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## Use of *Tinospora Cordifolia* in The Treatment of Various diseases

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### Abstract

*Gulvel is a medicinal herb with several important therapeutic properties. Natural products are becoming increasingly and more beneficial in clinical research since, in contrast to medications, they have no known harmful effects. Giloy, also referred to as "Guduchi," is widely used in the treatment of several illnesses, according to traditional ayurvedic literature. Since the plant's active ingredients have been identified and their biological significance in preventing illness has been demonstrated, interest in it has grown on a global scale. In this review, we address our ongoing studies on the plant's genetic variety and biological significance of the individual active constituents of the plant in disease targeting. The review's next goal is to take advantage of the signalling and metabolic pathways that the compounds found in *Tinospora* affect.*

**Keywords** - Diabetes, Medicinal plant, *Tinospora Cordifolia*.

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### INTRODUCTION

Relatively large, deciduous climbing shrub of the Menispermaceae family, *Tinospora cordifolia* is a frequently referred to as "Guduchi" in Sanskrit. Growing at higher altitudes, it has a variable genetic makeup. Greenish yellow flowers are typical for it. [1-3] Many people's health has benefited greatly by the use of medicinal plants, which are depending on a mix of long-established conventional use and continuing Shrubs that are deciduous research in science. The huge, glabrous plant *Tinospora Cordifolia* is climbing deciduous shrub. The transverse section displays wedge-shaped wood bundles accompanied with a yellowish wood. It is seen to possess big arteries divided by narrow medullary rays. Fibrous structure makes up the stem. The bark has a profound left spirally and varies in hue from grey to creamy white. The stem bears lenticels that resemble rosettes. The membrane-based leaves are cordate in shape. The tiny 2-9cm, yellow, unisexual flowers measuring in length are born in an auxiliary raceme on leaflet branches. While male blooms are typically together, female blooms are frequently alone.

Been dissociated as seen from the other parts of the entire plant, as well as the stem and root. The plant has an increasing number of potential therapeutic applications due to its anti-diabetic, antiperiodic, anti-spasmodic, anti-inflammatory, anti-arthritic, anti-oxidant, anti-allergic, antistress, anti-leprotic, anti-malarial, hepatoprotective, immunomodulatory, and antineoplastic qualities. Researchers from all over the world are interested in this application. The plant's genetic diversity as reported, its biological functions in humans and other animals, and its active<sup>1</sup> plant

components are all given particular consideration in this review. Biological processes seen in animals and people. [4]

## PLANT PROFILE

### Plant Name

Tinospora Cordifolia



**Figure 1:** *Tinospora Cordifolia*

### Synonym

Guduchi, Giloy, Gurbel, Amrita

### Chemical constituents

Steroids, Aliphatic chemicals, Polysaccharides, Alkaloids, Diterpenoids, and lactones

### Biological source

It is made out of developed, dried segments of *Tinospora Cordifolia* miers' stem.

### Family

Menispermaceae.

### Morphological characteristics

Gurucha is a glabrous, twiner plant that is gregarious.

The bark on older stems is corky and can reach a diameter of up to 2 cm.

White vertical lenticels are scattered throughout the stem and branches.

Bark is easily peeled off and is warty, papery thin, and either creamy white or grey brown.

Ovate, sharp leaf measure 5 to 15 centimetres.

When young, they are membrane-bound, but as they get older, they become somewhat leathery. [5]

### Description of flora

The giloy is a massive, sprawling, multi-branching, deciduous shrub that climbs. The following provides an explanation of the numerous morphologies that the different parts exhibit. [6]

### Roots:

Aerial roots are thread-like, long, filiform, squarish, and they grow downward and continuously lengthen after emerging from mature branches or chopped portions of stems occasionally touch the earth.

### Steam

The tall, thick, fill form stem of this plant is fairly succulent and has a tendency to climb.

In the branches, there are aerial roots.

The dehydrated stem has a slender, circular shape that is somewhat twisted.

The outer bark is papery and thin, with a colour ranging from brown to grey. Transverse sectioning of the stem reveals a structure like a wheel. Circular and noticeable are lenticels.



S-221.11.6232

**Figure 2:** *Steam of Gulvel*

### Leaves

This plant has simple, alternating, membrane-covered leaves that are about 15 cm long and have a pulvinate, heart-shaped, partly and partially twisted petiole.

When leaves are young, they are a bright green colour, but as they age, they become yellowish green or yellow in colour.

The leaves have a faint, bitter smell. The lamina measures 8–15 cm in length and is ovate cordate. Approximately 10–20 cm long and 8–15 cm wide, the lamina is oblong-cordate in shape.



**Figure 3:** *Leaves of Gulvel*

### Flowers

The bloom is tiny, less than 2 mm in size, yellow, and unisexual.

Female flowers are solitary as opposed to male blooms, which are arranged in axillary racemes.

Fruit is an ovoid, succulent drupe that is about the size of a large pea and has a solitary, glossy, red seed.

The meaty, coiled seed. While flowers appear in May and June, fruiting occurs in September and October.



**Figure 4:** Flower of gulvel

### Climate & soil

In tropical and subtropical climates, the plant thrives.

It can be grown on light to medium sandy loam soil that has sufficient drainage and is rich in organic materials.

It cannot withstand periods of intense rainfall or flooding.<sup>[7]</sup>

### Common names<sup>[8]</sup>

Latin	Tinospora cordifolia(wild)
English	Indian tinospora/Gulanha
Sanskrit	Amrita, Guduchi, Tantrika
Hindi	Guduchi, Giloya
Bengali	Gulanha
Kannada	Amrita balli, madhupa
Marathi	Shindilakodi
Tamil	Shindilakodi
Gujarati	Galo

**Table 1:** Common names

### Taxonomical classification:<sup>[9]</sup>

Kingdom	Plantae-Plant
Subkingdom	Tracheophyta-Vascular plant
Super division	Spermatophyta-seed bearing
Division	Magnoliopsia-flowering
Class	Magnoliopsia-dicotyledone
Subclass	Polypetalae -petal free
Series	Thalamiflorae many stamens
Order	Ramunnculate
Family	Menispermaceae
Genus	Tinospora
Species	Cordifolia

**Table 2:** Taxonomical classification

**Cultivation** <sup>[10]</sup>**Propagating material**

The ideal planting material for growing commercial crops is stem cuttings.

In June and July, mother plants can yield cuttings.

Seeds can also be used to grow the plant. Seeds require nearly twice as long to grow and produce the same amount of medication.

**Raising propagules**

Stem cuttings are sown right away in the field.

Cuttings are taken from older, node-containing stems.

Within 24 hours of being removed from the mother plant, cuttings should be sown. In the interim, they ought to be half-dipped vertically in water.

**Propagule rate & pretreatment**

For a plantation on one hectare of land, about 2500 cuttings are needed.

There is no need to apply any special care before seeding.

**Land preparation & fertilizer application**

The ground is ploughed, harrowed, and cleared of weeds.

Ten tons of farmyard manure (FYM) are applied as the base dose per hectare together with a half dose of nitrogen (75 kg) during the soil preparation process.

**Transplanting & optimum spacing**

The stem cuttings that are rich in nodes are directly sown into the field.

It is suggested to space plants 3 m by 3 m apart for optimal yield.

Raising wooden stakes or a trellis might provide the support the plant needs to flourish.

Trees or shrubs that are already growing can also sustain the plant.

**Intercropping system**

It requires a host to twine because it is a huge twiner, and it covers the host quickly.

Throwing stem cuttings with aerial roots over trees causes them to grow and come into contact with ground-level roots.

**Irrigation practices**

Rainfall is used to irrigate the crop. On the other hand, sparing irrigation in extremely hot or cold weather can help the crop withstand harsh circumstances.

**Crop maturity harvesting**

Gathering takes place in the autumn, upon the stem reaching a diameter exceeding 2.5 cm. In order to accommodate future growth, the base is kept intact.

**Post harvesting management**

Following that, it can be kept in cool, airy storage go downs and in gunny bags.

Hopping the root into little pieces, let it dry in the shade.

Stems should be chopped very carefully because the bark peels off even at the touch and the peeled stem quickly degrades.

**Yield**

About 1500 kg of fresh woody stem are produced by the plant, which in two years reduces to 300 kg of dry weight per hectare.

## Parts used to treat disease <sup>[11]</sup>

### Leaves

Leaf powder and decoction is reported to help heal gout, ulcers, jaundice, fever, wounds, and blood sugar when combined with cow's milk.

### Steam

Stem starch, also known as satva, is used as a tonic for fever, skin disorders, and jaundice. Stem extract can be administered both alone and in combination with honey. The recommended remedy for a scorpion sting and snake bite is a mixture of root and stem.

### Barks

In North Gujarat, India, milk is combined with the plant's stem and roots to treat cancer.

### Fruits

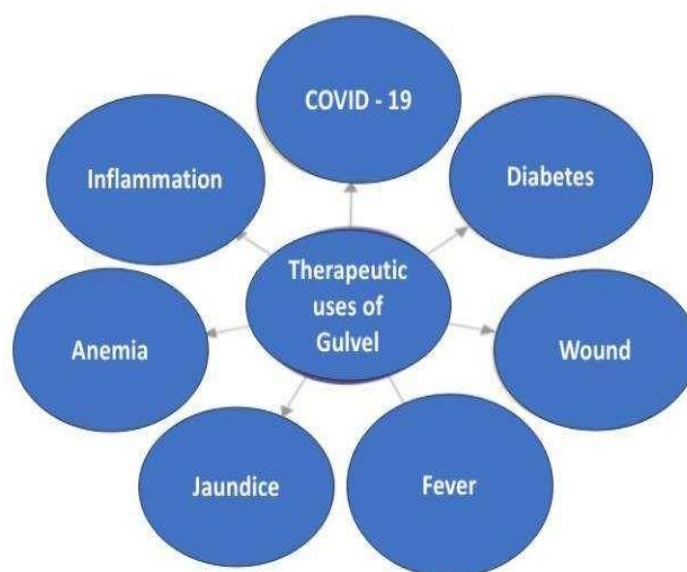
Both jaundice and rheumatism are treated with them.

### Roots

Aerial roots are thread-like, long, fill form, squairsh-shaped roots that grow downward from mature branches or clipped stem segments and occasionally reach the ground through continual growth.

### How to make giloy juice

Some clean, cut plant branches are needed to make Giloy juice. Mix the chopped branches with one cup of water to create a fine green liquid paste.



**Figure 5:** Therapeutic uses of *Tinospora cordifolia* in different diseases

## HERBAL FORMULATIONS OF GILOY

Churna

Kalka

Pinda

Vatti

### Diabetes

Hyperglycaemia is a common symptom of diabetes mellitus, a non-infectious endocrine condition marked by a disruption in the metabolism of glucose. Increased blood sugar levels brought on by a malfunction in either insulin secretion, insulin action, or both are hallmarks of diabetes mellitus,

a metabolic disorder.<sup>[12]</sup> Numerous severe illnesses, including microvascular (nephropathy, retinopathy, and nephropathy) and macrovascular (coronary heart disease and peripheral vascular disease) conditions, are associated with it.<sup>[13]</sup>

Diabetes mellitus, sometimes referred to as diabetes mellitus, has been linked to muscle loss and “sweet urine” related illnesses. The pancreas releases the hormone insulin, which regulates blood glucose levels. The pancreas produces insulin to maintain the blood glucose level as these levels rise. Hyperglycemia in diabetic patients is brought on by either insufficient or missing insulin production.<sup>[14]</sup> Giloy is listed in the Indian Ayurvedic Pharmacopoeia as a natural diabetes remedy medication because of this its glycosidic, diterpene, and alkaloids. The alkaloids palmatine, jatrorrhizine, and magnoflorin combined to create the hyperglycemic effect by inhibiting gluconeogenesis, insulin secretion, and insulin mimicry, as numerous Studies in animals and in vitro have revealed.<sup>[15]</sup>

### Arthritis and Gout



**Figure 6: Arthritis**



**Figure 7: Gout**

An inflammatory disease is rheumatoid arthritis. symmetrical, long-term autoimmune condition that begins in the small joints and spreads to the larger joints, the lungs, heart, kidneys, skin, and eyes in due course. In addition to ligaments and tendons degrading, joint bone and cartilage are frequently affected.<sup>[16]</sup>

Deformities and bone erosion result from all of this joint degradation, which is typically extremely painful for the patient. Weight loss, exhaustion, fever, rheumatoid nodules under the skin, and morning stiffness of the affected joints lasting more than thirty minutes are all typical symptoms of RA. This ailment typically first manifests between the ages of 35 and 60, with periods of aggravation and remission. It is also known as juvenile RA (JRA), because it is comparable to RA but does not have the rheumatoid factor. It could affect young children even before they turn sixteen.<sup>[17]</sup>

Giloy Anti-arthritic and anti-inflammatory qualities aid in lessen Arthritis and Gout. To ease pain in your joints, use Giloy powder with little warm milk<sup>[18]</sup>.

## Stress



**Figure 8:** *Stress*

Stress is a state of mental strain that many diseases are brought on by for particular person addressing matters concerning their environmental and social welfare. The initial years are important because they significantly alter the course of a young person's life. It is anticipated that they will be the social elites. They should therefore improve their capacity for managing stress in order to have after assimilating into society, lead healthy lives.

A children have to not only as they get older, adjust to a new life and environment, but also familiarize yourself with a plethora of strange individuals, occasions, and things. They are under a great deal of stress in their life. Consequently, knowing the reasons behind their tension and how they might control the. Stress is traditionally treated using an extract from gulvel roots.

Numerous investigations on animals have exhibited the extract's efficaciousness as an agent that reduces stress. <sup>[19]</sup> Giloy is a fantastic treatment for lowering anxiety and mental tension. Your body feels relaxed by it. Additionally, Giloy can enhance cognitive. <sup>[20]</sup>

## Fever



**Figure 9:** *Fever*

An high core temperature is referred to as a fever, and it is commonly, though not always, one of the host's defensive mechanisms against the infiltration of live microbes or inanimate objects that the body perceives as harmful or foreign. <sup>[21]</sup> Fever is commonly characterized in the clinical context as an increase in body temperature that is caused by pyrogens and beyond the usual range. The term, while helpful in characterizing the febrile patient, fails to acknowledge that an increase in body temperature is only one aspect of this complex reaction. When it comes to hay fever, or allergic rhinitis, giloy is quite helpful. It lessens symptoms like watering eyes, sneezing, nasal



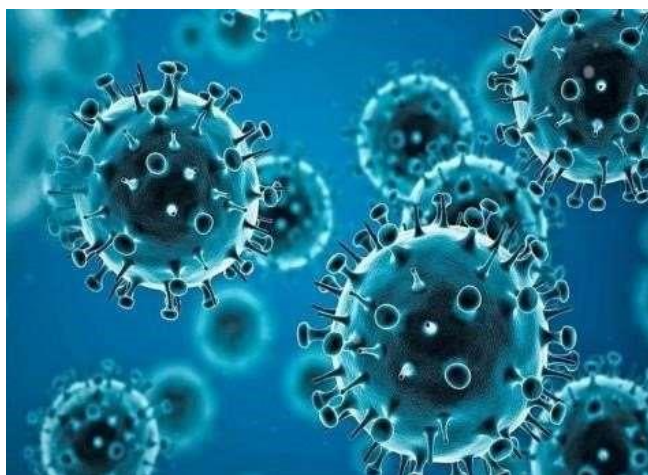
blockage, and runny nose. Take a Combine ½ tsp powder with honey. and consume it prior to eating lower the temperature.<sup>[22]</sup>

### Corona virus

The viral condition that causes COVID-19 is known by another name, SARS-CoV-2, or severe acute respiratory syndrome coronavirus-2. an international health disaster that has spread quickly throughout the world. There is currently no a particular COVID-19 infection therapy, despite the fact that many synthetic antiviral medications and therapeutic therapies have been utilized in the past to combat viral infections. Numerous medications have been suggested, including lopinavir, hydroxychloroquine, chloroquine, and ritonavir.

Animal and human corona viruses are significant diseases. It was discovered that a novel corona virus was the cause of a wave of instances of pneumonia in the Hubei Province of China's Wuhan towards the 2019's end. It expanded swiftly, starting an epidemic in China and leading to a rise in cases in various countries around the world. The disease was designated as COVID-19 by the World Health Organization, or corona virus illness in February 2020, in the year 2019. Giloy can boost your immunity to fight against a corona infection, even if there is no proof that it can cure the illness. Some scientific investigations indicate that the results show promise in the management of corona virus infection.

In particular, giloy may be beneficial for viral fevers such as corona infection, as it has the ability to boost immunity.<sup>[23]</sup>



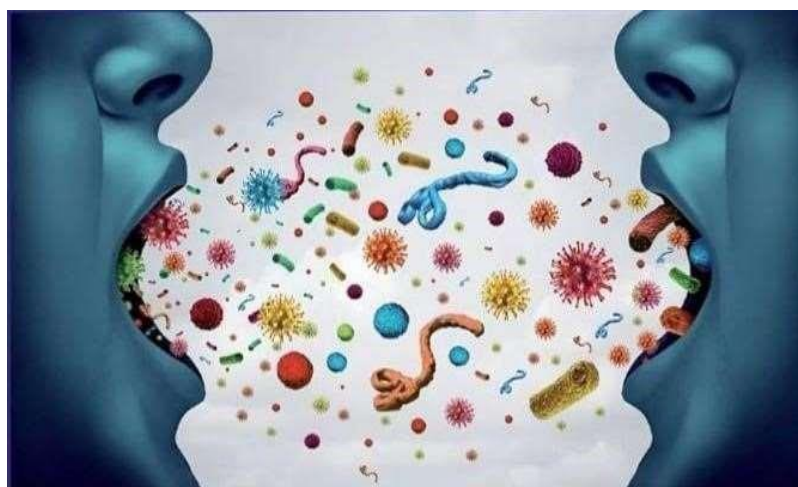
**Figure 10:** *Corona Virus*

### Viral infection

Viruses are the primary cause of global biogeochemistry and the agents responsible for a variety of diseases. Since viruses encode the majority of the genetic variation on the earth and outnumber cellular creatures in terms of number, In the game of life, they also triumph. It is plausible, in fact, to think of existence as a viral incubator. However, the majority of ecological and evolutionary ideas were created and still are without taking the virosphere into account. This implies that either we must establish new theories from the perspective of the virus or we must reinterpret previous theories in light of current viral understanding.

The only other living organisms that replicate only as information are viruses. The nucleic acid of a virus is replicated entering fresh genomes, which are subsequently sealed and dispersed as fresh virions, when the virion has fully disassembled and entered its host. The first virion form has nothing that needs to be physically transmitted from one age group to the following. Between the old and new, not a single molecule, atom, or quark needs to be moved. The information needed to

create the next generation of viruses is the only thing that needs to be transferred between virus generations. The rest of biology functions in a distinct way. At the time of division, every new cell physically shares every molecule with its mother cell. Tinosporin is a diterpenoid that has demonstrated efficacy against HIV, HTLV, and other viral infections due to its ability to selectively suppress the virus and modulate immune responses in target T helper cells. [24]



**Figure 11:** *Viral infection*

### **Leprosy**

Leprosy is a long-term communicable disease that causes Skin and mucous membrane granulomatous lesions & surroundings' nerve cells. Drinking Guduchi stem swarasa (juice) twice a day will support the body's immune system development. Due to its Kushtahara (antileprotic) qualities, guduchi is often used in Ayurveda to treat skin disorders including Visarpa and Kandu. [25] It is stated under "Tikta Saka Varga" in the Sushruta Samhita and is said to be helpful treating leprosy, or Kushta. [26]



**Figure 12:** *Leprosy*

### **Immunomodulatory activity**


Human immunity is a very powerful system. Specialized network of defending cells, including Natural killer cells, T lymphocytes, neutrophils, macrophages, and several different immunological chemicals such as antibodies and cytokines that have evolved to act as infection resistant mediators. The overuse of antibiotics when managing infectious illnesses leads to the creation of pathogen strains that are resistant to many drugs, which presents significant issues. It's necessary to develop appropriate substitutes for some Of the antibiotics that are already in use. [27] Giloy is known to have an immunomodulatory effect. According to reports, the active components

syringin, cordifolioside A, magnoflorine, tinocordiside, N-methyl-2-pyrrolidone, N-formylannonain, and 11-hydroxymustakone may have cytotoxic and immunomodulatory properties.<sup>[28]</sup> It has also been observed that aqueous Tinospora extracts affect immunological effect or cell stimulation, activation, mitogenicity, and cytokine generation.<sup>[29]</sup> When an oral dose of 100 mg/kg of giloy alcoholic extract was given. There was a discernible increase in bone marrow cells and WBC counts, together with a notable augmentation in the foot's thickness pads, indicating a strong immunomodulatory effect and a stimulatory effect on the hemopoietic system.<sup>[30]</sup>

Due to its ability to boost immunity and raise the body's resistance to disease, tinospora cordifolia has been used extensively in Ayurveda. An entity known as arabinogalactan polysaccharide (G1-4A) is present in giloy stems. It provides protection against endotoxic shock caused by lipopolysaccharide by controlling the excretion of nitric oxide and cytokines by murine macrophages. N-methyl-2-pyrrolidone, N-formylannonain, 11-hydroxymustakone, cordifolioside Syringin, & magnoflorine are among the immunomodulatory active ingredients in T. cordifolia that have the ability to modulate the immune system.<sup>[31]</sup>

### Marketed formulation of tinospora cordifolia

Sr no	Use	Ingredient	Efficacy	Topically tested	Image
1	Diabetes	Giloy, Jamun, Bittergourd	Balance blood sugar	Yes	
2	Arthritis	Giloy, Haldi	Reduce inflammation	Yes	
3	Stress	Giloy	Reduce stress	Yes	
4	Fever	Giloy juice	Reduce fever	Yes	

5	Immunostimulant	Giloy powder	Boost immunity	Yes	
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**Table 3:** Marketed formulation of gulvel

## CONCLUSION

Giloy, a herb with several healing uses, has demonstrated assurance in the course of care a number of. Diseases because of its immune-suppressive, anti-inflammatory, and antioxidant properties. Research shows that it works well for diseases like cancer, diabetes, liver problems, and respiratory infections. It is a useful herb in both traditional and modern medicine due of its aptitude. In order to fortify the defense mechanism and support general health. To completely comprehend its mechanics and develop standardized medicinal uses, more research is required. All things considered, tinospora cordifolia shows promise as an adjunctive therapy for a range of medical condition Gulvel is a versatile plant that may be Applied to a wide variety of diseases to completely comprehend its operations, make the best use of it, and develop standardized treatment protocols, more research and clinical trials are necessary.

In traditional medicine, especially in Ayurveda, gulvel, or Tinospora cordifolia, is highly esteemed. It is helpful in treating a variety of disorders since its active ingredients have antiinflammatory, antioxidant, and immunomodulatory qualities. Gullible aids in controlling blood sugar levels in diabetics. It functions as an expectorant for respiratory disorders and promotes lung health. Its adaptogenic actions improve stress resilience, and its antibacterial qualities can help fight infections. Gulvel is also utilized in the treatment of liver conditions and the enhancement of general health. Because of its many therapeutic benefits, research suggests that it may be useful in controlling chronic illnesses. All things considered, gulvel is a useful supplement to integrative methods for treating a variety of illnesses, fostering both health and vigor. For its clinical applications to be optimized and its mechanisms completely understood, more research is required.

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