



The Indian Magical Herb: ‘Sanjeevni’ (Selaginella Bryopteris)

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Abstract-- India is the largest producer of medicinal herbs and is called the botanical garden of the world. Ayurveda and herbal medicine are two important forms of alternative medicine that is widely available in India. In rural India, 70 per cent of the population depends on the traditional type of medicine. In India the herbal remedy is so popular that the government of India has created a separate department—AYUSH—under the Ministry of Health & Family Welfare. In Indian mythology sanjeevani also known as miracle herb due to its alleged potentiality for ‘resurrecting’ life. Literally sanjeevani means something that offers life; jeeva = life. Out of preliminary listing of about 17 plant species which could be Sanjeevani only three final species were shortlisted which were *Cressa cretica*, *Selaginella bryopteris*, and *Desmotrichum fimbriatum*. Out of which currently *Selaginella bryopteris* is considered as Sanjeevani. Sanjeevani is distributed widely in India and Nepal. This herbs have lots of medicinal values such as Relief from heat stroke and the burning sensation during urination, Restoring menstrual irregularities to normal, Helping in easy delivery of pregnant women in minimizing the labor pain, In the treatment of Jaundice, Antiprotozoal activity, In the treatment of HIV infection, Growth promoting and protective activity, Activity against radiation, In improvement of learning and memory, In dehydration, etc.

Key words-- Traditional, resurrecting, *Selaginella bryopteris*

I. INTRODUCTION

Humans have always used plant for multiple purposes. Plants are becoming known more and more for their vital usage in many areas, as well as medicinal purposes. In ancient cultures, medicine men

used the extracts from plant life to calm and relieve aches and pains of body parts. Many of the plants that were discovered by ancient civilizations are still in used. For example; the leaves of willows, which contain a compound very similar to aspirin, were chewed by Native Americans to relieve aches and pains, the cinchona tree from South America used against malaria. Because of this plant life is a very vital part of human life; without plants, both land and sea dwelling, human life could not exist.

Plenty of herbs are available for plenty of illnesses. Use of medicinal herbs is more safe and natural way to treat our body and mind, than eating synthetic pills. In Ayurveda medicinal plants, herbs, spices and herbal remedies are known since long times. Nowadays, the value of medicinal plants, herbs and spices as herbal medicine is being lost due to lack of awareness and knowledge.

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A. Mythology behind ‘Sanjeevani’:

The popular name Sanjeevani which translates as "One that infuses life" derives from the medicinal properties of the plant. In Hindu mythology, Sanjeevani is a magical herb which has the ability to

cure any disease. It was believed that medicines prepared from this herb could revive a dead person. This herb is mentioned in the Ramayana when, Ravana (King of demons) hurls a powerful weapon at Lakshmana (brother of Lord Rama) who had killed his beloved son Indrajit. Lakshmana was badly wounded and was nearly killed by Ravana. When Lakshmana fell unconscious, near death, hit by an arrow from Ravana, Hanuman (beloved disciple of Lord Rama) approached the Lankan Royal Physician Sushena for advice. Sushena asked Hanuman to rush to Dronagiri Hills and fetch four plants: Mruthasanjeevani (restorer of life), Vishalyakarani (remover of arrows), Sandhanakarani (restorer of the skin) and Savarnyakarani (restorer of skin colour) [3].

Hanuman, not able to pick the four from the multitude, brought back the entire mountain. And Lakshmana was revived from near death back to life. In various Vedic texts and also in Ramayana it has been clearly mentioned that sanjeevani booti glows in the dark. When made slightly wet and kept in dark it glows; emits light. Its properties and usage has also been described [4].

Thus it is likely that Sanjeevani had properties capable of awakening or rejuvenating (and in that sense 'resurrecting') him. It is also likely that owing to similarities of the syndrome of this stage with that of death, story tellers have termed the herb as a 'life giver'. Accordingly, if Sanjeevani does exist, it should have the ability bringing coma patients back to normal living state [5].

B. Taxonomy/ Scientific classification of Selaginella bryopteris:

1. Kingdom: Plantae
2. Division: Lycopodiophyta
3. Class: Isoetopsida
4. Order: Selaginellales
5. Family: Selaginellaceae
6. Genus: Selaginella
7. Species:
 - apoda
 - asprella
 - bifida
 - biformis
 - bigelovii
 - braunii
 - bryopteris
 - canaliculata
 - carinata
 - cinerascens

C. General characteristics

The general characteristics of Selaginellaceae family to which Selaginella bryopteris belongs is also known as Spike Moss Family includes plants that grow in or on rocks and feed off moss, nutrients in rain water, litter, and even their own dead tissue.

Stem: The stem is generally erect and radially constructed in the subgenus homoeophyllum. The branching is dichotomous in the homoeophyllum and somewhat lateral in heterophyllum. The anatomy of mature stem is very distinct and is differentiated into an outer epidermis, middle cortex and centrally located stele. The cortex is usually made up of compactly arranged angular parenchymatous cells without intercellular spaces. There is much variation in the vascular cylinder among the different species of Selaginella. The number of stele varies from species to species and sometimes even in the same species. This is due to the dissection of the main stele.

Rhizophores:

In Greek rhiza means root and phora means bearer. In many species of Selaginella, peculiar leafless, prop-like cylindrical, structures, originate from the stem at the point of branching. These grow downwards into the surface and form many adventitious roots at their free ends. They are known as rhizophores.

The plants are heterosporous (megaspores and microspores), and have structures called ligules, scale-like outgrowths near the base of the upper surface of each microphyll and sporophyll. Unusually for the lycopods, each microphyll contains a branching vascular trace. Roots borne on wiry rhizophores arising from forks in stems. Sporangia borne in axils of fertile leaves (sporophylls). Plants are heterosporous. Life cycle of Selaginella includes various stages having micro sporangia, megasporangia etc. Microspores are small, numerous, megaspores large, 4 per megasporangium. The gametophyte develops inside the megaspore.

Chromosome count of Selaginella bryopteris: n=10.

Distribution:

India- Uttaranchal, U.P., M.P., Chhattishgarh, Bihar, Odisha, Maharashtra, Tamil Nadu.

Nepal- Common at Western and Central part.

Habitat:

Sanjeevani grows on the mountains of tropical areas, particularly the Arawali Mountain terrains from east to west in India. *S. bryopteris* is known to be a poikilohydric lithophyte occurring along the mountains and in fact, this herb is sold for this peculiar feature in several markets in India mostly in places of pilgrimage such as Rishikesh, Hardwar and Varanasi. The plants grow luxuriantly during rains exhibiting a lush green velvety landscape. Sanjeevani booti (*Selaginella bryopteris*) has been reported to have the highest degrees of drought resistance [6]. During summer the plants undergo extreme desiccation. The fronds curl, become dry and virtually dead. In this condition they look like a closed fist hence often known in Unani as 'punjemariam' or 'hathazori'. The dry plants when left in water unfold their fronds, turn green and come back to active life [7]. The dry plants have traditionally been used as a remedy for several human health complications for centuries in India, particularly by tribal peoples.

Molecular bioactivities/Medicinal Properties:

The Sanjeevani booti or *Selaginella bryopteris* also has many therapeutic properties and is in use by local people for centuries. The sanjeevani herb contains a variety of secondary metabolites and bioactive compounds such as alkaloids, phenol (flavonoids, tannins, saponins), and terpenoids (triterpene, steroid). The main secondary metabolite of this herb is biflavonoid, whose type is various depending on the species [8]. These compounds act as antioxidants, anti-stress, anti-inflammatory, anti-cancer, anti-allergic, antimicrobial, antifungal, antibacterial, antiviral, antiprotozoan, anti UV-irradiation, anti-spasmodic, vasorelaxant, heart boosters, antihypertensive, anti-clotting, and affect the metabolism enzymes [9] evaluate the antimicrobial, phytochemical, minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) activity of the *S. bryopteris* used in folkloric medicine compared to all test showed significant activity against tested microorganism like *Bacillus subtilis*, *Staphylococcus aureus* and *Staphylococcus epidermidis*. Biflavonoids are naturally occurring compounds that are omnipresent in all vascular plants and have many favorable biological and pharmacological effects [10]. Traditionally the plant has certain specific properties and is used for:

(1) Relief from heat stroke and the burning sensation during urination: *Selaginella bryopteris* is extensively used in curing the heat strokes, which is a very common complaint of humans working outside

in the extremely hot hours in the month of May- June in the tropical part of the country.

(2) Restoring menstrual irregularities to normal: The cycle of reproductive activity shown by most sexually mature non-pregnant female mammals except most primates is called as the menstrual cycle/oestrous cycle/sexual cycle. The menstrual cycle is the periodic vaginal discharges in human and other mammals and the discharge is made up of blood and cells shed from the inner lining of uterus. *Selaginella bryopteris* is also used to cure the irregularities in the oestrous cycle or menstrual cycle.

(3) Helping in easy delivery of pregnant women in minimizing the labor pain: The female mammal hormone "relaxin" (released from ovaries) makes the delivery of the baby easy through the narrow passage of vaginal walls, by expanding its muscles. If this hormone is not produced in the adequate quantity by the body, then the labour pain (delivery pain) becomes unbearable. *Selaginella bryopteris* also has the power to help in easy delivery of pregnant women in minimizing the labor pain.

(4) In the treatment of Jaundice: Jaundice is the physiological disorder of human body in which the liver is affected by certain bacteria and becomes unable to perform its normal function i.e. to breakdown the harmful nitrogenous wastes and to make the internal environment clean and secure. Liver also secretes a greenish-yellow alkaline fluid called as 'Bile', which help in the digestion and absorption of fats. Bile is stored in the gall bladder. Bile also contains the bile pigments- Bilirubin and Biliverdin, which is produced by the breakdown of blood pigment- haemoglobin. In jaundice excess bile pigments -'bilirubin' starts gathering in the bloodstream and tissues giving a yellow to orange and even greenish colour to the skin, the white parts of the eyes and the mucous membrane. Jaundice may also be due to the blockage of bile flow start gathering in the blood, which ultimately impart yellow colour to the body and make the blood impure Sanjeevani Booti or *Selaginella bryopteris* is also used by traditional Indian people to cure the deadly disease i.e. Jaundice.

(5) Antiprotozoal activity: A series of eleven biflavonoids containing amentoflavone and hinokiflavone derivatives from *S. bryopteris* had been investigated for their antiprotozoal activity using in vitro assays against the KI strain of *Plasmodium falciparum*, *Leishmania donovani*, *Trypanosoma brucei*, *rhodesiense* and *Trypanosoma cruzi* [11].

(6) In the treatment of HIV infection: hinokiflavone is effective against HIV Infections [12].

(7) Growth promoting and protective activity: The aqueous extract of the herb possesses significant growth promoting and protective activities against several stress-induced apoptosis in experimental cell systems [13, 14].

(8) Activity against rediation: Water extract of *S. bryopteris* also significantly reduces potent cell dying caused by UV irradiation and increases endurance to oxidative stress, assists cell growth and protects from free radical stress caused by H₂O₂ [15].

(9) In improvement of learning and memory: Methanolic extract of *S. bryopteris* significantly improved learning and memory of Swiss Albino Mice. Antioxidant property of herb may be contributing favourably to the memory enhancement effect [16].

(10) In dehydration: Chemical analysis shows that the herb contains hexoses and proteins [17, 18] suggest that *S. bryopteris*, has about 250 proteins that expressed in response to dehydration.

CONCLUSION

Several species of *Selaginella* are also used as food (raw vegetables), ornamental plants, handicrafts materials as well as socio-cultural and packaging materials. The utilization of *Selaginella* is very limited compared to the number of species and the potential benefits of the medicine, so it requires further ethnobotanical and phytochemical researches.

Well, we have seen the genesis of the world Sanjeevani (Life giving herb) from the Indian Himalayas, mentioned in the grand old Hindu Epic "The Ramayana." We have also explored the plant botanically and can conclude that this is exactly not the similar plant as described in the Ramayana but interestingly it's a fern plant that has been used by local peoples from centuries and has earned the name Sanjeevani for itself. It is above board that this particular plant locally known as Sanjeevani, finds a place in the group of Heterosporous Pteridophytes of Indian Himalayas, when studied from botanical point of view. Scientifically it is known as *Selaginella bryopteris*. There is no doubt that this plant has several important medicinal properties and has been worshipped among local people as a magical herb owing to its medicinal properties.

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