



A comprehensive review on *tinospora cordifolia* (Giloy): The medicinal plant

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Abstract

Tinospora cordifolia is very important medicinal plant, climbing shrub from an important of Ayurveda system of medicine which belong to the family Menispermaceae acting as one of the main source of new pharmaceutical and health care products. It is commonly called as Amrita, Guduchi, Giloe, Heart moon leaved, and found throughout India. The medicinal qualities and therapeutic uses of giloy as well as its phytochemicals are important as valuable medicinal plant. This paper present a review on medicinal properties, phytochemical, benefits, side effects and toxicity, cultivation etc. in ayurvedic literature Giloy is described as amrita because of its innumerable medicinal properties and it is also said to increases the lifespan of human by preventing them from many chronic diseases. The Giloy is well known for its immunity boosting application and prescribed for the treatments of chronic fever, swine flu, malaria, diabetes, skin problem, urinary problem anemia etc. The Giloy also used in the treatment of coronaviruses because Giloy built a strong immunity in human body against COVID-19. The Giloy climbing on the neem tree is preferred more as compared to other. To fight against covid Giloy is consumed with ashwagandha, tulsi, honey etc. The chemical composition of Giloy belongs to different classes such as alkaloids, steroids, glycoside and polysaccharide like compound having medicinal properties. Giloy having some side effects such as constipation, harm full for autoimmune disorder patient.

Keywords: medicinal plant, *tinospora cordifolia*, covid-19

Introduction

Tinospora cordifolia (Giloy) is and ayurvedic climbing shrub used in Ayurveda as well as unani, belong to family Menispermaceae, it is commonly known as Guduchi, Heart leaved moonseeds, Amrita, Gurach, *Tinospora* [1]. It is known to be an amazing medicinal property and its benefits and also approved by FDA. The Giloy species is endemic to India and is commonly found throughout tropical and subtropical zones over 600 m altitude. In India it is distributed up to 1200 m in tropical region from Kumaon to Assam, in north extending through West Bengal, Bihar, in Decan Kankan, Karnataka and Kerala. The giloy species is also found in Myanmar, Malaysia, Vietnam, Bangladesh, North Africa, South Africa [2].

Giloy is large climber which grows over the highest tree in the forest with several elongated twining branches. The roots are aerial threat like squarish which arise from mature branches. The dried aerial roots are light grey brown or creamy white in color, odorless and bitter taste. Steam of this plant is rather succulent with long filiform, fleshy and climbing in natural dried stem is cylindrical, slightly twisted in shape starch obtained from the stem known as “Guduchi Sava” is highly nutritive and digestive and useful for many diseases. Leaves of this plant is approximately 10-15 cm long, green in color but over mature leaves are yellowish green to yellow green color this are rich in protein, calcium and phosphorous [3].

Giloy sticks are being recommended by number of ayurvedic institution as an immunity booster against COVID-19. One of the organizations in India which work in the field of Ayurveda is Patanjali Ayurveda who developed a drug kit called as “coronil” the major ingredient in coronil drug is Giloy, ashwagandha, tulsi [4].

Medicinal Properties

Tinospora cordifolia is widely used in traditional ayurvedic medicine in India. It has shown great potential for the development of biopharmaceutical products for the treatment of various diseases [5]. It also works as immunomodulator. Hepatosuppression, Anti-allergic, Anti-pyretic, Anti-HIV, Anti-diabetic, Anti-cancer, Anti-Toxic, Anti- Asthmatic, Anti-malaria etc. The Giloy plant has great potential for developing useful drugs. The leaves extract of Giloy have shown anti- HIV activities [6]. Thus, it can be said that biological extract from this plant will certainly be helpful in protecting and treating various viral diseases in humans. Guduchi is also used for soothing inflamed and injured mucous membrane in the digestive track. It protects stomach and duodenum by increasing the production of mucin. The starch obtained from Giloy stem or roots can be used for chronic diarrhea and dysentery. The biological extract from Giloy plant certainly be helpful in protecting and treating various viral diseases humans, also use in treatment of chronic fever, diarrhea, cancer, Jaundice, dysentery, bone fracture, pain, asthma, skin diseases, snack bite, poisonous, insects, eye disorder.

Phytochemistry and Nutritional Composition

Giloy is rich in nutrition like carbohydrates, Vitamins, Calcium, Iron, Fiber, proteins, and other essential elements [7]. All parts of *tinospora cordifolia* (Giloy) like leaves, Stem, Fruits and Roots are being used as a nutraceutical. The whole plant of *Tinospora Cordifolia* is a rich source of nutrition and essential macro-micro-nutrients and several phytochemicals [8]. The nutraceutical agents present in plant are responsible for its renowned immunomodulation, hepato-protective, anti-inflammatory, anti-pyretic, anti-spasmodic, memory boosting properties [9]. The nutrients

composition of ripened *tinospora cordifolia* fruit was studied by analyzing the content of carbohydrate total soluble sugar, amino acid, free amino acid, protein, starch, cellulose, lipids etc. Giloy contain high fiber (15.8%), Proteins (4.5-11.5%), Carbohydrates (61.66%), Low fat (3.1%), Nutritive value 292.54, Calories per 100mg^[10]. Beside its therapeutic properties the plant also provide multiple essential mineral such as potassium (0.845%), Chromium (0.006%) Iron (0.28), calcium (0.131%)^[8]. A variety of constituents have been isolated from *tinospora cordifolia* plants (Giloy) such as alkaloids, diterpenoids, Lactones, glycoside, aliphatic compound polysaccharide, steroids like tinosporine, tinosporide, tinosporaside cordifolia, cordifol heptacosanol, tinosporidine^[11]. All most all parts of plants are used in ayurvedic formulation; fresh plant is more beneficial than dried plant. The stem extract of *tinospora cordifolia* can be safe used for 8 weeks in proper storage condition. The main chemical constituents of Giloy plant are berberine mostly used in the treatment of cancer. The fresh stem bark yield giloin, giloinin, gilosterol, hypoglycemia agent and phenolic lignin have also been isolated from this plant^[12].

Benefits of Giloy

There are various active constituents of Giloy plant obtained from various parts of plant like Leaves, Stem, roots etc. the different constitution are used to treat various diseases. It is a multipurpose plant and its different dosage form are used for various purpose^[13].

Immunomodulator Activities

Drinking fresh giloy juice helps to improve immunity. It enhances the activities of macrophages (The cells responsible for fighting foreign bodies as well as micro-organisms) and thus helps in early recovery^[7]. Giloy increases body's resistance and stimulate the immune system^[14]. A large variety of compound which are responsible for immunomodulator are cytotoxic effect are 11-hydroxy muskatone, N-methyl-2-pyrrolidone, N-formylannanain cordifolioside, A. magnoflorine tinocordioside and syringing^[15].

Anti-oxidants Activities

Methanolic extract of stem of *tinospora* has reported anti-oxidants activities by increasing the erythrocytes membrane lipids peroxide and catalase activity.it also decrease the activity of SOD^[16]. Leaf extract of *tinospora cordifolia* reported to have in alpha- glycosidase inhibitor, characterized as somonarain was found to be also significant anti-oxidants and hydroxyl radical scavenging activities^[17-18].

Anti-Arthritis Activities

Giloy contain anti-inflammatory and anti-arthritis properties that helps treat arthritis and its several symptoms for join pain the power from giloy stem can be boiled with milk and consumed. It can be used along with ginger to treat rheumatoid arthritis^[19]. It reduces swelling, joint pain, and inflammation associated with arthritis by decreasing synthetic of proinflammatory cytokines like 1L-1B, 1L- 17 and tumor necrosis factor α ^[20].

Anti-diabetic Activities

The stem of this (Giloy) plant is generally used to cure Diabetic type 2 due to its hypoglycemic properties used to

cure diabetics by regulating level of blood glucose. Giloy also improve the long term cellulose insulin sensitivities that helps to manage diabetes well^[21-22]. It has been reported to act as anti-diabetic drug through explanatory oxidative stress promoting insulin secretion by inhibiting gluconeogenesis and glycogenolysis^[23]. The root extract of this plant has been reported to have anti-diabetic properties which decreases the level of glycosylated hemoglobin hydroperoxide and vitamin E^[16]. The aqueous, alcoholic and chloroform extract of the *tinospora cordifolia* leaves has significant hypoglycemic activities which is postulated to be an insulin^[11].

Anti-Asthma Activities

Tinospora cordifolia (Giloy) has been preferred traditionally to treat ailments such as bronchitis and chronic cough, sneezing etc. Due to its powerful anti-inflammation and anti-oxidants properties^[13], it pacifies the mucous membrane of the respiratory system thee by making it very effective in respiratory issues like asthma, cough, cold, and tonsils. Chewing Giloy roots drinking Giloy root juice give symptomatic relief to the patients suffering from asthma^[19].

Anti-cancer Activities

Tinospora cordifolia (Giloy) shows anti-cancer activities, this activity is mostly shown in animal model root extract of Giloy has been shown radio-protective role due to extensively increases in body weight, tissue weight, tubular diameter^[6]. The active principle of *tinospora cordifolia* is to enhance the host immune system by increasing immunoglobulin and blood leukocyte level and by the stimulation of stem cell proliferation^[24-1]. The Giloy extract has the ability to reduce the solid tumor volume by 58.8% – 60% which is comparable to cyclophosphamide a known chemotherapeutic agent^[25].

Anti-Toxic

Tinospora cordifolia (Giloy) shows anti- toxic activities due to its ability of lowering the concentration of thiobarbituric acid reactive substance (TBAR) and enhancing the level of glutathione ascorbic acid and profile more over the presence of alkaloids such as Palmetin, Isocolumbin tetrahydroxy palmatine and magnoflorine in *tinospora cordifolia* protect against aflatoxin induced nephrotoxicity^[26]. Free radical generated during aflatoxicosis can be scavenged by the antioxidants present in aqueous extract of Giloy. Lead nitrate induced liver damage was prohibited by the Giloy extract^[27].

Anti-HIV Activities

Giloy may also be beneficial for people with HIV and other autoimmune disorder. Giloy traditional use as an immune stimulant led researchers to study its effect on patient with HIV. Drinking Giloy root extract has shown significant effect in modulating the immune system positively in HIV positive patient^[28]. Recent studies published in 'Indian journal of pharmacology' stated that, 60% of HIV patient who received Giloy treatment reported a decrease in diseases and related symptoms and 20 percent who received placebo treatment. This study suggests that Giloy may improve the immune system of patient with HIV. Root extract of *tinospora cordifolia* show anti-HIV effect by indicating reduction in eosinophil count, stimulation in β – lymphocytes, macrophages, hemoglobin levels and

polymorphonuclear leukocytes. Ethyl acetate extract show 85% of HIV 1 RT inhibition activity at a concentration of 20 mg/ml [29].

Anti-Microbial

Tinospora cordifolia show antibacterial activity mainly its methanolic extract. Ethanolic activity has significant antibacterial activity activities *Escherichia Coli*, *Proteus Vulgaris*, *Enterobacter faecalis*, *salmonella typhi*, *staphylococcus aureus* and *serratia marcescens* [30]. The chemical constituents responsible for the anti-microbial activities are furenolactone, tinosporon, jateorin and columbine. The methanolic extract of *tinospora cordifolia* plant was found to have antimicrobial activities against *bacillus subtilis* (MTCC8), *E. coli* (MTCC1), *S. aureus* (MTCC98) and *S typhi* (MTCC737) and is sensitive to different microorganism. Thus, the Giloy plant could be utilized as a natural source of anti-microbial. Traditionally this drug has been reported to have protective effect against many infections which lead to its folklore use as an anti-microbial drug [31]. Current study suggested those anti-microbial properties of *giloy satva* may be due to the presence of chemical compound like alkaloids, berberine and glucoside *giloin* [32].

Cardioprotective Activities

Alcoholic extract of *tinospora cordifolia* (*Giloy*) is used in cardioprotective activity. The effect of *tinospora cordifolia* in cardioprotective is dose dependent; as dose increases the extract show increases effect as reflected by progressive decrease in plasma calcium and sodium level and increase in potassium level at higher dose when compared that to *verapamil*. Hence the *tinospora cordifolia* is used for the treatment of atrial and ventricular fibrillation, flutters, and ventricular tachyarrhythmias [33]. The main chemical constituents used in the cardioprotective and found in *tinospora cordifolia* are furan lactone, tinosporin, tinosporide, jateorine, columbine and clerodane derivative.

Anti-aging and vision

Tinospora cordifolia or *Giloy* is an effective anti-ageing herb it helps in reducing fine line, wrinkles and age spots [13]. Rich in flavonoids it fights against cell damage and initiate new cell growth. It also nourishes the skin and enhances collagen production to reduce the visible signs of ageing. *Giloy* plant help to boosts the clarity, for this boil *Giloy* powder and let it cool down and apply it on eye lids [34].

Side effect and toxicity:

The extremely beneficial *Giloy* does not have any serious side effects. It is used to treat numerous health conditions from simplest to life threatening ones.

Causes constipation

Although *Giloy* is extremely beneficial in treating a digestive health problem it can irritate the stomach and causes constipation as well. No matters what form it is consumed it may be in juices, capsules, or powdered form constipation is one of the serious side effects of *Giloy* [1].

Lowers blood sugar

If the person is diabetic and taking *Giloy* as an alternative treatment with prescribed diabetic drug you need to monitor

the blood sugar level frequently. These would be a need to adjust or change the medicines prescribed for diabetic to prevent the side effect of hypoglycemic [14].

Pregnancy and Breastfeeding

It's not that *Giloy* is known to cause any serious side effect in pregnancy and breastfeeding but that little is known as its effect. Much care is taken with the drug and treatment taken during the crucial phase. It still has to be research about its long-term effect and hence it is always better to avoid it and stay on the safe side [35].

Drug interaction

Giloy being used with other drug has its own effects. It is known to interact more with antidiabetic and immunosuppressant medication than any other drugs. Ex, when *Giloy* used in diabetic patients it might causes their blood glucose level to drop too low.

Surgery

Giloy should be stopped around 2-3 weeks before your scheduled surgery date because it is known to cause sugar level alternation in the blood. It could interfere with the sugar level control during and after surgery.

Autoimmune diseases

Giloy has immunomodulator properties it boost the immune system. In case of autoimmune disease, it may over stimulate the immune system. Hence it is best to not use *Giloy* if you suffer from any of the autoimmune. Those suffering from an autoimmune condition such as lupus, multiple sclerosis, and rheumatoid arthritis, might observe an increase in the symptom [36].

Cultivation

The *Giloy* climber herbs can be successfully grown in large variety of soils, ranging from sandy to clay loam. However, the soil should be well drained with sufficient moisture and rich with organic matter for its growth. *Giloy* grown on *Neem* tree if preferred moreover due to various medicinal benefits. It grows under varying climatic conditions. The crop is grown under rain-fed conditions. The plant is very rigid and it can be grown in almost all climates but prefers warm climate. Stem cuttings are the best planting material for raising commercial crop. Planting is usually done during rainy season (July to August) [10]. The stem cuttings are sown directly in the field with organic pesticide. Mostly they are sown near needed tress such as *Neem*. Cuttings are obtained from older stems with nodes. Cuttings should be sown within 24 hours of their removal from the mother plant. Meanwhile, they should be half-dipped in water vertically. The plant can also be raised using seeds. Seeds take almost more than double the time to mature and yield the same quantity of drug. A basal dose of FYM (farmyard manure) 10 tons per hectare and half dose of nitrogen (75 kg) are applied at the time of land preparation. Approximately 2000-2500 cutting pics of stem with nodes are required for 1 hectare land. The stem cuttings with nodes are sown directly in the field. An optimum spacing of 3 m × 3 m is recommended for better yield [2].

Types of Giloy combination used in the treatment of coronaviruses

Giloy climbing shrubs is known for its remarkable medicinal properties such as for anti-diabetic, anti-malarial, chronic fever, blood purifying, anti-oxidants, immunity booster; actions. As Giloy is a creeper it is cultivated with Neem, Ashwagandha, Tulsi, etc. As the Giloy shrub gets older and older it absorbed the nutrients and other chemical composition. Due to the combination the Giloy increases its effectiveness and medicinal properties.

Neem with Giloy

The Giloy climbers grow on neem tree are preferred more as compared to other medicinal plant. Neem Giloy is largely advised for the cure of illnesses related to weak immunity system, inflammation, and impure blood in the body. Its Anti-pyretic, anti-inflammatory, and blood purification properties have been scientifically proven in the cure of cancer^[37].

Ashwagandha with Giloy

Ashwagandha is therapeutic herb that when combined with Giloy helps in the effective treatment of severe viral infections and recommended for diseases like coronavirus, swine flu, etc^[38]. (Giloy sticks are beneficial in treating coronavirus by arresting the spread and growth of infection-causing virus in the body. Potent natural phytochemicals present in the herb prevents entry of covid-19 entry into host cells. In this way, it helps to restraint the covid-19 infection. This is a simple herb that is scientifically proven and time tested for the improvement of the immunity of a person). The presence of a potent compound in Ashwagandha as "withanone" improves endurance, agility, energy, and stamina in a person. It acts as protective against bacteria borne ailments, stress, and inflammatory conditions naturally^[39].

Tulsi with Giloy

Giloy when combined with natural Tulsi helps to balance pitta, strengthen lungs, cure respiratory infection and cure skin disorders in the body. It enhances the immunity system and effectively cures jaundice, seasonal viral infections, intestinal disorders, constipation, ingestion, urinary disorders, etc. in the body^[40].

Home remedy preparation of Giloy juice

Take the fresh stem of Giloy more than or equal to 1 feet.

- Cut into small pieces into 3 to 4 equal parts.
- Crush the pieces and add into water approximately 1 liter.
- You may add Tulsi leaves, Ashwagandha etc.
- Boil the mixture on low flame till 250 ml water remain out of 1 liter.
- Let the mixture get cool (i.e. not to hot not to cool)
- Filter the mixture and drink in morning empty stomach for the better action.
- The juice can be drink 3 times a day.

Conclusion

The main purpose of this review was to document the various medicinal properties as well as the phytochemistry, nutritional composition, benefits of Giloy, side effect and toxicology activities of *Tinospora cordifolia*. Giloy is a treasure of home remedies. *Tinospora cordifolia* (Giloy) is

available in powder, juices supplements. Any of this may use for consumption. It exploited the phytochemistry, benefits such as immunity booster, chronic fever, anti-asthma, anti-arthritis, anti-aging, Hepatoprotective, anti-oxidant. etc. side effects. It exploited cultivation the plant tissue culture is the alternative method for the rapid propagation example Giloy climber prorogated with neem tree this propagation enhances the stability and productivity of the plant. Neem Giloy is largely advised for the cure of illnesses. It exploited different types of Giloy and their homemade medicinal preparation. Giloy Sticks are being recommended by number of Ayurveda institutions as an immunity booster against Covid 19. Additionally a person should consult his/her doctor before using Giloy if having any health problems or if pregnant of breastfeeding.

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