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[TINOSPORA CARDIFOLIA:GILOY]

Manyata Yadav, Piyush Yadav, Asgar Shameem, ,

Priya singh , Sushil Kumar yadav,

Department of pharmacy ,Prasad Institute Of Technology ,Jaunpur 222001.U.P.INDIA

ABSTRACT:-

Tinospora cordifolia (Giloy) is one of the important as well as very common herb which is normally used as common ingredient in various Folk, Ayurvedic, Unani and Siddha system of medicines. This review article mainly contains the information on cultivation, Harvesting chemical constituents of Tinospora and the therapeutic benefits of this plant like Antiulcer, Antidiabetic, Antiinflammatory, Anticancer, Anti AIDS, Antiallergic activities. Giloy is considered as a most divine herb because of its various Ayurvedic uses. It is called as nectar/Amruta for its divine healing nature. Guluchi increases the immunity of the body. It fights against infecting organisms. The leaves of the plant in juice cure psychological disorder. The leaves are also used for swine flu treatment. It is also used for the treatment of fever due to infection. Guluchi is a remedy for diabetes. The traditional use of the leaves is to cure urine infection and stomach ulcer. Mixed with cow milk, Guluchi leaves are used to cure leucorrhoea. It is also used as anti ageing juice. The plant oil is used to cure skin diseases and promote healthy skin. It brings down the high blood sugar. Guluchi purifies blood and levels the blood pressure. Traditionally, Guluchi is used to cure bowel problem. The starch prepared from it called 'palo' is popular in India. The leaf juice mixed with cumin seeds is used to cure certain internal inflammation. It is also used to cure rheumatic pain. The leaf extract also used to cure jaundice and anaemia. This also can be used for the treatment of malarial fever and cough. It removes the toxins from the brain. It cures asthma and clears the respiratory tract. The juice of the leaf, root and stem helps in digestion. It also helps to bring down bleeding during menstruation. The juice is also used in the treatment of the cardiac disorder. Guluchi increases memory power. It enhances natural immunity in the human body. Guluchi increases appetite. It purifies milk in mothers. Guluchi adds strength and vigour to the body and removes the weakness. Because of the antioxidant nature, Guluchi is also used in the treatment of cancer. Giloy's various uses and therapeutic applicability is precisely delineated in this paper.

INTRODUCTION:-

Tinospora Cordifolia is a climbing shrub belongs to family Menispermaceae. It is commonly known as Guduchi, Amrita, Gurach, Tinospora. It is a large, glabrous deciduous climbing shrub. The stems are rather succulent with long filiform fleshy aerial roots form the branches. The bark is gray brown and watery. The leaves are membranous and cordate. The flowers small and greenish yellow. This herb is found throughout tropical asia ascending to a height of 300 mts.

KEY WORD's:-Introduction,tinospora cardifolia,Botonical descreption,Taxonomy,pharmacological Implementation.

PHARMACOGNOSY OF TINOSPORA CARDIFOLIA:-

- **Stems** - Flesh
- **Roots** - long thread like, aerial, arise from branches.
- **Bark** - Thin, greyish or creamy white in colour, when peeled fleshy stem is exposed.
- **Leaves** - Cordate (heart shaped), membranous, juicy.
- **Flowers** - Bloom during summer
 - >**Male flower** - Small, yellow or green coloured occur in clusters.
 - >. **Female flower** - Occur singly.
 - **Fruits** - Pea shaped, fleshy, shiny turn red when boiled. Occur in winter
 - **Seeds** - curved, pea sized.
 - **Parts Used:** Stems, Roots
 - **Distribution:** The plant occurs throughout tropical regions of India extending from Kumaon to Assam and Myanmar, Bihar, Konkan to Sri Lanka. It is a large climber which grows over the highest trees in the forests and throws out aerial roots which reach the length of 10 metres, though not thicker than packthread.
 - **Cultivation:** Soil And Climate: It grows well in almost any type of soils and under varying climatic conditions.

- **Nursery raising and planting:** The plant is cultivated by stem cutting in the month of May-June. It requires some support preferably Neem and Mango trees, such plants are supposed to possess better medicinal values.
- **.Weeding and Hoeing:** Periodical hoeing is done, both in the nursery and field as per requirement.
- **.Manures, Fertilisers and Pesticides:** The medicinal plants have to be grown without chemical fertilizers and use of pesticides. Organic manures like, Farm Yard Manure (FYM), Vermi-Compost, Green Manure etc. may be used as per requirement of the species. To prevent diseases, bio-pesticides could be prepared (either single or mixture) from Neem (kernel, seeds & leaves), Chitrakmool, Dhatura, Cow's urine etc.
- **Irrigation:** The field after plantation should be irrigated periodically as and when required.
- **Harvesting/Post Harvesting Operation:** Mature plants are collected, cut into small pieces and dried in shade.
- **Yield:** Approximately 8-10 q./ha.
- **Economics:** The rate for a kg. of dried stem ranges from Rs. 15-20. (YEAR-2001) [1]

BOTONICAL DESCRIPTION:-

Tinospora cordifolia is a popular traditional medicine distributed throughout the tropical region of India up to 1200 m above sea level from Kumaon to Assam, in north extending through West Bengal, Bihar, Deccan, Konkan, Karnataka and Kerala, India. It is a fairly common plant of deciduous and dry forests, growing over hedges and small trees[2]. It is a glabrous, succulent, climbing shrub, often attaining a great height and sending down long thread like aerial roots. The plant seems to be particularly found climbing up the trunks of large Neem trees. The aerial roots that arise from the mature branches or cut bits of stems grow downward and by continuously lengthening sometimes reach the ground. They thicken gradually and resemble the stems, except for the absence of nodal swellings. The fresh or tender stems are greenish, longitudinally striated ribbed.

The bark is grey of creamy white in color, deeply cleft with spiral and longitudinal clefts, the space between the clefts being usually dotted with large rosette like lenticels. The branches bear smooth heart shaped leaves[3]. Leaves are simple, alternate, exstipulate, long petiolate, chordate in shape showing multicoated reticulate venation. Flowers are small and unisexual where male flowers are in clusters and female flowers are solitary. Aggregate fruit is red, fleshy, with many drupelets on thick stalk with sub terminal style scars, scarlet coloured. Flowers grow during the summer and fruits during the winter.



VERNACULAR NAME's:-

- **Sanskrit:** Guduchi, Amrita
- **Bengali** : Golanha
- **English** : Tinospora
- **Gujarati** : Gulvel
- **Hindi** : Gulanha
- **Kannada** : Amrutaballi, Madhuparni
- **Malayalam** : Amrytu, ChittamritaO
- **Oriya** : Gulochi
- **Tamil** : Amudam, Chindi

- **Telugu** : Tippateege, Guricha
- **Urdu** : Gilo, Satgilo

Kingdome	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Ranunculidae
Order	Ranunculales
Family	Menispermaceae
Genus	Tinospora

TAXONOMICAL CLASSIFICATION:-[5]

PHYTOCHEMISTRY:-

Tinospora contains diverse phytochemicals, including alkaloids, phytosterols, glycosides, and mixed other chemical compounds. Columbin, tinosporaside, jatrorrhizine, palmatine, berberine, tembeterine, tinocordifolioside, phenylpropene disaccharides, choline, tinosporic acid, tinosporal, tinosporon, and tinosporide have been isolated from *Tinospora cordifolia*. [6] The major phytoconstituent in *Tinospora cordifolia* includes tinosporine, tinosporide, tinosporaside, cordifolide, cordifol, heptacosanol, clerodane furano diterpene, diterpenoid furanolactone tinosporidine, columbin and β -sitosterol. Berberine, palmatine, tembertarine, magniflorine, choline and tinosporin are reported from its stem. The new clerodane furano-diterpene 2 with the molecular formula $C_{20}H_{20}O_8$ has been isolated from the stems of *Tinospora cordifolia* [7]

MEDICINAL PROPERTIES:-

Tinospora cordifolia is widely used medicinal plant in Ayurvedic system for its general tonic, antiperiodic, anti-spasmodic, anti-inflammatory, antipyretic, anti-arthritic, anti-lepritic, anti-allergic and anti-diabetic properties [8] The plant is used to improve the immune system and the body resistance against infections. The root of this plant is known for its anti-stress and anti-malarial activities. The stem is bitter, stomachic, diuretic, stimulates bile secretions, allays thirst, enriches the blood and cures jaundice. The extract of the stem is useful in skin problems. The root and stem of *Tinospora cordifolia* is prescribed in combination with other drugs as an antidote to snakebite and scorpion. [8] The plant is

also used in the treatment of wounds, pneumonia, asthma and cough. *Tinospora cordifolia* has anti-cancer, immune stimulating, nerve cell protecting, anti-diabetic, cholesterol-lowering and liver-protective actions. *Tinospora cordifolia* is also responsible for decreasing the tissue damage caused by radiation, the side effects of some forms of chemotherapy and speeding healing of diabetic foot ulcers [9]]

PHARMACOLOGICAL IMPLEMENTATION:-

ANTI-OXIDANT ACTIVITY:-

- Various extracts of *T. cordifolia* exhibits an anti-oxidant potential by scavenging the free radicals and other reactive species respectively. *T. cordifolia* significantly reduces the regulation of lipid peroxidation process thereby decreasing the level of reactive free radical species in a diabetic rat model (alloxan induced diabetes) and up regulates antioxidant enzymes like catalase and glutathione indicating its anti-oxidant effects.[10] A study also suggests that TC bark extracts (ethanol) shows the higher free radical scavenging activity as well as the highest phenolic content compared to the methanol extracts.[11]

ANTI-HIV ACTIVITY:-

T. cordifolia has been evaluated to found its importance in treating HIV positive patients by decreasing the patient's resistance to the retroviral regimen. ¹⁰⁴ The anti-HIV activity of *T. cordifolia* uncovers its application in managing the disease by increasing the CD4 T-cells count and decreasing eosinophil-(a type of WBC) count in HIV positive patients. *T. cordifolia* extract showed significantly enhanced phagocytic and intracellular bactericidal activity. *T. cordifolia* also stimulated peritoneal macrophage. Furthermore, *T. cordifolia* increases phagocytosis and

intracellular killing property. *T. cordifolia* significantly stimulates B-lymphocytes, polymorph nuclear leucocytes and macrophages[.12 13,]

IMMUNOMODULATORY ACTIVITY:-

Isolated chemical compounds such as cordifolioside A and syringin of guduchi are reported as immunomodulating agent in the clinical study *T. cordifolia* stem alters the level of enzymes such as catalase and stimulates lymphocyte cells maintaining the immune strength, thus highlighting the immuno-protective role of this shrub.[14] Macrophage cell when exposed to *T. cordifolia* extract, increases the production of different enzymes including 'myeloperoxidase' that enhances the anti-microbial action so as to protect the immunity.[15] On the other hand, it also increases the phagocytic activity of macrophages. Additionally, it stimulates splenocytes and macrophages. Because of enhanced nitric oxide production signifying anti-tumor as well as immuno-protective activity.[16] A clinical study stated that, *T. cordifolia* lotion causes a decline in the level of interleukin i.e. IL-1 and IL-6 in scabies animal model. It inhibits hyperkeratosis and infiltration of inflammatory cells into scabietic gash, showing its anti-scabies activity.[17] Aqueous extract induces cellular mitosis, stimulates the production and activation of cytokine and immune effector cells.[18] *T. cordifolia* is also able to increase the response of immune cell and neutrophil activity highlighting it as a potent agent for the prophylaxis of immune susceptible diseases.[19] Compounds of guduchi including alkaloids, steroids, aliphatic compounds etc when tested preclinically in rat model has shown a potent immuno-protective activity.[20] A polysaccharide compound obtained from *T. cordifolia* recognised as G1-4A enhances the proliferation and differentiation of immune cells i.e. T-cell and B-cell associated with the expression of the anti-apoptotic gene. The

compound α -D-glucan obtained from TC has shown to maintain the body physiology by activating the cells of lymphocytes. Polymorphonuclear leucocyte (PMN) cells are important components of the host defense system. Extracts of *T. cordifolia* stimulated the PMN cells for phagocytosis.⁸⁰ Oral administration of *T. cordifolia* alcoholic extract (100mg/kg) initiates an increase in foot pad thickness as well as in white blood cell (WBC) count and bone marrow cells indicating a stimulatory effect on haemopoetic system which shows a potent immunomodulatory action.[21] A classical preparation of an aqueous extract of *T. cordifolia* named as 'Ghana' in Ayurveda when tested on the edema rat model, it reduced the edematogenic agents and thus has a potent immunostimulatory action.[22]

ANTI DIABETIC ACTIVITY:-

T. cordifolia stem (dried and powdered) serially extracted with various solvents, gave yields as depicted in Table 1. Among the extractants used, extraction with water gave the highest yield which was followed by methanol, ethanol, ethyl acetate and acetone. Total phenol content was determined in different extracts of *T. cordifolia* stem. Methanol extract of *T. cordifolia* showed high content of polyphenol, when compared to other extracts. Total polyphenol content in methanol extract of *T. cordifolia* was 9.5 ± 0.1 g Kg⁻¹ extract, water extract was 2.1 ± 0.2 g Kg⁻¹ and ethanol extract was 2.7 ± 0.1 g Kg⁻¹.

Table 1Yield of different extracts of *T. cordifolia* stem powder (g/Kg⁻¹ dry powder)

Extracts	(g Kg ⁻¹ dry powder)
Water	68.0 ± 2.11
Ethanol	6.4 ± 1.01
Methanol	19.2 ± 2.09
Acetone	5.0 ± 0.84
Ethyl Acetate	7.0 ± 1.03

Values are expressed as mean ± SD of quadruplicates of two independent extractio:

Aqueous extract of *Tinospora cordifolia* showed potent glucose uptake activity, compared to other extracts at 100 µg. At dosages of 1–100 µg there was a gradual increase in glucose uptake (Fig. 1a). Ethanol extract of *T. cordifolia* showed increase in net glucose uptake from 1 to 100 µg which were 52.3, 60.1, 74.1, 99.0, 110.5 and 112.2 nM, respectively, when compared to control. At 1 µg, ethanol extract of *T. cordifolia* showed more potent activity in promoting glucose uptake when compared to other extracts. Methanol extract showed better glucose uptake, at lower dosage (40 µg), when compared to other extracts. [23]

ANTI PYRETIC ACTIVITY:-

T.Cardifoliya is renowned in Ayurvedic therapeutics for its usefulness in the treatment of Jwara (fever). Guduchi Swarasa and Guduchi Kalka (expressed juice and paste, respectively) prepared from the stem of T.cordifolia (Willd.) Miers. was used for processing the Ghrita (ghee) in this formulation, which is indicated for the treatment of fever. Thus prepared formulation of Guduchi from male and female plants was subjected to screening for anti-pyretic activity to assess the impact of gender and formulation on expression of pharmacological activity of T.Cardifolia.[24]

ANTI ARTHERTIC ACTIVITY:-

Tinospora cordifolia Linn., is distributed throughout the tropical Indian subcontinent and China. The principal constituents are tinosporine, tinosporide, tinosporaside, cordifolide, cordifol, heptacosanol, clerodane furano diterpene, diterpenoid furanolactone tinosporidine, columbin and b-sitosterol. The plant is used to improve the immune system and the body's resistance to infections. The bitter principle present shows antiperiodic, antispasmodic, anti-inflammatory and antipyretic properties. It is used in the treatment of rheumatoid arthritis. At the dose of 100 mg/kg it shows reduction of paw volume in collagen induced arthritic rats[25].

CONCLUSION:-

Even-though, there are many herbal plants in the world, Guduchi is considered to be having greater medicinal value. The pharmacological actions attributed to *Tinospora cordifolia* in Ayurvedic texts have evidences suggesting that this drug has immense potential in modern pharmaco-therapeutics. Various crude extracts from various parts of guduchi have medicinal applications from time immemorial. *Tinospora cordifolia* can be a potential dietary component which can help in prevention of different diseases. The utility of Guduchi leaves in diet is advisable and is highly beneficial.

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