

Tinospora Cordifolia (Willd.) Hook.f. & Thomson: A Review on Herbal Formulations and Health Benefits

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Abstract

India has a vast variety of medicinal plants used as natural medicines since prehistoric times. Herbal medicine was the main form of treatment earlier in the 20th century because neither antibiotics nor analgesics were readily available. Nowadays, natural plant products are becoming more significant in clinical research since they have no side effects and have greater pharmacological response than allopathic medications. *Tinospora cordifolia* (Giloy or Guduchi) is a climbing shrub of the Menispermaceae family used in the Ayurvedic medicine system. It is a valuable medicinal plant with a long history of use in traditional medical systems such as Ayurveda, Unani, and Siddha. Since ancient times, Ayurvedic medicine has effectively employed *Tinospora cordifolia*, and its products are now used for both improved medicine and financial outcomes. *Tinospora cordifolia* is mentioned in various ancient literatures such as Charak Samhita, Ashtang Hridaya, Sushruta Samhita, and Bhava Prakash. The plant is utilized to treat illnesses like arthritis, eye disorders, viral infections, allergic rhinitis, chronic fever, blood sugar regulation, immunity boosting, improved digestion, and reduces stress and anxiety. It is also regarded as a strong immunomodulator, bitter tonic, and sharpens the memory. It was also found that *Tinospora cordifolia* acts as an active component in several polyherbal remedies for treating hepatotoxicity. The Indian government's Ministry of AYUSH has recommended this plant as a preventive home treatment for the COVID-19 outbreak. The plant's chemical constituents, such as aliphatic compounds, diterpenoid lactones, steroids, sesquiterpenoid, glycosides, phenolics, and essential oils found in the root, stem, and entire plant, are responsible for their pharmacological activities. It shows several biological activities, such as antioxidant, anti-inflammatory, anti-allergic, hepatoprotective, anti-diabetic, anti-stress, etc.

Keywords: *Tinospora cordifolia*, Ayurveda, formulations, dosage, traditional medicine

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INTRODUCTION

Herbal-based formulations have become more popular for the treatment of different diseases, and Ayurveda is the accepted traditional system of medicine in India. The national health care curriculum is implemented by the World Health Organization, which recommends Ayurvedic medicines due to their affordability, rapid accessibility to the general public, and being safer than allopathic drugs [1]. Natural plant-based medications are used by 70–80% people because they have no side effects [2]. *Tinospora cordifolia*, also known as Amrita, which means “root of immortality,” is regarded as an Ayurvedic medication under the 1940 Drugs and Cosmetics Act of India [3, 4]. It is found across the tropical and subtropical regions of Asia, Africa, and

Australia [5]. It is native to India and extends up to 1200 meters in tropical regions of India, spreading from Kumaon to Assam in the north and through West Bengal, Bihar, the Deccan Kankar, Karnataka, and Kerala in the south [6]. It is also found in Asian nations like China, Sri Lanka, Thailand, the Philippines, and Malaysia [7].

Tinospora cordifolia is described by Acharya Charaka and Acharya Vaghbata in Aagryasangraha [8]. It is an Ayurvedic drug referred to in many classical texts such as Charaka Samhita, Sushruta Samhita, Ashtang Hridaya, Bhavyaprakash, and Dhanvantri Nighantu [4]. It is included in the Ayurveda category of Vatsadani, as stated in one of the patra shakas, and is a remedy for Kasa (cough) and Shwasa (asthma) [9]. According to Ayurveda, *T. cordifolia* possesses the qualities of Rasayana (rejuvenating), Balsa (tonic), Vayah-sthapana (anti-aging), Aayushyaprada (extension of life), Vrishya (aphrodisiac), and Chakshusya (useful in eye disorders) [10]. Guduchi is the primary herb of Amrita Taila, also known as Mulaka Taila, mentioned in Charak Samhita [11]. Ghana and Satva are utilized in topical herbal formulations intended to treat acne [12]. Giloy is referred to as Madhunashini (sugar destroyer), which aids in boosting insulin synthesis, regulating blood sugar levels, and treating diabetes [4]. Several Ayurvedic centers suggest Giloy sticks to boost COVID-19 immunity. Patanjali has produced coronil made up of giloy, tulsi, and ashwagandha to treat COVID-19 and is referred to as Rasayana Dravya in Ayurveda [5, 13]. The tablet form of Giloy Ghanvati is an aqueous extract produced by Patanjali Ayurveda Limited, Haridwar, India [5]. Some Ayurvedic formulations, namely Sanjivanivati, Kantakariavleha, Amritashtaka churana, Dashmoolarishta, Guduchi saatva, and Guduchi ghrita, are prepared from ancient times [14]. Kwatha and Vati are the herbal formulations helping in boosting immunity, whereas the popular items in the market include Amrita guggulu, Giloyyadi churna, Rasnapanchak kwath, Sudarshan churna, Sanjivni vati, Giloy sattva, Kishore guggulu, etc. Ayurveda recommends 2–3 teaspoons of Giloy juice daily with water in the morning to enhance immune system development [15, 16]. In classical literature, the oral dosage of Giloy ranges from 4–9 gm per day, whereas Unani pharmacopoeia suggests a dosage of 5–10 gm. Intake of 40 ml of Guduchi Kwath helps to reduce fever, relieves maculopapular rash, and improves platelet counts without causing any adverse effects.

The National Medicine Plant Board, New Delhi, Government of India, has designated *T. cordifolia* as one of 29 highly prioritized medicinal plants of agroclimatic zone 8. *T. cordifolia* is important in traditional Ayurvedic medicine, which has been used for many years to cure fever, jaundice, persistent bleeding, cancer, nausea, fractured bones, asthma, skin conditions, and poisoning issues with bugs and snakes. It has been the first scientifically studied Ayurvedic drug for treating complex conditions like pyrexia, diabetes, Alzheimer's, osteoporosis, and glaucoma. It has been employed as a hypoglycemic agent in traditional and folk medical systems. Additionally, it assists in preventing anemia, fatigue, erysipelas, hiccups, dizziness, dyspnea, and psychiatric symptoms of chronic hypocalcaemia by supplying enough iron and calcium [15, 17]. The fruit pulp is used as a tonic for rheumatism and jaundice, whereas leaves are used to treat stomach ulcers and urinary infections. *Tinospora* and dry ginger powder are shown to be effective in treating joint inflammation in ancient Ayurvedic writings [6].

TAXONOMIC POSITION

- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Ranunculales
- Family: Menispermaceae
- Genus: *Tinospora*
- Species: *cordifolia*

Morphology

Tinospora cordifolia is an enormous, widely spreading, deciduous climbing shrub with several coiled branches. The bark is white to grey, whereas the stem is succulent, filiform, and fleshy. The leaves are

simple, alternating, long petioled, and heart-shaped. Lamina is membranous, oval, 10–20 cm long, seven nerved, and profoundly cordate at base [17]. Flowers are small, solitary, yellow, emerging in an axillary raceme of 2–9 cm. The fruits are glossy and grow into an orange-reddish tint during the winter. On maturity, fruits become pea-like, grow in clusters of one to three smooth, ovoid drupelets, and turn bright red. *T. cordifolia* is known as the moonseed family because the seeds have a curled appearance [7]. Wood is easily peeled off and is porous, with a delicate grey-brown or creamy white color [18].

Herbal Formulations

Herbal formulations (Table 1) are forms of dosage that contain one or more processed herbs to provide nutritional, cosmetic benefits for human health and to cure diseases. They are prepared by extraction, distillation, fractionation, purification, concentration, or fermentation.

Table 1. Herbal formulations and their uses.

S.N.	Name of the Formulations	Therapeutic Uses	References
1	<i>Tinospora cordifolia</i> Satva	Diuretic, antiperiodic, and consumed as a tonic.	[12, 4]
2	<i>Tinospora cordifolia</i> Ghana	Anti-inflammatory and acne management.	[19, 12]
3	Galo effervescent granules	Antipyretic, cardiotoxic, skin diseases, and rheumatoid arthritis.	[20]
4	Giloy cookies	Anti-inflammatory, anti-anxiety, immunomodulator, respiratory problems.	[21]
5	Giloy powder	Anti-inflammatory, anti-arthritic, antipyretic, reduces signs of aging. If consumed with warm water, it acts as an immunity booster.	[22, 23]
6	Giloy juice	Cures diarrhea, diabetes dysentery, piles, jaundice, chronic coughs, detoxifies the skin, and acts as an immunity booster.	[10, 24, 25, 26]
7	Giloy candies	Antioxidant and enhances immunity.	[27]
8	Guduchi Taila	Anti-inflammatory, enhances blood circulation, and improves tissue metabolism.	[28]
9	Guducyadi Vati	Anti-diabetic, liver diseases, respiratory problems, and improves digestion.	[29]

Dosage Description

It is crucial to administer drugs via the right route to provide the most therapeutic benefit. The method by which medications enter the body is known as the “route of drug administration.” Various techniques of administration, such as therapeutic massage, topical dusting powders, Avachornana (ointment), and Abhyanga (ointment), can be used to administer the varied dosage forms. There have been reports of different dosage forms (Table 2), and their applications are mentioned in various Samhita, Chikitsa grantha, and Rasa grantha [30].

Table 2. Various dosage forms and formulations of *Tinospora cordifolia*.

S.N.	Dosage Forms	Formulations	Indication
1	Taila	Bala taila Laghuvishagarbhataila Mashaditaila Bhulikadi Taila	Vataroga/Vatavyadhi (arthritis)
		Samangadi Taila Tagaradi Taila Trayodashang Taila	Vrana (wound)
		Maha Pinda Taila Brihanmarichaditaila Pinda Taila	Vatarakta (gout)
		Kshiravrukshadya Bruhat Pippaladhya	Jirna Jvara (chronic fever)
		Hayamaradu Tailam Guduchyadi Taila	Yoniroga (gynaecological disorders)

2	Basti	Dashamuladhya Basti Guduchyadi Asthapana Erandadhya Basti Basnadi Asthapana Shampakadi Asthapana	Vataroga/Vatavyadhi (arthritis)
		Mustadhyakshira Basti Mustadi Basti Vataraktadi nashaka Yapana Basti	Vatarakta (gout)
		Pittanashana Niruha Triphaladi kashaya	Pittaroga/Paithikaroga (digestive disorders)
		Sarvarogashaka Basti	Sarvaroga (all disease)
		Bhadradi Asthapana	Kamala (jaundice)
		Vidangadhya Basti	Kushtha (integumentary disease)
3	Churna	Mustadi churna	Dadru (eczema)
		Aragwadhadi Churna	Kushtha (integumentary disease)
		Tiktakam Churna	Dantaroga (tooth disorders)
4	Kwatha	Guduchyadi kwatha Dantayadi kwatha	Yonisula (pain in genital region)
		Yashtyadi kwatha Amrita kwatha	Netraroga (ophthalmic disease)
		Kshudradi kwatha	Mukharoga (oral cavity disorders)
		Guduchitriphala Kwatha Guduchyadi Kwatha	Yoniroga (gynaecological disorders)
		Jatipatradikwatha	Mukhapaka (oral cavity inflammation)
5	Lepa	Sumanadi lepa Vatadi churna lepa	Bhagandara (fistula-in-ano)
		Amritadyalepa Hinstradi lepa	Vatajagranti (cyst)
		Vasadi lepa Mustadilepa	Visarpa (erysipelas)
		Hinstradi lepa Sigrudalepa	Galaganda (goiter)
		Kulathadi lepa Saktudalepa	Valmika (neuromuscular diseases)
6	Varti	Triphaladi Gulika	Timira (partial/total blindness)
		Somadi Varti	Vrana Ropana (wound healing)
		Anjana Varti	Netraroga (ophthalmic disease)

CONCLUSION

Tinospora cordifolia has been one of the most prized herbs in Ayurvedic collections, where all its plant parts are utilized medicinally. In addition to Ayurveda, the plant is also mentioned in Chinese and other traditional medicine systems. *T. cordifolia* is consumed in a variety of ways; either the stem and leaves are consumed directly or various drug formulations such as Guduchi Ghana, Guduchi Satva, Guduchi Ghrita, and Guduchyadi Vati are prepared. Pharmacological and clinical investigations have proved that this plant can treat a variety of illnesses. *T. cordifolia* protects the immune system, skin, liver, and stomach, prevents COVID-19, and is considered as an essential component of rejuvenating tonics. Despite its medicinal value, it also has ritual and cultural value in different cultures. In Ayurveda, it is regarded as an adaptogen, or Rasayana, and increases vigor and longevity. The different techniques were used to isolate and purify active phytoconstituents, which were responsible for healing various diseases. The chemical components suggest that *T. cordifolia* plays a role in the traditional medical system as a leader in the creation of novel agents to treat different diseases in the incoming years. Berberine is the primary phytocompound responsible for its anti-dengue potential, whereas the

polysaccharide acts as adjuvants. Some screened compounds work as potent SARSCoV-2 inhibitors by *in silico* molecular docking. The cosmetic industries use *T. cordifolia* in their skin care products due to its anti-aging and antioxidant properties. *T. cordifolia* is a crucial component of nutraceuticals and dietary supplements meant to improve overall health. Guduchi leaves are very useful and should be included in diet. Since plant-based medications have no negative effects as compared to synthetic chemical-based medicines, Giloy should be grown commercially to facilitate export and generate revenue that contributes to both personal and global development. The demand for Giloy is increasing day by day, and there is a need to conserve it by *ex-situ* and *in-situ* methods.

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