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## Review Article

# ***Tinospora cordifolia* (Giloy Or Amrita): An Updated Insight On The Multifarious Pharmacological And Pharmacotherapeutic Paradigms Of A Most Promising And Miraculous Medicinal Ayurvedic Herb**

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## ABSTRACT

*Tinospora cordifolia* commonly known as giloy is used in traditional ayurvedic medicine and the Indian System of Medicine (ISM) since times immemorial. The ayurvedic herb giloy (*Tinospora cordifolia*) is found throughout in the Himalayas, tropical regions of particularly abundant in the dense forests of Chhattisgarh, China and the Indian subcontinent. One of the beneficial medicinal plants is giloy (*Tinospora cordifolia*), which can be consumed either raw or prepared. This plant is known to have a range of medicinal benefits, chief among them being its ability to enhance the immune system. Modern research shows that giloy is a strong immune stimulant and immune booster builder and has a potentially important role in building the immune system which are preat and treat the diseases like common cough, cold, fever, DM, cancer etc. Giloy is used to treat a variety of illnesses, including chronic fever, dengue fever, allergic rhinitis, viral infections, chronic fever etc. It also regulates blood sugar levels, strengthens the immune system, improves digestion, lessens stress and anxiety, treats gout and arthritis, improves eye sight, and has Ropan -like properties that help to regenerate skin and raise collagen levels, among other uses. Giloy has a few secondary effects like blockage and hurt full for immune system issues in patients. giloy is also used in the treatment of corona-viruses because giloy built a strong immunity in the human body against covid-19. The review shows that the concentrate of *Tinospora cordifolia* has an extensive variety of hostile to oxidant as well as antimicrobial movement against bacterial as well as contagious microorganisms. It was found that as

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concentration increased, antibacterial activity likewise did so as evidence by an expansion of the zone of inhibition. The entire plant is utilized both alone and in conjunction with other herbal plants in folk and Ayurvedic medicine. The goal of the current study was to assess the multiple pharmacotherapeutic uses of *Tinospora cordifolia*'s. In this review can be used for the further research investigations as well as clinical purposes in the development of novel drugs.

## INTRODUCTION

*Tinospora cordifolia* commonly named as “Guduchi” in Sanskrit belonging to family Menispermaceae is a genetically diverse, large, deciduous climbing shrub with greenish yellow typical flowers, found at higher altitude<sup>1-3</sup>. *Tinospora cordifolia* is one of the most significant plants utilized in the native arrangement of medication. There are multitudinous references to its purposes in conventional medication. *Tinospora cordifolia* is a helpful restorative plant; it goodly affects well-being, draws out life, upgrades memory, and works on the nature of voice and richness<sup>4,5</sup>.



**Figure 1: *Tinospora Cordifolia* Leaves**

In the present concentrate on the counter oxidants and antimicrobial action of the watery, ethanol, and chloroform separates from the stems and base of *Tinospora cordifolia* was assessed by involving some in-vitro model<sup>6,7</sup>. Fast spreading of this deadliest sickness calls for clear requirements for normal therapy choices to keep emergencies from twirling out of control. India's Ayurveda has a long history and customary therapeutic legacy since the old period. Different herbal plants like *Tinospora cordifolia* (Giloy), *Azadirachta indica* (Neem), *Withania somnifera* (Ashwagandha), *Ocimum tenuiflorum* (Tulsi), *Aloe vera* etc have been of restorative significance starting from the start of human civilization<sup>8,9</sup>. The *Tinospora* genus has 34 species, many of which are used as traditional medicines all over the world, including on the continents of Asia, Africa, Australia etc. The two varieties of *T. Hainanensis* and *T. Guangxiensis* for instance, are used in China as traditional remedies for the treatment of colds, mouth ulcers, rheumatoid arthritis, diarrhea, headaches, and other ailments. The *Tinospora cordifolia* species, which is cultivated in India and is frequently used to treat diabetes and enhance immunity, also aids in the prevention of upper respiratory tract infections. *Tinospora cordifolia* has been listed by the National Medicinal Plant Board, New Delhi, Government of India, as one of 29 highly priority medicinal species of agroclimatic zone 8 (Rajasthan, Uttar Pradesh, and Madhya Pradesh), due to its high demand. It is well renowned for its incredible therapeutic qualities, advantages, and FDA approval. The Giloy species is indigenous to India and is widely distributed in tropical and subtropical regions at elevations of over 600 meters. It is found in tropical regions of India up to 1200 m in elevation, ranging from Kumaon to Assam in the north and through West Bengal, Bihar, the Decan Kankan, Karnataka, and Kerala in the south. Additionally, the Giloy species can be found in North Africa, South Africa, Bangladesh,

Malaysia, Myanmar, and Vietnam. Giloy is a big climber that extends numerous long, twining branches over the forest's tallest tree. The roots, which grow from established branches, are aerial threat-like and squarish. The dried aeronautical roots are light dim brown or smooth white in variety, scentless and severe taste. Many ayurvedic institutions advise using Giloy sticks to enhance immunity against COVID-19. One of the Ayurveda-related organizations in India is Patanjali Ayurveda, which created a medication kit named "Coronil." The main ingredients in Coronil are Giloy, ashwagandha, and tulsi. Giloy is valuable in the treatment of helminthiasis, heart illnesses, uncleanliness, and rheumatoid joint inflammation, supports the resistant framework, the body's protection from diseases. It moreover helps in stomach-related illnesses like hyperacidity, colitis, worm pervasions, loss of hunger, stomach torment, unnecessary thirst, heaving, and, surprisingly, liver messes like hepatitis. *Tinospora cordifolia* has a significance in conventional ayurvedic medication utilized for a long time in the treatment of fever, jaundice, ongoing runs, malignant growth, diarrhea, bone crack, asthma, skin illness, toxic bug, snake chomp and eye problems. The current survey is meant to give a refreshed writing survey on the late exploration progression of pharmacognosy, science and pharmacological exercises of *Tinospora cordifolia*. *Tinospora cordifolia* has a variety of chemical elements that could have an impact on the body. Some of these chemical compounds have antioxidant properties, while others may boost the immune system's activity. In forest and throws out aerial roots which reach the length of 10 meters, through not thicker than packthread.

test animals, several chemicals may be active against cancer cells. In test tubes or on animals, the majority of research has been conducted. This review focuses on the medical use of the Giloy plant. Various parts of the Giloy plant can be used<sup>10</sup>.

### Taxonomy of Giloy

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Rnaunculales
Family	Menispermaceae
Genus	Tinospora
Species	<i>T. cordifolia</i>

### Pharmacognosy of *Tinospora coradifolia*

#### Stems-

Fleshy

#### Roots-

long thread like, aerial, arise from branches.

#### Bark-

thin, greyish or creamy white in colour, when peeled fleshy stem is exposed

#### Leaves-

corate or heart shaped

#### Flowers-

bloom during summer

#### Fruits-

pea shaped, fleshy, shiny turn red when boiled.

#### Seeds-

curved, pea sized Parts used- stem, roots

#### Distributions-

the plant occurs throughout tropical regions of india extending from Kumaon to assam and Myanmar, bihar, konkan to srilanka. It is a large climber which grows over the highest trees in the

#### Cultivation-

soil and climate- it grows well in almost any types of soils and under varying climatic conditions.





**Figure 2: Morphology of Tinospora cordifolia A. Stem; B. Leaves; C. Fruit; D. Root; E. Flower; F. Seed**

### Active Constituents-

Tinospora is a source of many important plants, namely terpenoids, di-terpenoids, alkaloids, lignans, glycosides, sesquiterpenoids, phenolics, aliphatic chemicals, polysaccharides. Several lab studies are suggested these compounds have antimicrobial, anti-inflammatory, antioxidant, anti-diabetics etc. properties, among other benefits.

### Physical Properties

- A perpetual climber can grow up to 20 m long.
- The stem is barrel-shaped, woody, and empty.
- The leaves are basic, inverse, and applaud moulded with pointed tips.
- They are 8-10 cm long and 5-6 cm wide.
- The blossoms are little, greenish-yellow, and borne in bunches.
- The organic products are oval-moulded, greenishyellow, and 2-3 cm long. Chemical Properties
- Giloy is the immune-modulatory herb in enhancing the immune system.
- It possesses anti-inflammatory, anti-bacterial, and antiviral properties in addition to being a strong antioxidant.

- Additionally, it aids in body detoxification and has laxative and diuretic properties

**Table 1: Indian Languages Use a Different Name for Giloy**

Sr. No.	Language	Name
1.	Hindi	Giloy
2.	English	Tinospora cordifolia
3.	Sanskrit	Amrita
4.	Marathi	Gulvel, Giroli
5.	Persian	Gulbel
6.	Punjabi	Gilow
7.	Urdu	Gilo
8.	Kannada	Amrutaballi
9.	Gujarati	Galac, Galo
10.	Oriya	Guluchi
11.	Nepalese	Gurjo

### Classical Name-

Gudhuchi, Madhuparni, Amrita, Amritavallari, Chhniia, Chhinaruha, Chinnodhava, Vatasadani, Tantrika, Kundalini, Chakralakshnika, Dhira, Vishalya, Rasayani, Chandrahasa, Mandali, Devanirmita.

**Table 2: Biological Uses of Giloy Based on its Components**

Sr. No	Parts of Plants	Current source	Substance Separated	Pharmacotherapeutic Uses
1.	Stem Root	Alkaloids	Tinosporin, choline, Magnoflorine, Palmatine	Virus prevention, Cancer prevention, Diabetic prevention, pain relieves

2.	Stem Aerial Root	Steroids	Giloinsterol, Sitosterol	Actuate osteoporosis in early fiery joint pain
3.	Stem	Glycosides	Tinocordiside	Parkinson's disease treatment
4.	Whole Plant	Diterpenoid	Jateorine, Columbin, Tinosporides	Mitigating, Antihypertensive, Vasorelaxant, Germicide
5.	Roots	Other	Giloin, Cordifol, Tinosporic acid	Used to treat nervousness, Anti-HIV protease inhibitor

**Table 3: Biological Uses of Giloy Based on its Chemical Components and Classes**

Sr. N.	Chemical Constituent	Classes	Properties
1.	Berberine	Alkaloid	Neuroprotective, antiviral, anticancer, anti-inflammatory, antidiabetic, immune-modulatory, aphrodisiac property
2.	Tinosporin	Alkaloid	Neuroprotective, aphrodisiac property, ameliorative effect, cardioprotective effects, antiviral, anticancer, anti-inflammatory
3.	Cholin	Alkaloid	Neuroprotective, antiviral, anti-cancer, anti-inflammatory, antidiabetic, immune-modulatory
4.	Tambetarin	Alkaloid	Neuroprotective, antiviral, anticancer, anti-inflammatory, antidiabetic, immune-modulatory
5.	Jatrorrhizine	Alkaloid	Neuroprotective, antiviral, anticancer, anti-inflammatory, antidiabetic, immune-modulatory
6.	Mangnoflorine	Alkaloid	Anticancer, hepatoprotectivactivity
7.	Isocolumbin	Alkaloid	Antiviral, anticancer, anti-diabetic, anti-inflammatory, immunomodulatory
8.	Aporphine	Alkaloid	Neuroprotective, antiviral, anticancer, anti-inflammatory, antidiabetic, immune-modulatory
9.	Tetrahydropalmatinic	Alkaloid	Neuroprotective, antiviral, anticancer, anti-inflammatory, antidiabetic, immune-modulatory
10.	Palmetin	Alkaloid	Neuroprotective, antiviral, anticancer, anti-inflammatory, antidiabetic, immune-modulatory
11.	Makisterone	Steroid	Glucocorticoid initiated osteoporosis in early inflammatory joint pain.
12.	Ecdysterone	Steroid	Glucocorticoid initiated osteoporosis in early inflammatory joint pain.
13.	Beta sitosterol	Steroid	Glucocorticoid initiated osteoporosis in early inflammatory joint pain, actuate cell cycle capture in G2/M stage and apoptosis through c-Myc concealment.
14.	$\beta$ -Hydroxyeedysone	Steroid	Glucocorticoids initiated osteoporosis in early inflammatory joint pain.
15.	Tinocordiside	Sesquiterpenoid	Antiseptic
16.	Tinocordifolin	Glycoside	Treats dementia, motor and cognitive deficits and neuron loss in spine and hypothalamus, immunomodulator.
17.	Tinocordifolioside	Glycoside	Treats dementia, motor and cognitive deficits and neuron loss in spine and hypothalamus, immunomodulator.

**Tinospora cordifolia: Biological roles**

A myriad of biologically active compounds, including alkaloids, diterpenoid lactones,



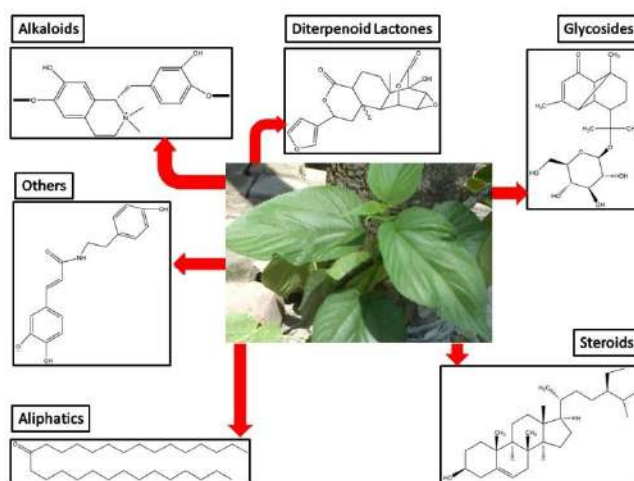
glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds, and polysaccharides have been isolated from different parts of the plant body<sup>11</sup>. These compounds have been reported to have different biological roles in disease conditions thus enabling potential application in clinical research. *Tinospora cordifolia* extracts are

extensively used in various herbal preparations for the treatment of different ailments for its anti-periodic, anti-spasmodic, anti-microbial, anti-osteoporotic, anti-inflammatory, anti-arthritic, anti-allergic, and anti-diabetic properties (Table 4)<sup>11</sup>

**Table 4 : Biological roles of *Tinospora cordifolia***

Active component types	Compounds	Source	Reported biological effects in animals	In humans, cell lines	References
Alkaloids	Berberine	Stem root	Isoquinoline alkaloids have anti-cataract potential in rats. Anti-oxidant activity in mice, anti-cancer in ehrlich ascites carcinoma (EAC) mice, hypoglycemic activity in RINm5F rat insulinoma cell line	Anti-cancer, anti-viral infections, inflammation and immuno-modulatory roles. Neurological, psychiatric conditions, anti-diabetes	[4,5,7-10]
	Choline				
	Palmatine				
	Tembetarine				
	Magnoflorine				
	Tetrahydropalmatine				
	Tinosporin				
	Isocolumbin				
	Tetrahydropalmatine				
	Jatrorrhizine				
Glycosides	Aporphine alkaloids, N-formylasimilobine 2-O-β-D-glucopyranosyl-(1→2)-β-D-glucopyranoside (tinoscorside A, 1)	Stem	Cytotoxic action, protection against iron-mediated lipid peroxidation of rat brain homogenate, anti-oxidant and hydroxyl radical scavenging activities in Swiss albino mice	Treats neurological disorders like ALS, Parkinson's, dementia, motor and cognitive deficits, and neuron loss in spine and hypothalamus. Immunomodulation: IgG increase and macrophage activation. Inhibits NF-κB and act as nitric oxide scavengers to show anti-cancer activities	[11-20]
	Aporphine alkaloids, N-acetyl asimilobine 2-O-β-D-glucopyranosyl-(1→2)-β-D-glucopyranoside (tinoscorside B, 2)				
	18-norclerodane glucoside				
	Furanoid diterpene glucoside				
	Tinocordiside				
	Tinocordifolioside				
Diterpenoid lactones	Furanolactone	Whole plant	Chemopreventive potential in diethylnitrosamine (DEN) induced hepatocellular carcinoma (HCC) in rats	Vasorelaxant: relaxes Norepinephrine induced contractions. Inhibits Ca <sup>++</sup> influx. Anti-inflammatory, anti-microbial, anti-hypertensive, anti-viral. Induce apoptosis in leukemia by activating caspase-3 and bax, inhibits bcl-2	[21-26]
	Clerodane derivatives [(5R,10R)-4R-8R-dihydroxy-2S-3R:15,16-diepoxy-cleroda-13 (16), 14-dieno-17,12S: 18,18-dilactone]				
	Tinosporides				
	β-sitosterol				
Steroids	hydroxy ecdysone	Stems aerial parts	Beta Ecdysone shows anabolic and anti-osteoporotic effects in mammals	IgA neuropathy, glucocorticoid induced osteoporosis in early inflammatory arthritis, induce cell cycle arrest in G2/M phase and apoptosis through c-Myc suppression. Inhibits TNF-α, IL-1 β, IL-6 and COX-2. Activates NF-κB	[27-30]
	Ecdysterone				
	Giloinsterol				
Aliphatic compounds	Octacosanol	Whole plant	Radiosensitizing activity in ehrlich ascites carcinoma mice. Modulating the pro-inflammatory cytokines. Inhibits proliferation of endothelial cells and Ehrlich ascites tumor cells	Anti-nociceptive and anti-inflammatory. Protection against 6-hydroxydopamine induced parkinsonism in rats. Down-regulate VEGF and inhibits TNF-α from binding to the DNA	[8,31-34]
	Heptacosanol				
	Nonacosan-15-one dichloromethane				
Others	3, [α,4-di hydroxy-3-methoxy-benzyl]-4-(4-hydroxy-3-methoxy-benzyl)-tetrahydrofuran	Root whole plant	Insulin-mimicking and insulin-releasing effect. Enhanced phagocytic activity of milk polymorphonuclear cells in bovine subclinical mastitis	Protease inhibitors for HIV and drug resistant HIV. Tyramine is a neuro-modulator. Used to treat anxiety and depression by inactivating neurotransmitters	[10,35-39]
	Jatrorrhizine				
	N-trans-feruloyl tyramine				
	Giloin				
	Tinosporic acid				

NF-κB= Nuclear factor-kappa-B. VEGF=Vascular endothelial cell growth factor. TNF=Tumor necrosis factor. IL=Interleukin. COX=Cyclooxygenase. ALS= Amyotrophic Lateral Sclerosis. IgG=Immunoglobulin G. IgA=Immunoglobulin A



## PHARMACOTHERAPEUTIC USES OF GILOY

### 1. Anti-Allergic [Rhinitis]

- Several clinical studies indicate that giloy is an excellent antiallergic, especially in case of allergic rhinitis.
- In a study done in india, 75 people were given giloy or placebo for a period of 8 weeks. The study reported a significant reduction in all types of rhinitis symptoms in the group that was given giloy.
- Additionally, the eosinophil and neutrophil counts were also found to be significantly decreased. So giloy may have some uses in anti-allergy therapies.
- Giloy has contain the anti-inflammatory and anti- histaminic properties. It helps in the treatment of asthma, allergies, sneezing, nasal discharge, nasal obstruction, nasal pruritus and skin diseases likes eczema, psoriasis, scabges etc<sup>12</sup>.

### 2. Immune Booster

- Giloy is extensively used by the traditional system of medicine for it improves the immunity. I read many studies giloy as one of the top immunity boosting herbs.
- Several studies are read in one study an RCT, 68 HIV positive patients were divided in to two groups. One group was given giloy while the other group was on placebo for a period of

six months. At the end of the assigned period, it was that the group who took giloy exhibited significant improvement in their health along with on decreases in the symptoms. According to the another article giloy has a band of natural biochemicals which are the responsible for the immunomodulatory effects of this herb.

- Fresh Giloy juice aids in boosting defense mechanisms against the pathogens. Giloy stem plays an immuno- protective effect by changing the concentration of immune-supporting enzymes like catalase and stimulating lymphocyte cells. It promotes macrophage activity, which aids in quick recovery. Macrophages are cells that fight pathogens like bacteria, viruses, fungus, protozoa etc.
- When macrophage cells are exposed to *Tinospora cordifolia* extract, they produce more enzymes overall, including "myeloperoxidase," which strengthens the anti- microbial action to safeguard the immune system. Additionally, *Tinospora cordifolia* can boost neutrophil and immune cell function.

### 3. Hyperthermia

- Giloy is used in traditional medicine for treating chronic fevers.

- Giloy is a powerful immunomodulator that is beneficial in treating fevers caused by a variety of etiologies. It can help shorten the length and intensity of viral fevers, which are circumstances where it is particularly helpful.
  - Giloy is work as against pyretic medication, it can decrease signs and side effects of a few perilous conditions like Dengue, Pig Influenza, and Jungle fever too". It serves to further develop blood platelets in fever.
  - All types of fever, including those brought on by bacterial and viral diseases, respond well to *Tinospora cordifolia*. It has immunomodulatory effects that shorten the duration of fevers and stop the spread of infections.
  - Several animals' models suggested the potentials antipyretic activity of giloy, and some clinical studies on the efficiency of giloy in dengue, marked reductions in fever was noted. But no evidence suggests the exact mechanism by which this herb effects body temperatures.
- #### 4. Hepatoprotective
- Giloy is considered one of the most important hepatoprotective herbs. Giloy are more effective in the jaundice. Recent lab and animals' studies indicates that administrations of giloy extract like leaf extract, bark extract, stem extract shown marked hepatoprotective activity.
  - Many studies done, giloy increased the levels of superoxide dismutase while simultaneously decreasing the secretions of various biochemicals from liver amino-transferase, alanine aminotransferase etc. according to the many research these enzyme are secreted in small doses by a healthy liver but in case of a damaged or problematic liver, these enzymes are secreted in much higher amounts. Which then becomes a reason for liver based toxicity in body.
- Clinical lab studies the active constituents of giloy like tinosporine and tinosporone present in giloy can be very useful against hepatitis B and hepatitis E.
  - According to a review article published in the Indian Journal of Traditional Knowledge, a clinical study has also been done to test the hepatoprotective efficiency of giloy. In this study 20 patients of hepatitis were given 4 giloy tablets three times a day for a period of 4 weeks. Significant reductions in liver damage and hepatitis symptoms were observed ai all patients.<sup>13</sup>.
  - Giloy is particularly helpful in treating bowel-related conditions and enhancing digestion. For best effects, combine Giloy powder with some amla, or use it in combination with jaggery to relieve constipation.
  - The Ayurvedic drug Giloy is useful for enhancing digestion. It promotes hunger and aids in the development of digestive enzymes. Additionally, Giloy can help with flatulence, bloating, and indigestion.
- #### 5. Anti-Hyperglycemic
- In traditional and folk medicine systems giloy has been used as a hypoglycemic agents. Several clinical and pre- clinical studies have been done to test efficiency of giloy as an anti-diabetic herbs.
  - Studies indicate that giloy is quite efficient in reducing blood sugar levels. This herb executes its hypoglycemic actions by increasing insulin sensitivity and reducing oxidative stress in the body.
  - Giloy also interfere with some crucial steps in glucose metabolism like gluconeogenesis and glycogenolysis which leads to an overall decreased blood glucose level.
  - The major phyto constituents of *Tinospora cordifolia* are alkaloids, tannins, cardiovascular glycosides, flavonoids, saponins, and steroids which have been



answered to play an enemy of diabetic especially Type 2 diabetes<sup>14,15</sup>.

#### 6. Anti-Hyperlipidemic

- Giloy as a use of anti hyperlipidemic effects, several pre-clinical and clinical studies suggest that regular use of giloy efficiently maintains a healthy lipids profile for the body. Several research studies indicate that giloy administrations significantly reduces the levels of LDL fats, it is known as bad cholestrols and free fatty acids in the body.

#### 7. Anti-Inflammatory

- In old texts of ayurvedic science, Tinospora powder alongside dry ginger powder is demonstrated to be powerful in the treatment of joint inflammation.
- The dose of ginger is to be decreased if the individual has corrosiveness issues.
- There is no after-effect revealed utilizing Tinospora cordifolia in the above-composed measurement. Be that as it may, the abundance dose may cause heat sensation in the body or various individuals can encounter different sorts of impacts as per their body type. All things considered, it isn't encouraged to go on with these cures.
- In India, Tinospora cordifolia is viewed as a help for people and ancestral individuals since it is powerful in fever and jaundice.
- Giloy has anti-arthritis and anti-inflammatory qualities that help treat arthritis and its various symptoms, including joint pain. You can boil the Giloy stem's strength with milk and eat it.
- For the treatment of rheumatoid arthritis, it can be used with ginger. By lowering synthetic pro-inflammatory cytokines such as 1L-1B, 1L-17, and tumor necrosis factor, it lessens swelling, joint discomfort, and inflammation linked to arthritis.<sup>16</sup>

#### 8. Respiratory Use

- Giloy is viable in respiratory issues like colds, hacks, bronchitis, and asthma.

- It assists with releasing the bodily fluid and mucus in the chest and makes it more straightforward to hack it up.
- Giloy likewise has calming properties which help to diminish the enlarging in the aviation routes and make breathing simpler.

#### 9. Ophthalmic Use

- Giloy is extremely compelling in further developing vision. It is a generally excellent cell reinforcement that helps in working on the vision.
- It helps in diminishing oxidative pressure and helps in lessening the irritation of the eyes.
- The Giloy plant is used in different regions of India to improve vision.
- Giloy powder should be boiled in water for this, allowed to cool, and then applied to the eyelids.
- This plant has anti-aging qualities that help lessen wrinkles, fine lines, dark spots, and zits. It offers a person's skin that is smooth and radiant.

#### 10. Anti-HIV

- Giloy may also be beneficial for the people with HIV and other autoimmune disorders.
- Several studies are done to suggested 60 percents of HIV patients who received giloy treatment reported a disease in disease related symptoms, as opposed to only 20 percent who received placebo treatment.
- This study suggested that giloy may improved the immune system of patients with HIV and other immune disorders.<sup>14</sup>.
- TCE has been shown to demonstrate a decrease in the recurrent resistance of HIV virus thus improving the therapeutic outcome<sup>17</sup>. Anti-HIV effects of TCE was revealed by reduction in eosinophil count, stimulation of B lymphocytes, macrophages and polymorphonuclear leucocytes and hemoglobin percentage thus, revealing its



promising role of application in management of the disease.

### 11. Giloy for Menopause

- Menopause not only marks the end of the reproductive phase in women but also comes with certain unpleasant yet natural signs and symptoms.
- It is believed to also have an effect on the immune system. Several studies are indicated that postmenopausal women have significantly lower levels of antibodies and other associated cell that are responsible for keeping a person free from infection.
- As results, women are comparatively more prone to diseases and infections in the later stages of life. Giloy has been excellent immune booster for postmenopausal women.
- In a several clinical studies comprising 200 postmenopausal women, 100 women were given giloy water extract while the other 100 women were given placebo.
- The effect of this treatment was studied by noticing changes in various body parameters and immune cells for a period of six months.
- At the end of study, it was found that the women who received giloy extract had a much better immune function than the women who received placebo. So giloy certainly has a potential in delaying menopause related changes in the immune system.

### 12. Anti-Tumor

- *Tinospora cordifolia* (Giloy) exhibit anti-cancer groupings; the majority of these groupings are demonstrated in critter models utilizing root extract.
- The radiosensitizing activity of DCM extract of *Tinospora cordifolia* has been reported in Ehrlich ascites carcinoma (EAC) mice enabling tumor-free survival via depletion of GSH and glutathione-S-transferase by

elevated levels of lipid peroxidation and DNA damage to tumor cells<sup>18</sup>.

- Giloy have contain the anticancer properties, several studies done to treat various types of cancers like breast cancer, skin cancer and brain tumours. Many in vitro studies suggest that giloy extracts have a potential as an anticancer agent. Other studies are suggested that palmatine alkaloids presents in *tinospora* may be responsible for its anti cancer properties.
- The *Tinospora cordifolia*'s active element factory by strengthening the host liable system's race leukocyte situation and by the immunoglobulin and proliferative activation of stem cells.
- Giloy is an exceptionally well-known fragrance in the Indian Ayurvedic arrangement of medicine<sup>19</sup>.

### 13. Giloy for weight loss

- Giloy is the most important herbal ayurvedic medicines with its amazing weight loss benefits.
- several studies are suggested that this herb is an excellent hypolipidemic and hepatoprotective properties.
- Regular consumptions of giloy would not only reduce the harmful fats like LDL in our body but it also helps keep the liver healthy so our food can be digested more efficiently.

### 14. Giloy for dengue fever

- Unfortunately, for the past 10 years, the number of dengue cases has gradually increased in india.
- Giloy is useful in managing dengue fever. It has anti-inflammatory and anti-pyretic properties. Regular consumption of giloy during dengue fever helps in improving the immune system. It also helps in increasing platelets counts.



- Giloy is not only helps in increasing the blood count but also take care of our liver. Together, it helps to manage dengue fever.
- Giloy play an important role in increasing the WBCs in our body which turn boosts the functioning of the immune system.
- Proper use of giloy can prevent the recurrence of diseases like Dengue, swine flu, malaria, typhoid etc. giloy also works in treating dengue by the maintaining the metabolic rate.
- According to a case study suggested, a female patient of dengue was administered 40 ml of giloy juice BID for a period of 15 days, the persons showed marked improvement in platlets levels along with a reduction in fever and rashes. There are no evident side effects were seen.
- In another studies; 200 people with low platelets count were a 5 ml mixture of papaya and giloy leaf extracts for 5 days. Significant improvement in platlets levels was observed in all patients. So, it can be safely said that giloy or tinospora gas potential in preliminary therapies against dengue<sup>20</sup>.

#### **15. Giloy for arthritis**

- Giloy have contain the anti-inflammatory properties. Several pre-clinical studies suggested that giloy is an excellent agent for reducing arthritic inflammation and bone damage.
- *Tinospora cordifolia* have been reported to affect the proliferation, differentiation and mineralization of bone like matrix on osteoblast model systems in vitro and hence finds potential application as an anti-osteoporotic agent<sup>21</sup>.
- And another studies done giloy reduced the inflammations by suppressing the activity of certain cytokines and Tcells, which are mainly responsible for the inflammatory activity of the body.

- The most important role of giloy to decreased the activity of osteoclasts, which are cells responsible for the bone resorption and remodelling in humans.

#### **16. Giloy as an antibiotics**

- Several in-vitro studies suggested that giloy or *tinospora* stem extract show variable antimycobacterial activity against a number of pathogenic bacteria.
- Other studies suggested that *pseudomonas* spp was most sensitive to this herb while *klebsiella* and *proteus* showed the moderate susceptibility.
- Pre-clinical studies indicate that giloy or *tinospora* is an excellent antimicrobial against peritonitis caused by *E coli*.
- However, due to lack of human studies, not much can be confirmed about the antimicrobial aspects of this herb.

#### **17. Giloy for asthma**

- *Tinospora* is widely used for the benefits in relieving in chronic cough, asthma, and asthma associated symptoms.
- Several per clinical studies suggested that giloy extract is very effective in reducing hypersensitivity and allergic responses that are associated with asthma.
- Review article published in pharmacognosy reviews mentions *tinospora* or giloy as potentials anti asthmatic herbs.

#### **18. Giloy for ulcer**

- *Tinospora* are used in Ayurveda as a remedy for indigestions, flatulence and stomach bloating.
- Several laboratory based studies suggested that giloy extract are very efficient in reducing gastric ulcer symptoms along with an increased in the stomach ph and decreasing acidity.

- But due to the absence of human based studies, it is difficult to confirm the effects of this herb in anti ulcer treatment<sup>22</sup>.

#### 19. Giloy for skin wounds

- Giloy (*Tinospora cordifolia*) is an ayurvedic fragrance that has been assumed in Indian medicines for a long time.
- Giloy is especially important in injury mending, because of its capacity to advance collagen coinage and epithelial cell evolution. Also, Giloy has antibacterial and antifungal groupings, which can support preventing contamination in injuries.
- Several animals' studies suggest that *tinospora* or *giloy* is an effective wounds healing agents. It was further suggested that topical applications of *giloy* not only heals wounds faster but it also leads to a more efficient development of connective tissue on the injury sites. Unfortunately, no human models are available to confirm the wound healing potential of this herb<sup>23</sup>.

#### 20. Giloy for anxiety and depression

- Several studies in India strongly suggested that *giloy* has a potential reducing anxiety and depression.
- In vivo studies suggest that the *giloy* is as efficient as some of the commonly used anti-anxiety drugs. However, research on human models is yet to be established. *Giloy* is also one of the tpo herbs used in memory boosting formulations.<sup>24</sup>.
- 21. *Giloy* for memory
- *Tinospora* has also been shown to enhance cognition in normal rats and reverse cyclosporine induced memory deficit.
- Both alcoholic and aqueous extract of *tinospora* produced a decreased in learning scores in herbs William maze and retention memory, indicating enhancement of learning and memory.<sup>25</sup>.

#### HOW GILOY IS USED ?

*Tinospora* or *giloy* can be taken in the form of stem or leaf decoction / kada but it is more commonly used in the form of powder. Other products like *giloy* tablets, capsules and *giloy* juice can be consumed if prescribed by homeopathic doctors.

#### Gioly Dosage

1-2 gm of *giloy* stem or *giloy* leaf powder and up to 5 ml of *giloy* stem or leaf juice can be taken without warring much about its side effects. But the correct dosage for any herbs varies as per the patients age, health and other factors.

- Side Effects
- Hypoglycemic effects
- Autoimmune diseases
- Constipation
- Harmful For Pregnant Women's
- *Giloy* is an herb plant and till now there is no side effects found by consuming *giloy*. But if *giloy* is consumed with any other diabetic medicines then one may lead to low blood sugar level.
- Still its side effects are unknown for or lactating mothers so it will be better to remain at a safe side and not to consume *giloy* during lactation.
- *Giloy* are used to bring down our blood glucose level so if *giloy* consumed along with diabetes medicine then and you may experience hypoglycaemia in which blood sugar level becomes too low.
- *Giloy* is very effective for our digestive system but sometimes in some cases it may also result in constipation by making poor bowel movement and very dry and hard stool.
- It will be better to stop using *giloy* if you need to go for a surgery as using *giloy* will bring down your blood sugar level too low and may affect your surgery.
- No evidence is found against the impact of *giloy* on pregnant women so it will be best

option to stop using this herb during pregnancy to be on the safer side.<sup>26,27</sup>.

## CONCLUSION AND FUTURE PROSPECTIVES

A plant with as diverse a role as *Tinospora cordifolia* is a versatile resource for all forms of life. There are reports as already discussed that the plant extracts have active compounds in the form of alkaloids, glycosides, lactones and steroids. All these active compounds have immunomodulatory and physiological roles of different types, thereby demonstrating the diverse versatility of the plant.

Giloy or Amrita has been the oldest scientific ayurvedic medications to treat complex diseases like diabetes, Alzheimer, osteoporosis, glaucoma, tumor, pyrexia etc. It has been widely used by many of people in many of countries like China, Bhutan, Nepal, Korea and India. Since it has wide proven in increased the action of immune system in body during covid-19.

It was proven effects on treating asthma and asthma like symptoms. Every part of this plant has a unique effects in treatment of various diseases. Hence called as amrita. It also has its major role in thrombocytopenia or dengue fever.

Since giloy is being the widely efficient and potent medicinal plant but should be used carefully in appropriate dosage and avoided for pregnant women during their pre- terms.

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## CONFLICT OF INTEREST

The author reports no conflicts of interest that are directly relevant to the content of the review article.

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