



## Review Article

# Potential Role Of *Tinospora Cordifolia* In Pharmaceuticals

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### ABSTRACT

A plant is a source of natural remedies. It is a huge source of retinoid substances still some plants still need to be exposed for their quality uses. This review led to a full-length study of *Tinospora cordifolia*. Giloy is an essential herb that can be used to treat a wide range of illnesses. This plant, also known by its common names Guduchi, Amrita, and Amritvali, is a member of the Menispermaceae subfamily (family). glycosides, steroids, lactones, sesquiterpenoids, aliphatic compounds, lignin, and other various substances are typically found in this plant... India's *Tinospora Cordifolia* is a deciduous hiking/climbing plant used in Ayurvedic ethnomedicine. *Tinospora cordifolia* is a medicinal plant that has numerous therapeutic uses in the Ayurvedic and Unani medical systems. *Tinospora cordifolia* shows antioxidant activity, antidiabetic activity, anti-malarial activity, antibacterial activity, anti-fungal activity, anti-stress activity, hypolipidemic effect, hepatic disorder, anti-cancer, HIV potential, anti-osteoporotic effect, anti-toxic effect, wound healing, and immunomodulatory activity, the current review emphasizes the pharmacological importance. daily because, in contrast to allopathic drugs, they have a higher pharmacological reaction and no aspect (side effect effect:). It has been used to treat a variety of illnesses, including diabetes, leprosy, fever, urinary issues, dysentery, and skin conditions.

### INTRODUCTION

In India, *tinospoza cordifolia* has long been used as an Ayurvedic medicine. This plant is a herbaceous perennial. The plant belongs to the Menispermaceae family in the tropical subtropical zone. It goes by several common names, such as heart-leaved moonseed species, Giloy, Guduchi, Gurcha, and Amrita, which are widespread in the region The course was observed in the Philippines,

Indonesia, Thailand, China, Bangladesh, India, and Sri Lanka. North Africa, Borneo, Malaysia S. South Africa is climbing the shrub continent. enormous mountain twining with long, spreading branches. Giloy helps treat coronary heart disease caused by helminthiasis. In addition to helping with digestive disorders including colitis and worm appetite, leprosy, and rheumatoid arthritis, support the immune system, and aid in infections,

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hyperacidity, infections, stomach pain, excessive thirst, vomiting, and even liver issues, such as hepatitis. Its chemical constituents, such as lactones, glycosides, sesquiterpene noide, phenolic compounds, and aliphatic compounds, are responsible for this pharmacological activity. Vital oil, an acidic mixture of fatty polysaccharides, is found in specific plant parts, such as the roots, stem, and the full portion of the plant.[1]

## **METHODOLOGY**

The article included published material on recent advanced research on *T. cordifolia* from various platforms. We included genuine articles and papers as secondary records from several search engines, including Pubmed, Pubmed Central Databases, Google Scholar, Crossref, WorldCat, Harvard Library, Mendeley, Scilit, Cite factor, Shodhganga, Science Central, Open J-Gate, and Biblioteca. For the review, medical advancements as well as *T. cordifolia* outcomes from specific investigations have been accumulated.

### **Morphology of *T. cordifolia*:**

#### **Flowers:**

Little subulate bracts have a cluster of male flowers in their axils. Like male flowers, female flowers are typically solitary.

#### **spatial**

There are six sepals: three tiny, ovate-oblong, sharp outer sepals and three bigger, membrane-shaped, roughly elliptical, concave, 3–4 mm, yellow inner sepals.

#### **Roses:**

There are six around 2 mm long, broadly spatulate petals, each of which, when young, closely encompassed a stamen. The lamina is either subtrilobed or triquetrous, and it is reflexed at the apex. The claws are cuneate.

#### **Root:**

The stem is tubercled pale, striate, and grooved. Slender pendulous fleshy roots are sent down by the branches. It has a bitter flavor.

#### **Leaves:**

Leaves are less cuspidate, obtuse or subdeltoid, cordate with broad sinus and big basal lobes, membranous, 7-90,5-10 cm, or rarely 12 by 10 cm, reticulately veined with microscopic glistening glands beneath. Habitat: It can be seen rising to an elevation of 1000 feet in tropical India. Items Used: Traditional medicine uses the entire plant as well as its many parts, such as the stem root, bark, and leaf, to treat a variety of illnesses. Some Unani doctors referred to this plant's temperament as Harl Yabis and Harl Ratabl.2, while Hakim Sharif Khan and Hakim Abdul Hakim claimed that it is known by the names Murakkabul Quwa and Barid Yabis.

Dosage: According to traditional literature, 4–9 grams of Giloy should be taken daily. Unani Pharmacopoeia states that the recommended oral dosage is 5–10 gm daily.

#### **Adverse effects:**

Safe and with little or no side effects. There have been no documented side effects from this medication.

**Alternative:** Satte Giloy is used as an alternative.

#### **Uses for various *Tinospora cordifolia* parts:**

##### **Stems:**

The stem of the giloy plant is a component of many ayurvedic remedies that are used to treat fever, dyspepsia, debility, and urinary illnesses. The bitter, stomachic, diuretic stem increases the release of bile. induces vomiting, quells thirst, burning sensation, and constipation, and enriches the jaundice treatment. Moreover, stems have anti-hyperglycemic characteristics, anticancer effects, dermatitis, and respiratory tract infections.

##### **Roots:**

Giloy's root and stem capsules act as an antidote for snakebite and scorpion stings. It also possesses antioxidant and anti-neoplastic properties.

##### **Leaves:**

Leaves are consumed orally as a juice or decoction with honey. in *Cordifolia* fever Bark. Giloy

contains antipyretic, anti-spasmodic, anti-leprotic, and anti-allergic qualities. The watery snippet from Giloy Root possesses antioxidant qualities. It successfully conducts experiments on male diabetes albino rats, male.

### Whole plant:

The entire Giloy plant is used to treat diabetes. Inflammatory high cholesterol content material, cancer, gout, arthritis, analgesic and neurotonic.

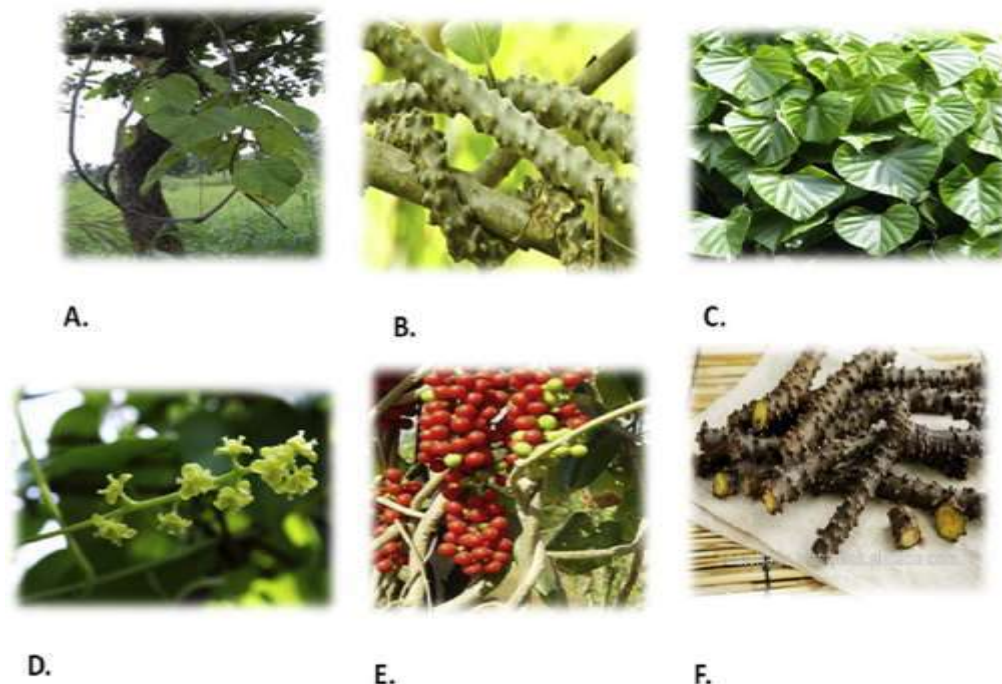


Fig. 1. Morphology of *Tinospora cordifolia* A) steam B) root C) leaves D) flower E) fruit F) seed.[2]

### SCIENTIFIC REPORTS

**Hypoglycaemic activity:** The antihyperglycemic effect of Giloy stem extract, both aqueous and alcoholic, was seen in streptozocin-diabetic albino rats at dosages of 200 and 400 mg/kg body weight. Additionally, it will boost the liver's glycogen synthase activity and expand the action of Giloy root extract are amount of glucose stored in hepatocytes. The pancreas' protective properties and hypoglycemic inherent.

### Hepatoprotective:

When CCl<sub>4</sub> causes hepatotoxicity in rats, Giloy leaf extract has a hepatoprotective effect. Through the combined synergistic effect of its ingredients and micronutrients, the Giloy plant material can be considered as a hepatoprotective agent through the inhibition of lipid peroxidation and a workable way to minimize the effects of free radicals, including proxy radicals and their antioxidant

endeavor. This is preferable to any single thing via free radicals' pastime.

### Avoid spasms:

Giloy's dry bark has antispasmodic properties.[An anti-ulcer agent: When combined with *Centella Asiatica*, an ethanolic extract of Giloy's roots provided full-size protection against the development of ulcers brought on by restraint stress.

### Antipyretic Action:

Research has demonstrated negligible antipyretic effects in the hexane and chloroform soluble fractions of the Giloy stem.

### Anti-hyperlipidemia properties:

When Giloy root extract was given to alloxan diabetic rats for six weeks, tissue cholesterol, phospholipids, and free fatty acids significantly decreased. Giloy root extract significantly lowers blood glucose, TG, LDL, and cholesterol while raising HDL cholesterol.

**Anti-microbial activity:**

The crude extract of the Giloy stems confirmed recreation towards bacteria and fungi.

**Immunomodulatory activity:**

Research has demonstrated that exposure to alcoholic extracts of Giloy increases bone marrow cellularity and  $\alpha$ -esterase recreation in rat groups.

**Immunomodulatory cardiovascular defense:**

Isoprenaline-induced MI is lessened when Giloy methanolic extract is administered beforehand. The potential of *Tinospora cordifolia* to strengthen the cardiac membrane through its membrane-stabilizing activity is probably responsible for its cardioprotective properties.

**Anti-scabies:**

A wide limit was seen in every parameter for the 50% Giloy lotion. The degree of infestation, preference websites, and general evaluation score all significantly decreased, although the patients' medical improvements during clinical assessment were confirmed to have significantly improved. Patients were asked to practice applying the lotion

after dinner and to wash their hands afterward, even though a bitter taste was previously reported when the lotion was applied topically. With Permethrin having the same remedy rate [Giloy: 70%, 53.60 to 86.94%; Permethrin: 50%, 32.11 to 67.89%;  $P = 0.187$ ] and clearing time of 23rd days, 20.47 to 25.53 days, Giloy lotion shown a similar anti-scabies effort. Given that Giloy lotion is less than pharmaceuticals sold in stores, it makes sense.[3]

**Anticancer Activity:**

*T. cordifolia*'s active ingredients strengthen the host's immune system by raising blood and immunoglobulin levels. leukocyte counts as well as by stem cell stimulation expansion. It can lessen solid tumor growth. volume by 58.8%, corresponding to the well-known chemotherapy drug cyclophosphamide. These immune-boosting characteristics can be applied in the prevention of immunosuppression mediated by tumors and may be a medication option for different types of cancer.[4]

Active Component	Compounds	References
Terpenoids	Tinosporide, Furanolactone diterpene, Furanolactone clerodane diterpene, furanoid diterpene, Tinosporaside, ecdysterone makisterone, and several glucosides isolated as poly acetate, phenylpropene disaccharides cordifolioside A, B and C, cordifolioside D and E, Tinocordioside, cordioside, palmatosides C and F, Sesquiterpene glucoside tinocordifolioside, Sesquiterpene tinocordifolin	5,6,7,8, 9,10,11 12,13,14 15
Alkaloids	Tinosporine, (S), Magnoflorine, (S), Berberine, (S), Choline, (S), Jatrorrhizine, (S), 1,2- Substituted pyrrolidine(S), Alkaloids, viz. jatrorrhizine, palmatine, beberine, tembeterine, choline.	16,17,18, 19,20
Lignans	3 (a, 4-dihydroxy-3- methoxybenzyl)-4-(4- hydroxy3-methoxybenzyl), (S)	21
Steroids	Giloinsterol, (S), $\beta$ -Sitosterol, (S), 20aHydroxy ecdysone, (S)	22 23 24 25
Others	Giloin, Tinosporan acetate, Tinosporal acetate, Tinosporidine, Heptacosanol, Octacosanol, sinapic acid, Tinosponone, two phytoecdysones, an immunologically.	26,27,28,29, 30

**CHEMICAL CONSTITUENT OF T. CORDIFOLIA:****Habit & habitat:**

Found in China, India, Burma, and Sri Lanka, TC is a big, smooth, deciduous climbing vine (Fig. 2).

The plant has been observed in Australia's and Africa's tropics. India-wide, starting in the Kumaon Mountains to Kanyakumari, the southernmost point of India, in the north[31]. The botanical identity of Guduchi is correlated with



*Tinospora cordifolia* (Wild.) Miers (Family: Menispermaceae) according to the Ayurvedic Pharmacopoeia of India (API). It is a huge, spreading, deciduous shrub that climbs and has multiple long, twining branches. Additionally, branches yield an abundance of long, filiform, meaty, pale brown aerial roots dangling like strings below. The smooth, greenish stems with thin Peeling papery, and gray, with several tiny, rounded protuberances known as lenticels. Simple, alternate, and exstipulate leaves have long petioles that can reach a length of 15 cm. roundish, and pulvinate at both the base and apex, the basal petiole being lengthy and somewhat twisted. From it, its name Heart-leafed moonseed is distinguished by its scarlet fruit and heart-shaped leaves. The lamina is membranous, profoundly cordate at the base, broadly elliptical or oval cordate, 10–20 cm long and 8–15 cm broad, seven-nerved, and prominently reticulated beneath. On independent plants, the small, unisexual flowers have a greenish-yellow appearance and lack leaves on the axillary and terminal racemes. While female flowers are often isolated racemes, male vegetation is often grouped.

Its six sepals are arranged in two sets of three each. The ones inside are larger than the ones outside. It has six obovate, membrane petals that are smaller than sepals. combination of fruits in one to three clusters. When fully ripe, they are pink, globose, easy drupelets on stout stalks with subterminal-style scars [33]. Numerous names in various Indian languages help identify Guduchi, including Amrita in Sanskrit, Tippa tea in Telugu, Amruthaballi in Kannada, Giloy in Hindi, Garo in Gujarati, Gulvel in Marathi, and Chittamrithu in Malayalam [34]. The dried stems thylakoid, of TC, are purchased in the local vernacular markets, known as Guduchi, Giloy, Seen Amruthaballi, etc. API (2001) states that the raw medication "occurs as parts varying in thickness (0.6–5 cm in diameter); young stems are green, smooth, and

swell at the nodes; older stems have a light brown floor dotted with warty protuberances from circular lenticels; the transversely smoothed floor has a radial form with prominent medullary rays that cross porous tissues and have a bitter taste (Fig. 3). TC is a member of the family Menispermaceae, which has over 350 species and 73 genera. [35] It is primarily found in tropical regions but also includes temperate Asia and North America [17]. There are 32 species of the genus *Tinospora* in the world, five of which are found in India. Willd. / *T. cordifolia* Miers. ex Hook.

The five primary species observed on the Indian subcontinent include *T. f.* and Thomson, *T. glabra* (Burm. f.) Merr., and the recently described *T. formanii* Udayan and Pradeep. The two recognized medicinal species are *T. cordifolia* and *T. sinensis* [36].

#### Trade

Giloy is one of the most popular uncooked tablet products in India, with over 1000 MT offered in the markets annually [34]. The dried stems of TC are usually sold for about Rs. 50 per kg in India's raw drug markets under the colloquial names Guduchi and Giloy. Nonetheless, *T. cordifolia* is purposefully or inadvertently mixed with other species of *Tinospora*, such as *T. sinensis* and *T. crispa* [35].



Fig. 2. Dried TC stems sold in raw drug markets under the name Giloy

#### Pharmacological Action:

The plant is commonly used in traditional ayurvedic medicine and has several therapeutic properties [6, 7] such as jaundice, rheumatism, urinary disorder, skin diseases, diabetes, anemia, inflammation, allergic condition, anti-periodic, radioprotective properties, etc. [8, 9] The root of Giloy.



**Fig no 3. Tinospora cordifolia has long been used as a remedy for several illnesses.**

Sr. No.	Pharmacological Activity	Part/s used	Phytochemical/ extract	References
1.	Cardioprotective activity	Whole plant	Alcohol extract	Gupta & Sharma, (2011)
2.	Antiulcer activity	Whole plant	Ethanol and / aqueous extracts	Mishra & Kaur (2015)
3.	Antidiarrheal activity	Whole plant	Ethanol and aqueous extract	Mishra & Kaur (2013)
4.	Immunomodulatory activity	Whole plant	Aqueous extract	Sengupta <i>et al.</i> , (2011)
5.	Neuroprotective effect	Aerial parts	Ethanol extract	Kosaraju <i>et al.</i> , (2014)
6.	Anti-inflammatory activity	Stem	Aqueous extract	Patgiri <i>et al.</i> , (2014)
7.	Gastroprotective activity	Whole plant	Ethanol extract	Antonisamy <i>et al.</i> , (2014)
8.	Antioxidant activity	Whole plant		Jayaprakash <i>et al.</i> , (2015)
9.	Radio protective and Cytoprotective activity	Stem	Ethanol extract	Patel <i>et al.</i> , (2013)
10.	Antifeedant activity	Whole plant	Chloroform extract	Sivasubramanian <i>et al.</i> , (2013)
11.	Ameliorative activity	Root	Ethanol extract	Gupta & Sharma, (2011)
12.	Hepatoprotective activity	Whole plant	Aqueous extract	Stanca <i>et al.</i> , (2011)
13.	Nootropic activity	Whole plant	Ethanol extract	Gupta <i>et al.</i> , (2013)
14.	Hypoglycemic activity	Stem	Aqueous extract	Patel & Mishra, (2011)
15.	Antiosteoporotic activity	Stem	Ethanol extract	Kapur <i>et al.</i> , (2008)
16.	Antineoplastic activity	Aerial parts	Dichloromethane extract	Jagetia & Rao, (2006)
17.	Antifertility effect	Stem	Methanol extract	Gupta & Sharma, (2003)
18.	Antiasthmatic activity	Stem	Hydro-alcoholic Extract	Tiwari <i>et al.</i> , (2014)
19.	Diabetic neuropathy	Stem	aqueous extract	Nadig <i>et al.</i> , (2012)
20.	Antimalarial activity	Stem	Ethanol extract	Dhanasekaran <i>et al.</i> , (2009)
21.	Hepatocellular carcinoma	Aerial parts	Ether extract	Dhanasekaran <i>et al.</i> , (2009)
22.	Antibacterial activity	Stem	Aqueous and ethanolic extract	Jeyachandran <i>et al.</i> , (2003)

**Table no.2: Mechanism of action of phytoconstituent of Giloy**

Although they differ botanically (Table 1; Figs. 3 and 4), the shape of the traded stems of TC and other *Tinospora* species seems identical to the untrained eye and necessitates the use of other scientific techniques. like chromatography, to verify them [36]. In the unprocessed medication Kerala's marketplaces, together with TC stems and *T. sinensis* (syn. *T. (malaria)*) has reportedly also been marketed under the name Amrita [37]. *T. Crispa* is a species that is often found in northeastern India. It is also in use in nations throughout Southeast Asia. According to reports, Because dried samples have a similar appearance, tribes in Maharashtra's Kandesh district employ *Pergularia daemia* (Apocynaceae) as TC [38]. With the use of the DNA barcoding method, Santhosh Kumar and colleagues (2018)

#### **Role as a protective agent against COVID-19:**

The world has come to a standstill because of the COVID-19 pandemic, which was caused by a microscopic organism that was discovered as a virus (SARS-COV 2), a member of the Coronaviridae family. Over time, the structure of SARS-COV2, which mostly affects the human respiratory system, was also revealed (Chen, Liu, & Guo, 2020). About 38.3 lakh people have died as a result of this virus worldwide, with 3.8 lakh of the deaths occurring in India. While medical interventions and vaccinations have been advised.[39]

#### **Insights into the application of various preparations of *T. cordifolia* in food product**

Perspectives on the use of different *T. cordifolia* preparation in food products. *Tinospora cordifolia* has a special place in human food research because of its enormous medicinal benefits, which are discussed in the sections above. According to reports, people primarily take it as a dietary supplement or in crude form (as a liquid) when they have infectious disorders like dengue fever or other conditions that are either in the early stages or progressed (Sood & Shilpa, 2015). While there

is no denying its use as a therapeutic ingredient in the food chain, its application as a preventive factor is equally important.[40]

#### **FUTURE WORK:**

Next projects

Much effort has gone into isolating and purifying the active ingredients in TC, which are primarily responsible for treating a variety of ailments, as well as validating these ingredients (Fig. 4). Its therapeutic agent status confers upon its users numerous health benefits. The TC integrated product and its diversification should be the primary focus of future study because the raw form of this therapeutic plant has a terrible and bitter taste. Integration [41]

#### **anti-HIV properties:**

has been demonstrated to show a reduction in HIV's recurrent resistance, enhancing the therapeutic result. TCE's anti-HIV effects were demonstrated by a decrease in the number of eosinophils, and an increase in B cells, macrophages, polymorphonuclear leucocytes, and hemoglobin percentage, indicating its potential for use in the treatment of the illness.[42]

#### **CONCLUSION**

The most important reason for this evaluation was to file the various medicinal properties as well as the phytochemistry, dietary composition, benefits of Giloy, aspect effect, and toxicology things to do of *Tinospora cordifolia*. Giloy is a treasure of domestic remedies. *Tinospora cordifolia* (Giloy) is available in powder, and juice supplements. Any of this may additionally be used for consumption. It exploited the phytochemistry, and benefits such as immunity booster, chronic fever, antiasthma, anti-arthritis, anti-aging, Hepatoprotective, and antioxidant. etc. facet effects. It explored cultivation of the plant tissue tradition as the choice technique for rapid propagation instance Giloy climber prorogated with neem tree this propagation enhances the steadiness and productiveness of the plant. Neem Giloy is



generally counseled for the therapy of illnesses. It exploited one-of-a-kind sorts of Giloy and their homemade medicinal preparation. Giloy Sticks are being recommended through a wide variety of Ayurveda establishments as an immunity booster against COVID-19. Additionally, a person has to consult his/her medical doctor before the usage of Giloy if having any fitness problems or if pregnant or breastfeeding.

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