the richest countries as regards to the resources and availability of the medicinal plants. From time immemorial, we have been depending upon the forests for food, shelter, clothing, ornamentation, religious beliefs and most important is for health care. Tribals mostly reside in the forest areas and hilly terrains and they rely on these medicinal plants because of their effectiveness. More than 2500 species of plants have been recognized that have medicinal values. While more than 6000 plants have been recognized for having herbal usage. More than 50,000 plants have been identified and used for medicinal purposes throughout the world. Tribal communities have diverse knowledge of traditional medicines related to indigenous plants for basic healthcare needs [1-3].

During past few decades, modern synthetic medicines have come into prominence with miraculous and instantaneous results. However, these are not providing adequate relief to common people of the developing countries due to their soaring prices and complicated side effects. Due to this, it is a worldwide realization today that the use of natural products as medicines is advantageous over synthetic ones. Extracts of some plants even in crude form are known to exert remarkable effects over biological systems. Such effects are due to certain chemical constituents present in plants and are commonly known as "active principle." Systematic phytochemical investigations of some medicinal plants have led to the isolation and characterization of some of the active principles and are widely used as potent drugs [4].

Bryonia laciniosa Linn commonly called as shivlingi is a medicinal plant belongs to the family Cucurbitaceae Shivlingi Seeds are used for the treatment of female infertility. It is a uterine tonic and improves the chances of conception in women suffering from infertility. It is fertility enhancer herb used in ayurveda along with

Putrajeevak Beej. However, it has different ayurvedic properties and based on these properties, it reduces KaphaDosha. Therefore, Shivlingi is more beneficial if the patient has more symptoms of increased or aggravated Kapha. It is not suitable if the patient has aggravated or increased Pitta Dosha [5].

From time immemorial the phenomenon of infertility was prevalent throughout the world which may persist as long as the human race exists. Every human being has an inherent, intense desire to continue one's own race. Infertility varies across the regions of the world and it has been estimated to affect 8-12% couples worldwide. The WHO has estimated the overall prevalence of primary infertility in India to be between 3.9 and 16.8%. In the event of infertility, couples turn to the traditional medicine which is being used over the centuries for succor as Ayurveda holds high esteem and trust in this field [6].

It is seen from the literature that *Bryonia lacinosa* is a very important plant for its large number of medicinal properties as well as medicinally important chemicals like Glucomannan, Goniothalamin, Arabinoglucomannan. The plant shows many pharmacological activities like analgesic, antipyretic, anti-convulsant, antimicrobial, cytotoxic, antiasthmatic, anti-inflammatory and anti-fertility. Many traditional uses are also reported like adenopathy, ague, asthma, bronchitis, carbuncles, cholera, colic, consumption, convulsions, cough, delirium, fertility, headache, megalospleny, paralysis, phthisis, snake bite which are being studied till today and further research has to be done. Thus, *Bryonia lacinosa* is quite promising as a multipurpose medicinal agent so further clinical trials should be performed to prove its efficacy [7,8].

Basic Information and Ethnobotony of Plant

Bryonia lacinios Linn. Commonly called as shivlingi is a medicinal plant belongs to the family cucurbitaceae. The seeds of *B. laciniosa* are known as "Shivlingi" because the upper surface of seeds has a making and morphology, which resembles "Shivlingi", icon of Lord Shiva, a popularly worshiped by Hindus [9]. It is an annual climber with bright red fruits and is reported to be of high medicinal value.It is mostly use for women infertility problem and most popularly for male child purpose as 'putrajivak'. It is commonly used as hypoglycemic herb by the native people of Porbander region. A literature survey indicated the use of entire plant as a bitter tonic, hepatoprotective, antipyretic and laxative. It is also used to correct metabolic abnormalities. The leaves of the plant are generally applied as an anti-inflammatory paste [10,11].

Botanical Name	***Bryonia laciniosa***
Botanical synonym	Bryonopsis Laciniosa, Diplocyclos Palmatus
Sanskrit synonyms	Lingini,Bahupatra,Ishwari,Shaivamallika,Swayambhu,Lingsasambhuta,Lingi,Chitraphala,Amruta,Pandoli,Lingaja,devi
Common Name	Shivlingi, Gargumara
Plant Family	Cucurbitaceae – grouds of squashes
Genus	Bryonia
Distribution	India-Madhya Pradesh, Uttar Pradesh,Gujrat, Uttrakhand
Habitat	Tropical & subtropical regions
Parts used	Leaves, Fruits, Seeds (Especially seeds)
Chemical constituent	Main constituent: Bryonin 1. PUNICIC ACID 2. GONIOTHALAMIN 3. GLUCOMANNAN
Medicinal Properties	➢ Uterine tonic ➢ Fertility booster ➢ Aphrodisiac ➢ Spermatogenic ➢ Antioxidant Anodyne ➢ Anti-inflammatory ➢ Carminative ➢ Anti-fungal ➢ Antimicrobial

	➢ Antihyperlipidemic ➢ Anti-diabetic ➢ Antipyretic
Dosage	The general dosage of Shivlingi Beej is as follows. Adults: 1 to 3 grams. Maximum Possible Dosage: 6 grams Per Day (in divided doses). Doses: Twice a day with Milk; warm water for weight loss. Best Time to Take: 3 hours after meal. Recommended Treatment Duration: Minimum 3 months (some patients may require treatment with Shivlingi for 6 months or more depending on the health condition).
Safety profile	It is safe to all type of patient when used in recommended dose; it is applicable to pregnant women's also. There is no any allergic reaction.

Table 1: Basic Information and Ethnobotony of Plant.

It is also a constituent of Ayurvedic formulation *'Striravallabhpugpak'* described in ancient text to improve sexual behavior and as a general tonic [5]. Women take the seeds in combination with other medicinal herbs for helping conception and prevent miscarriage. Traditional healers of Gulgul village, Chhattisgarh recommend the use of 3-4 seeds once daily by women, in empty stomach for 1 to 2 months to be get a male child [12,13]. Gond and Bharia tribes of Patalkot valley worshipthis plant and they consider that; this herb is boon for the childless parents. Traditional healers of Gaildubba suggest a mixture of Shivlingi seeds with Tulsi (*Ocimum basilicum*) leaves and Jaggery in female infertility [14]. The seeds of Shivlingi are potentially contraceptive when used in combination with ginger (dry), pepper, Putrajivi, Root bark of vata (*Ficus bengalensis*) and milk [15]. Besides, abortificient action of shivlingi seeds has also been reported when it is combined with equal quantity of ashwagandha roots and consumed with sugar and milk (Bhawda Amalad) [16].

Taxonomic Classification [17]

Domain: Eukaryota
Kingdom: Plantae
Subkingdom: Viridaeplantae
Phylum: Tracheophyta
Subphylum: Euphyllophytina
Infraphylum: Radiatopses
Class: Magnoliopsida
Subclass: Rosidae
Superorder: Violanae
Order: Cucurbitales
Family: Cucurbitaceae
Subfamily: Cucurbitoideae
Tribe: Benincaseae
Genus: Bryonia S
Pecies: laciniosa - L.
Botanical name: Bryonia laciniosa L

Morphology

Leaves are membraneous, 10-15 cm long and expansive, green and scabrid above, paler and smooth or almost so underneath. Profoundly cordate at base. 5 lobed, the projections are elongated, lanceolate, midrib once in a while subserrate. Petioles are 2.5-7.5 cm long, striate, slim. Male Flowers are with little fascicles of 3-6, peduncle 5-20 mm long, filiform, glabrous. Calyx is glabrous, 205 mm long, teeth subulate. Corolla is 3-5 mm long, fragments, applaud, oval, intense, pubescent and Female-Solitary or few, or numerous peduncles and shorter than male. Organic products are Sub sessile, 1.3-205 cm in breadth, globose, smooth, pale blue green, streaked with wide vertical lines and having seeds with 5-6mm long, yellowish cocoa [18,19].

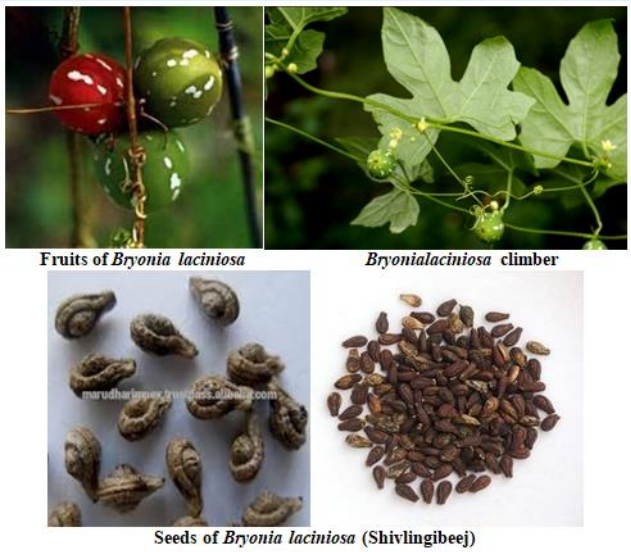

Figure 1: Morphology of plant part *Bryonia laciniosa*.

Rasa (Taste)	*Katu*(pungent), *tikta*(bitter)
Guna (Main quality)	*Laghu*(light), r*uksha*(dry), *tikshna*(sharp)
Virya (Potency)	*Ushna*(hot)
Vipaka (Resultant)	*Katu*(pungent)
Prabhava (Specific action)	Uterine tonic
DOSHA KARMA (Effect on Humors)	Pacifies KaphaDosha and increases Pitta Dosha
Karma	*Rasayana, Sidhma, Kushthahara*
Organs effect	Uterus, ovaries and testes
Main indication	Infertility

Table 2: Ayurvedic Properties [5].

Shivlingibeej Indications [5]

- Female infertility
- Male infertility due Oligospermia
- Impaired spermatogenesis.
- Asthenozoospermia –reduced spermatic motility.
- Teratospermia –defective or abnormal spermatic morphology.
- Constipation.
- Obesity & weight loss (when used alone).
- Hyperglycemia &Diabetes

Female Infertility

Diminished ovarian reserve (DOR) is a condition that causes infertility, mostly in older women. *Aartava-kshaya*, which can be correlated with DOR, has been described as deficiency or loss of *Artavadosha* not appearing in time, is delayed, or is scanty. DOR can occur in any condition according to Ayurvedic types of *Vandhyatva* (inherent infertility). Shivlingi Beej promotes fertility and increases the chances of getting pregnant. It also helps to normalize the menstrual cycle if the patient has light periods with a little blood flow. But if the patient has heavy blood flow during menstruation, then Shivlingi is contraindicated.

According to ayurvedic analysis, it is more beneficial if the patient is obese or overweight and has absent menses, light menstruation, having a feeling of heaviness in the lower abdomen and feeling of puffiness or swelling during the premenstrual and menstrual period. It is also beneficial if a woman with infertility suffering from depression along with a feeling of sadness and laziness, emotional eating, leucorrhea, increased sleep and swelling in legs or whole body.

If the patient has thick mucus during her period or yeast infection, then it is also most suitable. In such cases, Shivlingi should be used in maximum dosage.

Rasayan action of Shivlingi helps to synthesize purest Rasa dhatu subsequently, Upadhatu Artava is formed having required quality for fertilization. Hypothetically the Rasayan karma in this regard may act through androgenic effect via DHEA [20].

Impotence and Oligospermia

In traditional medicine, Shivlingi is used as an aphrodisiac. It is fertility booster for men too. It increases masculinity and testosterone level in the body. It is considered as a potential testosterone booster. Due to this reason, it is used in men for treating impotence. Shivlingi seeds also have spermatogenic action. Therefore, Shivlingi seeds improve the spermatogenesis process and improve the total count [21]. According to Ayurveda, Shivlingi seeds are best in cases of impotence and oligospermia if the patient has excess Kapha Dosha or symptoms of increased or aggravated Kapha. Shivlingi reduces blockage of several channels in the body by clearing the excess Kapha and Ama. This mechanism also improves the supply of nutrients to the testes and blood flow to male reproductive organs, which ultimately helps to improve the process of spermatogenesis and treat impotence.

Action of ethanolic extract of seeds of *Bryonia laciniosa* Linn on male Albino rats showed androgenic activity and effects on hypothalamo-pituitory gonadal axis [21-23]. Action was evaluated as follows.

1. Increase body weight, testis, prostate, epididymis and seminal vesicle.
2. Increase in spermatogenesis
3. Increase in sperm count.
4. Increase in fructose content of seminal vesicle.
5. Increase in serum testosterone and LH.

Shivlingi has a Rasayana and Vajikarana effect by which the purest Shukradhatu is synthesized, thus helping with fertilization in cases of Oligozoospermia, Asthenozoospermia and Oligoasthenozoospermia.

Antidiabetic Activity

The ethanolic extract (250 and 500 mg/kg; p.o.) and saponin fraction (100 and 200 mg/kg; p.o.) were administered to diabetic rats and standard drug insulin (5 IU/kg; i.p.) to the group serving as a positive control. Oral administration of the ethanolic extract and saponin fraction for 28 days to streptozotocin-induced diabetes rats significantly ($P < 0.05$) decreased the levels of blood glucose and improved the levels of plasma insulin. Oral administration of the ethanolic extract and saponin

fraction restored all these biochemical parameters to near control levels [24].

Anti-Inflammatory Activity

Chloroform extract of leaves of *Bryonia laciniosa* (CEBL) using carrageenan, dextran, histamine, serotonin induced rat paw oedema and cotton pellet induced granuloma (chronic) models in rats. In mice, carrageenan peritonitis test was performed for the extract by oral administration. The CEBL exhibited significant anti-inflammatory effect at the dose 50, 100 and 200 mg/kg. Maximum inhibition (52.4%) was noted at the dose of 200 mg/kg after 3 h of drug treatment in carrageenan induced paw oedema, whereas the indomethacin (standard drug) produced 62.1% of inhibition. The extract exhibited significant anti-inflammatory activity in dextran induced paw oedema in a dose dependent manner. The extract also exhibited significant inhibition on the hind paw oedema in rats caused by histamine and serotonin respectively. In the chronic model (cotton pellet induced granuloma) the CEBL (200 mg/kg) and standard drug showed decreased formation of granuloma tissue by 50.1 and 57.3% respectively [8].

Fever Management

Shivlingi has antipyretic, anti-fever and anodyne effects. The antipyretic action of Shivlingi leaves is comparable with Paracetamol.

Byronia laciniosa is touted as an anti-pyretic (against fever) and was found to exert anti-fever effects (at 500mg/kg) at an efficacy similar to the control drug, paracetamol (150mg/kg). This study also noted analgesic (painkilling) actions in a dose-dependent manner, although even 500mg/kg Byronia laciniosa was less effective (52.61% inhibition relative to control) than 100mg/kg Aspirin (68.87% inhibition) [23].

Constipation

Shivlingi contains GLUCOMANNAN, which is natural dietary fiber. It is a water soluble fiber and forms bulk in the intestine absorbing water content and aids bowel movement [5].

Obesity & Weight Loss

Shivlingi has anti-obesity action and its regular use reduces body weight and body mass index (BMI). Its anti-obesity action is likely to be attributed to its constituent GLUCOMANNAN, which is a good natural fiber helps for losing weight [5].

Doses: Twice a day with Milk; warm water for weight loss.

Anti-Microbial Activity

Bonyadi Rad Ehsan, et al. Evaluated the antimicrobial activity of ethanol extract of different parts of *B. laciniosa*. This activity evaluated against Gram positive and Gram-negative bacterial isolates, they include three strains of gram-negative bacteria like *Escherichia coli, Salmonella typhimurium*, and *Pseudomonas aeruginosa* and three strains of gram-positive bacteria, *Bacillus cerues, Staphylococcus aureus* and *Micrococcus luteus*. The ethanolic extract of leaves and stem showed direct antimicrobial activity against all tested microorganism with minimum inhibitory concentration ranging between 0.625 to 10 mg/ml and 0.156 to 5 mg/ml, respectively which reveals that the leaves show more antimicrobial action than the stem [25].

Anti-Epileptic Activity

Jayarama Reddy, et al. evaluated the 70% alcoholic extract of whole plant of *Bryonia laciniosa* on anticonvulsant activity by delaying the onset of MES induced seizures and protecting treated mice from mortality induced by seizures. The results suggest that % reduction of extensor phase was less (39.27) in *B. laciniosa* treated group when compared to the group treated with Carbemazepine (95.58) which reveals that there was significant increase in anticonvulsant activity in the case of *B. laciniosa* treated group [26].

Anti-Asthmatic Activity

70% alcoholic extract of dried aerial parts of *Bryonia laciniosa* on the degranulation rate of sensitized peritoneal mast cells of albino rats when challenged with antigen. Triple antigen was used as adjuvant and prednisolone was used for comparison as standard. The number of intact and disrupted mast cells, in ten randomly selected fields for each tissue was counted. Increase in % granulation was recorded in *Bryonia laciniosa* treated samples compared to control. 56.27% was recorded in *B. Laciniosa* treatment and 81.26% granulation was recorded in predinisolone [26].

Anticancer or Cytotoxic Activity

The water, methanol and chloroform extracts of *B. laciniosa* leaves were tested on human cancer and normal cell lines using three in vitro cytotoxicity assays i.e. cell viability, SRB and clonogenic potential. The effect was compared with that of standard anticancer drugs doxorubicin and vincristine. Activation of caspase-8 and caspase-3 enzymes was assessed to evaluate the effect of

extract on induction of apoptosis in cells. The different extracts, the aqueous extract demonstrated maximum cytotoxicity to cancer cells. The IC50 value was estimated to be 18 µg/mL. Nearly all cancer cells could be killed by the leaf extracts of *B. laciniosa* in vitro, whereas small fraction of cells from cancer cell lines showed resistance to doxorubicin even at concentration much higher than IC50. Results of caspase assay demonstrated activation of both caspase-8 and caspase-3 enzymes indicating induction of apoptosis in *B. laciniosa* leaf extract treated cells. The results thus show that aqueous extract of *B. laciniosa* leaves possess cytotoxicity to cancer cells and are able to kill all cancer cells without leaving residual population [26,27].

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