



Guduchi (*Tinospora CORDIFOLIA* (Wild)), A Traditional Indian Herbs And Its Medicinal Importance-An Ayurvedic Approach with Contemporary View.

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ABSTRACT:

T. cordifolia (Gulanca) is an available and well known herb all over the world. It is traditionally use for various aliment like fever, vomiting, diabetes, jaundice, anaemia, polyuria and skin diseases etc. It is indicated as *Medhyarasayana* (brain tonic), digestive, appetite stimulant and carminative for digestive system. It has potent rejuvenative, neuroprotective, hypoglycemic, immuno modulatory, anti inflammatory effect. Though various indications are found in classical text, experimental and controlled trials are needed to determine its real efficacy. The Guduchi plant, its properties, mechanism of action and clinical uses are briefly reviewed in this article.

KEY WORD: *T. Cordifolia*, Guduchi, Medhyarasayan

INTRODUCTION:

T. Cordifolia is commonly known as *Guduchi* in India. It is found abundantly as a shrub throughout India, Shrilanka, Bangladesh, and Nepal etc. It often used as an herbal medicine and green vegetable in many part of India. *Guduchi* is one of the most important herbs of *Ayurveda* use as *samshamaniya* (maintain homeostasis), *medhya Rasayana*. *Rasayana* (rejuvenator) have wide ranging health benefits. Among the *ayurvedic Rasayana* herbs, *Guduchi* holds the most prominent place. It enhances the function of the brain and nervous system and improves the memory. Being a powerful adaptogen, it enhances the body's resilience to stress, improves the body's defense against disease by improving the cell-mediated immunity. It also possesses potent antioxidant properties that help protect against cellular damage caused by free radicals. It controls infection through increase the number of white blood cell.

COMMON NAME: Guduchi

BOTANICAL NAME: [1] *Tinospora Cordifolia* (Wild) Miers. ex. Hook. f. Thoms

TAXONOMICAL CLASSIFICATION: [1]

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

VERNACULAR NAMES: [2]

Assamese : Siddhilata, Amaralata

Bengali : Gulanca **Gujarati**: Galac, Garo

Hindi : Giloe, Gurcha **Kannada** : Amrutaballi **Kashmiri** : Amrita, Gilo

Malayalam: Chittamrutu

Marathi :Gulvel

Oriya : Guluchi

Punjabi : Gilo **Tamil :** Seendal, Seendilkodi **Telugu:**Thippateega

Urdu : Gilo

PLANT MORPHOLOGY:

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

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.[¹]

Arial Root

Arial 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.[¹]

Leaves

Leaves of this plant are simple, alternate, exstipulate, long petioled approximately 15 cm round, pulvinate, heart shaped, twisted partially and half way round. Lamina is ovate, 10-20 cm long, 7 nerved and deeply cordate at the base and membranous.[¹]

Flowers

Flowers are unisexual, racemes, 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 they are orange-red in colour, fleshy, aggregate of 1-3 and ovoid, smooth, drupelets on thick stalk.[³]

Fruit

They are orange-red in colour, fleshy, aggregate of 1-3 and ovoid, smooth, drupelets on thick stalk with a sub terminal style scars. Fruits develop during winter.[⁴]

Seed

Curved seed have been reported in this species. Hence this family is named as moonseed family also. As seeds are curved in shape, embryo also turned in to curve shape automatically. Moreover, the endocarp is variously ornamented and provides important taxonomic characters.[¹]

DESCRIPTION:[⁵]

A) Macroscopic

Drug occurs in pieces of varying thickness ranging from 0.6-5 cm in diameter, young stems green with smooth surfaces and swelling at nodes, older ones show a light brown surface marked with warty protuberances due to circular lenticels; transversely smoothened surface shows a radial structure with conspicuous medullary rays traversing porous tissues, taste bitter.

B) Microscopic

Transverse section of stem shows outer-most layer of cork, differentiating into outer zone of thick-walled brownish and compressed cells, inner zone of thin walled colourless, tangentially arranged 3-4 rows of cells, cork broken at some places due to opening of lenticels, followed by 5 or more rows of secondary cortex of which the cells of outer rows smaller than the inner one, just within the opening of lenticels, groups of sclereids consisting of 2-10 cells found in secondary cortex region, outer zone of cortex consists of 3--5 rows of irregularly arranged, tangentially elongated chlorenchymatous cells, cortical cells situated towards inner side, polygonal in shape and filled with plenty of starch grains, simple, ovoid, or irregularly ovoid-

elliptical, occasionally compound of 2-4 components, several secretory cells, found scattered in the cortex, pericyclic fibres lignified with wide lumen and pointed ends, associated with a large number of crystal fibres containing a single prism in each chamber, vascular zone composed of 10-12 or more wedge-shaped strips of xylem, externally surrounded by semi-circular strips of phloem, alternating, with wide medullary rays, phloem consists of sieve tube, companion cells and phloem parenchyma of polygonal or tangentially elongated cells, some of them contain crystals of calcium oxalate, cambium composed of one to two layers of tangentially elongated cells in each vascular bundle, xylem consists of vessels, tracheids, parenchyma and fibres, in primary xylem, vessels comparatively narrow devoid of tyloses, secondary xylem elements thick-walled, lignified, vessels cylindrical in shape bearing bordered pits on their walls some large vessels possess several tyloses and often contain transverse septa, medullary rays 15-20 or more cells wide containing rounded, hemispherical, oblong, ovoid, with faintly marked concentric striations and central hilum appearing like a point, starch grains of 5.5-11.20 μ in diameter and 6-11.28 μ in length, pith composed of large, thin-walled cells mostly containing starch grains.

PARTS USED:^[6]Stem, Root, Leaves

ANALYTICAL DATA:^[5]

For dried drug

| | |
|----------------------------|----------------------------|
| Foreign matter | Not more than 2 per cent, |
| Total ash | Not more than 16 per cent, |
| Acid-insoluble ash | Not more than 3 per cent, |
| Alcohol-soluble extractive | Not less than 3 per cent, |
| Water-soluble extractive | Not less than 11 per cent, |

For fresh drug

| | |
|------------------|--------------|
| Foreign matter | Nil |
| Moisture content | 75 per cent, |

CHEMICAL CONSTITUENTS:^[7]

A variety of constituents have been isolated from *Tinospora cordifolia* plant and there. They belong to different classes such as alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds and polysaccharides.

Table 1: Chemical constituents of Guduchi

| Type of Chemical | Active principle |
|------------------|--|
| Alkaloids | Berberine,Choline, Magnoflorine,Palmatine, Palmatine, Tembetarine (0.012%), Magnoflorine (0.075%), Tetrahydropalmatine,Tinosporin Isocolumbin, |
| Glycosides | 18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside, Cordioside, Cordifolioside A, Cordifolioside B, |

| | |
|------------------------|--|
| | Syringin, Syringin-apiosylglycoside, Palmatosides C, Palmatosides F, Cordifoliside A, Cordifoliside B, Cordifoliside C, Cordifoliside D, Cordifoliside E |
| Diterpenoid | Furanolactone |
| Lactones | Clerodane derivatives, Tinosporon, Tinosporides, Jateorine, Columbin |
| Steroids | b sitosterol, d -sitosterol, 20 b -hydroxy ecdysone hydroxy ecdysone, Ecdysterone, Makisterone, Giloinsterol |
| Sesquiterpenoid | Tinocordifolin |
| Aliphatic compound | Octacosanol, Heptacosanol, Nonacosan-15-one |
| Miscellaneous compound | 3,(a,4-di hydroxy-3-methoxy-benzyl)-4-(4-hydroxy-3-methoxy-benzyl)-tetrahydrofuran, Jatrorrhizine, Tinosporidine, Cordifol, Cordifelone, N-trans-feruloyl tyramine as diacetate, Giloin, Giloinin, Tinosporic acid |

CONVENTIONAL PHARMACOLOGY:

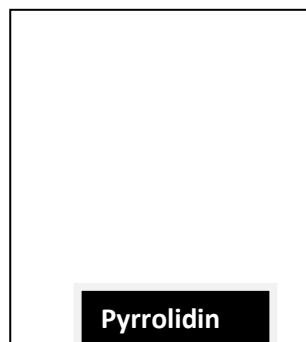
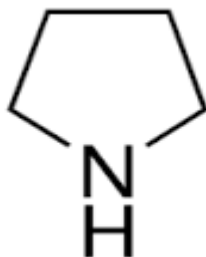
The Ayurvedic Pharmacopoeia of India, along with other therapeutic applications, recommends the dried stems in jaundice, anaemia, polyuria and skin diseases.

Analgesic activity: The aqueous extract of *Tinospora Cordifolia* has a significant anti-inflammatory activity. The mode of action resemble that's of an NSAID. It significantly reduces the pain and morning stiffness in rheumatoid arthritis.[⁸]

Immuno modulatory activity: *Tinospora Cordifolia* stimulates granulocytes macrophage formation. It shows predominant neutrophilia and stimulation of macrophage.[⁸]

Anti diabetic activity: *Tinospora Cordifolia* roots, leaves and stems have anti diabetic activity. The aqueous extract of *Tinospora Cordifolia* shows a significant hypoglycemic effect in animal model which is equivalent to one unit of insulin. Its hypoglycemic activity is claimed due to control of glucose metabolism by inhibiting gluconeogenesis. It is also claimed that *Tinospora Cordifolia* reduce the activity of glucose 6 phosphates in liver which again rests in decreasing the blood sugar level in blood.

It has been reported that **1,2- substituted pyrrolidines** isolated from the stem is responsible for anti-diabetic activity of Guduchi.[⁹]



Another study on anti diabetic activity of *Tinospora Cordifolia* reveals that *Tinospora* not only maintains glycemic control like those conventional drugs but possesses multiple target actions obliterating the complex diabetic pathology and remote apparent metabolic complications. Multiple sites of action of the plant were reported, such as liver, fat, pancreatic β cells, intestinal mucosa-L cells, muscle etc. It possesses multiple beneficial activities via several extrapancreatic (primarily) and intrapancreatic mechanisms attributed to improving the pathological status of diabetics. Its extra pancreatic activities such as glycogenesis/inhibited glycogenolysis in liver, improving glucose uptake and utilization, inhibiting gluconeogenesis, inhibiting intestinal glucose absorption, inhibiting α -glucosidase and α -amylase, mitigating oxidative stress, antioxidant properties and protection against tissue damage, seem to contribute profoundly to diabetes. The intrapancreatic actions involve preventing and restoring integrity and functioning of β cells, promoting endogenous insulin secretion/insulinotropic action and reduction of insulin resistance. Earlier studies reveal activities of its extracts in preventing, treatment or postponing the secondary diabetic complications. Thus, it works on all preventive, curative and restorative aspects of management, inevitably needed to counter diabetes. None of conventional synthetic drugs can provide all aforesaid beneficial properties.[10]

DOSE:[⁶]

| | |
|---------------------------------|---------------------|
| <u>In powder form</u> | 3-6 g of the drug |
| <u>In decoction form</u> | 20-30 g of the drug |

TOXICITY AND SIDE EFFECTS:[⁸]

It has no side effect and toxicity. However, there is little known about the toxicology of *T. cordifolia* in humans. No adverse reactions have been noted. The LD 50 is much higher than its therapeutic doses.

SUBSTITUTES AND ADULTERANTS:[¹¹]

The commonest species of *Tinospora* with which *T. cordifolia* is likely to be substituted or adulterated are *T. sinensis* (Lour.) Merr. and *T. crispa* (Linn.) Miers. The extract of Guduchi (*Guduchi Satva*) is adulterated with powder/flour of potato/sweet potato/ arrowroot/banana.

AYURVEDIC VIEW-

Position of Guduchi in different classical texts: It is described under *Guruchadi varga*, [^{12, 13, 14, 15, 16}] *Avayadi varga*, [¹⁷], *Oushadhi varga* [¹⁸], and *Guruchi varga*. [^{19, 20}]

Properties and action:[⁵]

- **Rasa** : Tikta, Kasaya
- **Guna** : Laghu

- **Virya** : Usna
- **Vipaka** : Madhura
- **Karma** : Balya, Depana, Rasayana, Sangrahi, Tridosashmaka, Raktasodhak, Jwaraghna.

Table 2: Showing qualities of Guduchi according to different nighantu

| Nighantu | Rasa | Guna | Virya | Vipak |
|--------------------------------------|-------------------|-------|-------|---------|
| Raj Nighantu ^[13] | Tiata kasaya | Guru | Usna | |
| Bhabprakash Nighantu ^[14] | Tiata katu kasaya | Laghu | Usna | Madhura |
| Saligram Nighantu ^[15] | | | Usna | |
| Nighantu Adarsha ^[16] | Katu | Guru | Usna | Madhura |
| Madanpal Nighantu ^[17] | | | Usna | |
| Kaidev Nighantu ^[18] | Tiata katu kasaya | Laghu | Usna | Madhura |
| Sankar Nighantu ^[19] | | | Usna | |
| Priyo Nighantu ^[20] | Tikta | | Usna | |

Table 3: Showing dosha karma of Guduchi according to different nighantu

| Nighantu | Dosa |
|--------------------------------------|----------------|
| Dhanwantari Nighantu ^[12] | Tridosa nasaka |
| Raj Nighantu ^[13] | Tridosa nasaka |
| Bhabprakash Nighantu ^[14] | Tridosa nasaka |
| Saligram Nighantu ^[15] | Tridosa nasaka |
| Nighantu Adarsha ^[16] | Tridosa nasaka |
| Madanpal Nighantu ^[17] | Tridosa nasaka |
| Kaidev Nighantu ^[18] | - |
| Sankar Nighantu ^[19] | - |
| Priyo Nighantu ^[20] | - |

Table 4: Therapeutic uses of Guduchi according to different nighantu

| Karma | DN ^[12] | RN ^[13] | BhN ^[14] | SaN ^[15] | MN ^[17]] | KN ^[18] | SnN ^[19] | PN ^[20] |
|-------------|--------------------|--------------------|---------------------|---------------------|-------------------------|--------------------|---------------------|--------------------|
| Agnidipaka | | | + | + | + | + | + | |
| Arshaghna | + | | + | + | | | + | |
| Ama dosa | | | + | | | + | | |
| Bhootnasaka | | + | | | | | | |
| Chardi | | | | | | + | | |
| Daha nasaka | | | + | + | | + | + | |

| | | | | | | | | | |
|-----------------------|---|---|---|---|---|---|---|---|---|
| Dhatu bardhan | | | | | | | | + | |
| Hridroga nasaka | | | + | + | | | + | | |
| Jwar hara | + | | + | + | + | + | + | + | + |
| Krimi nasaka | + | | + | + | + | + | | | |
| Kustha hara | + | | + | | | + | + | | |
| Kamla hara | | | + | + | + | + | + | + | + |
| Kasa nasak | | | + | + | | | | + | |
| Kshaya roga hara | | | | | | | | | + |
| Mutrakriccha nasak | | | | | | | | + | |
| Medhya | | | | | | | | | + |
| Pitta vikara nasak | | | | + | + | | | + | |
| Pradara nasak | | | | | | | | | + |
| Premeha hara | | | + | + | | | | + | + |
| Rakta vikara | + | | | | | | | | |
| Rasayana | | | + | + | + | + | | | + |
| Sangrahi | | | + | + | | | | | |
| Soma roga nasak | | | | | | | | | + |
| Tridosaja vikaranasak | + | + | + | | | | + | + | |
| Vata rakta hara | | | + | + | + | + | + | + | + |
| Vata vikara hara | | | | + | | | | | |
| Visarpa | | | | + | | | | | |
| Valit Palit nasaka | | + | | | | | | | |
| Visanasaka | | + | | | | | | | |
| Valya | | | | | | | | | + |

CONCLUSION:

It is evident from the above review that the Ayurvedic classics has been practice the herb *T.cordifolia* since old days and having a plethora of chemical constitutions effective against a large number of ailments. The plant hold unique place in the traditional herbs based remedies. The plant and its importance require to be catalogued properly so that people become more aware of it. However further study of the various compounds present in it and their pharmaceutical importance, exact mechanism requires to be carried out such that a drug with available in near future.

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