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Chlorophytum Borivilianum (safed musli) : A Review of *Aphrodisiac* and Rejuvenating Herbal drug for Human Health

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ABSTRACT

Safed musli (*Chlorophytum borivilianum*) Santapau & Fernandes (Liliaceae) family is an eminent, medicinal plant of India and considered as a 'white gold' or 'divya aushad' in Indian systems of medicine. In Ayurveda, *C. borivilianum* belongs to the group of "Vajikaran Rasayana' corroborated to its rejuvenating, aphrodisiac, natural sex tonic properties and effective in alleviating sexual disorders. Natural aphrodisiac dugs used as alternative to Viagra. Regulating diabetes and optimising overall mental and physical well-being. It is largely used as ethnic medicine by local healers of indigenous communities of India. In this short review Phytochemistry, benefits of safed musli, extraction and activity of safed musli have been reviewed.

Keywords : *Chlorophytum borivilianum,* Phytochemistry, Extraction methods, Aphrodisiac, Spermatogenic, Herbal drug, Safed musli

I. INTRODUCTION

Chlorophytum. borivilianum'safed musli' in Hindi (meaning "white tubers") is widely growing species and an integral part of Ayurvedic, Unani, Homeopathic and Allopathic systems of medicine, where root of the plant holds principal place. Traditionally, safed musli is considered as general health promotive tonic and has been used to treat various male sexual disorders[1]. The knowledge on indigenous uses of *C. borivilianum* have been mostly passed through oral communication from generation to generation in local spoken languages and left undocumented by various communities.[2] The literature surveys reveals that in different states of India revealed that ethnic communities of Aravali Hills, Rajasthan (Meena), Mizorum (Mizo), Maharashtra and Madhya Pradesh have enjoyed the health, vitality and longitivity by incorporating safed musli in their health care system.[3-5] The indigenous people of Dhule and Nandurbar districts of Maharashtra employ the root tubers of *C. borivilianum* for medicinal purposes and have initiated its cultivation, indicative of a fact that they are aware of its socioeconomic importance.[6,7] This review is an attempt to amalgamate the available

information concluding the therapeutic utility of C. *borivilianum* and the gaps that need research intervention. Thus, the current review is written in order to provide baseline information to the researchers who wish to carry forward the research on this plant. Also, the review will guide practitioners to utilize holistic approach of combining traditional and modern medicine. The compilation of gaps on quality and safety aspects of the plant will assist in the development of safe and pure pharmaceuticals. Since, C. borivilianum is an endangered plant; the review will provide deeper insight on the importance of its conservation and future economical sustainability.[8]

Types of safed musli

There are 8 common safed musali found in different parts of India such as 1*) Chlorophytum borivilianum, 2) Chlorophytum arundinaceum 3) Chlorophytum tuberosum 4) Chlorophytum malabericum 5) Chlorophytum attenuatum 6) Chlorophytum breviscapum 7) Chlorophytum filicinus 8) Chlorophytum gonoclados.*[9]

Among all these varieties C. borivilianum is cultivated on large scale in many parts of the county because it produces the highest yield and highest Saponins content and used as Safed Musli.

Safed musli is also used in the treatment of rheumatism; the leaves were consumed as vegetable, as an expectorant, in various culinary preparations, and a herbal remedy for knee pain. In addition to this, stem, cladodes, seeds and rhizomes of safed musli were also very important in Indian and Unani traditional medicinal remedies for treatment of spermatorrhoea, chronic leucorrhoea, diarrhoea, dysentery, general debility, senile pruritus, asthma and fatigue.[10]

Cultivation of safed Musli[11]

In India, it is widely distributed in Assam, Gujarat, Madhya Pradesh, Rajasthan, and Western Ghat Forests of Karnataka, Konkan, Maharashtra, Chhattisgarh, Eastern Himalayas, and Tamilnadu. Generally, safad musli cultivation thought in India, but main states of India for cultivation of safed musli are in Rajasthan, Gujarat, and Madhya Pradesh.

The cultivation of *Chlorophytum borivilianum* (safed musli) in an agriculture land during period of months April-May. Which requires well drained loamy to sandy loam soil and It requires warm and humid climatic condition with good amount of soil moisture during growing season luxuriant vegetative growth and facilitative fleshy root development in month of April-May and also *C. borivilianum* is predominantly invaded by rainy season

Saponins extraction[12]

The roots of safed musli (chlorophytum borivilianum) are extracted by maceration, soxhlet, sonication and microwave methods. Extraction was based on simple modified methods. The plant Safed musli (*Chlorophytum borivilianum*) part root were dried at room temperature in the laboratory before being transfer into oven dried at 50 ^{O}C for 10 h and then ground to pass a sieved 1 mm cloth. The material where defatted, (remove the lipophilic substances) with hexane at a ratio of sample to solvent of 1.5 (w/v) for 2 min. by direct sonication with an ultrasonic probe (1/2" diameter, output Sonication amplitude at 50 %). The mixture was centrifuged at 3000 rpm for 10 min. The supernatant was discarded and the precipitate was defatted again under the same condition after defatting the precipitate was extracted with methanol at a ratio of sample to solvent of 2:20 (w/v) for 10 minutes by direct sonication with and ultrasonic probe and the temperature during the process was kept under 40 ^{O}C the mixture was filter under vacuum and dry using a rotary vacuum evaporator the extract were store it -20 ^{O}C until further use. The extract were determined by the quantitative method analysis using 5 g of supernatant were added to 5 ml distilled water in a test tube. Stable persistent froth that is observed after vigorous shaking mixed 4 drops of olive oil forms an emulsion indicates presence of saponins.

Phytochemistry[13]

Chlorophytum. borivilianum contains wide range of phytochemicals such as saponins, alkaloids, flavonoids and phenolic acids.[14] The roots of *Chlorophytum. borivilianum* have 42 % carbohydrate, 8-9 % protein, 3-4 % fibers and 2-17 % saponin.[15] The other workers reported that root constitutes about 30 % alkaloids, 10-20 % saponins, 40-45 % polysaccharide (mucilage) and 5-7 % protein.[16] In addition, *Chlorophytum borivilianum* also contains steroid, triterpenoids, gallo-tannins, vitamins, potassium, calcium, magnesium, rare elements such as Zn, Cu, P, resins and high quantity of simple sugars mainly sucrose, glucose, fructose, galactose, mannose and xylose.[17,18] These chemical constituents are found in different parts of the plant. For example, the roots contain 2-17% saponin, 8-9% protein, 20-30% fibers and 42% carbohydrates.[19] It was also reported that roots contain 10-20% saponins, 30% alkaloids and 40-45% polysaccharides.[20] Saponins include furostanol saponin stigmasterol, saponinchloromaloside-A, chlorophytoside-I and hacogenin[21] and also spirostanolpentaglycosides embracing beta-dapiofuranose.[22] Other chemical constituents reported in *C. borivilianum* are 11-oxidoheneicosanol, 3-heptadecanone-4-hydroxy-8, pentacosy decasonate, tri-acontanoic acid, tatracosaanicic acid, neogitogenin, trigogenin, benzylglucoside, tokorogenin, methyl pentacosanoate, 8-hexadecanoic acid, stearic and palmitic acid.[23] A new chemical constituent named 1-acetoxychavicol acetate (ACA)was also reported in the roots of *C. borivilianum*.[24]

Pharmacological activity of *Chlorophytum borivilianum*

Aphrodisiac activity

The first study conducted on animals related to aphrodisiac activity of *C. borivilianum* was reported by.[25] this study was turned out to be one of the initial supporting scientific evidence towards the traditional use of *C. borivilianum* as an aphrodisiac. The effect of ethanolic and sapogenin extract from the *C. borivilianum* roots were evaluated; on sexual behavior and spermatogenesis in albino rats, at two different doses i.e. 100 mg/kg and 200 mg/kg body weight (b.w.). The increase in weight of body and reproductive organs including histological activities indicated the pronounced anabolic and Spermatogenic effect in treated animals. The marked reduction in mount, ejaculation, post ejaculatory and intromission latency, increase in mount frequency and attraction towards female was observed, signifying enhanced sexual behaviour. Thakur and et.al studied the pedunculation activities and sperm count of istar strain male albino rat under the influence of 'Vajikaran' plants such as *Asparagus racemosus* Willd., *Curculigo orchioides* Gaertn., *Dactylorhiza hatagirea* (D. Don) Soo, *Orchis latifolia* Linn and *C. borivilianum* (200 mg/kg b.w.).[26] According to their observations, these 'Vajikaran' plants have significantly improved the *in vitro* sperm count and pedenculatory activity after 14 days of drug administration.

The aqueous extract of dried roots of *C. borivilianum* 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 250 mg/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.[27]

In another study, the effects of *C. borivilianum* (Cb) on sexual dysfunction, loss of body weight, and lack of libido in hyperglycaemic rats induced with streptozotocin or alloxan was investigated. It was found that *C. borivilianum* extract treatment ameliorated the diabetes-induced dysfunction at 200 mg/kg dose. There was very low weight loss ($P<0.05$) in Cb-treated animals as compared to the diabetic control. There was a very high latency time ($P<0.05$) in the diabetic animals, whereas the latency time was very low in Cb-treated animals. Mount, intromission, and ejaculation frequencies were very high ($P<0.01$) in Cb-treated animals, while streptozotocin and alloxan groups animals had a very significantly lower sexual behaviour ($P<0.05$) compared to the normoglycemic control group animals. Polysaccharide and Saponins-rich aqueous extract appears to have the most suitable effects on diabetes and its associated effects on sexual functionality.[28]

Medicinal properties of safed musli [9]

Chlorophytum borivilianum (safed musli) popularly known as the Indian Ginseng which is traditionally used as a health promotive tonic. This plant has been reported to possess a number of biological activities including an adoptogenic drug, anti- ageing process, antioxidant, anti-arthritic, anti-tumour, anti-mutagenic, anti-inflammatory, antiviral antiulcer, antistress, antihelmintic, antifungal, antipyretic, antidiabetic, antimicrobial galactogogue, hyper-cholesteremia, hepatoprotective, hypolipidemic, larvicidal activity, aphrodisiac, and total rejuvenator.

Benefits of Safed Musli for Health

- Benefits of Safed Musli
- Combats sexual Problems
- Immune Booster and health Tonic
- Diarrhea treatment
- Treats Throat and Mouth Infection
- Can be used as stress buster and antioxidant
- Treats Arthritis
- Addresses Sleeping Disorders like insomnia
- Fights Fatigue
- Treats Diabetes
- Good for Lactating Mothers
- Used in Body building

II. CONCLUSION

It is evident from the available literature that *C. borivilianum* roots are the most investigated part of the plant. Safed Musli is celebrated as a Divya Aushad with unparalleled medicinal properties as the preparation of C. borivilianum is a very popular herb in traditional Indian medicine, and used as a potent "Rasayana" drug in Ayurveda" as a rejuvenator, a Vitalizer and health-giving tonic, and as a potent aphrodisiac, as it has tremendous properties which can be utilised for health improvement of human beings. Due to its unique pharmacological properties, so its high market value in national and international market world.

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