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Ethnobotanical and Pharmacological activity of Tinospora cordifolia

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Abstract-

The traditional systemmeans the use of herbal plants for every disease. Due to presence of bioactive compounds the plants are useful in every disease even in chronic diseases like cancer, neuroleptic diseases, etc. Tinospora cordifolia is a shrub commonly known as Giloy or Guduchi. It contains a wide variety of bioactive compounds like alkaloids, flavonoids, amino acids, proteins, glycosides, steroids, carbohydrates, and diterpenoids which are helpful for human being as a medicine. Tinospora cordifolia shows activities like an anti-inflammatory, antiulcer, antioxidant, antineoplastic, anticancer, antipyretic, analgesic. Antidiabetic activity is very common use of Tinospora cordifolia. In this review we discussed about some pharmacological activities of Tinospora cordifolia.

Introduction-

Herbal plants produce a wide variety of bioactive chemicals, making them a valuable source of various medications. As a result, proper scientific evidence or assessment has become the criterion for herbal health claims acceptance [1,2,3]. Natural products have been used as medicines for thousands of years in the form of traditional medicines, cures, potions, and oils, with many of these bioactive natural ingredients remaining unknown [4,5]. Because of increase in allopathic medicine system due to their fast therapeutic activity, herbal drugs lost their popularity in society [6].

A wide range of plants are utilised in medicine for medicinal or preventative purposes [7,8,9]. Among these medicinal plants, Tinospora cordifolia, which has a wide range of bioactive principles and has been demonstrated to be a medicinally useful plant, has gotten little scientific attention [10,11,12]. Several extracts of Tinospora cordifolia are utilised in pharmaceutical, pre-clinical, and clinical trials, including aqueous, alcohol, methanol, chloroform, ethanol, and acetone extract [13,14].

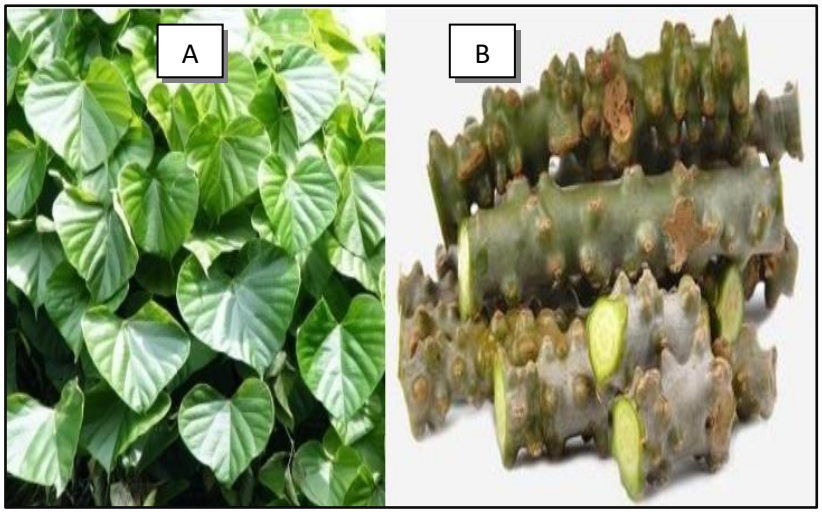

Fig.1 A) leaves of T. cordifolia B) stem of T. cordifolia [15]

T. cordifolia (Tinospora cordifolia L.) also known as "Heart-leaved Moonseed" or "Guduchi," is one of the most important medicinal plants in Indian folk medicine. Tinospora cordifolia (gurjo, guduchi, or T. cordifolia) is the herbaceous vine with heart-shaped leaves. It has been used in traditional medicine for generations to cure a variety of ailments [16,17,18].

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Scientific classification:

Table 1: Scientific classification of T. cordifolia

Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Order:	Ranunculales
Family:	Menispermaceae
Genus:	*Tinospora*
Species:	***T. cordifolia***

Geographical source:

T. cordifolia is native to the tropical areas of India, Sri Lanka, Myanmar, Sothern Eastern Asia, Africa, and Australia[19].

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CHEMICAL CONSTITUENTS

Table 2: Parts and chemical constituents of T. cordifolia [20,21]

Class	**Component**	**Part in which present**
Alkaloids	Berberine, Palme tine.	Stem
Glycosides	18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside, Cordioside, Syringin, Syringin-apiosylglycoside, Palmatosides C, Palmatosides F, Cordifoliside A, Cordifoliside B,	Stem
Diterpenoid	Furanolactone, Clerodane derivatives and [(5R,10R)-4R-8R-dihydroxy-2S-3R:15,16-diepoxy-cleroda-13 (16), 14-dieno-17,12S: 18,1S-dilactone] and Tinosporon, Tinosporides, and Jateorine, Columbin	Whole plant
Steroids	β -sitosterol, δ-sitosterol, 20 β-Hydroxy ecdysone. Ecdysterone, Makisterone A, Giloinsterol.	Aerial part stem.
Sesquiterpenoids Aliphatic compound Miscellaneous	Octacosanol, Heptacosanol Nonacosan-15-one	Stem Whole plant Root

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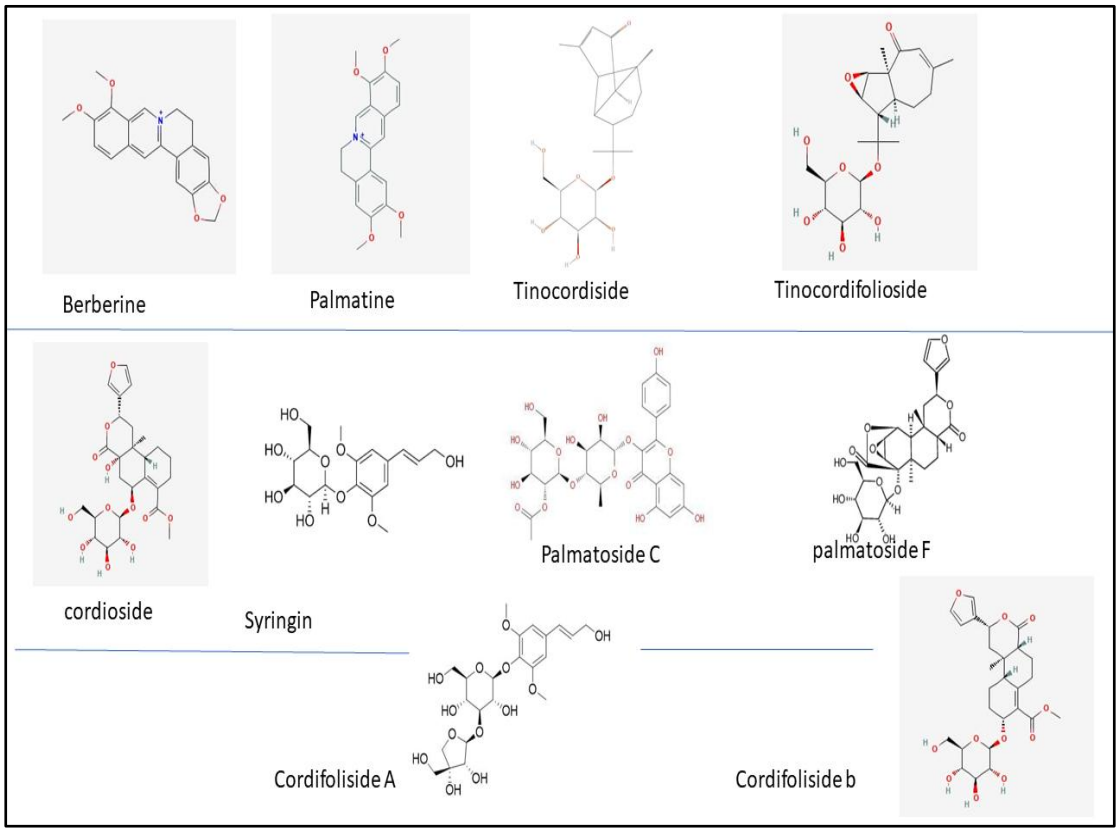

Fig.2 Structure of chemical constituents[20]

Plants have been utilised to treat and prevent diseases in all civilizations from antiquity, including the Indian and other countries. It has gained popularity in recent decades because its roots, stems, and leaves are utilised in traditional medicine to cure a variety of ailments[22,23,24]. Chemical constituents such as diterpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolic, aliphatic compounds, essential oils, a mixture of fatty acids, and polysaccharides contribute to the pharmacological activities of the plant, which are found in various parts of the plant, including the root, stem, and entire body[25,26,27].

Pharmacological Activity of T.cordifolia

The medicinal properties of T. cordifolia have been identified by the Indian Pharmacopoeia, and it is a key component in several medicinal formulations for the treatment of pyrexia, dyspepsia, syphilis, gonorrhoea, urinary tract diseases, gout, viral hepatitis, anaemia, general weakness, urinary tract infections, dermatological diseases, loss of appetite, and asthma[28,29]. T. cordifolia is an anti-toxin, analgesic, antipyretic (fever reducer), anti-inflammatory[30], and antioxidants that boost immunity[31,32,33,34].

Diterpenoid content of T. cordifolia have gastroprotective effect[35]. This traditional medicine is the ultimate solution to all health issues[36].The aqueous, ethanol, and acetone extracts of Tinospora cordifolia reduced the activity of urinary pathogens Klebsiella pneumoniae and Pseudomonas aeruginosa[37]. When antibacterial activity of T. Cordifolia was performed, the maximum efficacy was exhibited [38,39].

Alkaloids, tannins, cardiac glycosides, flavonoids, saponin, and other compounds have anti-diabetic properties[40].T. cordifolia possess β-cell regenerative properties[41]. Oral treatment of T. cordifolia root extract for two weeks in induced type 2 diabetic rats resulting in this plant promoting insulin secretion and inhibiting glycogenosis, and therefore improving blood glucose level management in the body[42]. The alpha-glucosidase enzyme was investigated using a crude extract of T. cordifolia. The enzyme's activity prevented hypoglycemia in diabetic and non-diabetic animals[43,44].

Berberine, plant alkaloid present in T. cordifolia have lots of therapeutic activity like antidiabetic, anti-inflammatory, cardioprotective, hepatoprotective etc[45]. Tinospora cordifolia alcoholic extract has been proven to have anti-inflammatory properties in models of acute and sub-acute inflammation[46].

T. cordifolia has also been studied for its anti-neoplastic properties[47]. T. cordifolia effects on human cancer cells[48]. It has also been discovered to destroy HeLa cells quite well in vitro[49]T. cordifolia has been tested for its anticarcinogenic and antimutagenic properties in C57 Bl mice and Swiss albino mice. T. cordifolia extract has been proven to suppress micronucleus generation in mice's bone marrow in a dose-dependent manner, as well as a significant reduction in tumour size when compared to control[50,51].

The anticancer property of T. cordifolia has also been investigated in Ehrlich's ascites carcinoma. The methanolic extract of Tinospora cordifolia is cytotoxic to human breast

cancer cells, but not to normal cells[52,53]. The mechanism of action of T. cordifolia ethanolic extract on cancer cell lines has already been described. In breast and oral cancer cells, an ethanolic extract of TC has been demonstrated to cause apoptosis[54,55]. Anticancer activity of Tinospora cordifolia was studied on human breast cancer cell and it shows the cytotoxic activity[56].

Tinospora cordifolia is good antioxidant. Activity was determined using various assay methods like total phenol content,total reducing power, hydrogen peroxide scavenging activity assay and hydroxyl radical scavenging activityEthanol extract of plant shows the higher antioxidant activity than other extract of plants[57].

Conclusion-

Tinosporacordifolia contains various bioactive phytoconstituentsused as medicine. It is also used in chronic diseases because of its antimutagenic, anticarcinogenic, and antineoplastic activity. The alkaloid content of Tinospora cordifolia gives antidiabetic, cardioprotective, and hepatoprotective activities. Because of the presence of various secondary metabolites like terpenoids, steroids, glycosides along with phenol compounds Tinospora cordifolia shows antioxidants, anti-inflammatory, and anticancer activities.

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