



Shweta Musali (*Chlorophytum Borivilianum* L.): A Precious Medicinal Plant

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ABSTRACT

Chlorophytum borivilianum (Safed Musli) is valued gift from the nature to humankind. Safed musli has nature oil, which is good manure for good and robust health and ideal for motherhood. Safed musli is a term for botanical herb name *Chlorophytum borivilianum* (Family: Liliaceae). In the Ayurvedic literature, Safed Musli is celebrated as a Divya Aushad with unparalleled medicinal properties. It is a chief ingredient in the preparation of over a hundred Ayurvedic formulations. *Chlorophytum borivilianum* supports the physiological balance or homeostasis. It improves an access to energy stores, help to improve stamina, resistance to stress, tiredness, help in mobilization of the body's nutritional resources, help to normalize various indices such as blood pressure, blood glucose and improve function. Although their action is primarily, supportive and restorative, but it treats male sexual inadequacies like oligospermia, lack of libido, impotency etc.

Keywords: *Chlorophytum borivilianum*, Rasayana, Traditional Uses

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INTRODUCTION

Ayurveda is the Vedic system of health care that developed in India over 5000 year ago. It was codified by the sage- physician's Charka and the sage surgeon Shushruta. Ayurveda is a holistic system of medicine from India that use constitutional model. Ayurveda is made up of two Sanskrit words: *Ayu*, which means life and *Veda*, which means the knowledge [1]. The three Doshas are Kapha, Vata and Pitta is referred to respectively as the water, air and fire personalities. Kapha is predominantly the water and earth elements, which combine to form the Kapha Doshas. The cerebral spinal fluid protects the brain and spinal column and is a type of Kapha found in the body. In addition, to the mucosal lining of the stomach is another example of the Kapha Doshas protecting the tissues. Vata governs the principle of movement and therefore, can be seen as the force, which directs to the nerve impulses, circulation, respiration, and elimination. Fire and water are the elements that combined to form the Pitta doshas. The Pitta doshas is the process of transformation or metabolism. The transformation of foods into nutrients can assimilate in our bodies is an example of pitta function. Pitta is also responsible for metabolism in the organ and tissue systems as well as cellular metabolism [2].

All the traditional systems of medicine have shown us that the plants have provided humankind a large variety of drugs to alleviate that suffering from diseases. They all use drugs in their natural state or as their preparation include them in crude form with progress in chemical techniques and with growth of pharmaceutical industries, crude drugs replaced gradually by synthetic drugs. These synthetic drugs have a single mode of action, causes severe adverse reactions, when given in only slight over doses or over a long period and some time differ with individuals. These synthetic drugs produce remarkable life saving results in acute disease but cannot be use often in the treatment of chronic diseases. A synthetic drug or a single chemical compound isolated from plants and some time causes various side effects or physicians – induced hazards. The reason being very simple they forget various simultaneous mechanism-taking places in human body [3].

On the contrary, the herb or crude drug is a complex compounds, some beneficial, some harmful, some vitamins and some even toxic but all integrated under a natural rule to make a crude drug function as a single chemical agent. This action without or much side effects because it is amalgamated in a fashion to

counter balance. The undesirable effects and ultimately only desirable action is incurred this has led to believe again on herbal or natural remedies and people are again fascinated to 'Back to the nature' [2, 3]. *Chlorophytum borivillianum* (Safed Musli) is valued gift from the nature to humankind. Safed musli has nature oil, which is good manure for good and robust health and ideal for motherhood. Safed musli is a term for botanical herb name *Chlorophytum borivillianum* (Family: Liliaceae). Safed musli has been one of the chief ingredients in Ayurveda and other local folklore medicines for ages. Native to Indian subcontinent, the plant occurs in the tropical and subtropical areas of the country. It is an annual herb of 1.5 feet height with erect lanceolate leaves erect dense, flowered racemes of white colour and tuberous root system. Safed musli is a native Indian plant with peerless healing and health giving properties. The particular and enormous potential of safed musli lies in its proven prowess as a safe herbal alternative to chemical-based Viagra, which is known to have certain side effects. Mainly the tuberous roots are used in the preparation of medicines [4]. Dry safed musli mainly contains carbohydrates, proteins, fibers, saponin, and alkaloids. The saponin and alkaloids present in the plant are the primary source of its significant medicinal properties [5].

Chlorophytum borivillianum is a health-promoting herb, which attenuates the endocrine system, the 'conductors' of the entire orchestra of physiological process of the body. Its effect cascade throughout the body owing to its rich Balya- provide energy to each cell, Rasayana- act inside the human body by modulating the neuro-endocrine systems and Vrishya gunas to endow the user with enduring vitality, immunity, youthfulness, cognitive ability, conjugal capability and an improved state of homeostasis (Fig.1). *Chlorophytum borivillianum* supports the physiological balance or homeostasis. It improves an access to energy stores, help to improve stamina, resistance to stress, tiredness, help in mobilization of the body's nutritional resources, help to normalize various indices such as blood pressure, blood glucose and improve function. Although their action is primarily, supportive and restorative, but it treats male sexual inadequacies like oligospermia, lack of libido, impotency etc [6].

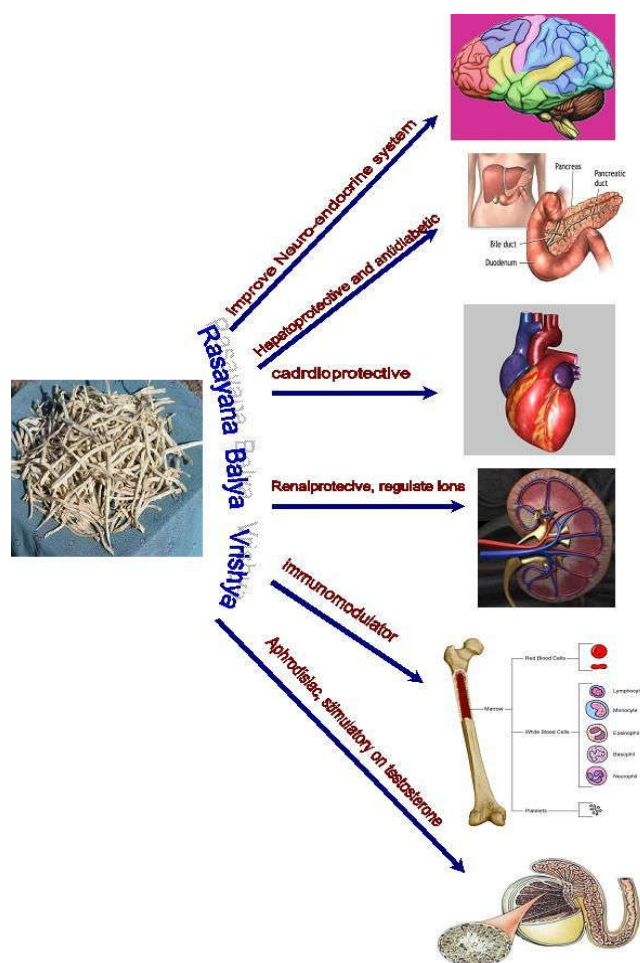


Fig.1: Pharmacodynamics of *Chlorophytum borivillianum*

COMMON NAMES

Hindi : - Safed Moosli, Dholi Musli, Khiruva
 English : - Land-Calotropis
 Latin : - Chlorophytum Borivilianum
 Family Name : - Liliaceae
 Sanskrit : - Swetha Musli
 Tamil : - Taniravi Thang
 Telugu : - Swetha Musli
 Malayalam : - Shedheveli
 Marathi : - Safed Musli
 Gujarati : - Dholi Musli
 Arabic : - Shaqaqule

CHEMICAL CONSTITUENTS

Safed Musli contains carbohydrates (35- 45%), fiber (25-35%), alkaloids (15-25%), saponins (2-20%), and proteins (5-10%). It is a rich source of over 25 alkaloids, vitamins, proteins, carbohydrates, steroids, saponins, potassium, phenol, resins, mucilage, and polysaccharides and also contains high quantity of simple sugars, mainly sucrose, glucose, fructose, galactose, mannose and xylose. Recently Stigmasterol and saponin named as furostanol and Chlorophytoside-I (3b, 5a, 22R, 25R)-26-(β -Dglucopyranosyloxy)-22-hydroxy-furostan-12- one-3yl O- β -D-galactopyranosyl (1-4) glucopyranoside has been isolated [6, 7].

USES & BENEFITS OF SAFED MUSLI [7]

- Safed musli is a very popular aphrodisiac agent, with no side effects. It is often prescribed for enhancing male potency and overcoming signs of fatigue. It is particularly used for individuals with low sperm count and low libido.
- It is also regarded as an energy booster in asthmatic conditions. The roots of the herb are also used to strengthen the general immune system of the body.
- The tuber roots of the plant have been used since ancient times, to prepare nutritive tonic for sexual weakness and is used in Ayurvedic medicines even today.
- Safed musli proves useful as a nutritive tonic for both the mother and the fetus, during pregnancy and is also used to replenish the body fluids during the post-partum stage.
- The herb improves the quantity and flow of breast milk, in feeding mothers.
- It has many health promotional benefits. It is used to control and prevent obesity and its side effects.
- The activities of vitamin C and antioxidant enzymes are also enhanced by the use of this plant species.
- Research has indicated that the plant species is used for curing diabetes and arthritic conditions.
- Safed musli is also beneficial in the treatment of natal and postnatal problems.
- Its regular use causes increase in the level of High Density Lipoprotein (HDL or good cholesterol) and decrease in the plasma and hepatic lipid profiles.
- Apart from rejuvenating the reproductive system, the herb prevents premature ejaculation and is also used in chronic leucorrhoea.

PHARMACOLOGICAL ACTION OF CHLOROPHYTUM BORIVILIANUM**Aphrodisiac activity**

The aqueous extract of dried roots of Safed musli is reported to have a potent aphrodisiac and spermatogenic potential. To evaluate this effect, male wistar albino rats were orally treated with the dose of 125 and 250mg/kg/day, their sexual behaviour was monitored 3 hr later using a receptive female. Their sexual behaviour was evaluated on days 1, 7, 14, 21 and 28 of treatment by pairing with a pro-oestrous female rat. For sperm count the treatment was continued further in all groups (control group-dist. water and treated group except group with sildenafil citrate 4mg/kg/day) for 60 days. At 125 mg/kg, *C. borivilianum* group had a marked aphrodisiac action, increased libido, sexual vigor and sexual arousal as compared with other groups. Similarly, at the higher dose (250 mg/kg) all the parameters of sexual behaviour were enhanced, but showed a saturation effect after day 14. On day 60 the sperm count increased significantly in both the *C. borivilianum* groups, 125 mg/kg and 250 mg/kg, in a dose dependent manner [8]. In another study, the effects of *C. borivilianum* (Cb) on sexual dysfunction, loss of body weight, and lack of libido in hyperglycemic rats induced with streptozotocin or alloxan was investigated.

It was found that Cb extract treatment ameliorated the diabetes-induced dysfunction at 200 mg/kg dose. There was very low weight loss (P effects on diabetes and its associated effects on sexual functionality [9]. Thus, it is evident that roots of *C. borivilianum* can be useful in the treatment of certain forms of sexual inadequacies, such as premature ejaculation and oligospermia.

Immunomodulatory activity

Ethanollic extract of the tubers of *C. borivilianum* and its saponin were evaluated for their immunomodulatory activity. The assessment of immunomodulatory activity was carried out by determining the effect of azathioprine induced myelosuppression and administration of extracts on haematological and serological parameters. Administration of extract greatly improved survival against *Candida albicans* infection. An increase in delayed type hypersensitivity response, % neutrophil adhesion and in-vivo phagocytosis by carbon clearance method was observed after treatment with extracts. Results suggested a potent activity of ethanolic extract when compared to saponin fraction of *C. borivilianum*. Polysaccharide fraction (CBP) of *C. borivilianum* has immunostimulating properties. CBP is derived from hot water extraction of *C. borivilianum* (Cb), comprising of ~31% inulin-type fructans and ~25% acetylated mannans (of hot water-soluble extract), was evaluated for its effect on natural killer (NK) cell activity (in vitro). Human peripheral blood mononuclear cells, isolated from whole blood were tested in the presence or absence of varying concentrations of each *C. borivilianum* fraction for modulation of NK cell cytotoxic activity toward K562 cells. Preliminary cytotoxicity evaluation against P388 cells was performed to establish noncytotoxic concentrations of the different fractions. Testing showed the observed significant stimulation of NK cell activity to be due to the CBP of *C. borivilianum*. Furthermore, in vivo evaluation carried out on Wistar strain albino rats for humoral response to sheep red blood cells and immunoglobulin level determination using enzyme-linked immunosorbent assay (ELISA), exhibited an effectiveness of *C. borivilianum* aqueous extract in improving immune function. Thus, results provide useful information for understanding the role of CBP in modulating immune function [10, 11].

Anthelmintic activity

Saponin extract of *C. borivilianum* has Anthelmintic property when checked against *Pheretima posthuma* and *Ascaridia galli*. He used methanolic extract, crude saponin extract and purified saponin extract, Piperazine as standard drug and distilled Water as control. Parameters used were time of paralysis and time of death of the worm. All extracts showed significant anthelmintic activity on selected worms. Purified saponin extract was found more active than other extracts [12].

Antioxidant activity

Antioxidant activity of aqueous extract of *C. borivilianum* (250 mg/kg for 7 days) was studied by 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging assay and lipid peroxidation assay. The aqueous extract of *C. borivilianum* (250 mg/kg for 7 days) inhibits significantly the levels of DPPH free radicals and thiobarbituric acid reactive substances, respectively in a dose-dependent manner [16]. Antioxidant activity of *C. borivilianum* root extract was again proved using chemicals/metals-mediated oxidation. Aqueous extract, when used in graded-dose (25 to 1000 µg/ml), exhibits a very good antioxidant potency as evidenced by powerful nitric oxide, superoxide, hydroxyl, DPPH and ABTS [2, 20-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid)] radicals scavenging activity along with reducing capacity (ferricyanide couple assays), metal chelating ability, as well as markedly suppressed the lipid peroxidation in mitochondrial fractions. Further, aqueous extract significantly decreased ($P < 0.05$) copper-mediated human serum and kinetics of LDL oxidation [20]. Significant increase ($p < 0.001$) compared to that of control group [13].

Antistress activity

Antistress activity was carried out using chronic cold restraint stress rat model. Chronic stress resulted in significant increase in plasma glucose level, plasma cholesterol, triglycerides level, serum corticosterone level and adrenal gland weight as compared to control. Pretreatment with aqueous extract of *C. borivilianum* at both dose levels (125 and 250 mg/kg) reverted significantly the rise in plasma glucose levels indicating adaptogenic potential, plasma cholesterol level, triglyceride level, serum corticosterone level and also adrenal gland hypertrophy [14].

Anti-tumour anti-mutagenic activity

The roots of *C. borivilianum* contain cytotoxic steroidal glycoside saponin chloromaloside-A and spirostanol pentaglycosides embracing beta-Dapiofuranose which are responsible chemicals for anticancer property [15]. Antitumour and anti-mutagenic property of aqueous extract of roots of *C.*

borivilianum were also established when he reported that skin papillomagenesis studies demonstrated a significant decrease in cumulative numbers of papilloma, tumour incidence, tumor size and tumor weight and significant increase in average latent period when the animals received *C. borivilianum* root extract at a dose level of 800 mg/kg body weight/day orally in double distilled water at pre, peri and post initiation stages of carcinogenesis [16].

Antidiabetic activity

A fructo-oligosaccharide, isolated from *C. borivilianum* extract were found to have significant antidiabetic activity with the blood sugar levels being 118.32 \pm 3.56 and 110.21 \pm 4.22, respectively, as compared to the control value of 231.25 \pm 3.03 along with moderate antioxidant activity in streptozotocin induced diabetic animals [17].

Antimicrobial activity

The antimicrobial potential of *C. borivilianum* was screened against eight bacteria and four pathogenic fungi, using microbroth dilution assay. Lowest concentration of the extract, which inhibits any visual microbial growth after treatment with p-iodo-nitrotetrazolium violet, was considered to be minimum inhibitory concentration. Water extracts of *Chlorophytum borivilianum* showed antimicrobial activity in a range of 75-1200 μ g/ml [18].

Larvicidal activity

The larvicidal properties of *C. borivilianum* saponin extracts (Methanolic extract, crude saponin extract, purified saponin extracts) was examined for the mosquito species *Anopheles stephensi*, *Culex quinquefasciatus* and *Aedes aegypti* on the basis of LC50 and EC50 values. All extracts found to be larvicidal activity and among them purified saponin fraction was found more effective [19].

CONCLUSION

Safed Musli is a precious medicinal herb and celebrated as a Divya Aushad with unparalleled medicinal properties. In "Ayurveda" as a rejuvenator, a Vitalizer and health-giving tonic, a curative for pre-natal and post-natal problems, a restorative for immunity-improvement and as a remedy for diabetes and arthritis and as a potent aphrodisiac. As it has tremendous properties which can be utilized for health improvement of human beings, a special care should be taken in cultivation of *Chlorophytum borivilianum*, isolation of different phytoconstituents. Many studies have been conducted so far on the medicinal and nutritional importance of *C. borivilianum*, the plant with potential therapeutic and nutritional uses.

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