

IS GUDUCHI (TINOSPORA CORDIFOLIA), A POPULAR AYURVEDIC LIVER-PROTECTING HERB, CAPABLE OF HARMING THE LIVER

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ABSTRACT

Ayurveda is a very old traditional medicine still used in India today. There are certain plants with known medical properties that are used in Ayurveda, and one of them is Guduchi or *Tinospora cordifolia*. It's known for its anti-inflammatory and immune-boosting effects, and it was even recommended for use in COVID-19 care by the Indian government. However, in 2021, a case series was published by Aabha Nagral that talked about six patients who developed liver problems after taking Guduchi or Guduchi-containing products during the COVID-19 pandemic. This was unexpected because Guduchi is considered safe. This article examines the different types of plants that are sometimes sold as Guduchi, their effects, and whether they can be harmful. It turns out that while real Guduchi is safe, there are other plants with similar names, like *Tinospora sinensis* and *Tinospora crispa*, which can be toxic to the liver. The article also noted that the patients in Nagral's case series had different histories and consumed various Guduchi products, but the authenticity of these products wasn't confirmed. After looking at existing research, it seems unlikely that genuine Guduchi caused the liver problems in these patients. It's more probable that they consumed the wrong plant. It's important to investigate the details of the products they used to prevent this from happening to others. Nagral's article also raises concerns about the problem of selling fake or impure herbal products and the need for a better system to monitor and report adverse effects in India.

Keywords: Fake Ingredients, Traditional Indian Medicine, Oronavirus Pandemic, Guduchi Plant, Liver Protection Liver Harm, Alternative Options, *Tinospora Cordifolia* Plant.

I. INTRODUCTION

Only around 5% of the world's 300,000 plant species have been studied for their potential as medicine. Herbal products are popular because people think they are safe and natural, even if they work a bit slowly. Right now, there are no effective drugs for COVID-19, and scientists are looking into traditional medicines in countries like China and India because they have a history of being anti-viral and good for the immune system. India has a rich history of traditional medicine, including Ayurveda, Yoga, Unani, Siddha, Homeopathy, and other practices. The Indian government has specific councils for each of these systems to promote research, education, regulation, and outreach. In June 2021, Aabha Nagral published a paper about six patients who got liver problems after taking an herbal immune booster called Guduchi. Guduchi is a plant known as *Tinospora cordifolia*, and the Indian government has recommended it as a home remedy for COVID-19. Guduchi is a well-known plant in traditional Indian medicine, and it's believed to protect the liver and boost the immune system. This article looks at the different types of plants that people call Guduchi, what they can do, and how safe and effective they are. It also examines the properties of Guduchi according to traditional Indian medicine references. The article analyzes the details of the cases reported by Nagral and points out what we still need to understand.

II. HISTORICAL AND TRADITIONAL USE

T. cordifolia, also known as Guduchi in Sanskrit, has been a prominent medicinal plant in Ayurveda since around 3000 BCE. It's often referred to as 'Amrita,' which means the elixir of life, due to its reputation for promoting health, vitality, and longevity. The ancient Ayurvedic texts, including Samhitas and Nighantus, provide extensive information on Guduchi's properties and uses, including its qualities, therapeutic actions, forms, and recommended doses. In these texts, Guduchi is recommended for treating various conditions like

asthma, fever, anorexia, leprosy, arthritis, and jaundice. The Ayurvedic Pharmacopoeia of India also outlines its pharmacological properties.

- Taste(Rasa): Bitter (Tikta) and Astringent (Kashaya)
- Characteristics (Guna): Weightless (Laghu)
- Strength (Virya): Warm (Ushna)
- Effect after digestion (Vipaka): Sugary (Madhura)

(Actions)Karma:

Ayurveda talks about the benefits of a plant called Guduchi and its actions on the body. Guduchi makes you strong and boosts your immune system (Balya). It also helps with digestion (Dipana), enhances your overall vitality (Rasayana), balances the body's doshas (Tridoshahara), purifies your blood (Raktashodaka), and reduces fever (Jvaragna). In Ayurveda, there are different ways to use Guduchi, and each has specific dosages and methods. These include taking its fresh stem juice (Swarasa), using a paste made from the fresh stem (Kalka), consuming powdered dried stem (Churna), making a hot water extract from dried stem (Kwatha), preparing a hot water infusion (Phanta), using a self-generated alcohol called Arishta, taking a starchy stem extract (Satwa), using crystallized aqueous extract (Ghana), and incorporating Guduchi into fat-based formulations processed in ghee or oil. There's also Guduchi Taila for external application. Ayurvedic texts mention various combinations with Guduchi, like Chandraprabhavati, Kaishor Guggulu, Abhayadi Kwatha, Rasnadi Kwatha, and more. Rasayana is an essential part of Ayurveda, and it's all about nourishing the body. Guduchi is a significant Rasayana plant, much like Amla, Haritaki, and Shunti. Modern scientific research also recognizes Guduchi as a valuable elixir due to its wide-ranging healing and health-boosting properties.

III. HABIT & HOME

The *Tinospora cordifolia* (TC) is a big, sleek, leaf-dropping vine that grows in India, China, Burma, and Sri Lanka. This plant has also been seen in the tropical regions of Africa and Australia. It can be found all over India, from the Kumaon Mountains in the north to the southernmost part of India at Kanyakumari.



Fig. 1 *Tinospora cordifolia* climber.

The Ayurvedic Pharmacopoeia of India (API) identifies Guduchi as the *Tinospora cordifolia* plant. It's a big, leaf-shedding vine with lots of long, twisting branches. These branches grow hanging roots that look like strings. The stems are green, smooth, and might have small round bumps called lenticels. The leaves are simple and heart-shaped, and the plant's fruit is red. The flowers are small, greenish-yellow, and grow separately on male and female plants. The fruits grow in clusters of one to three, are round, smooth, and red when they're ripe.



Fig. 2 Dried stems of TC sold as Giloy in raw drug markets.

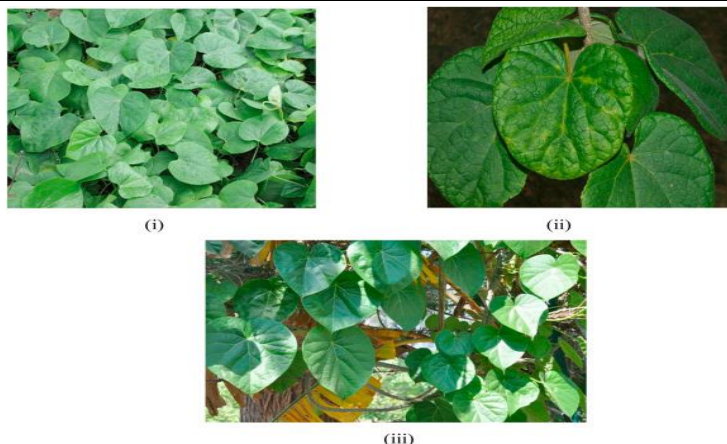


Fig. 3 Leaves of (i) *Tinospora cordifolia*, (ii) *T. sinensis* and (iii) *T. crispa*.

Guduchi, a medicinal plant, is called by different names in various parts of India. It's known as Amrita in Sanskrit, Tippa teega in Telugu, Seenthilkodi in Tamil, Amruthaballi in Kannada, Giloy in Hindi, Garo in Gujarati, Gulvel in Marathi, and Chittamrithu in Malayalam. The dried stems of Guduchi are sold under these names in local markets. According to API (2001), the raw Guduchi stems come in pieces of varying thickness, with young stems being green and smooth, and older ones having a light brown surface with warty bumps due to circular lenticels. When you look at a cross-section, you'll see a radial structure with clear medullary rays running through porous tissues, and it has a bitter taste. Guduchi belongs to the Menispermaceae family, which includes around 73 genera and 350 species, mainly found in tropical regions in North America and temperate Asia. In India, there are five primary species of the *Tinospora* genus: *T. cordifolia*, *T. sinensis*, *T. crispa*, *T. glabra*, and the recently described *T. formanii*. Among these, *T. cordifolia* and *T. sinensis* are known for their therapeutic properties.

IV. TRADE

Giloy is a popularly traded medicinal plant in India, with over 1000 metric tons sold each year. The dried stems of *Tinospora cordifolia* (TC) are commonly sold in Indian markets under names like Guduchi or Giloy, and they cost about Rs. 50 per kilogram. However, there's a problem of other *Tinospora* species like *T. sinensis* and *T. crispa* being mistakenly or intentionally mixed with *T. cordifolia*. These species look similar in appearance, even though they are botanically different. To distinguish them, scientific techniques like chromatography are needed. In Kerala, *T. sinensis* has also been sold as Amrita. *T. crispa* is primarily found in Northeast India and used in Southeast Asian countries. Some reports suggest that in Maharashtra, a different plant called *Pergularia daemia* is used as TC due to its similar appearance. Using a technique called DNA barcoding, a study found that 20% of the Guduchi stems traded in southern Indian raw drug markets are not genuine TC but are instead substitutes or adulterants.

Characteristics	<i>Tinospora cordifolia</i>	<i>Tinospora sinensis</i>	<i>Tinospora crispa</i>
Leaves	Broadly heart-shaped leaves, smooth, sometimes tiny hair pockets on the lower side, thin	Oval or nearly round leaves, fuzzy on top and hairy underneath, usually no hair pockets	Broadly oval to oblong or round leaves, smooth, no hair pockets
Flowers	Six petals, male flowers on short stems (about 5 mm long)	Six petals, male flowers on short stems (about 5 mm long)	Usually three petals, male flowers on longer stems (about 10 mm long)
Fruit (Drupe)	Round, turns red when ripe	Round, turns red, scarlet, or orange-red when ripe	Ellipsoid shape, orange when ripe

Stem	Not bumpy, smooth	Not bumpy, has at least some hair on young stems	Strongly bumpy, smooth
Distribution	Found throughout India, Sri Lanka, Bangladesh, and Myanmar	Found throughout India, Sri Lanka, Bangladesh, Nepal, Myanmar, China, Thailand, Cambodia	Found in eastern India, China, Cambodia, Thailand, Malaysia, Java, and the Philippines
Sap	Watery	Watery	Milky

Here's a simplified version of the information in Table 1 about the characteristics of *Tinospora cordifolia* and its substitutes and adulterants:



Fig. 4 Stems of i) *Tinospora cordifolia*, ii) *T. sinensis* and iii) *T. crispa*.

V. PHYTOCONSTITUENTS

The components found in *Tinospora cordifolia* (TC) are similar to those in *Tinospora sinensis* but differ from those in other substitute or adulterant species.

TC is a valuable source of nutrients, minerals, and various natural compounds found in all parts of the plant, such as leaves, stems, fruits, roots, as well as substances like fat, protein, dietary fiber, calcium, and more. TC is particularly rich in different substances, including alkaloids (like Berberine, Choline, Palmatine, Tembetarine, Magnoflorine, Tinosporin, and Isocolumbin), Glycosides (Tinocordiside and Cordioside), Diterpenoids (furanolactone), steroids (such as beta-sitosterol), aliphatic compounds (like octacosanol), and other compounds (like giloin and tinosporic acid). *Tinospora sinensis*, on the other hand, contains substances like Tinosenin, berberine, 4-methyl-heptadec-6-enoic acid ethyl ester, and 3 hydroxy-2, 9, II-trimethoxy-5,6-dihydro isoquinol. *Tinospora crispa* includes compounds like flavonoids (Apigenin and Diosmetin), triterpenes, diterpenoglucoside, cisclerodane, alkaloids (berberine, magnoflorine, higenamine), lignin, and sterols

5.1 COVID-19

COVID-19 is caused by a virus called SARS-CoV-2, which affects the respiratory system. It leads to symptoms like cough, fever, and difficulty breathing due to inflammation and the body's response. This virus can cause a severe inflammation in the lungs, making it hard to carry oxygen, which can be very dangerous. Currently, there are no proven medicines to cure or prevent COVID-19. However, traditional medicine like *Tinospora cordifolia* (TC), also known as Guduchi, has been studied for its potential to boost the immune system and fight the virus. During the COVID-19 outbreak, the Ministry of AYUSH in India recommended ways to improve immunity, especially for respiratory health. They suggested using natural remedies known for boosting immunity, and Guduchi is one such plant that's believed to help the body fight the virus.

TC is being looked at for its antioxidant, anti-inflammatory, and antiviral properties, which might be helpful in managing COVID-19. It's also rich in micronutrients like copper, calcium, phosphorus, iron, zinc, and

manganese. TC is traditionally used to promote health and protect the liver, especially in conditions like jaundice.

Studies show that TC has been effective in helping COVID-19 patients recover faster and clear the virus. It has reduced inflammatory markers and improved well-being without causing side effects.

5.2 Antioxidant Activity

The stems of TC, particularly a substance called arabinogalactan, have been found to have strong antioxidant properties. They can help counter the harmful effects of free radicals and have shown similar levels of antioxidant activity as *Tinospora sinensis*.

5.3 Anti-Inflammatory and Antipyretic Activity

TC stem extracts have demonstrated anti-inflammatory effects, and they can also reduce fever. These extracts inhibit certain enzymes involved in inflammation and have the potential to protect against conditions linked to inflammation.

5.4 Immunomodulatory Activity

TC has been researched for its ability to modify the immune system. It contains various components that can boost the immune response, and studies have shown that it can improve the production of antibodies in response to vaccinations. *Tinospora sinensis* also has some immunomodulatory effects, but *Tinospora crispa* is yet to be explored in this regard.

5.5 Antiviral Activity

Tinospora cordifolia contains a compound called tinosporin, which has antiviral properties. It can enhance the production of certain immune cells. Some formulations of TC, like Guduchi ghana vati, have been recommended for COVID-19 prevention. *Tinospora sinensis* has antiviral properties too, while *Tinospora crispa* contains compounds known for their antiviral activities.

5.6 Hepatoprotective Effects

TC is used traditionally for treating liver conditions like jaundice and reducing liver enlargement. It's considered a safeguard for the liver and doesn't cause harm to it. TC has been shown to protect the liver by acting as an antioxidant and promoting liver regeneration.

Tinospora sinensis also offers protection against liver damage, while *Tinospora crispa* can potentially harm the liver.

5.7 Toxicology

TC is generally safe even at high doses and doesn't cause harm to animals or humans. *Tinospora crispa*, on the other hand, has been associated with liver toxicity when used excessively, and it's important to be cautious with its use. *Tinospora sinensis* hasn't been widely studied for toxicity.

VI. DISCUSSION

In this discussion, we are looking at the Ayurvedic, chemical, and medical aspects of *Tinospora cordifolia* (TC). We believe TC has potential medicinal properties, including antiviral, antioxidant, anti-inflammatory, and immune-boosting capabilities. In Ayurveda, it's considered an important herb with immune-modulating and disease-treating qualities. It's also known for its liver-protecting effects, often used to treat jaundice. Importantly, there have been no reports of toxicity or health issues associated with TC. A study by Aabha Nagral published in June 2021 raised concerns about liver damage linked to an "Herbal Immune Booster." However, we suspect this damage might have been due to the use of *Tinospora crispa* (a different plant) instead of TC, as TC is generally safe. The study has some limitations, including the lack of authenticated information about the plant products used by patients.

Moreover, the patients in the study had varying histories of TC consumption, which raises questions about the consistency of the observations. Some of them had other health conditions and may have been taking other medications, but detailed information about this is missing.

As this article shows, there are substitutes and adulterants for TC in the market, such as *T. sinensis* and *T. crispa*, which can be sold under the name Giloy or Guduchi. *T. crispa* can potentially harm the liver. The demand for herbal remedies is increasing, but there's a risk of malpractice and adulteration. Often, reported negative effects of herbal products are due to these inferior substitutes rather than the original medicine. It's essential to

have better quality control and regulatory measures to ensure the authenticity and safety of herbal medicines. Protecting the environment and improving agricultural practices can also help prevent adulteration.

VII. CONCLUSION

When we looked at the Ayurvedic and medical properties of *Tinospora cordifolia* (TC), we couldn't find a clear link between the autoimmune-like hepatitis that affected the six patients in Aabha Nagral's study and their consumption of TC. However, it's crucial to establish a strong system for monitoring and reporting the side effects of Traditional Medicines, especially when people use herbal remedies on their own. This will help us understand and address any potential risks associated with these treatments.

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