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Comprehensive review on tinospora cordifolia (giloy): pharmacognosy, active constituents, and therapeutic applications

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ABSTRACT

The Menispermaceae family member Tinospora cordifolia, commonly known as "Giloy" or "Guduchi," is a versatile climbing deciduous shrub with a rich pharmacological profile. This review explores the plant's pharmacognosy, active constituents, and various therapeutic uses. Tinospora cordifolia has been traditionally employed in Ayurvedic medicine for its diverse medicinal properties, including anti-diabetic, anti-inflammatory, anti-arthritic, immune-modulatory, and anti-oxidant actions. The plant's different parts, such as roots, stems, and leaves, yield active compounds like alkaloids, glycosides, steroids, and diterpenoid lactones. Cultivation practices, distribution, and harvesting methods are also discussed. The active constituents of Giloy, including alkaloids, glycosides, diterpenoids, steroids, aliphatic compounds, and others, contribute to its diverse therapeutic effects.

The pharmacological activities of Tinospora cordifolia encompass immunity enhancement, anti-inflammatory effects, treatment of chronic fever, digestion improvement, anti-allergic properties, diabetes management, arthritis treatment, alleviation of asthmatic symptoms, vision improvement, anti-aging qualities, and potential anti-HIV effects. Scientific studies support its efficacy in various conditions, although further research is needed to fully understand its mechanisms of action. The plant's multiple uses make it a valuable resource in traditional medicine, with the potential for developing different dosage forms to enhance its medicinal applications.

KEYWORDS: giloy, medicinal properties, Chemical constituents, Tinospora cordifolia, Pharmacological activity.

1. INTRODUCTION

The Menispermaceae family member Tinospora cordifolia, also known as "Guduchi" in Sanskrit, is a huge, genetically diversified climbing deciduous shrub with typical greenish yellow flowers that can be found higher up.[1] In racemes panicles, the male flowers are grouped together while the female flowers are alone. The blossoming period extends throughout both the summer and the winter.[2] The various parts of the plant, including the root, stem, leaves, and complete plant, have yielded active compounds such as alkaloids, steroids, diterpenoid lactones, aliphatics, and glycosides. The plant is now becoming more and more significant for research to develop different dosage forms. because of its medicinal properties, which include anti-diabetic, anti-periodic, anti-spasmodic, anti-inflammatory, anti-arthritic, anti-oxidant, anti-allergic, anti-stress, anti-leprotic, anti-malarial, hepatoprotective, immune-modulatory, and anti-neoplastic action.

Tinospora cordifolia has a variety of chemical elements that could have an impact on the body. Some of these chemical compounds have antioxidant properties, while others may boost the immune system's activity. In test

animals, several chemicals may be active against cancer cells. In test tubes or on animals, the majority of research has been conducted. This review focuses on the medical use of the giloy plant. [3]

FIG No 1 : Leaves & Stem of Giloy[22]

1. Tinospora Cordifolia's Pharmacognosy

1) **Synonyms –** Gudichi, Amorita, Ambervel.
2) **Family-** Menispermaceae
3) **Stems** - Fleshy
4) **Roots** - long thread like, aerial, arise from branches.
5) **Bark** - Thin, greyish or creamy white in colour, when peeled fleshy stem is exposed.
6) **Leaves** - Cordate (heart shaped), membranous, juicy.
7) **Flowers** - Bloom during summer
   a) **Male flower** - small, yellow or green coloured occur in clusters.
   b) **Female flower** - Occur singly.
8) **Fruits** - Pea shaped, fleshy, shiny turn red when boiled. Occur in winter
9) **Seeds** - curved, pea sized.
10) **Parts** Used: Stems, Roots
11) **Distribution**: This plant grows throughout all of India's tropical areas, from Kumaon to Assam, and from Myanmar, Bihar, Konkan, and Sri Lanka. Large and climbing over the tallest trees in the forest, it shoots out aerial roots up to ten meters long, yet they are no thicker than pack-thread.
12) **Cultivation**: Climate and Soil: It thrives in a wide range of weather conditions and practically any kind of soil.
13) **Planting and nursery raising**: In May and June, stem cutting is used to grow the plant. It needs some assistance, ideally from mango and neem trees, as these plants are thought to have more therapeutic benefits.
14) **Weeding and Hoeing**: As needed, hoeing is done on a regular basis in the field and in the nursery.
15) **Manures, Fertilisers and Pesticides**: It is necessary to cultivate medicinal plants devoid of artificial fertilizers and pesticides. Depending on the needs of the species, organic manures such as Farm Yard Manure (FYM), Vermi-Compost, Green Manure, etc., may be utilized. Bio-pesticides (single or combination) from neem (kernel, seeds, and leaves), chitrakmool, dhatura, cow urine, etc., might be made to stop infections.
16) **Irrigation**: Following planting, the field should get frequent irrigations as needed.
17) **Weekly or fortnightly.**
18) **Harvesting/Post Harvesting Operation**: When mature plants are gathered, they are sliced into little pieces and shade-dried.
19) **Yield**: Approximately 8-10 q./ha.
20) **Economics**: The rate for a kg. of dried stem ranges from Rs. 15-20. (YEAR-2001) [20]

2. ACTIVE CONSTITUENTS OF GILOY

The giloy plant contains a variety of active ingredients that can be found in the leaves, stems, roots, and other plant parts. (Table no. 1)

The plant is mostly composed of alkaloids, glycosides, steroids, sesquiterpenoids, aliphatic compounds, essential oils, a combination of fatty acids, and polysaccharides. The alkaloids include berberine, bitter gilonin, and non-glycoside gilonin gilosterol. Tinosporine, tinosporide, tinosporaside, cordifolide, cordifol, heptacosanol, clerodane furano diterpene, diterpenoid furanolactone tinosporidine, columbin, and b-sitosterol are among the main phytoconstituents in Tinospora cordifolia Berberine, palmatine, tembertarine, magniflorine, choline, and tinosporin have all been identified in the stem of the plant. The giloy plant contains a number of active ingredients that can be found in the leaves, stems, roots, and other plant parts. For its effectiveness in treating Jwara (Fever) or acting as an anti-pyretic, giloy stem is well-known in Ayurvedic medicine. The plant has hypoglycaemia properties and is utilized in the partial control of diabetes as an oral synthetic anti-diabetic medication. [14]

Additionally, during the early stages of inflammation, the Giloye is employed to change how different chemical mediators of inflammation including histamine and 5 HT function. Therefore, it is established that traditionally prepared Giloye produced notable anti-inflammatory effects. When frequently ingested, Giloye, one of the Medya Rasayan, promotes life, prevents disease, increases strength, Agni, improves skin and voice, and is intellectually stimulating. One can achieve longevity, memory, intelligence, freedom from illness, youthfulness, excellence of lustre, complexion, and voice on a regular basis with the right quantity, maximum strength of the body and sensory organs, intelligence, deliberation excellence, and decency. Giloy is used to strengthen or increase immunity. Antioxidants found in it battle free radicals, maintain the health of your cells, and fight disease. Giloy helps to eliminate toxins, cleanses the blood, and fights bacteria. Giloy is particularly helpful in treating bowel-related conditions and enhancing digestion. Giloy has anti-arthritic and anti-inflammatory characteristics that can be used to treat arthritis and its various symptoms. Giloy stem powder is good for joint pain. To treat rheumatoid arthritis, it can be used with ginger. The Giloy plant is used in different regions of India to improve vision. Giloy powder should be boiled in water for this, allowed to cool, and then applied to the eyelids. This plant has anti-aging qualities that help lessen wrinkles, fine lines, dark spots, and zits. It offers a person's skin that is smooth and radiant. [14]

Table No. 1. Active constituents of Giloy with Biological response [4-5]

Sr. No	Active Component Type	Compounds	Source	Biological Response
1	Alkaloids	Berberine, Choline, Palmatine Tembetarine, Magnoflorine, Tinosporin, Isocolumbin	Stem Root	Anticancer, Antiviral infections, Neurological Disorder and Anti-diabetic
2	Glycosides	Tinocordiside,Cordioside	Stem	Treat Neurological Disorder like Parkinsons
3	Diterpenoid	Furanolactone	Whole plant	Vasorelaxants, Antiinfammatory, Antimicrobial Antihypertensive, Antiviral
4	Steroids	Beta-Sitosterol	Stem aerial parts	Induce Osteoporosis in early inflammatory arthritis
5	Aliphatic compound	Octacosanol	Whole plant	Anti-nociceptive and anti-inflammatory
6	Others	Giloin, Tinosporic acid	Root	Used to treat anxiety, Protease inhibitors for HIV

3. Health Benefits and Medicinal Properties of Giloy (Tinospora cordifolia)

Tinospora cordifolia's various parts are used to treat a range of diseases. It is a plant with multiple applications, and the many dosage forms it produces are used for a variety of goals.[6-13]

3.1 Immunity Enhancer

Giloy is also known as immune booster herb. To enhance or strengthen immunity, use giloy. Antioxidants found in it battle free radicals, maintain the health of your cells, and fight disease. Giloy helps to eliminate toxins, cleanses the blood, and fights bacteria. The plant Tinospora, which has heart-shaped leaves, has long been used and recommended in Indian medicine. Having fresh Giloy juice might boost immunity. Increasing the activity of macrophages, which are immune cells that combat both foreign bodies and pathogens, aids in early healing [15].

3.2 In Chronic Fever

Giloy promotes recovery from fever. Giloy is an anti-pyretic drug that can also alleviate the symptoms of several dangerous illnesses, including dengue, malaria, and the swine flu. It aids in improving blood platelets when there is fever. [6-13]

The antipyretic properties of giloy juice may contribute to its health advantages by lowering elevated fever. It could be a helpful antipyretic drug to lessen the symptoms of a number of deadly illnesses, including swine flu, dengue fever, and malaria. The improvement in blood platelet levels that are impacted during these severe fevers might be the mechanism.[22]

3.3 Anti-inflammatory Activity

A study was carried out by C M Siddalingappa and colleagues. After 30, 60, and 90 minutes of administration, it was noted that Tinospora cordifolia significantly increased the reaction time (pain threshold) at dosages of 100 mg/kg, 200 mg/kg, and 100 mg/kg with 5 mg/kg of diclofenac. After three hours, Tinospora cordifolia demonstrated 32.63%, 36.63%, and 40.5% suppression of paw edema at the same dosages as before. [19]

3.4 In Digestion

Giloy is particularly helpful in treating bowel-related conditions and enhancing digestion. Giloy powder can be used consistently to achieve the best benefits, or it can be combined with jaggery to relieve constipation. [6-13]

3.5 anti allergic activity

Allergies can trigger asthma in some individuals. Giloy is believed to have antiallergic properties and may help in managing allergic reactions that contribute to asthma symptoms. Tinospora cordifolia has been investigated for its ability to prevent allergies. When compared to a placebo, T cordifolia was shown to significantly reduce sneezing, nasal discharge, nasal obstruction, and nasal pruritus. It also consistently improved nasal smear and mucosa test results[18].

3.6 Treats Diabetes

giloy, also known as Tinospora cordifolia, is a popular herb in traditional Ayurvedic medicine and is often used for its potential health benefits, including its role in managing diabetes. While Giloy has been traditionally used for various health conditions, including diabetes, it's essential to note that scientific evidence supporting its

efficacy in diabetes management is still limited. Always consult a healthcare professional before using any herbal remedy, especially if you have diabetes, as it may interact with other medications or treatments you are using.[21]

Giloy is a hypoglycaemic medication that aids in the management of diabetes, particularly Type 2 diabetes. Blood sugar levels are also lowered by it. Its anti-diabetic activity has reportedly been mediated via reducing oxidative stress (OS), enhancing insulin production, and also by suppressing gluconeogenesis and glycogenolysis, which controls blood glucose. Alkaloids, tannins, cardiac glycosides, flavonoids, saponins, and steroids are the main phytoconstituents of Tinospora cordifolia and have been shown to have anti-diabetic properties. At a dosage of 250 mg/kg, oral administration of three different extracts (hexane, ethyl acetate, and methanol) from the stem of T. cordifolia was reported to have strong antidiabetic effects by lowering blood sugar levels in streptozotocin-induced diabetic rats [16].

3.7 Treats Arthritis

Giloy has anti-arthritic and anti-inflammatory characteristics that can be used to treat arthritis and its various symptoms. Giloy stem powder is good for joint pain. To treat rheumatoid arthritis, it can be used with ginger. Tinospora cordifolia may have potential as an anti-osteoporotic agent because it has been shown to influence osteoblast model systems' in vitro proliferation, differentiation, and mineralization of bone-like matrix.[6-13] According to a review study by Saxena et al. (2019), giloy may have a favorable impact on the process of bone mineralization.[22]

3.8 Reduces Asthmatic Symptoms

Chest tightness, breathlessness, coughing, wheezing, etc. are all symptoms of asthma. Because of its anti-inflammatory properties, giloy helps to lessen respiratory issues such a persistent cough, colds, and tonsils.[6-13]

3.9 Improves Vision and reduces Signs of Aging

The Giloy plant is used in different regions of India to improve vision. Giloy powder should be boiled in water for this, allowed to cool, and then applied to the eyelids. This plant has anti-aging qualities that help lessen wrinkles, fine lines, dark spots, and zits. It offers a person's skin that is smooth and radiant.

3.10 Anti-HIV effects

TCE has been proven to show a reduction in the HIV virus's recurrent resistance, increasing the treatment result. TCE's anti-HIV effects were demonstrated by a decrease in eosinophil count, stimulation of B lymphocytes, macrophages, polymorphonuclear leucocytes, and haemoglobin percentage, demonstrating the drug's potential for use in the treatment of the condition.

Additionally, those who have HIV and other autoimmune diseases may benefit from giloy. Because giloy has long been used as an immune booster, researchers have been examining how it affects HIV patients. According to research that was published in the "Indian Journal of Pharmacology," compared to just 20% of HIV patients who got placebo therapy, 60% of those who received giloy treatment reported a decrease in disease-related symptoms. According to this study, giloy may help people with HIV and other immunological illnesses by boosting their immune systems and reducing typical adverse effects [17].

4. Uses and Benefits of Guduchi

The guduchi plant has several medical uses for all of its components. The plant oil works well for gout and skin conditions, as well as for pain and edema. The plant bestows youth, prolongs life, sharpens memory, boosts energy, and improves complexion, voice, and skin shine. In addition to liver diseases like hepatitis, it is beneficial in treating digestive issues such hyperacidity, colitis, worm infestations, appetite loss, stomach discomfort, excessive thirst, and vomiting. When combined with rock candy, fresh guduchi juice helps hepatitis patients recover more quickly. Ailments such as splenic diseases, anemia, diabetes, heart debility, sexual debility, and raktapitta can be treated with it. The plant's starch acts as a common home treatment for persistent fever, reducing burning feeling and elevating energy and appetite.

5. Interactions With Other Drugs

Herb-drug interactions, which occur when the bioactive components in herbs interact with other pharmaceuticals, can impact how well a drug works as a whole.[23]

- A certain anti-diabetic medication may interact with giloy juice, resulting in a significant reduction in blood sugar levels. As a result, if you take giloy juice together with anti-diabetic drugs, you must regularly check your blood glucose levels.[23]
- Additionally, Giloy may interact with blood thinners, or anticoagulants, which might cause issues with blood clotting.[23]
- giloy may have mild hypotensive effects, potentially lowering blood pressure. If you are already taking medications for high blood pressure, combining them with Giloy may enhance this effect

CONCLUSIONS

Tinospora cordifolia, or Giloy, stands out as a remarkable medicinal plant with a wide array of therapeutic properties. Its active constituents contribute to its effectiveness in addressing various health issues, and traditional uses are being substantiated by scientific research. The plant's ability to boost immunity, combat inflammation, treat chronic fever, improve digestion, and manage conditions like diabetes and arthritis makes it a versatile remedy.

Furthermore, the anti-allergic, anti-aging, and potential anti-HIV effects add to the plant's significance in medical research. As research continues, Tinospora cordifolia may emerge as a valuable component in the development of novel therapeutic agents. The cultivation and harvesting practices outlined provide insights into sustainable utilization. Overall, Giloy's rich pharmacological profile positions it as a promising candidate for further exploration in both traditional and modern medicine.

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