

## An Ayurvedic Drug Review of Giloy (Tinospora Cordifolia)

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### Abstract

Giloy (Tinospora Cordifolia) plant is an important medicinal drug of the Ayurvedic system. All the parts of the Giloy are immensely useful due to the presence of different compounds of pharmaceutical importance belonging to various groups as alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoid, and phenolics. Many names of Giloy have been given in Ayurveda like Amrita, Guduchi, Chakralakshanaa etc. Due to the health benefits of this herb, it has been named Amrita. Giloy is an antipyretic that reduces the symptoms of many life-threatening diseases like malaria and dengue and cancer. Improves blood, Giloy is a vine rich in pure herbal properties, every part (stem, leaves, root) of which is used to cure diseases. Giloy has antioxidant properties that help in fighting many dangerous diseases. Giloy removes toxins from the kidney and liver, purifies the blood and helps fight all kinds of bacteria causing diseases. Giloy (Tinospora Cordifolia) is a chief herbal drug of traditional system as well as Ayurveda. Giloy is one of the most useful and powerful Ayurvedic herbal drug that acts as a tonic Aphrodisiac, it is also anthelmintic, antirheumatic, recurrent, Antipyretic, blood purifier, heart booster, Carminative, digestive, diuretic, Anti-Cancer Activities, Anti-oxidant Activity, expectorant, Carminative, energizing, appetite stimulant and anti-inflammatory.

**Keyword** – Ayurveda, Giloy, Guduchi, Tinospora Cordifolia, Antimutagenic, Immunity plant, Chemical constituents.

### Introduction –

Giloy (Tinospora Cordifolia) is an herbaceous shrub belongs to Menispermaceae family. It is commonly known, as “Amrita” or “Guduchi” or “heart moon leaved” herbal drug and is well known for its medicinal properties in traditional Ayurvedic medical system.<sup>1</sup> Giloy is a natural ayurvedic medicine because of the presence of natural chemical constituents. Giloy has various therapeutic properties such as rheumatism, urinary disorder, skin diseases, diabetes, anaemia, inflammation, allergic condition, radio protective properties, jaundice, anti-periodic, etc.<sup>2</sup>



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### 1. Image: Giloy – Leaf, Stem, Fruit.

#### Sanskrit Shloka –

अथ गुडूची

चन्द्रहासा वयस्था च मण्डली देवनिर्मिता । गुडूची 'कटुका तिक्ता 'स्वादुपाका रसायनी ॥८॥

संग्राहिणी कषायोष्णा लघ्वी बल्याऽग्निदीपिनी । दोषत्रयामतृद्धाहमेहकासांश्च पाण्डुताम् ॥९॥

कामलाकुष्ठवातास्त्रज्वरक्रिमिवमीन्हरेत् । प्रमेहश्चासकासाराः कृच्छ्रहृद्रोगवातनुत् ॥१०॥

Giloy is bitter, pungent and sweet in taste and contains sweet juice in Vipak, chemical, collector, heat, small, forceful, fire lamp and tridosha, mango, trisha, Dah, Meh, Kas, Pandurog, Kamla, leprosy, varicose, fever, to Krimi and VabhiImatica removes. Vata is the destroyer of all diseases.<sup>3</sup>

**Ayurvedic properties of Tinospora Cordifolia** – There are following properties of Tinospora Cordifolia<sup>4,5</sup>–

1.	<b>Rasa</b>	Tikta, Kashaya
2.	<b>Guna</b>	Guru, Snigdha
3.	<b>Virya</b>	Ushna
4.	<b>Vipaka</b>	Madhura
5.	<b>Karma Prabhava</b>	Doshatrayahara, Vedanasthapana, Kusthaghna, Chhardinigravana, Deepana, Pachana, Pittasaraka, Anulomana, Sangrahi, Krimighna, Hridya, Raktashodhaka, Raktavardhaka, Kaphaghna, Vrishya, Balya, Pramehahara, Mootrajanana, Jwaraghna, Dahaprashamana, Rasayana.

**Botanical Classification of Giloy (Tinospora Cordifolia)** – There is botanical classification of Tinospora Cordifolia<sup>6</sup>–

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Ranunculales
Family	Menispermaceae
Genus	Tinospora
Species	T. Cordifolia

**Vernacular Names of Giloy (Tinospora Cordifolia)** – Vernacular name of Giloy in different languages are following<sup>7</sup>–

<b>Language</b>	<b>Name</b>
<b>Botanical Name</b>	Tinospora cordifolia
<b>Sanskrit</b>	Chakralakshana, Amruta, Amrita, Guduchi, Chakrangi, Chandrasaha, Chinnaruha, Chinnodbhava, Jwarari,

	Jwaranashini, Ayattha, Amarwalli, Kundali, Devanirmita, Dhara, Nagakanyaka, Bhashakpriya, Madhuparni, Somavalli, Vyavastha, Jivantika, Tantrika.
<b>Hindi</b>	Gurcha, Guduchi, Giloy
<b>English</b>	Tinospora, Indian Tinospora, Heart Leaved Moonseed, Heart Leaved Tinospora, Tinospora Gulancha
<b>Punjabi</b>	Gilo
<b>Marathi</b>	Gulvel
<b>Kashmiri</b>	Amrita, Gilo
<b>Gujrati</b>	Gado, Galac
<b>Malayalam</b>	Chittamrutu
<b>Oriya</b>	Guluchi
<b>Bengali</b>	Gulancha, Giloy
<b>Tamil</b>	Amrida, Valli, Silam, Attigai, Amrithavalli.

**Plant Parts Used of *Tinospora Cordifolia***– Each part of the Giloy has therapeutic value, the stem is the most frequently used part of the medicinal preparations.<sup>8</sup>The whole plant possesses diverse health benefits and has been used as traditional medicine against many human ailments since the distant past so the following parts used of *Tinospora Cordifolia*<sup>9</sup>–

- A. Stem
- B. Leaves
- C. Root
- D. Flowers

**Each part of Giloy (*Tinospora Cordifolia*) used to treat various physical, mental disorder or illness<sup>10</sup>–**

S.N.	Parts of Plant	Pharmacological Properties
1.	Stem	T. Cordifolia used to treat various ailments.
2.	Leaves	Mental disorder, anti-ulcers, hypoglycaemic, antiarthritis.
3.	Roots	Anti-ulcer activity, anti-microbial
4.	Flower	Anti-toxicants, aphrodisiac, anti-inflammatory
5.	Whole plant	Anti-fungal, anti-microbial, anti-cancer, antiallergic, anti-diabetic, against AIDS, anti-inflammatory, as an immunomodulator, antioxidants.

**Morphology of Giloy (*Tinospora Cordifolia*)** – There are following chemical constituents to different part of the *Tinospora Cordifolia* –

**Stem** – The stem is bitter, stomachic, diuretic. The leaves afford a good fodder for cattle.<sup>11</sup>

**Root** – Roots of this plant are aerial, thread like, long filiform, fleshy and arise from the branches. These aerial roots are characterized by tetra to penta-arch primary structure. However, cortex of root is divided in to outer thick walled and inner parenchymatous zone.<sup>12</sup>

**Leaves** – The leaves afford a good fodder for cattle. It has tubercles on the surface of grayish stem.<sup>13</sup>

**Flowers** – Flowers grow during summer; and fruits, during winter. Male and female flowers are formed on separate branches. Male flowers are clustered while female flowers are usually single.<sup>14</sup>

**Fruits** – Fruits are pea shaped, shiny, druping and become red when fully grown. Seeds are usually hooked or reniform.<sup>15</sup>

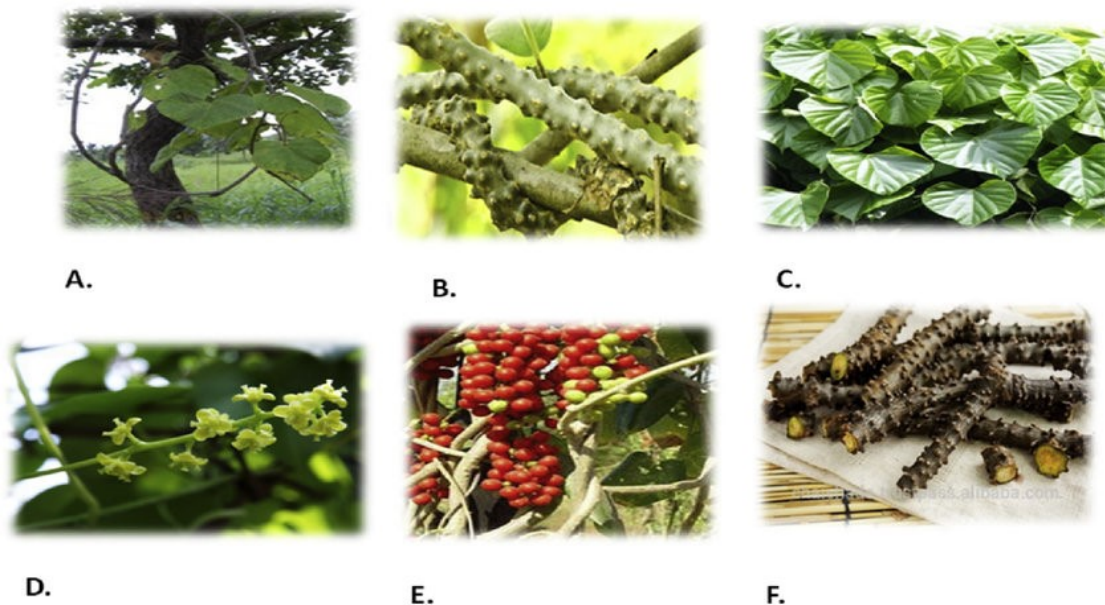


Fig:<sup>16</sup> *Tinospora Cordifolia* A. Stem, B. Root, C. Leaves, D. Flower, E. Fruit, F. Seed.

**Pharmacodynamic Properties of Giloy (*Tinospora Cordifolia*) according to texts of Ayurveda –**

Name of text	Properties				
	Rasa	Guna	Virya	Vipaka	Prabhava
Bhavaprakash Nighantu <sup>17</sup>	Tikta, Kashaya	Guru, Snigdha	Ushna	Madhura	Vata, Pitta, Kapha Shamak, Rakta Shodhak, Jwar, Trishna, Vatarakta Nashak.
Dhanvantarinighantu <sup>18</sup>	Tikta, Kashya, Medhya	Guru	Ushna	Katu	Vata, Pitta, Kapha rog Nashak, Jwarghna, Trushna, Vatarakta, Pandurog, Kasrog Nashak, Balya.

Kaidevniaghantu <sup>19</sup>	Kashya, Katu, Tikta, Medhya	Laghu	Ushna	Madhura	Vata, Pitta, Kapha Nashak, Kushtha, krumi, Vatarakta, Pandurog, Kasrog Nashak.
Ashtanga Hridaya <sup>20</sup>	Tikta	-	Shita	Katu	Vatakaraka, Kaphapittashamaka
Gunaratnamala <sup>21</sup>	Kashaya, Katu, Tikta,	Laghu	Ushna	Madhura	Tridoshahara

**Chemical constituents present in different parts of Giloy (*Tinospora Cordifolia*)** – Chemical Constituents isolated from different parts of *Tinospora Cordifolia* are following –

Serial Number	Active Component	Chemical- Compound	Parts of Plant	Biological Activity
1.	Alkaloids <sup>22-27</sup>	Berberine, Choline, Tembetarine, Magnoflorine, Tinosporin, Palmetine, Isocolumbin, Aporphine alkaloids, Jatrorrhizine, Tetrahydropalmatine	Stem, Root	Anti-viral infections, Anticancer, anti-diabetes, inflammation, Neurological, immunomodulatory, psychiatric conditions
2.	Diterpenoid Lactones <sup>28-32</sup>	Furanolactone, Clerodane derivatives [(5R,10R)-4R-8Rdihydroxy-2S-3R:15,16-diepoxy-cleroda-13 (16), 14-dieno-17,12S:18,1Sdilactone], Tinosporon, Tinosporides, Jateorine, Columbin	Whole Plant	Vasorelaxant: relaxes norepinephrine induced contractions, inhibits Ca <sup>++</sup> influx, anti-inflammatory, antimicrobial, antihypertensive, anti-viral. Induce apoptosis in leukemia by activating caspase-3 and bax, inhibits bcl-2.
3.	Glycosides <sup>33-39</sup>	18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside,		Treats neurological disorders like ALS, Parkinsons, Dementia, motor and

		Tinocordifolioside, Cordioside, Cordifolioside Syringin, Syringinapiosylglycoside, Pregnane glycoside, Palmatosides, Cordifolioside A, B, C, D and E	Stem	cognitive deficits and neuron loss in spine and hypothalamus, Immunomodulation, Inhibits NF-kBand act as nitric oxide scavenger to show anticancer activities.
4.	Steroids <sup>40-42</sup>	$\beta$ -sitosterol, $\delta$ -sitosterol, 20 $\beta$ -hydroxy ecdysone, Ecdysterone, Makisterone A, Giloinsterol	Shoot	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 $\alpha$ , IL-1 $\beta$ , IL-6 and COX-2.

**Medicinal Uses of Giloy (Tinospora Cordifolia)** – According to Ayurveda, all three Giloy leaves, root and stem are very beneficial for health. A large number of antioxidants are found in Giloy, as well as anti-inflammatory and anti-carcinogenic properties are also found in it. Due to the divine properties of Giloy, this prototype gives relief from fever, jaundice, rheumatism, Pitta, diabetes, constipation, acidity, disorders, anemia, indigestion, urinary cholesterol, etc. Giloy is a very useful herbal drug that controls Vata, Pitta and Kapha, Giloy is one of them.<sup>43</sup>

**Pharmacological activities of Giloy (Tinospora Cordifolia)** – From the notable traditional use of Giloy (Tinospora Cordifolia) the biological activities of various research papers have been studied to show that it possesses various therapeutic powers due to its chemical composition such as anti-oxidant, Analgesic activity, antiviral antidiabetic, anticancer and immunomodulatory activities. In this paper of ours, literary survey of Giloy (Tinospora Cordifolia), biological and pharmacological activity research has been spotlighted. The whole plant of Giloy (Tinospora Cordifolia) can be used for medicinal purposes in the medical system. Some main uses are following –

The active principles from T. cordifolia enhance host immune system by increasing immunoglobulin and blood leukocyte levels and by the stimulation of stem cell proliferation. It has the ability to reduce solid tumour volume by 58.8%, which is comparable to cyclophosphamide, a known chemotherapeutic agent. These immune stimulating properties can be used in the prevention of tumour mediated immunosuppression and hence could be a drug

choice for various cancers. Cancer is one of the most dreaded diseases of the 20th century and spreading further with continuance and increasing incidence in 21st century. In the United States, as the leading cause of death, it accounts for 25% of all the deaths in humans presently. It is considered as an adversary of modernization and advanced pattern of socio-cultural life dominated by Western medicine. Multidisciplinary scientific investigations are making best efforts to combat this disease, but the sure-shot, perfect cure is yet to be brought into world medicine.<sup>44,45,46</sup>

**Anti-Cancer Activities:** *T. cordifolia* shows anti-cancer activity, this activity is mostly shown in animal models. Root extract of *T. cordifolia* has been shown radio protective role due to extensively increase in body weight, tissue weight, tubular diameter. Dichloromethane extracts of TC shows cytotoxic effects owing to lipid peroxidation and release of LDH and decline in GST.<sup>47</sup>In pre-irradiating mice, root extract has widely affected radiation, induced rise in lipid peroxidation and resulted in the decline of GSH in testes.<sup>48</sup> Most of the synthetic chemotherapeutic agents laid toxic side effects on the living organisms.<sup>49</sup>The effect of Giloy has been reported better than doxorubicin treatment.<sup>50,51</sup>

Anti-cancer property of Giloy is largely researched in animal models. In male Swiss albino mice, TCE has been demonstrated to have a radio protective effect by increasing body weight, tissue weight, testes-body weight ratio, and tubular diameter, as well as inhibiting the damaging effects of sub-lethal gamma radiation on testes. TCE had a substantial effect on the radiation-induced elevation in lipid peroxidation in pre-irradiated animals, resulting in a decrease in GSH concentration in the testes. TCE pretreatment of HeLa cells was found to reduce cell viability, increase LDH, and decrease GSH S-transferase activity. TCE containing dihydrotestosterone has been shown to promote the development and proliferation of human LNCaP cells (which are androgen-sensitive human prostate adenocarcinoma cells).<sup>52</sup>

**Anti-oxidant Activity of Giloy (*Tinospora Cordifolia*)** – The starchy material from the stems of Giloy (*Tinospora Cordifolia*) is traditionally used for boosting immunity. Scientific studies on a polysaccharide (arabinogalactan) isolated from Giloy stems showed good antioxidant properties.<sup>53</sup>

**Hepatoprotective activity of Giloy (*Tinospora cordifolia*)** –The effect of an ayurvedic agent, *Tinospora cordifolia* (TC), which has been shown to have hepatoprotective and immunomodulatory properties in experimental studies, on surgical outcome in patients with malignant obstructive jaundice was evaluated. Methods Thirty patients were randomly divided into two groups, matched with respect to clinical features.<sup>54,55</sup>

**Antiviral activity of (Giloy *Tinospora cordifolia*)** – *Tinosporin*, a diterpenoid found in *Guduchi*, has antiviral properties that are particularly effective in the treatment of retroviruses and other viral disorders. Aqueous Extract from *Guduchi* has enhanced cytokine production and immune effector cell activation. Sanshamani Vati (*Guduchi* Ghana vati) is preventive and prophylactic medicine for COVID-19 that comprises an extract of *Guduchi*.<sup>56</sup>

**Immunomodulatory activity of Giloy (*Tinospora cordifolia*)** – The research by the late Dr. Sharadini Dahanukar and team during the 90's on the immunomodulatory effect of TC is seminal, using *in vitro*, *ex vivo*, and animal models for various conditions.<sup>57</sup>A polysaccharide rich in

glucose, fructose, and arabinose as monomer units is mainly responsible for TC's immunomodulatory activity. 11-hydroxymustakone, N-methyl-2-pyrrolidone, N-formylannonain, cordifolioside A, magnoflorine, tinocordiside, and syringin are some of the other immunomodulatory active components found in this plant.<sup>58</sup>

#### **Antimicrobial activity of Giloy (Tinospora cordifolia) –**

Tinospora Cordifolia methanol extracts are effective against microbiological infection. Tinospora Cordifolia Extract Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Proteus vulgaris, Salmonella typhi, Shigella flexneri, Salmonella Tested for antibacterial activity against Paratyphi, Salmonella Typhimurium, Pseudomonas, Enterobacter aerogene, and Serratia marcescens (Gram-positive bacteria).<sup>59</sup>

#### **Anti-Arthritic Activity of Giloy (Tinospora cordifolia) –**

Traditional medicine has utilised single or synergistic formulations of Tinospora cordifolia and Zingiber officinale to treat rheumatoid arthritis. Tinospora cordifolia has been shown to inhibit the proliferation, differentiation, and mineralization of bone-like matrix in osteoblast model systems in vitro, suggesting that it could be used as an anti-osteoporotic agent. Tinospora cordifolia alcoholic extract has been demonstrated to increase the proliferation of osteoblasts, as well as the differentiation of cells into the osteoblastic lineage and the mineralization of bone-like matrix.<sup>60</sup>

The anti-osteoporotic properties of 20-OH—Ecdysone isolated from Tinospora cordifolia have also been documented, underlining Tinospora Cordifolia's involvement in the treatment of osteoporosis and osteoarthritis.<sup>61</sup>

#### **Anti-toxic potential of Giloy (Tinospora cordifolia) –**

The antioxidants found in the Giloy aqueous extracts can scavenge free radicals produced during aflatoxicosis. The Giloy extract prevented lead nitrate-induced liver damage. Tinospora cordifolia has anti-toxic properties due to its ability to reduce thiobarbituric acid reactive substance levels while increasing glutathione, ascorbic acid, and protein levels. In the kidneys, it also boosts the activity of antioxidant enzymes such superoxide dismutase, catalase, glutathione peroxidase, glutathione S-transferase, and glutathione reductase. Furthermore, alkaloids found in Tinospora cordifolia, such as isocolubin, palmitic, tetrahydropalmatine, and magnoflorine, protect against aflatoxin-induced nephrotoxicity. The above study shows the anti-toxic properties of Giloy.<sup>62</sup>

#### **Conclusion –**

Giloy (Tinospora Cordifolia) is a chief herbal drug of traditional system as well as Ayurveda. Giloy is one of the most useful and powerful Ayurvedic herbal drug that acts as a tonic Aphrodisiac, it is also anthelmintic, anthelmintic, antirheumatic, recurrent, Antipyretic, blood purifier, heart booster, Carminative, digestive, diuretic, expectorant, Carminative, energizing, appetite stimulant and anti-inflammatory. Almost all parts of the Giloy are use in preparing herbal drugs. Natural products discovered from medicinal plants have played an important role in the treatment of various diseases. The present study points to the potential antifeedant, anticancer, antifeedant, hepatoprotective, analgesic related activities and other chemical constituents extract



of Giloy (*Tinospora Cordifolia*). Thus, the use of *Tinospora cordifolia* plays an important role in the prevention of various diseases. Giloy naturally increases immunity in the human body.

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