

**TINOSPORA CORDIFOLIA(GILO): A REVIEW BASED ON ITS  
MEDICINAL PROPERTIES**

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**ABSTRACT**

*Tinospora cordifolia* (Gilo) is prominent in traditional medicine systems due to its diverse therapeutic applications and bioactive compounds. This review explores the botanical characteristics, nutritional composition, and pharmacological properties of *Tinospora cordifolia*. The plant is known for its immunomodulatory, anti-inflammatory, antioxidant, and adaptogenic effects, making it an invaluable resource in treating ailments like fever, diabetes, jaundice, and skin disorders. Its bioactive compounds such as alkaloids, glycosides, and diterpenoids—have shown significant potential in combating diseases and promoting overall health. By integrating insights from historical and modern perspectives, this study highlights the importance of *Tinospora cordifolia* as a cornerstone in developing herbal medicines and biopharmaceuticals. Further research on its safety profile and therapeutic efficacy can pave the way for its enhanced application in contemporary medicine.

**KEY WORDS:** *Tinospora Cordifolia* (TC), Gilo, Antidiabetic, Traditional medicine.

## INTRODUCTION

Throughout human history, nature has been a source of fascination and reliance. Our primitive ancestors depended on plants for food, shelter, and medicine. Plants played a crucial role in treating diseases, paving the way for modern medical systems. Traditional medicine remains vital today, especially in developing countries, where a significant portion of the population relies on it for healthcare.

Medicinal plants are a cornerstone of traditional medicine, serving as the foundation for synthetic and herbal drug production. These plants have been used for centuries in various forms, offering a rich source of healing properties. Traditional healing systems, including Ayurveda, Unani, and Chinese medicine, rely heavily on herbs for treatment. Researchers emphasize the significance of herbal medicine in managing various diseases, citing its accessibility and affordability as key factors. The importance of plants in human health gained prominence with the introduction of aspirin in 1897, a synthetic derivative of salicylic acid found in willow bark. Other conventional drugs, such as digoxin, quinine, and morphine, also originate from plants. According to the WHO, approximately 70% of the global population relies on plant-based drugs. Herbal medicine effectively treats various conditions, including malaria, heart diseases, and diabetes, with fewer adverse effects, making it a sought-after primary healthcare option.

One of the most common dioecious plants is *Tinospora cordifolia*, commonly known as "Giloy" "Amrita" or "Guduchi", is a climbing shrub that grows up to 1200 meters above sea level native to India, Myanmar, and Sri Lanka. This endangered herb is highly valued in Ayurvedic medicine for its adaptogenic and aphrodisiac properties. Traditionally, it's used to treat various ailments, including fevers, diabetes, jaundice, skin diseases, and anemia. Its anti-inflammatory, immunomodulatory, and antioxidant properties make it a potential candidate for developing biopharmaceuticals to combat various diseases.

In medication, the stems, roots, and leaves of TC are used. TC contains a diverse range of bioactive compounds, including glycosides, phenolics, alkaloids, terpenoids, lignans, steroids, and polysaccharides. Notably, its leaves are rich in protein, phosphorus, and calcium. Methanol extracts from the leaves also contain high amounts of alkaloids, glycosides, and flavonoids. The plant's therapeutic properties are attributed to three primary components: alkaloids, terpenoids, and polysaccharides, including protoberberine(1).

## MATERIAL AND METHODS

This review paper synthesizes information from a vast array of published research studies on *Tinospora cordifolia*, sourced from national and international journals, books such as Tankeeh-ul-Mufradat, Bustan-ul-Mufradat, Unani Pharmacopeia of India, and other publications. A comprehensive analysis of existing data and scientific literature was conducted to evaluate the therapeutic applications and functional significance of *Tinospora cordifolia*.

### Vernacular Names(2,3)

Gilo	Arabic
Amarlata	Assamese)
Gadancha, Guluncha, Giloe	Bengali
K'uan chu Hsing	Chinese
Culancha	French
Tinospora	English
Gado, Galo, Gulo	Gujerati
Giloe, Gulbel, Gurcha	Hindi
Amrytu, Sittamrytu	Malayalam
Ambarvel, Giroli, Gulvel	Marathi
Garjo	Nepali
Gulancha	Oriya
Amrutoballi, Amrulballi, Madhuparne, Uganiballi	Kannada
Gulbel	Persian
Gilo	Punjabi, Kashmiri
Amrita, Guduchi	Sanskrit
Gurjo	Sikkikim
Amridavalli, Niraidarudian	Tamil
Guduchi, Iruluchi	Telugu
Guruch	Urdu

### Synonyms(5)

**Giloy:** is a divine elixir that has kept celestial beings eternally youthful and shielded from old age.

**Guduchi:** That which protects.

**Amruta:** That which can act like the celestial nectar which can make the person immortal.

**Chakrangi, Chakralakshanika:** Referring to the radiating medullary rays visible on the transverse section.

**Chinnaruha, Chinnodbhava:** propagation by stem cuttings

**Taxonomic classification:**

Kingdom: Plantae – Plants

Subkingdom: Tracheophyta –Vascular Plants

Super-division: Spermatophyta-Seed bearing plants

Division: Magnoliophyta-Flowering

Class: Magnoliopsia-Dicotyledons

Subclass: Polypeptalae-Petals are free

Series: Thalamiflorae-Many stamens and flower hypogynous

Order: Ranunculales

Family: Menispermaceae-The Moonsee family

Tribe: Tinosporeace

Genus: *Tinospora*

Species: *cordifolia*

**Botanical description:** *Tinospora cordifolia* is a sprawling, hairless, and deciduous climber that grows on various trees and hedges. It produces distinct male and female flowers. The stem has a green, succulent bark covered with a thin brown layer and features wart-like lenticels. As the stem dries, it shrinks, and the bark separates from the wood. The branches give rise to slender, fleshy roots that hang downward, characterized by a tubercled, pale, and sometimes shiny bark. Leaves membranous, 7-9 nerved, 5-10 cm, roundish, cordate, or heart-shaped (giving the name *cordifolia* to the plant) with a 2.5- 7.0 cm petiole. The flowers bloom in summer. Racemes are rather lax, 5.0 cm, elongating, and often longer than leaves. The male flowers are small, yellow or green, and occur in clusters in the axils of small subulate bracts. Sepals are 6, the outer 3 are very small, ovate-oblong, and acute, and the inner 3 are larger, membranous, broadly elliptical, concave, and yellow. Petals are 6, equal, broadly spatulate, each loosely embracing a stamen, claw cuneate, reflexed to apex, pistillode. Female flowers are usually solitary, similar to the male flower, but sepals are green, margins not reflexed, staminode short, and linear. Carpels 1-3 in number, widely separated on the short fleshy gynophores, dorsally convexed, and scarlet. The fruit is of the size and shape of a large pea turns from green to red when ripe in winter and is mucilaginous(3).

**Nutritive Composition of *Tinospora cordifolia*:** *T. cordifolia* contains high fiber (15.9%), sufficient protein (4.5%-11.2%), sufficient carbohydrate (61.66%), and low fat (3.1%). Its nutritive value is 292.54 calories per 100 g. It has high potassium (0.845%), high chromium

(0.006%), sufficient iron (0.28%), and sufficient calcium (0.131%), important in various regulatory functions(3). The use of TC in cookies has increased the protein, iron, copper, zinc, and antioxidants, while the fat content has been reduced(4).

**Temperament/Mizaj:** Hot1 Dry1(5)

**Action mentioned in Unani literature:**

Antipyretic (Dafae humaa), Stomachic (Muqawwi meda), Astringent (Qabiz), Antihelminthic (Qatil kiram-e-shikam), Vermicidal (Qatil jarasim), Spermetogenic (Muallid-e-Mani), Aphrodisiac (Muqawwi-e-Bah), Diuretic (Mudr-e-bol), Blood purifier (Musaffi dam), Resolving of inflammation (Muhallil awram), spasmolytic (Dafi'-e-Tashannuj), Hypoglycemic (Naqis-e- sukru-alddam), and hepatoprotective (Muqawwi jigar) activities(5–10)

**Therapeutic uses mentioned in Unani literature:**

It is used in all kinds of fevers (Humma, Humma Diq) and cough (Sual), all types of diarrhea (Ishaal), jaundice (Yarqaan), palpitation (Khafqaan) gonorrhea (Suzaak), anemia (Qillat-i-dam), skin diseases (Amraaz-e-jild), urinary tract infections (Harkatul Bol), hemorrhage (Jiryaan), dyspepsia (Zaof-e-Ishteha), itchiness (Zarab wa Hikka), acne (Basoor), wound (Qaroo), helps to kill intestinal worms, effective in leprosy(Juzam), leucorrhea and snake bite, syphilis (Atishak), and joint pain (Waja-ul-mafasil). Moreover, It is effective in hiccups and filariasis when given with dry ginger(sonth) powder and relieves constipation if given with jaggery. The decoction/extract of fresh Gilo (Gilo sabz) is more beneficial. In the above-mentioned diseases, Gilo is used as a concoction (Kheesanda)(8–11).

**IDENTITY, PURITY AND STRENGTH:**

**For dried drug**

Foreign Matter : Not more than 2 percent  
Total ash : Not more than 16 percent  
Acid-insoluble ash : Not more than 3 percent  
Alcohol-soluble extractive: Not less than 3 percent  
Water-soluble extractive : Not less than 11 percent

**For fresh drug**

Foreign matter : Nil

Moisture content : 75 percent

**Dosage:** 3-5 gm(9), 5-10 gm(5)

**Substitute/Badal:** Satte-e-Gilo (*Tinospora cordifolia* (Willd.) Miers. – Extract)

**Correctives/Musleh:** Tabasheer(*Bombusa arundinacea* Retz.), Elaichi (*Elettaria cardamomum* Maton)

**Compound Formulations:** Safoof-e-satt-e-gilo silajeet, Safoof-e-qalayi qushta, Arq hara bhara, Habb-e-suzaak, Sufoof-e-Satt-e-Gilo-Sartani

**Adverse effect/Muzarrat:** Not found or not mentioned in literature.

**Evaluated Toxicity of *Tinospora Cardifolia*:** The median lethal dose (LD50) of *T. cordifolia* has been more than 1000 mg/kg, which showed some gross effects like initial excitement, followed by mild depression, dullness, decreased respiration, and reduced SMA in female albino rats(12), and might be toxic to the heart, liver, and kidneys after long-term administration(13). Extract of *T. cordifolia* also shows teratogenic effects on Zebrafish (*Danio rerio*) embryos(14).

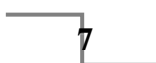
**Table 1: Ethnomedicinal importance of *Tinospora cordifolia*(3)**

S. No.	Plant part	Ethnobotanical use
1	Leaves	Used in the treatment of gout and ulcer
2	Stem	The stem is bitter stomachic, diuretic, stimulates bile secretion, enriches the blood, cures jaundice, and is useful in skin diseases, The <b>juice</b> is useful in diabetes, vaginal and urethral discharges, low-grade fevers, and splenomegaly. <b>(Stem as an infusion)</b> used as a vermifuge and also used to treat jaundice <b>(Stem as decoction)</b> antipyretic, antimalarial, and also used for washing sore eyes and syphilitic sores. <b>Starch (statue)</b> obtained from stem used for chronic diarrhea and some form of obstinate chronic dysentery, deals with intestinal problems and improves digestion
3	Stem+ Root	Combination with other drugs is used as an antidote to snake bites and scorpion stings and also possesses an Ameliorative effect(15)
4	Fruit	Dried fruit with ghee or honey is used as a tonic and treatment for jaundice and rheumatism.
5	Bark	Anti-allergic, anti-spasmodic, anti-leprotic
6	Extract	Methanolic ex.- Anti-tumor(15,16), Antiatherogenic(18) Ethanollic, aqueous ex.- Radioprotective(19), Cytoprotective(20) Chloroform, hexane, ethyl acetate, dichloro methane ex.- inhibit the salivary and pancreatic amylase(21)
	NS	Urinary diseases, syphilis, skin diseases, bronchitis
	NS	Promote longevity and increase the body's resistance. Stimulates the immune system

NS=not specify

**Table 2: Bioactive Compounds and Their Pharmacological Activities in Humans and Animals.**

Phytochemicals	Part Used	Pharmacological Activity in Humans	Pharmacological Activity in Animals	References
<b>Alkaloids</b> Berberine, Choline Palmatine, Tembetarine Magnoflorine, Tetrahydropalmatine Tinosporin, Isocolumbin Tetrahydropalmatine Jatrorrhizine Aporphine alkaloids, N-formylasimilobine 2-O-β-D-glucopyranosyl-(1→2)-β-D-glucopyranoside (tinoscorside A, 1) Aporphine alkaloids, N-acetylasimilobine 2-O-β-D-glucopyranosyl-(1→2)-β-D-glucopyranoside (tinoscorside B, 2)	Stem root	Anti-cancer, anti-viral activity, anti-inflammatory, immunomodulatory, Neurological and anti-diabetic activity	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	(15,22–24)
<b>Glycosides</b> 18-norclerodane glucoside Furanoid diterpene glucoside Tinocordiside Tinocordifolioside Cordioside Palmatosides	Stem	Treats neurological disorders like ALS, Parkinsons’ disease, dementia, motor and cognitive deficits, and neuron loss in the spine and hypothalamus. Immunomodulation: increase in igG and macrophage activation. Inhibits NF-κB and acts as nitric oxide scavengers to show anti-cancer activities	Cytotoxic action, protection against iron-mediated lipid peroxidation of rat brain homogenate, antioxidant and hydroxyl radical scavenging activities in Swiss albino mice	(25–28)
<b>Diterpenoid lactones</b> Furanolactone Clerodane derivatives [(5R,10R)-4R-8R-dihydroxy-2S-3R: 15,16-diepoxy-cleroda-13(16), 14-dieno-17,12S:18,1S-dilactone] Tinosporides	Whole plant	Vasorelaxant activity: relaxes Norepinephrine-induced contractions. Inhibits Ca <sup>++</sup> -influx. Anti-inflammatory, anti-microbial, anti-hypertensive, anti-viral, Anti-leukemic activity	Chemopreventive potential in diethylnitrosamine (DEN) induced hepatocellular carcinoma (HCC) in rats. Induces apoptosis in leukemia by activating caspase-3 and bax, inhibits bcl-2	(29–31)
<b>Steroids</b>	Stems	Anti-osteoporotic activity in	Beta-Ecdysone	(32,3



β-sitosterol hydroxy ecdysone Ecdysterone Giloinsterol	aerial parts	glucocorticoid-induced osteoporosis in early inflammatory arthritis, induces cell cycle arrest in the G2/M phase and apoptosis through c-Myc suppression. Inhibits TNF-α, IL-1 β, IL-6 and COX-2. Activates NF-κB	shows anabolic and anti-osteoporotic effects in mammals	3)
<b>Aliphatic compounds</b> Octacosanol Heptacosanol Nonacosan-15-one dichloromethane	Whole plant	Anti-nociceptive and anti-inflammatory activity. Down-regulate VEGF and inhibit TNF-α from binding to the DNA	Radiosensitizing activity in Ehrlich ascites carcinoma mice. Protection against 6-hydroxydopamine-induced parkinsonism in rats Modulating the pro-inflammatory cytokines. Inhibits proliferation of endothelial cells and Ehrlich ascites tumor cells	(15,3 4)
<b>Others</b> 3, (a,4-di hydroxy-3-methoxy-benzyl)- 4- (4-hydroxy 3-methoxy-benzyl)-tetrahydr ofuran Jatrorrhizine N-trans-feruloyl tyramine Giloin Tinosporic acid	Root whole plant	Protease inhibition activity in HIV and drug-resistant HIV. Tyramine is a neuromodulator used to treat anxiety and depression by inactivating neurotransmitters	Insulin-mimicking and insulin-releasing effect. Enhanced phagocytic activity of milk polymorphonuclear cells in bovine subclinical mastitis	(27,3 5-37)

**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**

### CONCLUSION

The findings in this review underscore the immense medicinal potential of *Tinospora cordifolia*. From traditional Unani & Ayurvedic practices to modern pharmacological applications, this plant has demonstrated a wide range of therapeutic benefits, including immunomodulation, anti-inflammatory, and antioxidant properties. Its diverse phytochemical composition contributes to its effectiveness in treating chronic and acute diseases, such as diabetes, fever, and inflammatory conditions. While *Tinospora cordifolia* has a well-established safety profile in traditional usage, modern toxicological studies caution against

excessive or long-term consumption without further investigation. Continued exploration of its bioactive compounds and mechanisms of action can strengthen its role in integrative medicine, fostering the development of novel plant-based therapeutics. Ultimately, *Tinospora cordifolia* represents a vital link between ancient wisdom and modern science, reaffirming the enduring value of medicinal plants in healthcare.

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