

Phytopharmacological Review of *Tinospora cordifolia*

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ABSTRACT

Tinospora cordifolia from the family Menispermaceae commonly called as Seenthil, Amirthavalli, Amirthakodi, Somavalli, Amirthai, Kundali is traditionally used to treat diabetes, interstitial cystitis, urinary tract infection, jaundice, malaria, impotence, leprosy, ulcer, dysentery etc. The plant has various pharmacological activities such as immune modulatory, anti-diabetic, anti-leptitic, antioxidant, anti-inflammatory, demulcent, anti-malarial, Hepato protective, stomachic, aphrodisiac, alterative, mild diuretic, anti-periodic which help in treating diseases. This review paper efforts to evaluate the presence of phyto constituents like tinosporine, magniflorine, tinosporidine, tembertarine, choline, tinosporin isoquinoline, jatrorhizine, palmatine, berberine, terpenes like sesquiterpenoid, diterpenoid lactones, glycosides like pregnane, palmatosides, cordifolioside, tinosporaside, steroids, aliphatic compounds like octacosanol and other miscellaneous compounds. The bitter taste of plant when ingested changes to pungent taste after digestion. The following article review to summarize the phytopharmacological and biological activity of *Tinospora cordifolia*.

KEYWORDS

Tinospora cordifolia, diabetes, malaria, jaundice, immune modulatory, seenthil.

INTRODUCTION

The climbing shrub *Tinospora cordifolia* is a large deciduous plant with heart shaped leaves indigenous to tropical areas of India, Myanmar, Sri Lanka, Rajasthan and Burma [1][8]. Leaves are simple, alternate, exstipulate, long petioles grows up to 15 cm long [3]. The stem is characterized by the formation of meristematic layers outside the original ring of vascular bundles [3] and it is used mainly for medicinal purposes than leaves as it has high content of alkaloids [4]

SCIENTIFIC CLASSIFICATION

Kingdom:	Plantae
Subkingdom:	Tracheobionta
Division:	Magnoliophyta
Class:	Magnoliopsida
Subclass:	Ranunculidae
Order:	Ranunculales
Family:	Menispermaceae
Genus:	<i>Tinospora</i>
Species:	<i>Cordifolia</i>



Other names

Tamil: Seenthil, Amirthavalli, Amirthakodi, Amirthai [1]

Sanskrit: Amrta, Guduchi, Cinnodbhava [1]

Telugu: Tippa-teega [1]

Malayalam: Amruthu, Chittamruthu [1]

English: Heart-leaved moon seed, Gulancha Tinospora [1]

Hindi: Geloya, Gurcha [1]

Kannada: Amrutha Balli [1]

Parts used: Leaves, stem, root (rhizome) [1]

Various types of seenthil in Siddha

- i) Seenthil
- ii) Por seenthil
- iii) Agaya Garudan [1]

Seenthil Chakkarai is a kind of salt obtained from its climber which is used to treat diabetes [8], jaundice, splenomegaly, vomit, fever and any other chronic interstitial cystitis. The whole plant improves immune system and increases the body resistance against infections. The stem is bitter, stomachic, diuretic, aphrodisiac, alterative [8] stimulates bile secretion, allays thirst [8], enriches the blood and cures jaundice and its extract is useful to treat skin problems and promotes speedy recovery of diabetic foot ulcer. The starch of the plant serves as a home remedy for chronic fever, increases appetite and energy, relieves burning sensation. The root has anti-stress, anti-malarial activities and also a strong emetic and used for bowel obstruction. The medicine should be prescribed with at most care as the chemical constituents of this plant may result in contraindications.

Medicines Prepared from *Tinospora cordifolia*

I. Seenthil Decoctions:

Take the ingredients, grind it roughly, add the given quantity of water and boil it until the water level reaches 30 ml to 40 ml. The below decoctions can be given to the various diseases as per siddha aspect to Pitha suram, Maantha suram (types of fever), Indigestion and gastro intestinal problems respectively. [1]

Decoction 1:

S. No.	Ingredients	Quantity
1.	<i>Tinospora cordifolia</i>	5.1 g
2.	<i>Hedyotis corymbosa</i>	5.1 g
3.	<i>Santalum album</i>	5.1 g
4.	<i>Plectranthus vettiveroides</i>	5.1 g
5.	<i>Zingiber officinale</i>	5.1 g
6.	<i>Vetiveria zizanioides</i>	5.1 g
7.	<i>Pavonia zeylanica</i>	5.1 g
8.	<i>Cyperus rotundus</i>	5.1 g
9.	Water	300 ml

Decoction 2:

S. No.	Ingredients	Quantity
1.	<i>Tinospora cordifolia</i>	5.1 g
2.	<i>Terminalia chebula</i>	5.1 g
3.	<i>Operculina turpethum</i>	5.1 g
4.	<i>Areca catechu</i>	5.1 g
5.	<i>Zingiber officinale</i>	5.1 g
6.	<i>Veratri viridi</i>	5.1 g
7.	<i>Aloe vera</i>	5.1 g
8.	Water	300 ml

Decoction 3:

S. No.	Ingredients	Quantity
1.	<i>Tinospora cordifolia</i>	5.1 g
2.	<i>Plectranthus vettiveroides</i>	5.1 g
3.	<i>Tragia involucrate</i>	5.1 g
4.	<i>Hedyotis corymbosa</i>	5.1 g
5.	<i>Cleodendrum serratum</i>	5.1 g
6.	<i>Coriandrum sativum</i>	5.1 g
7.	<i>Zingiber officinale</i>	5.1 g
8.	<i>Andrographis paniculata</i>	5.1 g
9.	Water	300 ml

Decoction 4:

S. No.	Ingredients	Quantity
1.	<i>Tinospora cordifolia</i>	35 g
2.	<i>Syzygium aromaticum</i>	1 g powder
3.	Water	300 ml

Decoction 5:

S. No.	Ingredients	Quantity
1.	<i>Tinospora cordifolia</i>	34 g
2.	<i>Coriandrum sativum</i>	4 g
3.	<i>Glycyrrhiza glabra</i>	4 g
4.	<i>Foeniculum vulgae</i>	2 g
5.	<i>Rosa damascene</i>	2 g
6.	Water	300ml

II. Seenthil Churnam

S. No.	Ingredients	Quantity
1.	Wash the <i>Tinospora cordifolia</i> climber in water 21 times for purification. Smash the purified climber with milk and then dry it. Finally make it as powder.	350 g
2.	<i>Eclipta prostrata</i> powder	350 g
3.	Purified ash of Earthworm (poonagam) is dissolved in milk three times. Filter and dry it .After that powder the content.	350 g

The ingredients given in the above table are mixed thoroughly and given with Ghee to treat cough, cold, STD, Vatha disease, Pitha disease, Pulmonary Tuberculosis. When given with honey Nasal Ulcers, Sinusitis and with sugar *Taenia capitata* are resolved. [9]

III. Seenthil Chakkarai

Take finely grinded *Tinospora Cordifolia* climber and soak it in cold water, next day filter the water and keep it in sunlight for 2 to 3 hours (suriya pudam). Drain the water and repeat the above said procedure again. The settled down flour like substance is called Seenthil Chakkarai. After the substance is completely dried it is given to treat Jaundice, Hepatomegaly, Vomiting, Cystitis, and Diabetes.

Dosage: 1 g to 4 g [1]

Collection of plant material

The fully matured plant of *Tinospora cordifolia* is collected in the month of June especially in summer [1]. The plant was identified by Dr. G.C. Joshi (Botanist), Ranikhet, Uttarakhand who made the study by preparing the extraction and collecting various animals to investigate the phytopharmacological activity in the Department of Pharmacy, IFTM, Moradabad, Uttar Pradesh, India.[7]

PHYTOPHARMACOLOGICAL ACTIVITIES

Neuro-protective activity

The neuro-protective activity identified from the ethanol extract of the aerial parts has 6-hydroxy dopamine lesion rat models of Parkinsonism disease. [2]

Anti-neo plastic activity

The anti-neo plastic activity identified from the DCM extract of aerial parts has mice transplanted with Ehrlich ascites carcinoma. [2]

Hepato cellular activity

The Hepato cellular activity identified from the Ether extract of aerial parts has diethyl nitrosamine induced Hepato cellular carcinoma in male wistar rats. [6]

Anti-diarrheal activity

The anti-diarrheal activity identified from the ethanol and aqueous extract of the whole plant has castor oil and magnesium sulphate induced diarrhea in albino rats. [2]

Anti-ulcer activity

The anti-ulcer activity identified from the ethanol and aqueous extract of the whole plant has induced ulcer in pylorus ligated albino rats. [2]

Analgesic activity

The analgesic activity identified from the ethanol and aqueous extract of the whole plant done by hot plate and abdominal writhing method in albino rats. [2]

Aphrodisiac Activity

The aphrodisiac activity identified in adult albino rats of wistar strain from the aqueous and hydrochloric extract. [2]

Anti-feedant Activity

The anti-feedant activity identified from the chloroform extract of the whole plant for which the microorganism used is *Earias vitella*, *Plutella xylostella*, *Spodoptera*. [2]

Anti-dyslipidemic Activity

The anti-dyslipidemic activity identified from the stem extract has Alloxan induced diabetic male adult rats of Charles foster strain. [2]

Ameliorative Effect

The ameliorative activity identified from the ethanol extract of root by exposing aflatoxin to male swiss albino mice. [2]

Antipsychotic Activity

The antipsychotic activity identified from the aqueous and ethanol extract showed amphetamine challenged mice model. [6]

Anticancer Activity

The anticancer activity identified from the aqueous and ethanol extract produced IMR 32 human neuroblastoma cell line as a model system. [5]

Allergic Rhinitis

The allergic activity from the aqueous extract was done by double blind placebo controlled trial. [6]

Anti-Bacterial Activity

The anti bacterial activity identified from the aqueous and ethanolic extract of stem for which microorganism used is *E.coli*, *P.vulgaris*, *E.faecalis*, *S.typhi*, and *S.aureus*. [2]

Immuno Modulatory Activity

The Immuno modulatory activity identified from the aqueous and extracts of whole plant for swiss male albino mice. [5]

Hepato Protective Activity

The Hepato protective activity identified from the aqueous and extract of whole plant for ligation of bile duct jaundice in rats. [6]

Antioxidant Activity

The antioxidant activity identified from the aqueous and extract of whole plant that induced liver cancer in male wistar albino rats by n-nitroso diethylamine. [7]

Nootropic Effect

The nootropic effect identified from the aqueous and extract of whole plant by using radial arm maze task performance and barnes maze test in amnesic rats. [2]

Anti-Inflammatory Activity

The anti-inflammatory activity identified from the aqueous and extract of stem that induced carrageenan in pawedenna model rats. [6]

Hypoglycemic Activity

The hypoglycemic activity identified from the aqueous and extract of stem that the effect of releasing insulin was detected in vitro using rat pancreatic B cells lines. [2]

Diabetic Neuropathy

In diabetic neuropathy streptozotocin induced wistar albino diabetic rats and in vitro aldose reductase inhibition assay and in vivo results were analyzed with Mann Whitney test was found from aqueous extract of stem. [5]

Radio-Protective and Cyto-Protective Activity

The Radio-protective and cyto-protective activity identified from the ethanol extract of stem showed 4 Gy- γ radiation in albino mice and cyclo phosphamide induced genotoxicity. [2]

Anti Steoporotic Activity

The anti steoporotic activity identified from the ethanol extract of stem found in female Sprague dawley rats. [2]

Anti-malarial Activity

The anti-malarial activity identified from the ethanol extract of stem revealed on white swiss mice by using microorganism plasmodium berghel. [7]

Active components and biological activity

1. The diterpenoid lactones extracted from the whole plant has various compounds such as furanolactone, clerodame derivative [(5R, 10R)-4R-8R-dihydroxy-2S-3R:15, 16-diepoxycleroda-13(16), 14-dieno-17, 12S:18, 1S-dilactone], Tinosporon,

Tinosporides, tactorine, columbin was effective against viral infections, inflammation, diabetes, cancer, psychiatric conditions, immune modulation.

2. The aliphatic compound extracted from the whole plant has octacosanol is an effective antinociceptive and anti-inflammatory, protection against 6-hydroxy dopamine induced parkinsonisms in rats, DOWM regulate VEGF and inhibits TNF- α from binding to the DNA.
3. The other active components extracted from the root has 3(a, 4 dihydroxy 3-methoxy-benzyl)-4-(4-compounds hydroxyl-3-methoxy-benzyl)-tetrahydrofuran tatorrhizine, tinosporidine, cordifol, cordifellone, giloinin, giloin, N-trans ferulotyramine as diacetate, tinosporic acid which are protease inhibitors for HIV and drug resistant HIV.
4. The sesquiterpenoid extracted from the stem has Tinocordifolin which is an antiseptic.
5. The glycosides extracted from the stem 18-norclerodane glucoside, furanoid diterpene glucoside, tinocordifolioside, cordifolioside, syringing, syringinapiosyl glycoside, pregnane glycoside, palmatosides, cordifolioside A, B,C, D and E treats neurological disorders like ALS, parkinsonism, dementia, motor and cognitive deficits and neuron loss in spine and hypothalamus, immune modulation, inhibits NF-KB and acts as nitric acid scavenger to show anticancer activities.
6. The alkaloids extracted from the stem and the root are berberine, choline, temvetarine, magnoflorine, tinosporin, palmetine, isocolumbin, aporphine alkaloids, tatorrhizine, tetrahydropalmetine treats viral infections, cancer, diabetes, inflammation, neurological immune modulation, psychiatric conditions .
7. The steroids extracted from the shoot β -sitosterol, β -sitosterol, 20 β -hydroxy ecdysone, ecdysterone, giloin sterol which treats IgA neuropathy, glycocorticoid induced osteoporosis in early inflammatory arthritis, induced cell cycle arrest in G2/M phase and apoptosis through C-Myc suppression, inhibits TNF- α , IL-1 β , IL-6 and COX-2. [2]

CONCLUSION

From this review paper, it has been concluded that the phyto chemicals extracted from the plant *Tinospora cordifolia* exhibits many pharmacological and biochemical activities. However, the research on *T. cordifolia* is still going on for further usage of the plant in preventing and treating diseases to investigate that it should either be given as a single drug or in combination with other drugs.

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