International Journal of Research in Engineering, Science and Management
Volume-2, Issue-11, November-2019
www.ijresm.com | ISSN (Online): 2581-5792

A Review on *Tinospora Cordifolia*

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***Abstract*: *Tinospora.cordifolia* (Gulancha) 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. Thoughvarious indications are found in classical text, experimental and controlled trials are needed to determine itsreal efficacy. The Guduchi plant, its properties, mechanism of action and clinical uses are briefly reviewed in this article.**

***Keywords*: *Tinospora.Cordifolia*, phytoconstitutions, pharmacological activities**

1. Introduction

Guduchi is a glabrous climbing shrub with a succulent stem and papery bark that is creamy white to grey in color. The shrub shoots out aerial roots, usually on neem and mango trees, which could be as long as 30 meters. It bears heart-shaped leaves. The yellow flowers are axillary and long-stalked racemes. The fruit is pea-sized, subglobose drupe and red colored on maturity. Flowers can be seen in June, while fruits occur in November. Guduchi is found in deciduous and dry forests throughout India. The herb is known as guduchi and amrutha in Sanskrit, and giloy and gurcha in Hindi. It is obtained from stems of *Tinospora Cordifolia* (Wild).

2. 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. Aerialroots arise from the branches. The bark is creamy white to grey in colour and deeply left. 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.

Leaves:

Leaves of this plant are simple, alternate, estipulate, 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 Flowers : 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 they are orange-red in colour, fleshy, aggregate of 1-3 and ovoid, smooth, drupelets on thick stalk.

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.

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.

3. Vernacular names

Assamese: Siddhilata, Amaralata
Bengali:Gulancha
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

4. Taxonomical classification

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

5. Chemical constituents

A variety of constituents have been isolated from *Tinosporacordifolia* 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%), Magnoflorin (0.075) tetrahydropalmatine,tinosporin
glycosides	:	18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside Cordioside, Cordifolioside A, Cordifolioside B, Syringin, Syringin-apiosylglycoside, Palmatosides C, Palmatosides F, Cordifoliside A, Cordiofoliside B, Cordifoliside C, Cordifoliside D, Cordifoliside E
Diterpenoid Lactones	:	Furanolactone Clerodane derivatives, Tinosporon, Tinosporides, Jateorine, Columbin
Steroids	:	b sitosterol, d-sitosterol, 20b-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-hydroxy3-methoxy-benzyl)-tetrahydrofuran, Jatrorrhizine, Tinosporidine, Cordifol, Cordifelone, N-trans-feruloyl tyramine as diacetate, Giloin, Giloinin, Tinosporic acid

Pharmacological activities

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

- *Analgesic activity:* 7 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.
- *Immuno modulatory activity:*20 Tinospora Cordifolia stimulates granulocytes macrophage formation. It shows predominant neutrophilia and stimulation of macrophage.
- *Anti-diabetic activity*: 2,23 Tinospora Cordifolia roots, leaves and stems have anti diabetic activity. The aqueous extract of Tinospora Cordifolia shows a significant hypoglycaemic effect in animal model which is equivalent to one unit of insulin.
- Antioxidant activity:1 Antioxidant activity and amelioration of cyclophosphamide-induced toxicity has been reported. It has an amelioratic effect in aflotoxicosis of duck.
- *Anti-stress activity:*10 Ethanol extract of T. cordifolia at the dose of 100 mg/kg exhibited significant anti-stress activity in all the parameters studied, compared with diazepam at the dose of 2.5 mg/kg.

- *Anti-Ulcer activity:4* The ethanol extract of the root of T.cordifolia was observed to induce amarked protective action against restrain stress induced ulcerization. The activity was comparable to that of diazepam.
- *Digestive activity:11,24* The anti-amoebic effect of a crude drug formulation containing T. cordifolia against Ent amoeba histolytica was studied. There were varying degrees of inhibition of theenzymes, viz. DNase, RNase, aldolase, alkaline phosphatase, acid phosphatase, α-amylase and protease activities of crude extracts of axenically cultured amoebae.
- *Hypolipidaemic activity:14,16* The hypolipidaemic effect of an aqueous extract of roots was evaluated. Administration of the extract of 2.5 and 5.0g/kg body weight for 6 weeks resulted in a significant reduction in serum and tissue cholesterol, phospholipids and free fatty acids in alloxan diabetic rats. The root extract at a dose of 5.0 g/kg body weight showed highest hypolipidaemic effect.
- *Immuno biological activities:13* The water and ethanol extracts of stem of T. cordifolia inhibit immunosuppression produced by cyclophosphamide. The ethanol extract of stem of the plants inhibits cyclophosphamide-induced anemia. The water extract of the plant is found to be more potent than the other extract.
- *Anti-inflammatory activity:12,3* The decoction of T. cordifolia showed anti-inflammatory activity on carrageen in-induced hind paw oedema in rats. The effect of extract of stem of T.cordifolia was studied on the contractile response due to various agonists (such as histamine, 5-HT, bradykinin, pros-taglandin E1 and F2α, cholinomimetics and KCl) on smooth muscles of rat in the dose of 100 to 600 µg/mg.
- *Liver disorders:6* The drug was also studied against the hepatic damage induced by a standard hepatotoxin – carbon tetra chloride(CCl4). Though acute damage was aggravated by T. cordifolia, it was proved to be effective in preventing fibrous change and promoting regeneration by parenchymal tissue.
- *Mental disorders:15* A herbal psychotropic preparation BR-16A containing T.cordifolia was investigated in short term memory paradigms in mice. The results suggest for possibly nootropic action of BR-16A involving cholinergic and GABAergic modulation.
- *Urinary calculi:19* The water extract of the stem of T.cordifolia was experimentally evaluated for dissolution of urinary calculi.
- *Uraemia:17,22* Pharmacological and clinical study of T. cordifolia was undertaken and its role in uraemia elicited. The water extract produced marked but transient fall in B.P. along with bradycardia and increased force of ventricular contraction in dogs and diuresis in rats. It significantly de-creases blood urea levels in uremic dogs and patients.
- *Anti-Cancer activity:9,25* A prospective, randomized, double blind placebo controlled clinical trial was conducted on breast cancer patients. Consenting breast cancer patients, who were receiving adjuvant therapy (CMF regimen), were recruited, and randomized to drug and placebo group.
- *Hepatic disorders:5,21* In clinical studies 20 patients of infective hepatitis were selected on the basis of clinical and biochemical findings. Four tablets (500mg each) thrice in a day, orally with fresh water were given to the patient for 4 weeks.
- *Post-menopausal syndrome:8,26* Clinical evaluation of a non-hormonal drug minofil containing T. Cordifolia along with other plant drugs was done in women of post-menopausal syndrome. Breast discomfort, nausea and fluid retention was observed in 22% (7 cases) with estriol and almost no side effect was observed with,

6. 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 aliments. The plant holds 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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