



A Review: On *Tinospora Cordifolia*

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Abstract-

Tinospora cordifolia (Willd) Miers ex Hook.F. and Thom belonging to the family Menispermaceae, is a large, deciduous, climbing shrub found throughout India, especially in the tropical parts ascending to an altitude of 300 m. and also in certain parts of China. It is known as heart leaf Moonseed plant in English, Guduchi in Sanskrit and Giloy in Hindi. A great number of plants are being used in medicine for therapeutic or prophylactic purposes. Guduchi (*Tinospora cordifolia*) is a popular medicinal plant spread over the tropics. Its effectiveness in therapy is well known globally. Lesser known are its dietary benefits. Guduchi is being used in Diet by many tribal people of India and it also forms a part of traditional Indian cuisine. Ayurveda also states its dietary utility. The various benefits acquired by the use of Guduchi as a dietary component have been reviewed and discussed in this article.

Keywords – *Tinospora cordifolia*, phytoconstituents, biological activity, methanol.

Introduction

The World Health Organization (WHO) estimated that up to 80% of people still rely mainly on traditional remedies such as medicinal plants for their medicines. Since the beginning of human civilization, plants have been used as natural medicines. Recently, scientists are showing a great interest in the development of new drugs from traditional medicinal plants. India with its vast bio-diversity and huge knowledge of ancient traditional systems of medicine such as Ayurveda, Siddha, Unani, Amchi and provide a strong base for the utilization of a large number of plants in general healthcare and common ailments of the people. Among the vast library of main medicinal plants, *Tinospora cordifolia* (Willd) is a deciduous climbing shrub which belongs to the family Menispermaceae. The plant family Menispermaceae contain of about 70 genus & 450 species that are found in tropical regions. It is found throughout the India & also in parts of Sri Lanka, Bangladesh and China. The plant is designated as Rasayana in Ayurveda and is very well known for building up the immune system and body's defence against definite infecting Micro-organisms [1]

Uses of medicinal plants in the industrialized societies have been traced from the extraction and development of several drugs and chemotherapeutic drugs from these plants as well as from traditionally used rural herbal remedies. Among the wide library of important medicinal plants *Tinospora cordifolia* (willd.) [2]

Tinospora cordifolia (Willd.) Miers ex Hook.F. and Thom belonging to the family Menispermaceae, is a large, deciduous, climbing shrub found throughout India, especially in the tropical part ascending to an altitude of 300 m. and also in definite parts of China . It is known as heart leave Moonseed plant in English, Guduchi in Sanskrit and Giloy in Hindi. A large numbers of plants are being used in medicine for therapeutic or prophylactic purposes. The therapeutic properties of medicinal plants are attributed due to the presence of active substances such as vitamins, tannins, alkaloids, flavonoids, glycosides, and coumarins . These natural compounds physiologically affect the body of human beings, interact with the pathogens and interrupt their growth at different stages of development and make the body disease free. [3]

Tinospora cordifolia is an important drug of Indian systems of medicine and used in medicines since times immemorial. The drug is well known Indian bitter and prescribed in fever, diabetes, urinary problems, skin diseases, dyspepsia, jaundice and chronic diarrhoea and dysentery. It has been also indicated useful in the treatment of heart disease, leprosy, and helmenthiasis. The starch obtained from the stem is high nutritive and digestive and used in many diseases. [4]

Botanical classification



Common name: Guduchi

Scientific name: Heart-leaved Moonseed

The plant is popularly known as Guduchi, is an herbaceous creeper belonging to the Menispermaceae and is found normally deciduous and dry forests. The botanical classification of this medicinal herbs is given below;

Kingdom: Plantae.

Division: Magnoliophyta.

Class: Magnoliopsida.

Order: Ranunculale.

Family: Menispermaceae.

Genus: Tinospora

Species: T. cordifolia. [5]

Distribution:

The plant is distributed throughout the tropical and subtropical regions of India. It is indigenous to areas of India, Sri Lanka, China, Myanmar, Thailand, Philippines, Indonesia, Malaysia, Vietnam, Bangladesh and South Africa.

Growth Requirement:

The plant is very rigid and it can be grown in almost all climates but prefer warm climate. Planting is usually done during rainy season (July-August) . It can be successfully grow in all variety of soil. For cultivation purpose medium black or red soil can prefer. [6]

Botanical description:

International Journal of Scientific Research and Review Volume 7, Issue 12, 2018 ISSN NO: 2279-543X Page No: 587 Tinospora corifolia is a large, deciduous, extensively spreading and climbing shrub with several elongated twining branches. Different parts of exhibits different types of morphology which are described below.

Root

Root are aerial, thread like, long filiform, threadlike, squairsh, which arise from the mature branches or cut bits of stems grow downward and by continuously lengthening sometimes reach the ground. Microscopic observation of aerial roots are characterized by tetra to penta-arch primary structure. However, cortex of root is split in to outer thick walled and inner parenchymatous zone. The dried aerial roots are light grey –brown or creamy white in colour, odourless and bitter taste. Starch is present throughout the parenchyma of the aerial root.



[7]

Stem

Stem of this plant is rather moist with long, filiform, fleshy and climbing in nature. Aerial root arise from the branches. Dried stem is cylindrical, slender, slightly twisted in shape. Outer bark is thin and papery which is brown to greyish in colour. The stem when sectioned transversely shows a wheel like structure. Lenticels are circular and prominent. The stem powder is creamish brown to dark brown in colour with characteristic odour and bitter taste. The stem is used in indigestion and urinary diseases. The starch acquire from the stem known as “Guduchi-satva” is highly healthful and digestive and used for many diseases.



[8]

Leaves

Leaves of this plant are membranous, simple, different, with long petiole approximately 15cm which is round, pulvinate, heart shaped, twisted partially and half way round. Leaves are Observe in bulk intensely green in colour but over mature leaves are yellowish green to yellow colour. Leaves are bitter and have an cloudy odour. Lamina is ovatecordate, 10- 20 cm long, 8-15cm broad. Leaves are rich in protein, calcium and phosphorus.



[9]

Flowers

Flowers are small and unisexual which are greenish yellow in colour. Male flowers are clustered and female flowers exist in solitary. Sepals are six in two series of three each. Outer ones are smaller than the inner sepals. Petals are also six, smaller than sepals, free and membranous. Flowers is seen during summer (March to June). International Journal of Scientific Research and Review Volume 7, Issue 12, 2018 ISSN NO: 2279-543X Page No: 588



[10]

Fruit

Fruits are heavy and single seeded which are aggregates of one to three. These are drupelet on thick stalk with a sub terminal style scars .The shape of the fruit is ovoid with smooth texture and Scarlet or orange red in colour .These appear during winter .



[11]

Seed

Seeds are white, bean shaped and bend. Embryo also turned in to curve shape automatically. [6]



[12]

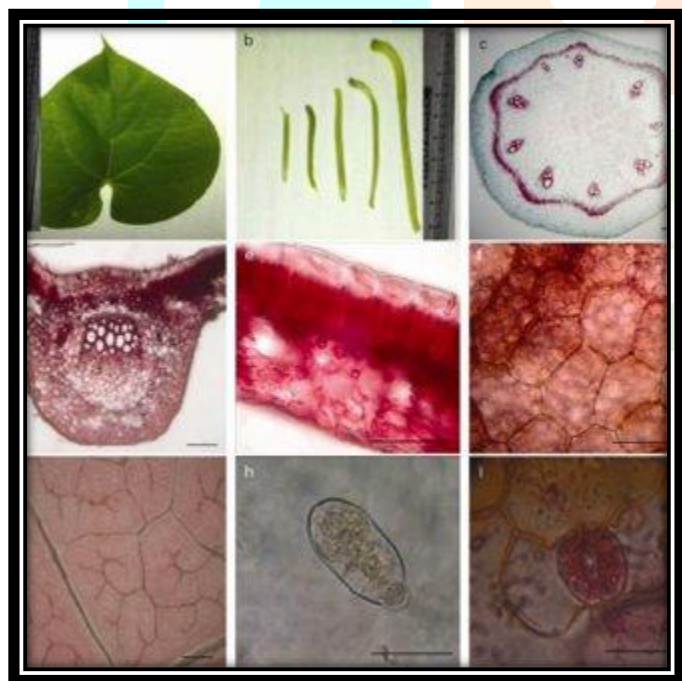
Evaluation

Organoleptic Chracter

Parameter	Raw (Fresh guduchi stem)
Rupa(colour)	Creamish brown
Rasa(test)	Bitter
Gandha(odour)	Not specific (better smell after removing outer loose skin)

TLC Analysis

Nowadays, TLC has employed as an important tool for the qualitative and quantitative phytochemical analysis of herbal drugs and formulations²²⁻²⁴. TLC method was developed to evaluate berberine (at R_f 0.46) and tinosporaside (at R_f 0.52) in the methanolic extract of studied part of *T. cordifolia*, i.e. leaf, stem and aerial roots.⁽²⁴⁾



Analytical findings of *Tinospora cordifolia* extract

Sr no.	Test Parameters	Lot 1Te/14/1051	Lot 2 Kg 475	Lot 3 Kg 154	Lot 4 Kg173
1	Loss On Drying at 105 °C (%w/w)	3.35	3.88	2.41	5.59
2	Total Ash (%w/w)	11.82	6.42	6.43	6.68
3	Acid Insoluble Ash (%w/w)	1.37	0.71	0.53	1.49
4	Water Soluble Extractive on d/b (%w/w)	88.62	96.18	89.83	93.42
5	50%Alcohol Soluble Extractive (%w/w)	81.68	83.05	81.26	86.72

(25)

Chemical Constituent:

Active Component	Compound	Plant Part	Biological Activity (In Human being)
Alkaloids	Berberine, Choline, Tembetarine, Magnoflorine, Tinosporin, Palmetine, Isocolumbin, Aporphine alkaloids, Jatrorrhizine, Tetrahydropalmatine,	Stem, Root	Anti-viral infections, Anticancer, anti-diabetes, inflammation, Neurological, immunomodulatory, psychiatric conditions ⁵⁻¹² ,
Diterpenoid Lactones	Furanolactone, Clerodane derivatives [(5R,10R)-4R-8Rdihydroxy2S-3R:15,16-diepoxy-cleroda-13 (16), 14-dieno17,12S:18,1Sdilactone], Tinosporon, Tinosporides, Jateorine, Columbin	Whole Plant	Vasorelaxant: relaxes norepinephrine induced contractions, inhibits Ca ⁺⁺ influx, anti-inflammatory, anti-microbial, antihypertensive, anti-viral. Induce

			apoptosis in leukemia by activating caspase-3 and bax, inhibits bcl-2. 13-17
Glycosides	18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside, Cordioside, Cordifolioside Syringin, Syringinapiosylglycoside, Pregnane glycoside, Palmatosides, Cordifolioside A, B, C, D and E	Stem	Treats neurological disorders like ALS, Parkinsons, Dementia, motor and cognitive deficits and neuron loss in spine and hypothalamus, Immunomodulation, Inhibits NF-kB and act as nitric oxide scavenger to show anticancer activities18-24
Steroids	β -sitosterol, δ -sitosterol, 20 β -hydroxyecdysone, Ecdysterone, Makisterone A, Giloinsterone	Shoot	IgA neuropathy, glucocorticoid induced osteoporosis in early inflammatory arthritis, induce cell cycle arrest in G2/M phase and apoptosis through c-Myc suppression. Inhibits TNF- α , IL-1 β , IL-6 and COX-2.25
Sesquiterpenoid	Tinocordifolin	Stem	Antiseptic28
Aliphatic compound	Octacosanol, Heptacosanol Nonacosan-15-one dichloromethane	Whole plant	Anti-nociceptive and anti-inflammatory. Protection against 6-Hydroxyl dopamine induced parkinsonisms in rats. Down regulate

			VEGF and inhibits TFN- α from binding to the DNA
Others	3,(a,4-di hydroxy-3-methoxy-benzyl)-4-(4-compounds hydroxy-3-methoxy-benzyl)-tetrahydrofuran, Jatrorrhizine, Tinosporidine, Cordifol, Cordifellone, Giloinin, Giloin, N-transferuloyl tyramine as diacetate, Tinosporic acid	Root, Whole Plant	Protease inhibitors for HIV and drug resistant HIV

[13]

Extraction Method

Maceration: Extraction was moved out by placing 20 g of coarsely powered sample drug in a closed vessel at room temperature. Added 200 mL of ethanol and allow for extraction for 7 days with occasional stirring at regular intervals.

The liquid was filter and the percentage yield of extract was calculated, after completion of the extraction process.

Soxhlet extraction: The 20 g powder of dried stem of tinospora cordifolia was placed in thimble holder. About 300 ml of ethanol was filled in the flask. The thimble was blocked with cotton in order to avoid transfer of sample particles to the distillation flask. The drug was extracted with ethanol in soxhlet apparatus for 3 h. The ethanolic extract was filtered and concentrated on rota-evaporator to give the ethanolic extract. Percentage yield of extract was calculated.

Microwave assisted extraction: For MAE, the dried stems of Tinospora was crushed and screened through 24 mesh sieve. Twenty gram of the powdered drug was transferred to a 500 ml conical flask. Two hundred ml of 80% (v/v) ethanol-water was added. The mixture was shaken well and kept for little time so that the drug absorbs the solvent. In this way the impact of solvent was avoided and extraction was better when the flask kept in the microwave oven and treated for microwave process. The best match combination obtained after central composite design were applied. Extraction temperature was set at 3 minutes and irradiation power set at 480 W. After the extraction finished, the conical flask was taken out from the oven. Required quantity of solvent was added to make a solution and then filtered. Conc of extract was then carried out on water bath and calculated the percentage yield of extract (% w/w).

used was a deuterium lamp. The peaks obtained in HPTLC chromatogram were analysed based on retardation factor values and confirmed through overlay absorption spectra retardation factor(15)

Pharmacological activity

In the history of traditional medicine using *Tinospora cordifolia* has release it to have pharmacological value as Hypoglycemic, anti-inflammatory, hepatoprotective, immune-modulator activity, anti-oxidant, antitumour activity, Antineoplastic and has antifertility activity.

Hypoglycemic activity

Oral administration of the water extract of *Tinospora cordifolia* root produce a significant reduction in blood glucose, brain lipid level, serum acid phosphatase, hepatic glucose-6-phosphatase ,alkaline and lactate dehydrogenase and increase in body weight, total haemoglobin and hepatic hexokinase in alloxanized diabetic rat s (Stanely et al., 2000).

Hypoglycemic activity of saponarin was determined in rats according to Matsui et al. [20]. 6-week-old male rats (Sprague–Dawley) were fed a laboratory diet and given water *ad libitum*. All rats were house for 1 week at 21-22°C under controlled light conditions. Food was withheld for 16 h before the experiment. Saponarin was orally administered to rats (n = 6, 220-225 gms in weight) at a single dose of 20, 40, 80 mg/kg body weight. After 5 min, maltose was fed to rats through the same route at the dose of 2 gm/kg body weight. Blood sample (20 µL) was collected from the tail vein at different time intervals till 2 h. Blood glucose was measured by a disposable glucose sensor (Accu-chek, Roche, Switzerland). Each set of experiment was carried out in triplicate. Animal experiments were done as per protocol laid down by the University of Burdwan, West Bengal, India.

Antiallergic activity

In a clinical study,100% relief was reported from sneezing in 83% of the patients on treatment with *T. cordifolia*. Thus *Tinospora cordifolia* significantly reduced all symptoms of allergic rhinitis and was well tolerated (Badar et al., 2005).

Allergic rhinitis implies hypersensitive response following exposure to allergens including pollens of grass, weeds, trees, animal danders, house dust and food. Rhinitis symptoms impair patients' quality of life (Bousquet et al., 1994). Antihistamines, decongestants, cromolyn sodium, glucocorticoids are routinely used in the control of allergic rhinitis (Naclerio, 1991). H₁ antagonists which are commonly used, produce drowsiness and CNS depression. The newer generation of H₁ antagonists is devoid of drowsiness but have other side effects. Hence the search for an effective, safer, better tolerated alternative, which is natural. It has been suggested that when routinely used pharmacological interventions fail to relieve the symptoms, allergen immunotherapy may be effective (Kalra et al., 2002).

Cardioprotective activity

A dose dependent reduction in closure size and in serum and heart lipid peroxide levels was observed with prior treatment with *Tinospora cordifolia* in ischemia-reperfusion-induced myocardial infarction in rats (Rao et al., 2005).

Cordifolia possesses a dose dependent cardioprotection against ischemia reperfusion induced myocardial injury and the cardioprotection may be due to its free radical scavenging activity or indirectly by enhancing the endogenous antioxidant levels or by protecting Mg^{2+} dependent Ca^{2+} -ATPase enzyme or by antagonizing.

Anti-inflammatory

The alcoholic extract of *Tinospora cordifolia* has been found to exert anti-inflammatory actions in models of acute and subacute inflammation (Wesley et al., 2008).

Tinospora cordifolia (TC) has shown remarkable anti-inflammatory properties and has been found useful in the treatment of inflammatory disorders. However, the effects and mechanisms of TC on AI have not been studied yet. We conducted in vivo and in vitro studies to evaluate the effect of TC on AI.

Antiulcer activity

Treatment with a formulation include *Tinospora cordifolia* has been shown to reduce ulcer index total acidity, with an increase in the pH of gastric fluid in pylorus-ligated rats and in the ethanol-induced gastric mucosal injury in rats (Bafna and Balaraman, 2005).[14]

Marketed formulation



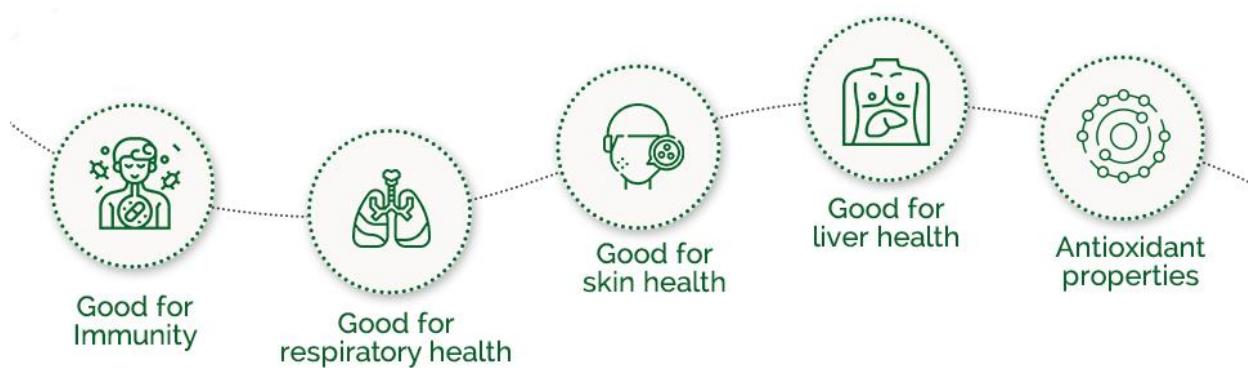
Active ingredient Giloy, Tulsi, Amla, Neem

Ingredient	Quantity	Uses
Giloy satva	3.50 g	Antimicrobial, antioxidant
Tulsi	2.80 g	Antioxidant, antiseptic
Neem	3.50 g	Antibacterial
Amla	15 g	Cleaning

As per Ayurveda, Giloy get Rasayana properties. Giloy is an adaptogen that helps decrease stress and fatigue, which are regarded as main root cause of all lifestyle disorders.

- Neem is renowned for its antimicrobial properties and has been used traditionally in managing many skin problems like acne. It also helps improve liver functions that helps in detoxification.
- Tulsi is a sacred herb and has many beneficial effects in our health system.
- Absorb Dabur Giloy Neem Tulsi Juice for giving a boost to body's natural immunity.
- 10-20 ml of Dabur Giloy neem Tulsi juice taken two times a day can be a source of good health for you and your family.

- **BENEFITS**



(16)



Active ingredient-*Tinospora cordifolia*.

Giloy (Guduchi) is a multi-use herb, and its most common uses are against diabetes, allergy, arthritis, and skin diseases. It is proved that Giloy may improve your immunity and Liver health. In some countries, Giloy is used as an anti-periodic herb to prevent some kind of infection (17)

Formulation Of Giloy Satva Powder

Satva is called as the Sara bhaga or essence of plant material and in case, it is the essence of the giloy or guduchi plant obtained from maceration in water.

Ingredients

5 parts of fresh guduchi stem

20 parts of water

Method:

Wash the guduchi or giloy stems, remove the outer covering and cut the stems into smaller pieces of 2-3 inches length.

Pulp the stems inside the given quantity of water and allow it to settle overnight for about 10-12 hours.

In the following morning, strongly macerate the partially mashed giloy stems so as to release the mushy starchy material into the liquid.

Filter the mixture a few time through mesh no.100 to remove any woody hard particles of the stem.

Keep the liquid aside uninterrupted for 4-5 hour so that the filtrate separates from the residue.

Carefully remove the supernatant liquid and collected the starchy sediment onto a tray.

Air-dry the sediment under the fan and store it in air-tight vessel for future use.

Ingredient	Quantity	Uses
Giloy stem	100 gm	Improve digestion
Water		Vehicle

(18)

MEDICINAL USAGE AND THEUREPETIC PROPERTIES

Ayurveda without this plant may not be possible as it is the main component of various ayurvedic medicines. *Tinospora cordifolia* is beneficial in viral and bacterial fever, diarrhea, jaundice, low immunity, bone weakness, recurrent infections, common flu cold, fatigue, asthma, diabetes, arthritis, cancer, etc. Various parts of the plant are used for medicinal benefits since ancient time by folks and tribals.

Diseases	Application	Properties
Periodic fever	Giloy stem juice	Antipyretics
Diarrhoea	Giloy stem juice	Enhance the activity of microphages
Jaundice	Giloy stem juice	Antioxidant
Asthma	Chewing on giloy root or drinking giloy juice	Anti-allergic
Skin infections	Giloy leaves paste and drinking juice	Anti-aging, antibacterial
Diabetes	Giloy juice	Hypoglycemic agent
Insect bits	Giloy leaves paste	Anti-inflammatory
Arthritis	Giloy stem powder	Anti-arthritis
Cancer	Giloy stem juice	Anti-proliferative
Wounds	Paste of giloy leaves	Astringent

(19)

Herb Essential Giloy (Tinospora Cordifolia) 500mg Immunity Booster Tablet

Herbs Essential Giloy Immunity Booster Tablet is an essential herb used in the Ayurvedic system of medicine to treat a number of ailments. It is called as “Amrita” which literally means root of immortality due to its varied medicinal properties.(20) It can be used to treat chronic fever, digestive disorders and can be used to boost immunity and helps your body fight of various bacterial infections and recurring diseases.

Key Ingredients:

Tinospora Cordifolia(21)

Procurement and identification of *Guḍūci stem*

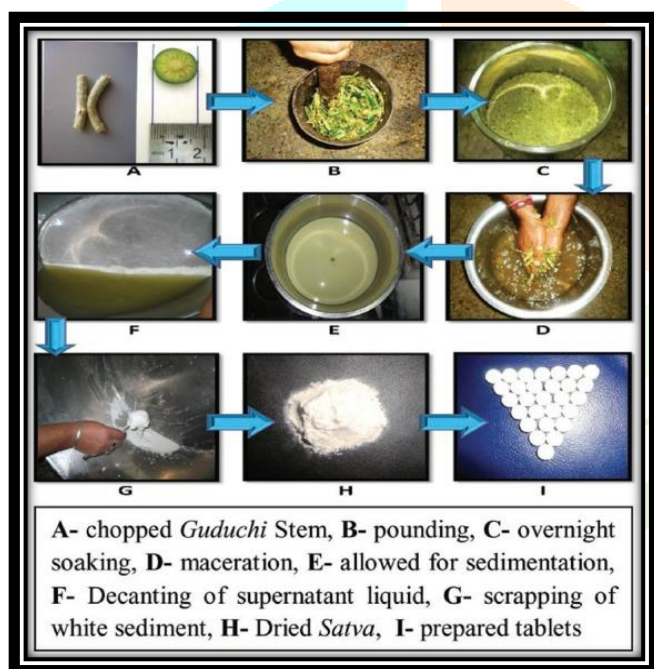


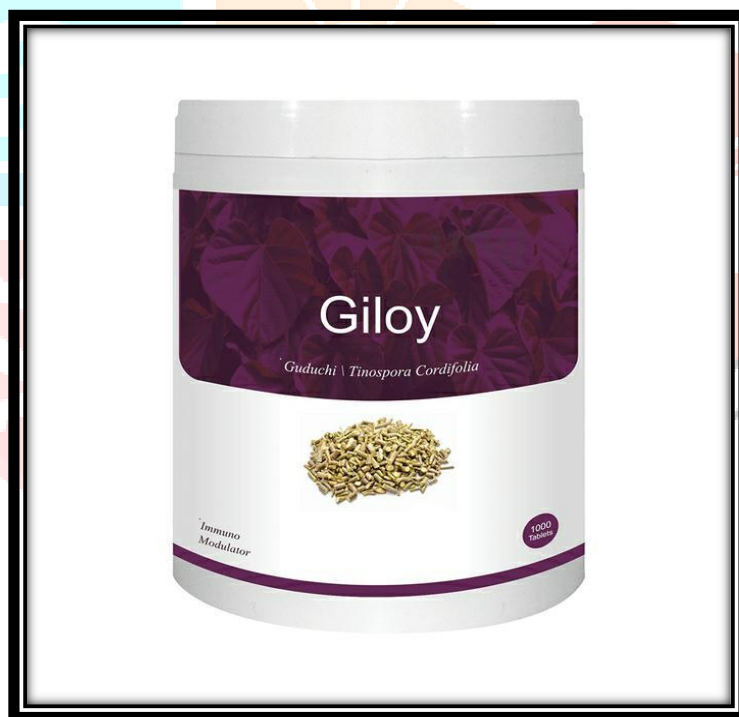
Fig- preparation of Guduchi satva

Fresh Guduchi (*Tinospora cordifolia* (Willd.) Miers) stem spreading over Nimba (*Azadirachta indica*) tree [Fwas procured from the campus of Gujarat Ayurved University, Jamnagar in the month of December-January 2012 and authenticated at Pharmacognosy laboratory. The physical impurities and outer loose skin were removed and the stem was washed thoroughly with water. Necessary equipment such as stainless steel (SS) vessel, SS ladle, cotton cloth, measuring jar, SS spoon etc., were arranged prior to beginning of the pharmaceutical procedur

Preparation of Gudūci Sattva

5 kg of fresh Guduchi stem of 1.6-2.0 cm thick was taken and cut up into pieces of 1.5-2.0 inches length. These pieces then were grind thoroughly and converted into a slimy paste. The mass so obtained was kept for wet through overnight (12 h) in 4 times of potable water (w/v) in a SS vessel. The next morning, the mass was macerated in water thoroughly with hands for about 1 h and filtered slowly through a clean cotton cloth folded four times. The liquid was kept aside undisturbed for 4 h, thereafter the supernatant liquid was carefully siphoned off. White and smooth stuffy sediment settled at the bottom was collected into a SS tray, air-dried under a running fan and stored in dry airtight glass jars under sterile conditions. 14 more batches were prepared to ensure symmetric multiprocessing by following similar process. Whole unit operating process is shown in figure.

Preparation of tablets of Guduchi Sattva



Prepared Sattva was taken in stainless steel vessel and converted into granules (size 20) with the help of a 20 mesh sieve, taken into a SS tray and kept in the oven at 50°C until it completely dried. Next day they were mixed with 1% binding agent (Gum acacia). Granules were passed through a tablet punching machine to prepare tablets of 500 mg. A 16station single rotary tableting machine was used for tableting. The tablets were collected, weighed and stored in air-tight sterile glass containers along with small pieces of cotton in them. Equipments and their respective specifications used in preparation of Guduchi Sattva and its tablets preparation are listed in Appendix 1 and 2 respectively.

Formulation table

Ingredient	Quantity	Uses
Guduchi stem	5 kg	Immunity stimulant
Gum acacia	1%	Binder

(22)

Key Benefits:

- Highly effective in improving digestion and also acts as a mild laxative to cure constipation
- It can be used to reduce high blood sugar levels and treats ailments related to diabetes
- Contains mild sedative properties and effectively treats anxiety, depression and insomnia
- Acts as an anti-inflammatory agent and is useful in treating respiratory disorders
- It can also be used to relieve pain associated with arthritis and rheumatism
- Reduces signs of ageing, improves vision and can be used for the treatment of asthma

Directions For Use

As a herbal supplement take 2 tablets daily or as directed by the physician

Safety Information:

- Read the label carefully before use
- Store in a cool dry place away from direct sunlight
- Keep out of reach of the children
- Do not exceed the recommended dosage

Bixa Botanical's Guduchi Powder



Giloy (Botanical Name–*Tinospora Cordifolia*) is widely known as Guduchi, heart leaved moonseed Or Tinospora. Giloy is original to the tropical areas of India, Myanmar, Sri Lanka. A plant with as diverse role as *Tinospora cordifolia* is a versatile resource for all forms of life. There are reports that the plant extract has active compounds in the form of alkaloids, glycosides, lactones, bitters and steroids. All these active compounds have immune modulator and physiological role of different types, thereby demonstrating the diverse versatility of the plant! In Ayurveda, *Tinospora* or Guduchi is considered to be very valuable Herb & used in various generic formulations. As per Ayurvedic text, *Tinospora* is pungent, bitter in taste, sweet after digestion & hot in potency. Guduchi supports mitigation of all three Doshas (Vata, pitta, kapha), helps in digestion, removes Toxic waste (Ama) and rekindles the digestive fire.

Giloy helps in various ailments like skin diseases, piles, high blood glucose level, High temperature of Unknown origin & used as Immunity modulator and as Rejuvenation therapy. Aqueous *Tinospora* extracts has been reported to influence the cytokine production, stimulation & activation of immune effector cells and prevention of oxidative Stress on cells. duct information

Guduchi extract may be used in various ailments as adjuvant therapy. Study has also shown antidiabetic potential through its action of mitigating oxidative stress (OS), promoting pancreatic secretions and also by inhibiting gluconeogenesis and glycogenesis, thereby regulating blood glucose.

Benefits of Guduchi Powder

Support Healthy Immunity System

Useful in body pain, muscle ache and supports as anti-inflammation.

Useful to decrease toxicity in body and support as blood purifier.

Presence of Bitters encourage low blood Sugar levels.

Product details-

Brand	Bixa Botanical
Item form	Powder
Products benefits	Immunity
Active ingredient	Cordiofolia
Age range	All
Use for	Whole body
Specific uses for product	Immunity
Package information	Bottle
Dosage form	Powder
Country of origin	India

IMPORTANT INFORMATION

Safety Information:

Please consult with your health care practitioner prior to the use of this product if you are pregnant or nursing, taking medications, or have a medical condition. Keep out of the reach of children.

Indications:

Use to prevent secondary infection due to long term diabetes illness. Useful to reduce Glycosylated haemoglobin or average blood glucose level.

Ingredients:

Guduchi Powder (Tinospora Cordifolia / Giloy), Superb Immunity Modulator, Natural Herbal Supplement for Decrease Toxicity in Body & Blood Purifier, Useful in Various Infectious. (7 Oz / 200g), Bixa Botanical

Directions:

1/2 - 1 teaspoon with warm water twice daily or as directed by your health practitioner.(23)

Conclusion

A plant with diverse a role as *Tinospora cordifolia* is a versatile resource for all forms of life. There are report as already discussed that the plant extracts have active compounds in the form of alkaloids, glycosides, lactones and steroids. All these active compounds have immuno modulatory and physiological roles of different types, thereby demonstrating the diverse versatility of the plant. Studies need to be conducted with aspect how the active compounds actually interact with the living systems and affects the structure-function relationships. Crystal structures of the membrane bound receptor and the activation of the downstream signaling cascades and the changes in the immediate environment of the site of action can lead us into identification of novel perspectives into our understanding of nature. The search into the vivacious source of nature can also lead us into differential interactions among the evolutionarily related groups of organisms. The future scope of the review remain in exploiting the biochemical and signaling pathways of the active components of *Tinospora* thus, enabling effective disease targeting. With so much to offer to the scientific world of medicine, the plant *Tinospora* truly acts as an incredible source.

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