

GURUCHE (*Tinospora cordifolia*) AND ITS ETHNOMEDICINAL USES: A REVIEWNEETU SINGH<sup>1</sup>

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## ABSTRACT

*Tinospora cordifolia* commonly named as (Guruche or Amrita) in Sanskrit belonging to family Menispermaceae is a genetically diverse, large, deciduous climbing shrub with greenish yellow typical flowers. *T. cordifolia* is a popular medicinal plant spread across the tropics. Its effectiveness in therapy is well known globally. Lesser known are its dietary benefits. Guruche is being used in diet by various tribal people of India and it also forms a part of traditional Indian cuisine. Ayurveda also states its dietary utility. The various benefits acquired by the use of Guruche as a dietary component have been reviewed and discussed in this article.

**KEYWORDS:** Guruche, *Tinospora cordifolia*, Diet, Ayurveda, Ethnomedicine, Tribal uses

*Tinospora cordifolia* belonging to the family Menispermaceae (Rana *et al.*, 2012) is well known in Ayurveda as Guduchi. It is an important drug used by Ayurveda practitioners in various diseased conditions and also for maintenance of health. A majority of the Ayurvedic lexicons admire the potential health benefits of this drug and compare it to the celestial nectar which brings about immortality, hence the name Amrita is attributed to this. It is a famed rejuvenator and nootropic, used very commonly in treatment of ailments such as fever, diabetes and skin disorders (Raut, 2006). Medicinal plants have been used as natural medicines. This practice has been in existence since prehistoric times. There are different ways in which plants have been found useful in medicines such as crude extract of plants has been used directly because of the presence of natural chemical constituents such as berberine, morphine, psilocin, vincristine etc. and natural compounds for the synthesis of drugs such as tubocurarine, colchicine, nicotine, quinine etc. for therapeutic purpose by folk people.

Guduchi is widely used in veterinary folk medicine/ayurvedic system of medicine for its general tonic, antiperiodic, anti-spasmodic, anti-inflammatory, antiarthritic, anti-allergic and anti-diabetic properties. The plant is used in ayurvedic, "Rasayanas" to improve the system and the body resistance against infections hence the plant is a natural immune booster (Sharma, 2012). The root of this plant is known for its antistress, anti-leprotic and anti-malarial activities.

*Tinospora* is supposed to be the nectar of God Indra, that's why, it is considered as Amrita (pious liquid or nectar). It is used in the treatment and cure of many diseases and known as panacea for all the diseases and disorders. Giloy is useful in the promotion and restoration

of health and make you ready for holistic well-being. It is helpful in stress and anxiety and having immunomodulatory effects. Besides, it has many unknown health benefits and uses; it is also very useful in Dengue and Covid-19 because it helps to increase the count of platelets.

India also has very strong traditional care health practices that are represented by the Indian system of medicine like Ayurveda, Siddha, Unani and Homoeopathy. A very significant population is having the medicinal plants are an integral part of people's life. Also, the plant species which generally used as health promoters are categorized as 'Health Plants'.

## TAXONOMIC CLASSIFICATION

Kingdom: Plantae – Plants; Subkingdom: Tracheophyta – Vascular Plants; Super-division: Spermatophyta – Seed bearing plants; Division: Magnoliophyta – Flowering; Class: Magnoliopsida – Dicotyledons; Subclass: Polypetalae – Petals are free; Series: Thalamiflorae – Many stamens and flower hypogynous; Order: Ranales Family: Menispermaceae – The Moonseed family; Tribe: Tinosporeae Genus: *Tinospora* Species: *cordifolia*.

## Distribution

It is found throughout India especially tropical area mainly in state of India such as Arunachal Pradesh, Assam, Bihar, Delhi, Gujarat, Goa, Karnataka, Kerala, Maharashtra, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh, and West Bengal.

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**Vernacular Name**

English	<i>Gulantha tinospora, India tinospora</i>
Hindi	<i>Giloy, Amrita</i>
Bengali	<i>Gulantha, Giloe</i>
Gujarati	<i>Gulvel, Galo</i>
Marathi	<i>Gulvel, Amrita</i>
Punjabi	<i>Gilo, Garham Palo</i>
Sanskrit	<i>Jivantika, Vatsahani, Guduchi</i>

**Growth Constraints**

*T. cordifolia* can be propagated by seeds and vegetative cuttings. However, both the ways are not suitable for large scale production and having problems in traditional methods of propagation. Viability of seeds is very less; poor seed set and germination of seeds are the main problems associated with its clonal propagation. Vegetative cuttings are also not suitable due to less productivity and also dependent upon weather conditions for its further growth. Keeping in view the Growth constraints, plant tissue culture techniques may be suitable methods for its large-scale production in a lesser time and space.

**Morphological Description**

*Tinospora cordifolia* is a large deciduous, extensively spreading climbing shrub with a number of coiling branches. Different parts of *Tinospora* have following type of morphology. Stem of this plant is rather succulent with long, filiform, fleshy and climbing in nature. Aerial roots arise from the branches. The bark is creamy white to grey in colour and deeply left spirally. Aerial Root: Aerial roots are present; 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. Leaves of this plant are simple, alternate, exstipulate, long petioled approximately 15 cm, long, 7 nerved and deeply cordate at the base and membranous. Flowers are unisexual, recemes, greenish yellow in colour, appears when plant is leaf less. Male flowers are clustered and female flowers exist in solitary inflorescence. Sepals are 6 in 2 series of 3 each. Outer ones are smaller than the inner sepals. Petals are also 6, smaller than sepals, free and membranous. Flowering occurs during March to June. Fruit they are orange-red in colour, fleshy, aggregate of 1-3 and ovoid, smooth, drupelets on thick stalk with a sub terminal style scar. Fruits develop during winter. Seed Curved seed have been reported in this species. Hence this family is named as moonseed family (Figure 1).



**Figure 1: *Tinospora cordifolia***

**Phytochemistry**

The plant mainly contains alkaloids, glycosides, steroids, sesquiterpenoid, aliphatic compound, essential oils, mixture of fatty acids and polysaccharides. The alkaloids include berberine, bitter gilonin and non-glycoside gilonin gilotsterol. The major phytoconstituent in *Tinospora cordifolia* includes tinosporine, tinosporide, tinosporaside, cordifolide, cordifol, heptacosanol, clerodane furano diterpene, diterpenoid furanolactone tinosporidine, columbin and  $\beta$ -sitosterol. Berberine, palmatine, tembertarine, magniflorine, choline and tinosporin are reported from its stem. A rearranged cadinane sesquiterpene glycoside named tinocordiside, consisting of a tricyclic skeleton with a cyclobutane ring, has been isolated from the immunomodulatory aqueous fraction of the plant. The new clerodane furano-diterpene 2 with the molecular formula  $C_{20}H_{20}O_8$  has been isolated from the stems of *Tinospora cordifolia*. *T. cordifolia* contains high fibre (15.9 %), sufficient protein (4.5 %-11.2 %), sufficient carbohydrate (61.66 %) and low fat (3.1 %).

### Anti-Diabetic Activities

The stem of this plant is generally used to cure diabetes by regulating level of blood glucose. It has been reported to act as anti-diabetic drug through explanatory oxidative stress, promoting insulin secretion by inhibiting gluconeogenesis and glycogenolysis. The anti-diabetic properties exhibited by this plant species are attributed due glucose level and shows potential activities against Diabetes mellitus disease. The root extract of this plant has also been reported to have anti-diabetic properties which decrease the level of glycosylated haemoglobin, hydroperoxidase and vitamin E.

### Anti-toxic Activities

Aqueous extract of this plant has already been reported to show scavenge activity due to the presence of antioxidant against free radicals generated during aflatoxicosis. Further alkaloids such as choline, tinosporine, isocolumbin, palmetine, tetrahydropalmetine and magnoflorine from *T. cordifolia* showed protection against aflatoxin induced nephrotoxicity. Furthermore *T. cordifolia* shows protective effect by lowering the concentration of thiobarbituric acid reactive substance (TBARS) and enhancing the glutathione (GSH), ascorbic acid, protein and the activities of antioxidant enzymes viz., superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase, glutathione S-transferase (GST) and glutathione reductase (GR) in kidney (Sangeetha *et al.*, 2011). However, leaf and stem extract of *T. cordifolia* has been reported to show hepatoprotective effect in male albino mice against lead nitrate induced toxicity.

### Anti-HIV Activities

Root extract of this plant has been shown a decrease in the regular resistance against HIV. This anti-HIV effect was exposed by reduction in eosinophil count, stimulation of B lymphocytes, macrophages, level of haemoglobin and polymorphonuclear leucocytes.

### 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 (Ali and Dixit, 2011). In pre-irradiating mice, root extract has widely affected radiation, induced rise in lipid peroxidation and resulted in the decline of GSH in testes. Most of the synthetic chemotherapeutic agents laid toxic side effects on the living organisms. The effect of Giloy has been reported better than doxorubicin treatment.

### Anti-Microbial Activities

Methanolic extract of *T. cordifolia* has been reported against microbial infection. Anti-bacterial activity of *T. cordifolia* extract has been bio assayed against *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Proteus vulgaris*, *Salmonella typhi*, *Shigella flexneri*, *Salmonella Para typhi*, *Salmonella typhimurium*, *Pseudomonas aeruginosa*, *Enterobacter aeruginosa*, *Enterobacter aerogene*. Further, *T. cordifolia* extract has been reported against bacterial growth and improved phagocytic and intracellular bacterial capacities of neutrophils in mice.

### Ayurvedic Uses (Dravya, Guna-Karma)

Ayurvedic pharmacology is based on biophysical, experiential, inferential and intuitional mechanisms. The action of a substance is based on five mechanisms of action or attributes of a substance, namely, rasa (taste appreciation of the substance by the chemical receptors on the tongue- Six tastes are described namely sweet (*Madhura*), sour (*amla*), salty (*lavana*), bitter (*tikta*), pungent (*katu*) and astringent (*kasaya*), guna (10 pairs of opposite or mirror image attributes; attribute or property of any substance) (Chunekar and Pandey, 2006).

Samhita has not mentioned about the varieties of Guduchi where as Mahendra Bhogika of Dhanwantari Nighantu has identified two the varieties of the Guduchi.

**Table 1: Showing category of Guduchi according to their uses and action in different Ayurvedic texts**

<i>Samhita/Nighantu</i>	<i>Guna/Varga</i>
<i>Charak Samhita</i>	<i>Sandhaniya, Tripathighna, Sthanyashodana, Snehopaga,</i>
<i>Sushruta Samhita</i>	<i>Aragwadadi, Shyamadi, Ppatoladi, Kakolyadi, Guduchyadi.</i>
<i>Ashtanga Hridaya</i>	<i>Tiktavarga, Patoladigana, Guduchyyadi, Aragwadadadigana.</i>
<i>Dhanvantari Nighantu</i>	<i>Guduchyadi varga</i>
<i>Raja Nighantu</i>	<i>Guduchyadi varga</i>
<i>Nighantu Aadarsha</i>	<i>Guduchyadi varga</i>
<i>Priya Nighantu</i>	<i>Pippalyadi varga</i>

**Ethnobotanical, folk and tribal uses of *T. cordifolia***

There are over 400 different tribal and other ethnic groups in India. Each tribal group has its own tradition, folk language, beliefs and knowledge about use of natural resources as medicines (Singh *et al.*, 2003). *T.*

*cordifolia* finds a special mention for its use in tribal or folk medicine in different parts of the country (Sood *et al.*, 2005). Some of the important uses reported in the literature are listed in the Table. Almost all the parts of the plants are documented to be useful in ethnobotanical surveys conducted by ethnobotanists (Jain *et al.*, 1991)

**Table 2: Uses of Guduchi in Tribal medicine**

Tribal and areas	Diseases	Mode of application
Tribal of Jammu and Rajasthan	Fever	Decoction of stem is administered orally.
Baiga, Varanasi, U.P.	Fever	The pills are prepared from the paste of stem of Guruchi
Bhils, Agaris, Khakaris	General debility	Decoction of stem with hot water
Mundas of Chhota Nagpur	Fracture	Paste of whole plant used as plaster.

**DISCUSSION**

The biological roles in *Tinospora cordifolia* extract. Such properties may be exploited for production of new formulations, which may be better and promising over conventional one. Although genetically diverse and reports of application of tissue culture-based propagation of *Tinospora* exist, effective conservation strategies of the germplasm for such an economically important medicinal plant with many biological roles remains yet to be accomplished. *Tinospora cordifolia* (Tambekar *et al.*, 2009) has an importance in traditional ayurvedic medicine used for ages in the treatment of fever, jaundice, chronic diarrhoea, cancer, dysentery, bone fracture, pain, asthma, skin disease, poisonous insect, snake bite, eye disorders (Parthipan *et al.*, 2011)

**CONCLUSION**

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. Studies need to be conducted with aspects how the active compounds actually interact with the living systems and affects the structure-function relationships.

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