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Review Article

Adiantum lunulatum

A Comprehensive Review of Hansapadi (Adiantum lunulatum) - In Classical Texts

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Ayurveda is a comprehensive and holistic system that offers a variety of drugs with various beneficial functions. Adiantum lunulatum, commonly referred to as "Maidenhair fern," is a plant that is widely planted as an ornamental in India. This drug has important ethnobotanical and medicinal uses. This herb grows in an area near a water source and moist place and grows to a height of 1-1.5 feet. Root- brownish, branches- thin, leaves-small, soft with round dentate borders. The plant is described as a fern that grows in a creeping or sub-erect position. Fern is small, rhizomatous glabrous, and smooth. Hansapadi is having Kashaya Rasa, Guru Guna, Sheeta Veerya and Madhura Vipaka. It has been referenced in classical texts for its therapeutic actions such as Kasahara, Shwashara, Vranaropana, Shothahara, and Jwaraghna Karma. Different Nighantu defines synonyms such as Triparni, Keetamata, Padika, Godhapadi, Hansaraj, Raktapadi, etc. This article reviews the complete details of the drug, such as Morphology, Distribution, chemical constituents, Ethno-botanical claims, and Amayika prayoga (therapeutic uses).

Keywords: Adiantum, Hansapadi, Ethnomedical uses, Walking Maiden hair fern, Triparni

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Introduction

Pteridophytes have been poorly studied and are considered an economically less important group of plants in the plant kingdom. *Hansapadi*, *Adiantum lunulatum* Burm. (*A. Philippense* Linn) usually known as 'Walking Maiden hair fern' is used as an ornamental plant and widely distributed in India. It is found in moist places throughout North India, on the western side, in the plains, and on lower slopes of the hills in South India. *Adiantum lunulatum* grows frequently, especially during the rainy season specifically from June to October. The plant is described as a fern that grows in a creeping or sub-erect position. It is known by synonyms like *Hansaraj*, *Padika, Madhushrava*, ***Triparni,*** *Keetamata,* and *Tripadika* and is grown in environments with moisture.

Materials and Methods

A literature search was done on *Hansapadi* (*Adiantum lunulatum* Burm.) using various Samhita, Nighantu, other relevant literature, various publications, online resources, and research papers. The collected information was systematically organized & presented, detailing synonyms, properties, therapeutic uses & various formulations.

Literature review

In *Samhita Kala*

Hansapadi is mentioned in several key Ayurvedic texts for its therapeutic properties. The *Shadvirechanashatashritiya Adhyaya* of the *Charaka Samhita*, it is included in the *Kanthya Mahakashaya*, highlighting its use for throat-related disorders. Additionally, *Hansapadi* is found in the *Madhura Skandha*, which is noted for its efficacy in treating Pitta imbalances. In the *Shaka Varga*, it is referred to by the synonym *Triparni*. In the *Vishachikitsa Adhyaya*, *Hansapadi* is part of a group of drugs used to prepare a paste for treating *Nakhadantavish* (poisoning from nails and teeth). Moreover, in the treatment of *Vatarakta*, *Hansapadi* is an essential ingredient in the preparation of *Madhuparnyadi Taila*, an oil used in various therapeutic applications. *Acharya Sushruta* has mentioned the drug *Hansapadi* in *Vidarigandhadi Gana*. *Acharya Vridha Vagbhata* has mentioned the drug *Hansapadi* in '*Kanthya Mahakashaya'* and *Vidarigandhadi Gana*.

Table 1: Synonyms of *Hansapadi* according to different *Nighantu*

SN	Synonyms	CS	SuS	AH	DN	SoN	MN	RN	KN	BPN	ShN
1.	Triparni	+									
2.	Tripadi								+		
3.	Raktapadi				+	+	+	+	+		
4.	Vishagranthi				+				+		
5.	Hansapadi	+		+	+		+		+	+	
6.	Ghritamandalika				+	+		+	+		
7.	Vishvagranthi					+		+			
8.	Vipadi					+		+			
9.	Keetamari					+	+	+	+		
10.	Madhusrava					+	+	+	+		+
11.	Karnatini					+					
12.	Hansapaadi	+	+	+	+	+	+	+	+	+	+
13.	Tripadika						+	+		+	
14.	Prahladani						+		+		
15.	Keetamata						+			+	
16.	Padi								+		
17.	Keetanama								+		
18.	Aalaselaka								+		
19.	Keermata,									+	+
20.	Hansapadika							+			
21.	Hemapadi							+			
22.	Karnati							+			
23.	Tamrapatri							+			
24.	Vikranta							+			
25.	Suvaha							+			
26.	Brahmadani							+			
27.	Padangi							+			
28.	Shitangi							+			
29.	Sutapaduka							+			
30.	Sancharini							+			
31.	Padika							+			
32.	Prahladi							+			
33.	Keelapadika							+			
34.	Godhapadi							+		+	
35.	Hansanghri							+			
36.	Dharttarashtrapadi							+			
37.	Samalapatti									+	
38.	Hansaraj									+	
39.	Ghritamanda								+		
40.	Tripada							+			
41.	Tripaadi			+	+	+			+		+
42.	Hansavhay		+								
42.	Krimighni					+					

In *Nighantu Kala*

The classical literature dealing with the study of herbs is Nighantu. According to *Bhavprakash Nighantu Hansapadi* is mentioned under *Guduchyadi Varga*. In *Raj Nighantu Hansapadi* is described under *Parpatadi Varga*. *Kaiyadeva Nighantu* has described *Hansapadi* in *Aushadhi Varga*. In *Sodhala Nighantu Hansapadi* is mentioned in *Lakshmanadi Varga*. In *Madanpal Nighantu Hansapadi* is described under *Abhayadi Varga*. In *Priya Nighantu*, *Hansapadi* is explained in *Sharadi Varga.*

Etymology

"*Adiantum*" is derived from the ancient Greek word "*Adiantos*" which means "unwetted" because the fronds oppose moisture/water and the term "*lunulatum*" means moon-shaped to describe the half-moon shape of the pinnae.

Hansapadi: *'Hansasyeva Paadaa Moolaanyasyaa'* The root of the plant resembles the leg of the Swan. According to *Dalhana*, *'Hansapadaakaara Patra'* means the leaves resemble the Swan's leg i.e., pinnules resemble the leg of the Swan.

Vernacular names

Table 2: Vernacular names of *Hansapadi*

SN	Language	Vernacular Name
1.	Sanskrit	Hansapadi, Raktapadi, Kitamata, Tripadika
2.	Hindi	Hansapadi, Banda, Samalpatti, Hansaraj, Hansapagi, Godhapadi, Kalijhamp, Kalijhant, Paresiyavasam
3.	English	Walking fern, Maiden hair fern, Walking Maiden hair fern
4.	Assam	Sharul Arj, Sharujeena, Parsiyav
5.	Bengali	Goyalelata, Kalijhant, Goyaliya lata, Kali saaha
6.	Gujrati	Hamsara, Hansaraj, kali dandalino, Hansapadi, Mubarkha, Mubarkhinipalo
7.	Kannada	Naviladi, Hansapadi, Nayalad, Naralad,
8.	Kashmiri	Dumtuli
9.	Malayalam	Hansapadi, Hansaraja
10.	Marathi	Hamsapadi, Lal lajjalu, Hansaraj,
11.	Porebandar	Hansaraj, Kalohansaraj
12.	Punjabi	Hansaraj
13.	Tamil	Seruppadai
14.	Telugu	Hamsapadum, Nayalod, Hansapadi

Synonyms

Several synonyms for drugs are mentioned in the classical Ayurvedic literature. These synonyms provide important information about the properties, effects, morphological characteristics, habits, and habitat of drugs.

The following are synonyms for *Hansapadi* that have been mentioned in various texts.

Synonyms of the *Adiantum lunulatum* [1]

1. Adiantum philippense Linn.
2. Adiantum arcuate Sw.
3. Adiantum lunatum Cav.
4. Adiantum lunulata (Burm.)

Classification of *Hansapadi*

Table 3: Classification of *Hansapadi* in different *Samhita/Nighantu*

SN	Samhita/Nighantu	Classified under Varga/ Gana
1.	Charaka Samhita	Kanthya Mahakashaya, Madhura Skandh, Shaka Varga
2.	Sushruta Samhita	Vidarigandhadi Gana
3.	Ashtanga Sangrah	Vidarigandhadi Gana, Kanthya Mahakashaya
4.	Ashtanga Hridya	Vidaryadi Gana
5.	Dhanvantari Nighantu	Karviradi Varga
6.	Sodhala Nighantu	Chandanadi Varga
7.	Madanpal Nighantu	Abhayadi varga
8.	Raj Nighantu	Parpatadi Varga
9.	Kaiyadeva Nighantu	Aushadhadi Varga
10.	Bhavaprakash Nighantu	Guduchyadi Varga.
11.	Shaligram Nighantu	Guduchyadi Varga
12.	Hridyadipika	Vatapittaghna Varga.
13.	Nighantu Aadarsh	Hansarajadi Varga.
14.	Priya Nighantu	Sharadi Varga

Habitat[2]

Adiantum lunulatum grows frequently, especially during the rainy season specifically from June to October. It is classified as a fern that grows mainly on stone walls, uphills, hilly slopes, or often on rocks. It is found in moist places throughout North India, on the western side, in the plains, and on lower slopes of the hills in South India. It can survive at altitudes ranging from 150m to 1400m. It prefers wet fertile soil rich in humus.

Botanical description

Root: Approximately 10-15 cm long, reddish-brown or black, thin, twisted, brittle, delicate and branched.

Rhizome: Long, frequently branched rhizome is up to 0.4 cm thick, dark reddish-brown or black in color, glabrous, prostrate or erect, and densely covered in scales.

Frond: Rachis shiny, reddish-black in color, simply pinnate. Pinna are dark green, roughly lunulate (half-moon shape) in shape exist in alternate pairs, and are up to 15 pairs. Pinna gradually becomes smaller towards the tip of the frond, alternating and closely arranged displaying forked venation and joined to the rachis by a pointed base. A few sori in a continuous line under the surface along the edge, with a false indusium. Petioles are 5-12mm long with herbaceous texture.

Taxonomic hierarchy[3]

Kingdom: Plantae
Phylum: Pteridophyta
Division: Traacheophyta
Class: Polypodiopsida
Subclass: Polypodiidae
Order: Polipodiales
Family: Pteridaceae
Genus: Adiantum
Species: A. lunultum
Botanical Name: *Adiantum lunultum* Burm.

Therapeutic uses of *Hansapadi* in different *Samhita*

***Dhanvantari Nighantu*:** *Raktavikara, Daha, Visarpa* and *Vrana Ropan*.**[4]**

***Madanpal Nighantu*:** *Raktvikar, Visha, Vrana, Visarp, Daah, Atisar*, *Lootavish, Krimi, and Agnirohini*.**[5]**

Kaiyadeva Nighantu*:** *Raktavikara, Visarpa, Daha, Atisara, Bhootgraha, Lootavisha,* and *Vrana.[6]**

***Raj Nighantu*:** *Visha, Bhutagrah* and *Apasmara*.**[7]**

Bhav Praksah Nighantu: *Raktvikar, Visha, Vrana, Visarp, Daah, Atisar*, *Lootavish, Krimi* and *Agnirohini* .**[8]**

Shaligram Nighantu: *Raktadoshahara*, *Vishahara*, *Vrana ropaka*, *Visarpa*, *Daha*, *Atisara*, *Lootavisha*, *Bhootgriha*, *Apasmar* and *Agnirohini*.

***Nighantu Adarsh*:** *Raktvikar, Visha,Varna, Visarp, Daah, Atisar*, *Lootavish, Krimi Agnirohini* and *Apasmar.*

Chemical constituents

Several phytoconstituents have been isolated and reported from the *Adiantum lunulatum*. Flavonoids and terpenoids are the dominant within the plant.

The preliminary phytochemical analysis of the alcoholic and aqueous extracts of the fern *Adiantum lunulatum* demonstrates the presence of some significant bioactive secondary metabolites like tannins that are attributed to its astringent characteristics, anti-helminthic, anti-allergic properties. The astringency of the tannins limits their applicability as they potentially reduce the bioavailability of the nutrient and exert antinutritional effects.

Tannin- The presence of tannins in the fern further corroborates their wound healing and anti-inflammatory properties.**[25,26]**

Flavonoids- The antioxidant properties of *Adiantum lunulatum* are due to presence of flavonoids which execute strong free radical scavenging properties.

Flavonoids are the most abundant and important plant phytocompound with demonstrated pharmacological properties like anti-inflammatory, antibacterial, antifungal anticancer, and cardioprotective properties.**[27,28]**

The immune modulation potential of the plant is accredited to the steroids which function as anticholesterimic agents.

Saponins- In Ayurvedic medicine, the concoctions prepared from *Adiantum lunulatum* are employed to address blood disorders owing to the presence of saponins in them which have the potential to precipitate and coagulate the erythrocytes.**[29]**

Terpenoids- Terpenoids have exhibited various health benefits like antiviral, antimicrobial, antidiabetic, cardioprotective, anticancer, neuroprotective, and immunomodulatory properties. **[30]**

The preliminary analysis revealed the presence of secondary metabolites like tannins, flavonoids, steroids, anthocyanin, and alkaloids, in both methanolic and hexane extracts. While certain phytocompounds like phlobatannins, terpenoids were predominantly present in the hexane extracts and anthraquinones and glycosides in methanolic extracts.**[31]**

Rasa Panchaka

In Ayurveda, drugs were categorized using qualitative analysis as the foundation. The *Rasa Panchaka*, also known as the five quality attributes or pharmacodynamics, are used in this analysis.

They are *Rasa* (taste), *Guna* (property), *Veerya* (potency), *Vipaka* (final quality transformation following primary and secondary digestion), and *Prabhava* (unexplainable distinctive quality).

Table 4: *Rasa Panchak* of *Hansapadi* according to different *Nighantu*[9]

SN	Rasa Panchak	K.N.	B.P.N.	M.N.	R.N.
1.	Rasa	Kashaya	Madhura	------	Katu
2.	Guna	Guru	Guru	Guru	-----
3.	Veerya	Sheeta	Sheeta	Sheeta	Ushna
4.	Vipaka	Madhura	-----	-----	-----
5.	Doshakarma	Kaphapitta Shamak	-----	-----	-----

Rasa Panchak of *Hansapadi* according to *Acharya P.V. Sharma*

Rasa: Kashaya
Guna: Guru
Veerya: Sheeta
Vipaka: Madhura
Mukhyakarma: Kanthya
Doshaghnata: *Kaphapittashamak*

Ethnomedical (Traditional) uses:

Adiantum lunulatum is traditionally used to treat different types of pathological conditions. Decoction of whole plant is used as antidiarrheal and antidysentric.**[10]** Decoction of leaves of fern is used as an expectorant for treating wet cough.**[11]** Extract of rhizome is given to children for throat infection and used for treatment of filaria.**[12]** The roots of plant are used along with stem bark of *Terminalia* bellirica in managing bronchial asthma. **[13]** Decoction of rhizome is used to reduce glandular swelling.**[14]** Roots are used as diuretics and also have proved beneficial in kidney stones. **[15]** Paste of plant is also applied on pimples and is considered beneficial in preventing hair loss.**[16]** It is also used in indigestion and serves as a good carminative.**[17]** Paste of whole plant is applied with turmeric on infected burns and wounds.**[18]** Decoction of the fresh leaves is used as a remedy for irregular menstrual cycles.**[19]** Leaf juice is used for the relief from ulcers.**[20]** It is also used as an antidote for rabid dog bites and for snake bites.**[21]** The plant is also used in generalized symptoms as an analgesic and antipyretic.**[22]** Among Normadian tribes of India, plants are used for the treatment of epileptic fits, and erysipelas.**[23]** Tribal people of Soliga of Mysore district in Karnataka it used for birth control.**[24]** Powder of dried rhizome (2-3 tsp) mixed with water and is used orally once for 3-5 days during the menstrual period for contraception /sterility by tribal women. It is used by native people to treat cough, headache, fever, muscular pains, and scorpion bites. Decoction of fresh leaves is given to cure irregular menstrual cycles.

Amayika Prayog (therapeutic uses):

- *Svarabhanga* (Hoarseness of voice)- In hoarseness of voice caused by *Vata*, oil cooked with the root of *Hansapadi* should be used as *Nasya*.**[25]**
- Poisoning- Paste *of Katphala, Asvakarṇa, Gojihva, Hansapadi, Haridra. Daruharidra* and red ochre counteract the poisoning caused by injury to nails and teeth.**[26]**

- *Galgand* (Goitre)- Intake of oil cooked with *Guduchi, Nimba, Hansapadi, Kutaja, Pippali, Bala, Atibala,* and *Devadaru* is useful in goiter. **[27]**
- Expressed juice with pepper is a favorite remedy for all kinds of fever.
- A syrup prepared from the leaves is useful in chronic cough. As an expectorant, it is given in cough and respiratory problems.
- The decoction of the rhizome given in throat infections.
- It is useful for external application in *Visarpa*, *Luta visha,* and *Pitta* predominant inflammatory conditions.**[28]**
- *Daha* - Leaves paste is applied to the burns and burning sensations.
- *Atisara* - Powder with buttermilk is beneficial in diarrhea.
- *Vrishchika visha* - In scorpion bite, application of the *Hansapadi* leaves paste is beneficial.
- It is widely used in the management of feverish affections in children. The leaves are rubbed with water and given with sugar.**[29]**
- Since it is a refrigerant, and antidote, and has wound-healing properties, it is used in urticaria, plague, and spider poisoning to reduce swelling, pain, and burning sensation.
- It is used to treat intestinal worms and diarrhea because of its astringent properties.
- It helps with bleeding disorders and other blood disorders since it is *Pittashamak*.
- Being an expectorant, it helps in bronchitis, asthma, rhinitis, and pneumonitis.
- As it is *Vatapittashamak*, it increases the flow of urine, which helps with dysuria.

Substitutes and Adulterants

Adiantum capillus veneris Linn., A aethiopium Linn., A. pedatum Linn. and A venustum G. Don. are used as substitutes.**[30]** Desmodium triflorum is used as *Tripadi* and *Hamsapadi* in Kerala.**[31]**

Formulations: *Madhuyashtyadi Taila, Manasamitra Vatak, Hansapadyadi Taila, Muktapanchamrita Rasa, Madhuparnyadi Tail, Swarnabhupati Rasa,* and *Kalakuta Rasa.*

Conclusion

Adiantum lunulatum, or *Hansapadi*, is a fern with significant Ayurvedic value. *Adiantum lunulatum* is commonly called "Maidenhair fern." The plant is referenced extensively across numerous classical *Ayurvedic* texts, such as the *Charaka Samhita*, *Sushruta Samhita*, and various *Nighantu*, where it is used to treat a range of conditions. Various synonyms *Raktapadi, Tripada, Hansapadika, Vishvagranthi, Tripadika, Vipadi, Keetamari, Hemapadi, Madhusrava, Karnati, Tamrapatri, Vikranta, Suvaha, Padangi, Shitangi, Padika, Keelapadika, Godhapadi, Dhartarashtrapadi* and *Hansapaadi* are described in various *Nighantu*. The plant thrives in moist, fertile environments and is commonly found growing on stone walls and hilly slopes, particularly in regions across North and South India. *Hansapadi* is having *Kashaya Rasa, Guru Guna, Sheeta Veerya* and *Madhura Vipaka.* The plant's cooling and astringent properties make it effective in balancing *Kapha* and *Pitta Dosha*. On account of these properties, it is *Dahaprashaman, Vranaropana, Vishaghna, Krimighna, Shothahara, Stambhana, Mootral, Ashmaribhedana, Raktaprasadana, Pittashamaka, Kaphaghna, Kanthya, Kasahar, Shwasahar, Balya, Rasayana, Grahi, Krimighna,* and *Shothahara.*

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