International Journal of Research and Reviews in Pharmacy and Applied science

www.ijrrpas.com

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ANCIENT AND PHARMACOLOGICAL REVIEW ON CENTELLA ASIATICA (MANDUKPARNI): A POTENTIAL HERBAL PANACEA

ABSTRACT

Since long time it has been used traditionally as a remedy for several skin disorders, it is used by the cosmetic industries in preparing skin care products but this aspect is still untouched by Ayuvedic researchers.So in this chapter, we will give the literary description of Mandukaparni so that we can know our drug very well. In recent times, focus on plant research has increased all over the world. Centella asiatica is an important medicinal herb that is widely used in the orient and is becoming popular in the West. Triterpenoid, saponins, the primary constituents of Centella asiatica are manly believed to be responsible for its wide therapeutic actions. Apart from wound healing, the herb is recommended for the treatment of various skin conditions such as leprosy, lupus, varicose ulcers, eczema, psoriasis, diarrhoea, fever, amenorrhea, diseases of the female genitourinary tract and also for relieving anxiety and improving cognition. In general, there are various drugs, used in various conditions, in various forms from long time, among them Mandukaparni is one, which is well known for its Medhya property.

KEYWORDS Centella asiatica, description, herb-drug interactions, pharmacology of Centella asiatica, preclinical and clinical studies, side effects, therapeutic uses

INTRODUCTION

Plants have been used as treatments for thousands of years, based on experience and folk remedies and continue to draw wide attention for their role in the treatment of mild and chronic diseases. In recent times, focus on plant research has increased all over the world and a large body of evidence has been accumulated to highlight the immense potential of medicinal plants used in various traditional systems of medicine. Centella asiatica (CA) is a very important medicinal herb used in the orient, which is also becoming popular in the West. Commonly known as mandukparni or Indian pennywort or jalbrahmi, it has been used as a medicine in the Ayurvedic tradition of India for thousands of years and listed in the historic 'Sushruta Samhita', an ancient Indian medical textThe herb is also used by the people of Java and other Indonesian islands. In China, known as gotu kola, it is one of the reported "miracle elixirs of life" known over 2000 years ago. CA or gotu kola should not be confused with kola nut as it does not contain any caffeine and has not been shown to have stimulant properties. In the nineteenth century, CA and its extracts were incorporated into the Indian pharmacopoeia, wherein in addition to wound healing, it was recommended for the treatment of various skin conditions such as leprosy, lupus, varicose ulcers, eczema, psoriasis, diarrhoea, fever, amenorrhea, and diseases of the female genitourinary tract.

1. **ABOUT CANTELLA**

Historical review

Original dimensions of Ayurveda are in built in the ancient compendia of Indian wisdom called Vedas, which are believed to be documented around 6000 years back. So to make this study more informative, authentic and interesting let us look into the past and begin with VEDAS. In vedic literature, we may find the extensive description of Mandukaparni in Atharvaveda.In Matsaya purana, Mandukaparni is mentioned among the medicinal plants that beneficial for brain. In Agnipurana, it is placed with the plants that are used as sterilizers i.e. poison killers (Ag.Pu.222.7,8,9) and for curing Kamla(Ag.Pu.300.34). Besides these it is also used in Churna form with milk as Anupana to rule out Valli, Palit (Ag.Pu.286.5).Among the eight brahmanas, Mandukparni is described in Shathpathbrahmana.In Kaushiksutra, it is described as an Aushadhi that resembles manduka.

Among the existing old medical treatise of India, 'Charaka Samhita' can be considered as the oldest. The whole book is divided into eight parts. In which a large number of medicinal plants are described including their different classification and rational administration in different kinds of diseases in various forms. A few regarding Mandukaparni are tabled below:

S. No.	Indications	References
1	Anti-aging	Charak samhita .Sutrasthan.4/18
2	Vegetables	Charak samhita .Sutrasthan 27/96
4	Equipment of maternity	Charak samhita .Sarirasthan 8/34
5	Third stage of labour	Charak samhita .Sarirasthan 8/41
6	General tonic	Charak samhita .Chikitsasthan 1/1-48
7	Brain tonic	Charak samhita .Chikitsasthan 1/1-57
8	Memory booster	Charak samhita .Chikitsasthan 1/3-30
9	Sensitizer	Charak samhita .Chikitsasthan 1/4-13
10	Nourishing	Charak samhita .Chikitsasthan 11/92
11	Antidote of all poison	Charak samhita .Chikitsasthan 13/181
12	Antidote	Charak samhita .Chikitsasthan 3/225

In Sushruta Samhita many formulations are available of the selected drug such as cardio tonic, skin diseases, appetizer. In Ashtanga Hridaya, Mandukaparni was described in various preparations for the treatment of same conditions as said in Charak samhita and Susruta samhita.

Nighantu (Book contains in-depth knowledge) is a special kind of work in which synonyms of similar meanings is collectively described. (Vachaspatyam). The main purpose of nighantus is that which gives a comprehensive knowledge from all the aspects of a particular subject, especially plants through synonyms. The descriptions regarding actions and indications of Mandukaparni, have been reviewed from various nighantus which were tabulated are as follows:

S. No.	Nighantu	Chapter	Indications/actions	Quotation No.
1	Madanvinod Nighantu	Abhyadi varga	Medya, Rasayana, kushta, visha	34
2	Shankar Nighantu		Pandu, Visha, Jwara	60
3	Paryayamuktavali	Shaka varga	-	16
4	Aushadha samgraha Nighantu	Shaka varga	Hridya, kushtha, jwara	27
5	Anekartha samgraha	Panchama Kanda	-	17-18
6	Vrihadnighantu ratnakar	Hitahitiyadhyay	-	1891
7	Ashtanga Nighantu	Viprakirna Varga	-	246
8	Paryayaratnamala		-	359

9	Dhanvantri Nighantu	Karviradi varga	Sfotaka,medya,saraka, Rasayana	87-88
10	Sodhala Nighantu	Karviradi varga	Hridya,Shwasa	532-536
11	Sodhala Nighantu	Mishraka Adhyaya	-	1172
12	Madhava Dravyaguna	Shreshta varga	-	4
13	Madhava Dravyaguna	Shaka varga	-	12
14	Hridaya dipaka Nighantu	Chatushpada varga	-	20
15	Madanpal Nighantu		Kushtha, pandu, Rasayana,	85-87
16	Kaidev Nighantu	Aushadhi varga	-	719-723
17	Bhavaprakash Nighantu	Guduchyadi varga	-	55
18	Raj Nighantu	Shatavahadi varga	-	73
19	Rajvallabha Nighantu	Shaka varga	Rasayana	66
20	Shaligram Nighantu	Guduchyadi varga	Pandu, visha, shotha, jwara	175
21	Nighantu Adarsh	Jirakadi varga	-	24
22	Priya Nighantu	Shatpushpadi varga	Hridya, kushtha, Rasayana	118

Controversy on Mandukaparni

Mandukparni has been identified and used since 1000 B.C., the period of Atharveda. On its long journey of these thousands of years it has faced lots of ups and downs and now it is leading a controversial life with Brahmi. From the vedic period as we move further in puranas, in Agnipurana both Brahmi and Mandukaparni has been used against poisons (Ag.Pu.222.7,8,9) which indicates that these two are separate plants and have some similar effects which may be the cause of the origin of confusion between them. Since there is no description of either Brahmi or Mandukparni in the texts, only their usage is handed down, their distinction is not clear to us. As we come to Samhita period , in Charaka Samhita Mandukparni is used in several places as in Vayasthapana Mahakshaya, Shaka varga, Tikta skandha, Medhya rasayana,Brahmarasayana etc. whereas Brahmi is used for Prajasthapana Mahakshaya, Garbhsthapana dravya, Endriya Rasayana, Apasmara Chikitsa, Kushtha Chikitsa etc. Similarly, in Sushruta Samhita, Mandukparni is mentioned in Pathya Shaka, Mahapanchmoolasava, Kushtha Chikitsa, Medhayushkamiya Rasayana on the other hand Brahmi is indicated as Bala Rasayana, Ashmari Chikitsa, Mahakushtha, Visha Chikitsa. Also on taking a view of Ashtanga Hridya, Brahmi is used in Balagrahanashaka Sarivadi Ghrita, Unmadahara Ghrita, Brahmiyadi Varti, Apasmara Chikitsa, Kushtha Chikitsa and as Rasayana but Mandukparni is mentioned in Shaka varga, Kasa Chikitsa and Rasayana Prakarana. So after this analytical study of Vrihatrayi it can be understood that both Brahmi and Mandukparni can be considered as synonyms as both of them are not included in the same prakarana. Brahmi is karmparaka and Mandukparni is roopparaka name of the same plant. The Commentator, Dalhana has also mentioned Mandukparni as Brahmi and Brahmi as Mandukparni. In Lexicons like Amarkosha Mandukparni is used as synonym of Manjishtha. In Nighantu period, most of the Nighantus, has given their apart description as two different dravyas. But Ashtang nighantu and Kaidev nighantu has mentioned them as synonyms while Mahaushadh nighantu and Bhavprakasha nighantu has given it among the synonym of Manjishtha. In Bhavaprakasha nighantu, it has also been described as an individual plant. So till the Medieval period of Ayurvedic Granthas there was a big confusion

and chaos about Mandukparni. But as we move ahead, the authors of the modern period recognized both to be two different Dravyas, Mandukaparni as Centella asiatica and Brahmi as Bacopa monnieri. After an outlook of different regions of India it is found that in many parts of North India Centella asiatica is prescribed as Brahmi while in Bengal and Bihar Bacopa monnieri is known as Brahmi. In Saurashtra and in some parts of South India the entire plant Merremia emarginata is sold under the name of Brahmi and Mandukaparni due to some of its morphological similarities.

Substitutes and Adulterants

Centella asiatica and Bacopa monnieri often get substituted for each other in the market as both are sold under the same vernacular name 'Brahmi'.(Database on medicinal plants used in Ayurveda vol.1). Comparative anatomical features can differntiate two species. Chemically both species are rich in saponins. Madecassoside and asiaticoside are important saponins of Centella asiatica whereas B.monnieri contains bacoside A and bacoside B. (Database on medicinal plants used in Ayurveda vol.1). Hydrocotyle javanica Thunb. is used as substitute for C.asiatica in Ceylon and the Malaya Archipelago. (Indian medicinal plants,Kirtikar & Basu)

1) Description of the plant:

Centella asiatica (CA), a clonal, perennial herbaceous creeper belonging to the family Umbellifere (Apiceae) is found throughout India growing in moist places up to an altitude of 1800 m. It is found in most tropical and subtropical countries growing in swampy areas, including parts of India, Pakistan, Sri Lanka, Madagascar, and South Africa and South pacific and Eastern Europe. About 20 species related to CA grow in most parts of the tropic or wet pantropical areas such as rice paddies, and also in rocky, higher elevations. It is a tasteless, odourless plant that thrives in and around water. It has small fan-shaped green leaves with white or light purple-to-pink or white flowers and it bears small oval fruit. The whole plant is used for medicinal purposes.

Chemical constituents

Asiaticoside

Medacassoside

Brahmoside

Alkaloids- Hydrocotylin, Vellarine

New triterpene glycoside- Thankuniside

Triterpene acid- Thankunic acid

Anthrone of Asiaticoside

Asiatic acid

Madegascaric or madecassic acid

Isothankuniside

Brahmic acid

Centelloside

Centic acid

Centellic acid centoic acid

Indocentoic acid

Indocentelloside

Oligosaccharide

Madecassoside In clinical studies, madecassoside has demonstrated skin healing as well as anti- aging properties in skin. It's thought that it works in several ways including:

- ✓ Controlling inflammation
- ✓ Stimulating the synthesis of collagen I& III
- ✓ Reducing the activity of enzymes (matrix metallo proteins – MMPs) that contribute to the breakdown of the skin's matrix or framework.

Propagation and cultivation

It is propagated from seeds or stolons and can be grown on variety of soils. However moist locations are more suitable. It can be grown in shady places as well. (Database on medicinal plants used in Ayurveda vol.1)

Toxicology

Gotukola has been consumed as a leafy vegetable particularly in Bangladesh, Thailand, Indonesia, Sri Lanka and South Africa and appears to have no harmful effect when used as food. The leaf and stolon is eaten as raw and cooked.

Subcutaneous injection of 40 to 50 mg/kg of asiaticoside was toxic to the mice and rabbits while 20 to 250 mg/kg resulted in increased bleeding time. An oral dose of 1g/kg was as well tolerated. The local toxicity of asiaticoside was investigated by the measurement of skin respiration and histological analysis.

Contact dermatitis has been observed due to madecassol. Triterpene glycosides have been identified as having oncogenic activity. Asiaticoside was found to be a weak tumour promoter. (The essential guide to herbal safety)

Adverse effects

Herbs rich in saponins may cause irritation to the gastric mucus membrane and reflux. Traditional sources indicate that Gotukola may produce photosensitization. When used in tropical areas. (The essential guide to herbal safety)

Posology

The typical adult dose ranges-

- **Panchanga Churna (Powdered whole plant)** - 250mg-500mg
- **Fresh leaves** - 8-12 in numbers and 2-4 for children.

(Bhavaprakasha Nighantu).

Over dosage

The plant properly prepared and administered is a powerful stimulant of the circulatory system, its action chiefly affecting the vessels of skin and mucous membrane. In large doses it is stupefying narcotic, and in some cases produces cephalgia or vertigo with a tendency to coma.

Contraindication

Gotukola is contraindicated in patients with known allergy.

Use in pregnancy and lactation

No increase in frequency of malformation or other harmful effects on the foetus from limited use in women. No evidence of increased foetal damage in animal studies.

Gotukola has been traditionally used in Bengal as a contraceptive agent. Antifertility activity was demonstrated in vivo in an early study of C.asiatica. gotukola was tested for antizygotic, anti implantation and early abortifacient activity. There is no more information regarding these studies. (The essential guide to herbal safety). It is compatible with breast feeding. (The essential guide to herbal safety)

Safety in children

Dried herb has been assessed in a clinical trial in India as a mental tonic for mentally disabled children. (The essential guide to herbal safety)

Uses described in folk medicine, not supported by experimental or clinical data.

Therapy of albinism, anaemia, asthma, bronchitis, cellulite, cholera, measles, constipation, dermatitis, diarrhoea, dizziness, dysentery, dysmenorrhoea, dysuria, epistaxis, epilepsy, haematemesis, haemorrhoids, hepatitis, hypertension, jaundice, leucorrhoea, nephritis, nervous disorders, neuralgia, rheumatism, smallpox, syphilis, toothache, urethritis, and varices; and as an antipyretic, analgesic, anti-inflammatory, and "brain tonic" agent. Poultices have been used to treat contusions, closed fractures, sprains, and furuculosis. (WHO monographs on selected medicinal plants vol.1)

Cosmeceutical applications

The potential cosmetic uses of this herb are varied, given its skin-tightening and regenerative capacity. It is included in some products for its **antiwrinkling** properties and for its ability to reduce acne-induced blemishes. C. asiatica is similar to aloe vera insofar as it has a long history of wide-ranging medical applications. But it is used in the West primarily for its cutaneous anti-inflammatory activity.

The amassed record thus far on Centella is relatively small but impressive. Randomized, controlled trials are warranted in human subjects to evaluate the safety and efficacy of topical products containing C. asiatica for wound healing and other applications. The future is promising regarding the inclusion of this herbal ingredient in an increasing number of products.

Centella asiatica extract was shown to enhance the levels of enzymatic and non-enzymatic antioxidants such as superoxide dismutase, catalase, glutathione peroxidase, vitamin E and ascorbic acid in newly formed tissues, further validating its role in skin health maintenance. Reported topical applications of Centella asiatica extract include OTC skin care products recommended for regeneration of aged skin and innovative scar management

products (such as those used after plastic surgery). Products containing Centella asiatica extract are also used in the management of dermal itch and other skin irritations.

The extract therefore finds a wide range of cosmetic applications including soothing creams, milks, repairing and regeneration creams, anti-aging products, after-shave products, preparations for chapped hands, lip balms, stretch mark removal preparations and related products.

Safety

Scientists who studied the topical effects of the herb and its active constituents (asiaticoside, asiatic acid and madecassic acid) on guinea pigs, reported that all the materials studied are very weak sensitizers and that the risk of acquiring contact sensitivity to the plant or its constituents is low.

Pharmacological actions

Actions & uses	**Indian medicinal plants**	**Database on medicinal plants**	**Materia medica**	**Wealth of india**	**Ayurvedic encyclopaedia**	**Poisonous plants of india**	**WHO monographs on selected plants**
Antipyretic	+	+	+		+		
Appetiser	+						
Leukoderma	+						
Anemia	+						
Blood disorders	+	+				+	
Bronchitis	+	+					
Antinflammatory	+	+					
Splenomegaly	+						
Thirst	+						
Asthma	+	+					
Small pox	+						
Insanity	+				+		
Hiccoughs	+	+					
Headache	+						
Syphilis	+	+	+		+	+	
Leprosy	+	+	+	+			
Dysentery	+	+	+				

Snake bite	+						
Skin eruptions	+		+				
Rheumatism					+	+	
Nervousness	+					+	
Nerves disorder		+			+		
Skin disease	+	+	+		+	+	
Tuberculosis				+			
Wound healing							+
Burns							+
Ulcerousskin disease			+				+
Elephantiasis			+		+		
Ozeana			+				
Scrofula			+				
Psoriasis			+		+		
AIDS					+		
Eczema			+		+		
Epilepsy		+			+		
Hair loss					+		
Senility					+		
Tetanus					+		
Laryngitis		+					
Strangury		+					

CONCLUSION

The herb is widely available and very cost effective. The therapeutic potential of this plant in terms of its efficacy and versatility is such that further detailed research appears crucial. The growing number of herbal preparations in the market, including CA, raised the possibility of complications related to improper use of these products, or the lack of medical supervision along with the likelihood of interactions with the drugs and herbs on simultaneous use. Several of the recent cases reported to the special Nutritionals adverse event monitoring System indicated the importance of providing patient counseling on the use of herbal preparations

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