

A Review on Phytochemical and Pharmacological study of guduchi [Tinospora Cardifolia]

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Abstract : A significant portion of the population receives treatment from traditional systems of medicine based on medicinal plants. A deciduous woody climbing shrub known as *Tinospora cardifolia* is found in India, China, and Africa. The plant is a member of the Menispermaceae family. The root, stem, and leaf of this plant are primarily responsible for its pharmacological significance. According to reports, the plant contains phytoactive substances like alkaloids, steroids, glycosides, and lactones. *T. cardifolia* had a variety of pharmacological properties, including antibacterial, antidiabetic, hepatic problem, and anti-osteoporotic effects. The goal of this review is to provide a concise summary of the knowledge pertaining to the phyto chemistry and therapeutic properties of the *Tinospora cardifolia* plant .

Keywords : Pharmacological action , *Tinospora cardifolia* , medicinal plant, chemical constituent.

I. INTRODUCTION

In Ayurveda, *Tinospora cordifolia*, a member of the Menispermaceae family, is commonly referred to as Guduchi. It is a significant medication that Ayurvedic doctors use to treat a variety of diseases as well as to maintain good health. Amruta is given to this medicine because of its health advantages and comparisons to the celestial nectar that grants immortality. It is a well-known rejuvenator and nootropic that is frequently used to treat illnesses like fever, diabetes, and skin conditions [1]. Although well-known, its use in food and nutrition is less wellknown. According to the type of food, it has been discovered that Ayurveda divides food into many vargas or groupings. Shaka Varga is one such group that deals with veggies. According on the part used, this Shakavarga is further separated into other groupings, including leaves (Patra shaka), fruits (Phala shaka), tubers (Kanda shaka), etc [2]. Vatsadani, a synonym for Guduchi, is identified as one of the Patra Shakas alongside Guduchi [3,4]. This suggests that early Indians used the leaves of Guduchi as a vegetable. In the present paper, its nutritional value and significance as a dietetic in particular disorders are reviewed.

II. CHIEF CHARACTERS

Perennial climber, simple leaf, alternate phyllotaxy, green and yellow coloured flowers, unisexual flowers, fruit is drupe.

III. VERNACULAR NAMES

HINDI -Amrita, Giloe, Gilincha, Gulbel, Guloh, Gulancha, Guracha.

ENGLISH - *Tinospora*.

GUJARATI - Galo, Gado, Gulo, Gulvel.

MARATHI - Ambervel, Gharol, Giroli, Gulavela, Wulavel, Guloe.

MARAWADI - Gilve Kachchi - Gadu Kashmiri - Bark, Bekhgilo.

PUNJABI - Batinue, Gilo Gilogularich, Zakhmihayat.

SINDHI - Sutgilo.

BENGALI - Gudancha, Giloe, Guluncho, Nimgilo, Guruch, Golvancha.

TAMIL - Amudem, Chindilkodi, Ketta-mirtu, Amridavalli.

TELUGU - Gaduchi, Somida, Tippateege, tiyatij, godhuchi.

MALAYALAM - Amrita, Katamrit, Kattamruta, paiyamritam, chidramritam.

ORIYA - Gulochi.

KANNADA - Amrutball, Madhupurne, Sundar sanbolli.

KONKANI - Amritvel, Garudvel.

URUDU - Gilo.

IV. TAXONOMIC POSITION

Kingdom - Plantae

Division - Spermatophyta

Subdivision - Angiospermae

Class - Dicotyledonoae

Group - Polypetale

Natural order - Rannals

Family - Menispermaceae

Genus - *Tinospora*

Species - *Cordifolia*

There are 40 species, of which 3 have been recorded from India, that are found in tropical Africa, South-East Asia, the Indo-Malaya area, and Australia. The following species are reportedly utilised medicinally, according to Indian medicinal plants.

T.bakis Miers - In Senegal
 T.cordifolia Miers - In Indo - China
 T.crispa Miers - In Indo - China
 T.malabarika Miers - In Indo - China

V. COLLECTION

In the hot season, when the bitter component is most prevalent and concentrated, the root and stem are gathered [5]. To obtain both quantitative and qualitative starch for Sattva preparation, fresh stem should be gathered during flowering when there are no leaves on the stem.

VI. DESCRIPTION

MACROSCOPIC- 0.6 to 5 cm in diameter, with pieces of varying thickness. Young stems are green with smooth surfaces and swelling at nodes. Older stems have light brown surfaces marked by warty protuberances caused by circular lenticels. Transversely smoothed surfaces reveal a radial structure with obvious medullary rays traversing porous tissues. The drug has a bitter taste.

BOTANICAL DESCRIPTION

It is a big, glabrous, climbing deciduous shrub. *Tinospora cordifolia* has a tall, filiform stem that is rather succulent. aerial roots from the branches that are fleshy and have a thick, soft wart

Bark: The bark ranges in colour from creamy white to grey, is severely twisted, and is dotted with huge lenticels that resemble rosette flowers.

Leaf: The leaves are cordate at the base and membranous. Alternate, roundish oval, whole, sharp at the apex, 2-4 inch long spreading, fairly smooth and thin leaves on long flexuose petioles. When the leaves are seen in mass, they seem vividly green and have a bitter flavour and vague odour. The colour of mature leaves ranges from yellow to green.

Flower: The tiny, yellow or greenish blooms are in bloom. Male flowers are typically grouped together and female flowers are typically solitary in auxiliary and terminal racemes or racemose panicles.

Male flower: 6 petals opposite the sepals, roughly half as long as the inner ones, 3 lobed above with the lateral lobes, sepals in two rows of three each, outer short and roundish, inner twice as long, broadly obovate, concave, smooth.

Female flower: the stamens are reduced to short, oblong sepals in front of the petals, the petals are oblong and spasmodic, and there are three separate carpels opposing the outer sepals. 3 or fewer subglobose, stalked, and usually shorter fruits are produced. The drupes are crimson, pea-sized, shiny, succulent, and oval in shape. Flowers grow in the summer and fruits, which are meaty, in the winter. Seeds are solitary, bent seeds.

MICROSCOPIC

Aerial root : The aerial root is distinguished by a tetrarch primary structure; the cortex is divided into an inner parenchymatous zone containing secretory canals and an outside thick walled zone indicating the velamen. Starch granules are also present throughout the parenchyma of the aerial root. Transverse section of the stem reveals the outermost layer of cork, differentiating into an outer zone of thick-walled, compressed, brownish cells and an inner zone of thin-walled, colourless, tangentially arranged cells. The cork is broken in some places due to the opening of lenticels, followed by 5 or more rows of secondary cortex, with the cells of the outer rows being smaller than the inner ones, and just within the opening of the lenticels, groups of sclereids made up of two to ten cells are found in the secondary cortex region, the outer zone of the cortex is made up of three to five rows of irregularly arranged, tangentially elongated chlorenchymatous cells, and the cortical cells located on the inner side are polygonal in shape and stuffed full of starch grains. The cortex contains several secretory cells, pericyclic fibres that have been lignified, wide lumens, and pointed ends, along with numerous crystal fibres that have one prism in each chamber. The vascular zone is made up of 10–12 wedge-shaped xylem strips that alternate with semi-circular phloem strips. Phloem is made up of sieve tubes and companion cells. the cambium, which is made up of one to two layers of tangentially elongated cells in each vascular bundle, the phloem parenchyma, which is composed of polygonal or tangentially elongated cells, some of which contain calcium oxalate crystals, In addition to vessels, tracheids, parenchyma, and fibres, xylem also comprises of thick-walled, lignified vessels that are cylindrical in shape and have bordered pits on their walls as secondary xylem elements. Several tyloses can be found in some huge vessels. They frequently have transverse septa, medullary rays 15-20 cells wide with rounded, hemispherical, oblong, and ovoid cells, weakly visible concentric striations, and a central hilum that resembles a point. The pith is made up of big, thin-walled cells with starch grains primarily within. The drug's powder microscopy revealed hemispherical to ovoid starch grains as well as pitted vessels.

VII. PHYTOCHEMISTRY

Alkaloids, glycosides, steroids, sesquiterpenoids, aliphatic compounds, essential oils, a combination of fatty acids, and polysaccharides are the principal chemical components of the plant. Berberine, bitter gilonin, and non-glycoside gilonin gilosterol are some of the alkaloids. Tinosporine, tinosporide, tinosporaside, cordifolide, cordifol, heptacosanol, clerodane furano diterpene, diterpenoid furanolactone tinosporidine, columbin, and -sitosterol are among the principal phytoconstituents in *Tinospora cordifolia*. Its stem has been found to contain berberine, palmatine, tembertarine, magniflorine, choline, and tinosporin. Tinocordiside, a rearranged cadinane sesquiterpene glycoside with a tricyclic structure and cyclobutane ring, has been identified from the plant's immunomodulatory aqueous fraction. From the stems of *Tinospora cordifolia*, a novel clerodane furano-diterpene 2 with the chemical formula C₂₀H₂₀O₈ has been isolated¹⁰. *T. cordifolia* has a high fibre content (15.9%), enough protein (4.5% - 11.2%), enough carbohydrate (61.66%), and a low glycemic index. and 3.1% less fat. It is significant in several regulatory functions and possesses high potassium (0.845%), high chromium (0.006%), enough iron (0.28%), and enough calcium (0.131%).[6]

VIII.SUBSTITUTES AND ADULTERANTS

Tinospora cordifolia is misidentified as or combined with other species, namely *T. crispa* (Linn.) Miers ex Hook. f. & Thoms. and *T. mala-berica* Miers ex Hook. f. are synonyms for *T. sinensis* (Lour.) Merrill. There are not many characteristics that can be used to distinguish between *T. sinensis* and *T. cordifolia*, despite the similarities in their microscopic characteristics. The identifying characteristics are: In the cortical regions of *T. cordifolia*, the sclerenchymatous sheath disintegrates into scattered, uneven patches, whereas in the cortical regions of *T. sinensis*, it is fragmented into cordifolia. The lumen of each cork cell in *T. sinensis* contains a sizable calcium oxalate crystal. *T. cordifolia* has more mucilaginous cells than *T. sinensis* does. *T. cordifolia* has fewer vascular strands, but *T. sinensis* has more. In comparison to *T. sinensis*, Xylem is well developed in each strip of vascular strand in *T. cordifolia*. The pith of *T. cordifolia* is extremely narrow and made up of cells with thin walls, whereas the pith of *T. sinensis* is large. Compared to *T. sinensis*, *T. cordifolia* has a higher starch content [7]



Figure no.1- A: Whole plant, B: Stem part of the plant.

IX. CHEMICAL CONSTITUENTS

Table1- Type of chemical constituents in *Tinospora cordifolia*

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Type of Chemical	Active principle	Part in which present
Alkaloids	Berberine(I), Palmatine(II), Tembetarine(III, 0.012%), magnoflorine (IV, 0.075%), Choline(V), Tinosporin, Isocolumbin, Palmatine, Tetrahydropalmatine (VI), Magnoflorine	Stem Root
Glycosides	18-norclerodane glucoside (VII), Furanoid	Stem
	diterpeneglucoside(VIII and IX), Tinocordiside (X), Tinocordifolioside(XI), Cordioside, Cordifolioside A, Cordifolioside B, Syringin(XII), Syringinapiosylglycoside, Palmatosides C, Palmatosides F, Cordifolioside A(XIII), Cordifolioside B, Cordifolioside C, Cordifolioside D,	
Diterpenoid	Furanolactone XIV, Lactones Clerodane derivatives XV, XVI and XVII[(5R,10R)-4R-8R-dihydroxy-2S-3R:15,16-diepoxy-cleroda-13(16),14-dieno-17,12S:18,1S-dilactone] and Tinosporon, Tinosporides XVIII and XIX, Jateorine (XX), Columbin (XXI)	Whole plant
Steroids	b-sitosterol(XXII), d-sitosterol, 20β-hydroxyecdysone(XXIII), Ecdysterone(XXIV), Makisterone A(XXV), Giloinsterol.	Aerial part Stem
Sesquiterpenoid	Tinocordifolin, Octacosanol(XXVI), Heptacosanol (XXVII), Nonacosan-15-one (XXVIII),	Stem Whole Plant
Aliphatic Compound Miscellaneous compounds	3-(4-hydroxy-3-methoxy-benzyl)-4-(4-hydroxy-3-methoxy-benzyl) Tinosporidine, Cordifol, Wholeplant Cordifellone, N-trans-feruloyltyramine as diacetate, Giloin, Giloinin, Tinosporic acid	Whole Plant Root Whole plant

Table 2 - Shows the Therapeutic activity of *Tinospora cordifolia*.

Activity	Part/Extract	Animal Model/Cell Lines	Reference
Cardioprotective effect	Whole plant/ Alcohol extract	Calcium chloride administrated by intravenous infusion to produce arrhythmia in rats	[8]
			[9]
Antiulcer activity	Whole plant/Ethanol and Aqueous extracts	Albino rats using pylorus ligation induced ulcer.	[9]
Antidiarrheal activity	Whole plant/Ethanol and Aqueous extract	Castor oil and Magnesium sulphate induced diarrhea in albino rats.	[10]
Analgesic activity	Whole plant/Ethanol extract	Hot plate and abdominal writhing method in albino rats.	[11]
Aphrodisiac property	Aqueous and hydroalcoholic extract	Adult albino rats of wistar strain.	[12]
Immunomodulatory activity	Whole plant/Aqueous extract	Swiss male albino mice.	[13]
Antidyslipidemic	stem Extract	Alloxan induced diabetic male adult rats of charles foster strain.	[14]
Neuroprotective effect	Aerial parts/ Ethanol extracts	6-hydroxy dopamine lesion rat models of Parkinson's disease.	[15]
Anti-inflammatory activity	Stem/Aqueous extract	Carrageenan induced paw edema model in rats.	[16]
Gastroprotective activity	Whole plant	Indomethacin induced gastric ulcer in rats.	[17]
Antioxidant activity	Whole plant/Ethanol extract	N-nitrosodiethylamine induced liver cancer in male wistar albino rats.	[18]
Radio protective and Cytoprotective activity	Stem/Ethanol extract	4 Gy- γ radiation in albino mice and cyclophosphamide induced genotoxicity.	[19]
Antifeedant activity	Whole plant/ Chloroform Extract	Microorganism used: Earias vitella, Plutella xylostella, Spodopteralitura.	[8]
Ameliorative effect	Root/Ethanol extract	Male swiss albino mice exposed to aflatoxin B1.	[20]
Hepatoprotective activity	Whole plant/ Aqueous Extract	Bile duct ligation induced jaundice in rats.	[21]
Nootropic effect	Whole plant/Ethanol extract	Amnesic rats using radial arm maze task performance and barnesmaze test.	[22]
Hypoglycemic activity	Stem/ Aqueous Extract	Insulin released effect was detected in vitro using rat pancreatic β -cell lines.	[23]
Antipsychotic activity	Aqueous and Ethanol extract	Amphetamine challenged mice model.	[24]
Antidepressant activity	Petroleum ether extract	Swiss albino mice and activity was evaluated using tail suspension test and forced swim test.	[25]
Antiosteoporotic activity	Stem/Ethanol extract	Female sprague-dawley rats.	[26]
Antineoplastic activity	Aerial parts/DCM extract	Mice transplanted with ehrlich ascites carcinoma.	[27]
Antifertility effect	Stem/Methanol extract	Male rats.	[28]
Antiasthmatic activity	Stem/Hydroalcoholic Extract	Mice were sensitized with intraperitoneal ovalbumin followed by intranasal ovalbumin in vivo asthma model.	[29]
Antitumor activity	Aqueous alcoholic extract	C6 glioma cells were used, extract reduced the cell proliferation in dose dependant manner.	[30]
Allergic rhinitis	Aqueous extract	Double blind placebo-controlled trial.	[31]
Diabetic neuropathy	Stem/aqueous extract	Streptozotocin induced wistar albino diabetic rats and in vitro aldose reductase inhibition assay and in vivo results were analysed with Mann whitney Test.	[32]
Antimalarial activity	Stem/ Ethanolic extract	Microorganism used Plasmodium berghei on white swiss mice models.	[32]

Hepatocellular carcinoma	Aerial parts/ Ether extract	Diethyl nitrosamine induced hepatocellular carcinoma in male wistar rats.	[32]
Anticancer activity	Aqueous and Ethanolic extract	IMR 32 human neuroblastoma cell lines as a model system.	[33]
Antibacterial activity	Stem/ Aqueous and Ethanolic Extract	Microorganisms used: E. coli, P. vulgaris, E. faecalis, S. typhi, S. aureus, S. marcescens.	[33]

X.THERAPEUTIC APPLICATIONS

Antimicrobial Activity

When combined with various solvents, *T. cordifolia*'s antibacterial activities have been reported [34]; in-vitro tests were carried out, and the results demonstrated action against both gramme positive and gramme negative bacteria [35]. *Salmonella paratyphi*, *Proteus vulgaris*, *Salmonella typhi*, *Klebsiella pneumoniae*, *Shigella flexneri*, *Staphylococcus aureus*, and *Serratia marcescens* were among the harmful bacterial strains that the plants showed effectiveness against [36]. Certain infections were stopped in their tracks by *T. cordifolia*'s aqueous extract, acetone, and ethyl alcohol [37]. Additionally, it has been claimed that silver nanoparticles exhibit antibacterial efficacy against several bacterial strains [38]. Numerous fungus, including *Aspergillus fumigatus*, *Aspergillus flavus*, and *Aspergillus niger*, showed strong antifungal activity [39]. 0.2% chlorhexidine and dimethylformamide were employed as the respective positive and negative controls for evaluation while the etholic extract was generated by subjecting plates to different concentrations for 48 hours. Analytical studies performed on the data revealed that *T. cordifolia* at a 2% concentration had the greatest antibacterial activity [40]. *Tinospora cordifolia* aqueous extract's anti-fungal efficacy was evaluated in vitro against various *Aspergillus* species at dosages of 10, 25, and 50 mg/kg. Mice were used to assess the in-vivo activities [41].

Antidiabetic Activity

The *T. cordifolia* stems' antidiabetic properties are probably caused by a variety of substances, including alkaloids, tannins, flavonoids, and saponins [42]. When the enzyme inhibited action in hypoglycemia diabetic animals and normal animals, the crude extract of the stem was tested in dichloromethane, ethyl acetate, chloroform, and hexane. Without the addition of *T. cordifolia* extract, the aqueous extract examined in rats increased sugar by 21.3%, insulin by 51.5%, triglycerides by 54.12%, and the glucose-insulin index by 59.8%. [43].

In-vivo tests of several extracts have been conducted by Methew and his research team to identify associations with diabetic patients. Different concentrations of *T. cordifolia* leaf ethanolic plant (200 mg/kg and 400 mg/kg b.w.) were synthesised. Streptozotocin-induced diabetes albino rats received the doses orally for ten days and thirty days. When compared to insulin, *T. cordifolia*'s anti-diabetic action on test animals was between 50% and 70% effective [44]. Due to the activity of the insulin hormone, alkaloids isolated from the plant *T. cordifolia* shown insulin-mediated activities [45]. *T. cordifolia* was added to the diet on a daily basis up until diabetic pregnant mice (streptozocin-induced diabetes) and showed a protective effect by lowering the oxidative load and reducing the overall occurrence of disease-conditions [46]. In a diabetic rat model, *T. cordifolia* decreased blood glucose and brain interposed cholesterol, suggesting that it may have antidiabetic and lipid-lowering properties [47]. Guduchi's root extract had an antihyperglycemic effect in the alloxan-induced diabetes model, as evidenced by a reduction in the excess glucose in urine [48]. In diabetic rodent models, a few natural remedies, including Guduchi, such as Hyponidd, Dihar, and Ilogen-Excel, have been used, and the antidiabetic effect of *T. cordifolia* was noted. The effect of Ilogen-Excel reduced the severity of systemic glucose overload and increased the effectiveness of insulin by increasing its quantity in blood circulation. It was discovered that hyponidd reduced the glucose-mediated haemoglobin count while preserving oxidative load via reducing reactive species. In a streptozotocin-induced animal model, "Dihar" was tested for 1.5 months; during that time, it decreased urea and systemic creatinine levels while increasing enzyme activity [49,50,51].

Anti-Anxiety Action

In compared to normal diazepam (2.5 mg/kg), Sarma et al. discovered that a 100 mg/kg ethanolic extract of *T. cordifolia* exhibits notable anti-anxiety effect [52]. The patients' I.Q. level showed improvement in line with the clinical investigation. *T. cordifolia* preparation is used as a brain tonic in Ayurveda, and it is said to operate by enhancing mental faculties including memory and recall [53]. Hypolipidemic Effect Stanely et al. examined the hypolipidemic effects of an aqueous extract of the root on rats weighing 2.5 and 5.0 g/kg body weight on the sixth week, which resulted in diminished tissue cholesterol, diminished serum, diminished phospholipids, and diminished free fatty acid levels. These rats were alloxan diabetic rats. The greatest significant hypolipidemic effect was seen by the root extract at a dose of 5.0 g/kg of body weight. The ability of *T. cordifolia* root extract to reduce serum or tissue lipid levels in diabetic rats has never been studied before [54].

Hepatic Disorder

According to Sharma et al study 's of the effects of *T. cordifolia* water extract (TCE) on hepatic and gastrointestinal toxicity, alcoholic samples had significantly higher levels of gamma-glutamyl transferase, aspartate transaminase, alanine transaminase, triglyceride, cholesterol, HDL, and LDL. However, these levels were down-regulated after TCE mediation, and patients appeared [55].

Anti-Proliferative Potential

Response surface methodology was utilised by Ali et al. to examine the anticancer effectiveness of *T. cordifolia* extract in animal models. The extract displayed anticancer efficacy in a mouse skin cancer model produced by 7, 12-dimethylbenz(a)anthracene (DMBA) [56]. Rahul et al. produced the extract in a dose-dependent manner at concentrations of 200, 400, and 600 mg/kg dry weight. They then administered the extract to C57 BI mice for 30 days at a concentration of 750 mg/kg body weight. The size of the tumour reduced the anticipated lifespan [57].

Anti-HIV Potential

According to Kalikae et al., the root concentrate of *T. cordifolia* encourages the secure placement of HIV-positive patients. Reduced eosinophil count, B lymphocyte incitement, macrophage incitement, haemoglobin level, and polymorphonuclear

leucocytes are all indicators that *T. cordifolia* stem concentrate has substantial anti-HIV potential [58,59].

Wound Healing Property

According to Shanbhag T. et al. assessment, the wound healing profile of the alcoholic extract of *T. cordifolia* and its effect on the wound healing were found to be reduced by dexamethasone. The plant's ability to heal wounds shown increased flexibility in the *T. cordifolia* extract, which may be attributed to the development of collagen synthesis. The *T. cordifolia* concentrate did not reverse the dexamethasone-induced damage prevention [60].

Immunomodulating and Anticomplement Activities

Syringin and cordiol, two isolated pure compounds from *T. cordifolia*, were studied by Kapil et al. They discovered that both substances prevented the in-vitro hemolysis of sheep erythrocytes by guinea pig serum. The classical complement pathway's C3-convertase was hindered, which decreased hemolysis in the immune system. The mixes of *T. cordifolia* lead to appreciable increases in guinea pig serum IgG antibodies. The macrophase was triggered by cordioside, cordiofolioside-A, and cordiol by lengthening the incubation period. Different classes of dynamic mixes were described by Sharma et al., who also revealed their immunomodulatory movement [61].

Use in Parkinson's Disease

The detailed *T. cordifolia* concentration described by Birla et al. is incredibly attractive in the face of parkinsonism. Intoxicated parkinsonian micromodels using 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), they observed the anti-inflammatory movement of watery concentrate. The outcome suggested that *T. cordifolia* protected dopaminergic neurons by reversing the behavioural abnormalities caused by acute MPTP-intoxicated rats. Inflammation of the nervous system in MPTP-induced parkinsonism [62]. Because diverse sections of *T. cordifolia* contain organically active substances, it is clear why individuals with various ailments have used various parts of this amazing plant since ancient times.

Anti-Osteoporotic Effect

According to Abiramasundari and his study team, *T. cordifolia* has an impact on the differentiation in proliferation and mineralization of bone-like matrix on osteoblast model frameworks in vitro. This has an expected application in the treatment of osteoporosis. Alcoholic extract of *T. cordifolia* has shown to stimulate osteoblast growth, increasing cell division into osteoblastic heredity and moreover increasing mineralization of bone-like grid [63]. Ecdysteroids that have been isolated from a plant have been linked to anti-osteoporotic and pro-protein effects in vertebrates. From *T. cordifolia* extricates, beta-ecdysone (Ecd) has been identified.

XI. CONCLUSION

T. cordifolia being a resourceful plant, contains a vast number of biologically active substances that have been suggested to have medicinal potential. There are reports in pharmacological and clinical investigations that support the plant's therapeutic and remedial functions in the treatment of various illnesses. The various bioactive substances, including as sesquiterpenoids, alkaloids, steroids, glycosides, and others, have been discovered to have potential applications, particularly as immunomodulators and antioxidants. Studies on *T. cordifolia* have been undertaken in a variety of ways. *T. cordifolia* demonstrates that it is a fantastic medication and has not yet had any negative or harmful consequences. In conclusion, this review provides details on *T. cordifolia*'s traditional anti-toxin, antidiabetic, anticancer, immunomodulatory, antioxidant, and antibacterial action. *T. cordifolia* can be employed for additional research studies in the creation of new drugs.

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