

**GULVEL HEALTH BENEFITS****Manali Milind Bhide\* and Sachin A. Nitave**

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Article Received on  
23 January 2022,

Revised on 13 Feb. 2022,  
Accepted on 03 March 2022

DOI: 10.20959/wjpps20224-21564

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**ABSTRACT**

Gulvel is a medicinal plant with various properties of therapeutic importance. It belongs to the family Menispermaceae and scientifically it is called *Tinospora cordifolia*. It is large deciduous extensively spreading, climbing shrub with several elongated branches. Leaves are simple, alternate, exstipulate, long petioles, roundish, pulvinate both at base & apex with the basal one longer & twisted partially & half way around. The plant is distributed throughout the tropical region of India up to 1,200 m above sea level from Kumaon to Assam, in north extending through west Bengal, Bihar, Deccan, Konkan, Karnataka & Kerala. It is fairly common plant of deciduous & dry forests, growing over hedges & small trees. In Ayurveda, *Tinospora* has been used over centuries to treat various diseases. The drug is well known Indian bitter and prescribed in fevers, diabetes, dyspepsia, jaundice, urinary

problems, skin diseases and chronic diarrhoea and dysentery. It has been also indicated useful in the treatment of heart diseases, leprosy, helminthiasis and rheumatoid arthritis. The starch obtained from the stem known as "Guduchi-satva" is highly nutritive and digestive and used in many diseases. During last two decades, the drug has been subjected to extensive phytochemical, pharmacological and clinical investigations and many interesting findings in the areas of immunomodulation, anticancer activity, liver disorders and hypoglycemic are reported. It is used to treat corona virus infection.

**KEYWORDS:** *Tinospora cordifolia*, Jaundice, Dyspepsia, Skin diseases, Guduchi-satva, coronavirus.

## INTRODUCTION

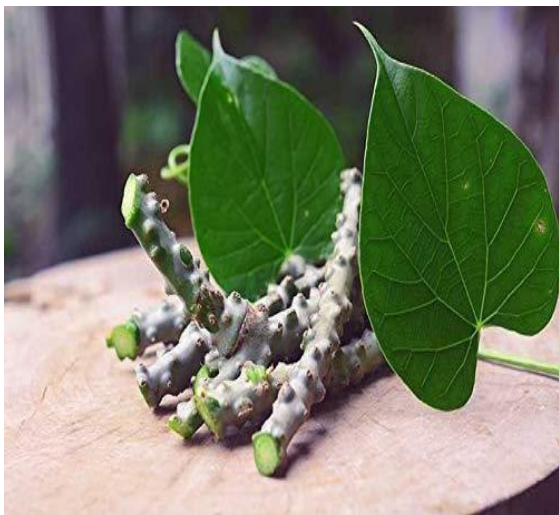
The World Health Organization (WHO) estimated that upto 80% of people still rely mainly on traditional remedies such as medicinal plants for their medicines. Since the beginning of human civilization, plants have been used as natural medicines.<sup>[1]</sup> Recently, scientists are showing a great interest 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 and Unani provide a strong base for the utilization of a large number of plants in general healthcare and common ailments of the people.<sup>[2]</sup> Among various medicinal plants, *Tinospora cordifolia* (Family: Menispermaceae) is one of the most widely used shrub from the ancient medical system as a medicine. Giloy is scientifically known as *Tinospora Cordifolia* or Guduchi in Hindi. The stem of Giloy is considered highly effective because of its high nutritional content and the alkaloids found in it but the root and leaves also can be used.<sup>[3]</sup> According to a shloka of Charak Samhita, Giloy is one of the main herbs with a bitter taste. It is used in various disorders and also helps alleviate Vata and Kapha dosha. Giloy also gets its name Heart-leaved moonseed by its heart-shaped leaves and its reddish fruit. *Tinospora cordifolia* [*Tinospora cordifolia* (Willd.) Miers ex Hook. F. & Thoms], known as Gulvel or Guduchi, has been an extensively used and investigated plant from family Menispermaceae for its varied activities.<sup>[4]</sup> It is a deciduous, fleshy, robust climber growing with support of mango or neem trees, and is also known as *Cocculus cordifolius* Dec, *Menispermum cordifolium* Willd, and *Tinospora glabra* (N. Brum.) Merr. —Giloyal, the Hindi name of the plant refers in Hindu mythology to a heavenly elixir used to stay off the aging and to stay young forever. The Sanskrit name —Guduchil means one that protects from illnesses.<sup>[5]</sup>

Hence the words —rejuvenator or —adaptogen seem to have appeared in literature. It is found in India, China, Myanmar, Sri Lanka, Thailand, Philippines, Indonesia, Malaysia, Borneo, Vietnam, Bangladesh, North Africa, West Africa, and South Africa. In India, it is abundantly found in Maharashtra, Gujarat, Madhya Pradesh, Himachal Pradesh, and some other states in North and South India.<sup>[6]</sup>

### Morphological characteristics<sup>[7]</sup>

- Gurcha is a gregarious glabrous, twiner.
- Older stems are up to 2 cm in diameter and have corky bark.
- Aerial roots arise from nodal scars of branches.

- Stem and branches are specked with white vertical lenticels.
- Bark is grey-brown or creamy white, warty, papery thin, and peels off easily.
- Leaves are 5–15 cm, ovate, and acute.
- They are membranous when young but become more or less leathery with age.



### Botanical description<sup>[8]</sup>

*Tinospora cordifolia* is a large, deciduous, extensively spreading and climbing shrub with several elongated twining branches. Different parts exhibit different types of morphology which are described below.

### Root<sup>[9]</sup>

- Roots are aerial, thread like, long filiform, threadlike, squarish, which arise from the mature branches or cut bits of stems grow downward and by continuously lengthening

sometimes reach the ground.

### **Stem**<sup>[9]</sup>

- Stem of this plant is rather succulent with long, filiform, fleshy and climbing in nature.
- Aerial roots 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.

### **Leaves**<sup>[9]</sup>

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

### **Flowers**<sup>[9]</sup>

- Flowers are yellow, unisexual, minute, and less than 2 mm in size.
- Male flowers are grouped in axillary racemes, while female flowers are solitary.
- Fruit is an ovoid and succulent drupe, lustrous, red in colour, and of the size of a large pea, having a single seed.
- Seed is fleshy and curved. Flowering occurs in May–June, while fruiting is witnessed in September–October.

### **Climate & Soil**<sup>[9]</sup>

- The plant grows in subtropical and tropical climate.
- Light medium sandy loam soil rich in organic matter, and with adequate drainage, is suitable for its cultivation.
- It does not tolerate high rainfall or waterlogged conditions.

**Common names**<sup>[10]</sup>

|           |  |
|-----------|--|
| Latin     | Tinospora cordifolia (willd.)  |
| English   | Gulantha/ Indian Tinospora   |
| Sanskrit  | Guduchi, Madhuparni, Amrita, Chinnaruha, Vatsadaani, Tantrika, Kundalini & chakralakshanika. |
| Hindi     | Giloya, Guduchi  |
| Bengali   | Gulantha   |
| Telugu    | Thippateega  |
| Tamil     | Shindilakodi   |
| Marathi   | Shindilakodi   |
| Gujarathi | Galo   |
| Kannada   | Amrita balli, Madhupa  |

**Taxonomic classification**<sup>[11]</sup>**Kingdom:** Plantae – Plants,**Subkingdom:** Tracheophyta –Vascular Plants**Super- division:** Spermatophyta-Seed bearing plants;**Division:** Magnoliophyta-Flowering;**Class:** Magnoliopsia-Dicotyledons**Subclass:** Polypeptalae-Petals are free;**Series:** Thalamiflorae-Many stamens and flower hypogynous**Order:** Ranunculales**Family:** Menispermaceae**Tribe:** Tinosporeace**Genus:** Tinospora**Species:** cordifolia

**Growth requirements:** 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 grown in all variety of soils. For cultivation purpose medium black or red soil can prefer.<sup>[12]</sup>

**Phytochemistry:** Almost all the parts of the plant are used in ayurvedic formulation. Fresh plant is more efficacious than dried plant. The plant mainly contains alkaloids, glycosides, steroids, sesquiterpenoid, aliphatic compound, essential oils, mixture of fatty acids and polysaccharides.<sup>[13,14]</sup>

| Class                   | Chemical constituents  | Activity  | Plantpart          |
|-------------------------|--|---|--------------------|
| Alkaloids               | Berberine, Magnoflorine, Choline Palmatin, Tembetarine, Tinosporine, Isocolumbin, Aporphine  | Anti-viral infections<br>Neurological,  | Stem & Root        |
|                         | alkaloids, Jatrorrhizine, Tetrahydropalmatine  | Immunomodulatory<br>anti-diabetes, Anticancer   |                    |
| Steroids                | 20 $\delta$ -Hydroxyecdysone, $\delta$ sitosterol, $\beta$ -sitosterol, Giloinsterol Ecdysterone, Makisterone A  | Inhibits TNF- $\alpha$ , IL-1 $\beta$ , IL-6 and COX-2.<br>inflammatory arthritis, IgA neuropathy   | Shoot              |
| Glycosides              | Tinocordiside, Tinocordifolioside, Cordioside, 18-norclerodane glucoside, Cordifolioside, Syringin, Syringinapiosylglycoside, Furanoidditerpene Glucoside, Palmatosides, Cordifolioside A, B, C, D and E, Pregnane glycoside | anticancer activities<br>Treats neurological disorders like ALS, Parkinsons, Dementia   | Stem               |
| Diterpenoid lactones    | Furanolactone, Tinosporon, Tinosporides, Columbin, Clerodanederivatives, Jateorine   | anti-inflammatory, anti-microbial, anti-viral.<br>Anti hypertensive, Vasorelaxant. Induce apoptosis in leukemia by activating caspase-3 and bax, inhibits bcl-2 | Wholeplant         |
| Sesquiterpenoid         | Tinocordifolin   | Antiseptic  | Stem               |
| Aliphatic compounds     | Heptacosanol, Octacosanol, Nonacosan-15-one dichloromethane.   | anti-inflammatory, Protection against 6-hydroxydopamine induced parkinsonisms in rats   | Wholeplant         |
| Miscellaneous compound: | 3, ( $\alpha$ , 4-di hydroxyl-3-methoxybenzyl)-4-(4-hydroxyl-3-methoxy-benzyl)-tetrahydrofuran, Giloinin, Tinosporic acid, Tinosporidine, Cordifol, Cordifelone, Jatrorrhizine, Ntransferuloyltyramine as diacetate.         | Protease inhibitors for HIV and drug resistant HIV  | Whole plant & Root |

### Nutritive composition<sup>[15]</sup>

Guduchi includes high fiber content approx. (15.9%), proteins (4.5%-11.2%), sufficient carbohydrate (61.66%) and low fat (3.1%). Its nutritional value is 292.54 calories per 100 g. It has high potassium (0.845%), high chromium (0.006%), sufficient iron (0.28%) and sufficient calcium (0.131%).

**Parts used<sup>[16]</sup>**

**Leaves:** Powdered leaves and their decoction are reported to treat gout, ulcers, jaundice, fever, and wounds, and to control blood glucose, along with cow's milk.

**Stem:** The extract of stems alone and with honey is useful as a tonic in jaundice, skin diseases and fever; stem starch (satva) is used as a tonic. A combination of root and stem is prescribed as an antidote to snake bite and scorpion sting.

**Bark:** In North Gujrat (India), root and stem bark of the plant is used along with milk to treat cancer.

**Fruits:** These are used in the treatment of jaundice and rheumatism.

**Roots:** Roots are used as an emetic for visceral obstructions, leprosy, diarrhea and dysentery.

**How to consume giloy?**

As per Ayurveda, Giloy can be consumed in either a powdered form or can be in the form of kadha (decoction) or even juice. Nowadays it is also available in capsules and readymade powder. Giloy applied topically too as a paste for skin problems.

The regular dose of Giloy is a teaspoon at a time, taken twice a day. The dose might vary depending on the type of health problem.

**How to prepare giloy juice?**

To prepare Giloy juice, you need some clean, chopped branches of the plant. Blend these chopped branches with a cup of water in fine, green liquid paste. Now, sieve this green paste to make a Giloy juice.

**Side effects**

So far, no study has reported the toxicological effects of *Tinospora cordifolia* or Guduchi, even in a very high dose (900 mg/D). But there is also limited information on the safety of using *Tinospora cordifolia* for longer periods or for pregnant and breast-feeding women. So, always consult with your doctor before using the herb.

**Therapeutic uses**

- **Antioxidant activity:** This is due to the alkaloidal constituents (choline, palmatine, tetrahydropalmatine and magnoflorine), (-)- epicatechin, and an aromatic glycoside, secoisolariciresinol.<sup>[17]</sup>

- **Hypoglycemic activity:** In the Ayurvedic Pharmacopoeia of India, *T. cordifolia* is categorized as an antidiabetic herbal drug due to its alkaloids, diterpenoids and glycosidic constituents. Several studies in vitro and in vivo showed that the alkaloids palmatine, jatrorrhizine and magnoflorin were synergistically responsible for the hyperglycemic effect via a mechanism of insulin releasing, insulin-mimicking and gluconeogenesis inhibition.<sup>[18]</sup>
- **Benefits of gulvel for stress:** Traditionally, the extract from the roots of gulvel is used to treat stress. Many animal studies have demonstrated how the extract is effective as an anti-stress agent.<sup>[18]</sup>
- **Improve digestion:** Giloy improves digestion and reduces digestion-related problems like diarrhoea, colitis, vomiting, hyperacidity, etc.<sup>[19]</sup>
- **Treats Arthritis and Gout:** Giloy contains anti-inflammatory and anti-arthritic properties which help to reduce arthritis and gout. For joint pains, consume Giloy powder with warm milk.<sup>[19]</sup>
- **Antiviral activity:** A diterpenoid, tinosporin, showed activity against HIV, HTLV and other viral diseases for its immunomodulatory and selective inhibition of the virus to target T helper cells.<sup>[19]</sup>
- **To treat chronic fever:** In Ayurveda, two factors cause fever – Ama (toxic remains in the body due to improper digestion) and the second one is due to some foreign particles. Giloy acts wonderfully in chronic, recurrent fevers. It is an anti-inflammatory, antipyretic herb which helps to boost our immunity to fight against the infection and also helps in early recovery.<sup>[19]</sup>
- **Immunomodulatory activity:** The immunomodulatory activity of *T. cordifolia* is due to the synergistic effects of compounds including low molecular weight alkaloids, clerodane diterpenoids, sesquiterpenoids and phenyl propanoids.<sup>[20]</sup>
- **Reduces Stress and Anxiety:** Giloy is an excellent remedy to reduce mental stress and anxiety. It calms down your body. Giloy also has the power to enhance memory and cognitive functions.<sup>[20]</sup>
- **Benefits of gulvel for the liver:** Gulvel has protective action on the liver and is useful in



conditions like anaemia, jaundice, inflammation of the liver. It helps in reducing liver toxicities caused by drugs used against tuberculosis infections.<sup>[20]</sup>

- **Boosts immunity:** This herb activated the immune system of our body and increase vitality in a person. Include Giloy juice or kadha in your diet twice a day can improve your immunity. It is full of antioxidants and helps to release toxins from the body. Giloy juice also detoxifies your skin and improve your skin. Giloy is also used for liver diseases, urinary tract infections, and heart-related issues.<sup>[21]</sup>
- **Improves eye-sight:** Giloy is very effective to improve eye-sight when applying topically. It is usually used in Panchkarma.<sup>[21]</sup>
- **Improved respiratory health:** Giloy has anti-inflammatory properties. Breathing problems caused by asthma can be traced to inflammation of the trachea. Giloy can help ease the inflammation to help you breathe more freely.<sup>[21]</sup>
- **Benefits of gulvel for the lungs:** Bronchial asthma is an allergic condition where the person experiences episodes of difficulty in breathing, wheezing and cough. Due to its immunomodulatory property as demonstrated in animal studies, gulvel is useful in allergies and in bronchial asthma.<sup>[21]</sup>
- **Youthful skin:** Free radicals speed up the ageing process. Since giloy is loaded with antioxidants, it can prevent oxidative stress and that in turn slows down the ageing of the skin. Giloy can also improve blood circulation which bestows a natural glow to the skin.<sup>[21]</sup>
- **To treat Corona-virus infection:** Giloy can boost immunity hence it may be useful for various fevers specifically for viral fevers like corona infection. Though there is no evidence that Giloy can cure corona infection but it can raise your immunity to fight against it. According to some scientific studies, the results show promising results to control Corona infection.<sup>[22]</sup>
- **To treat dengue fever:** Giloy is an antipyretic herb. It improves platelet count in dengue fever and reduces the chances of complications. Regular intake of Giloy helps to improve immunity during dengue and also for a speedy recovery.<sup>[23]</sup>

- **To treat hay fever:** Giloy is very useful in hay fever also known as allergic rhinitis. It reduces the symptoms like runny nose, sneezing, nasal obstruction, watering of eyes. To reduce the temperature, take ½ teaspoon of Giloy powder mix with honey and eat this before food.<sup>[23]</sup>
- **Benefits of gulvel for depression:** Depression is a disease marked by low mood and low levels of chemicals like dopamine, norepinephrine, and serotonin. Traditionally, gulvel has been in use to treat depression in people. Animal studies have shown that the plant has antidepressant effects.

The chemical berberine present in the plant is responsible for this action and further research is needed for its use in people.<sup>[24]</sup>

- **Benefits of gulvel for Learning and Memory**

In Ayurveda, gulvel is referred to as “Medhya Rasayana” which means it is a learning and memory enhancer. Many animal and human studies have shown benefits in improving learning and memory. Children with mental disorders too have shown a response to gulvel.<sup>[24]</sup>

- **Benefits of gulvel for infections:** Gulvel is used to treat infections of various kinds like diarrhoea, ear infection, urinary tract infection (UTI), infection of tonsils, and tuberculosis (lung infection). In diarrhoea, it is useful due to its antispasmodic property (relaxes gut muscles). Apart from these actions, it proves to be effective in infections because of its immunomodulatory and antioxidant properties.<sup>[24]</sup>
- **Benefits of gulvel for the gut:** Gulvel is useful in diarrhoea, dysentery, dyspepsia, bloating, flatulence, and in cases of abdominal pain due to its antispasmodic action (relaxes gut muscles). While in the case of ulcers it makes the gastric fluid less acidic.<sup>[24]</sup>
- **Benefits of gulvel for the genitourinary system:** Traditionally, gulvel has been used in urinary tract infections as it has the ability to dissolve stones, make the urine more alkaline, and has a diuretic effect (that is it can increase urine formation). It affects the immune process, and possesses antioxidant and anti-inflammatory properties.<sup>[24]</sup>
- **Benefits of gulvel for the reproductive system:** In Ayurveda, it is claimed to treat infertility by preventing impotence.<sup>[24]</sup>

- **Benefits of gulvel for Snake and Scorpion bite:** Its use is mentioned in texts for snake and scorpion bites owing to its anti-toxin, immune modulation, and antioxidant properties.<sup>[24]</sup>

## CONCLUSION

The present review focuses on the botanical description and medicinal importance of the plant *Tinospora cordifolia*. It is reported in literature that the plant extracts have active compounds in the form of alkaloids, glycosides, lactones and steroids. All these active compounds have immunomodulatory and physiological roles of different types, thereby demonstrating the diverse versatility of the plant. *T. cordifolia* has high medicinal value in the world and is also the number one recommended natural herb for the Indian system of medicine (ISM). In fact, in Egyptians, Chinese, Indian, Greek, Roman and Hebrew have given the high status of importance to this medicinal property. In this regard, further studies need to be carried out to explore *Tinospora cordifolia* for its potential in preventing and treating diseases and indicate the need to carry out research on the plant so that they could get some medicinally important drugs.

## REFERENCES

1. C. Bharathi, A. Harinatha Reddy, G. Nageswari, B. Sri Lakshmi, M. Soumya, D. S. Vanisri, B. Venkatappa, Department of Microbiology, Sri Krishnadevaraya University, Anantapur-515 003, Andhra Pradesh, India, A Review on Medicinal Properties of *Tinospora cordifolia*, International Journal of Scientific Research and Review, ISSN NO: 2279-543X, 2018; 7(12): 585 - 598.
2. M. Pandey, S. Rastogi, A. Rawat, Indian herbal drug for general healthcare: An overview, Internet Journal of Alternative Medicine, 2007; 6: 1.
3. Gundu Anusha Abbaraju Krishna Sailaja, Department of Pharmaceutics, Rbvrr Women's College of Pharmacy, Hyderabad, India, An Overall Review on *Tinospora Cordifolia*, experimental medicine, 2020; 2(1): 1-6.
4. N M Reddy, Rajasekhar Reddy N, Nalabolu Anantha Reddy Agriculture Research Farms (NARARF), Appannapeta, Garedepally-508201, Telangana, India, *Tinospora cordifolia* Chemical Constituents and Medicinal Properties: A Review, Scholars Academic Journal of Pharmacy (SAJP), Sch. Acad. J. Pharm., 2015; 4(8): 364-369.
5. Madhav Mutalik, Maitreyee Mutalik, *Tinospora Cordifolia* & its varied activities: What is believed & what is known?, International Journal of Research & review, December,

- 2011; 3: 12.
6. Jitendra Mittal, Madan Mohan Sharma, Amla Batra, *Tinospora cordifolia*: a multipurpose medicinal plant- A review, *Journal of Medicinal Plants Studies Year*, 2014; 2(2): (32), (47) ISSN: 2320-3862.
  7. Prashant Tiwari, Puravi Nayak, Shakti Ketan Prusty, Pratap Kumar Sahu, *Phytochemistry and Pharmacology of Tinospora cordifolia: A Review*, *Sys Rev Pharm*, 2018; 9(1): 70-78.
  8. Ashish Kumar, Jnanesha A. C. & Soudamalla Nagaraju, *Cultivation and Medicinal Properties of Giloy [Tinospora cordifolia (Thunb.) Miers]*, Vol. No. XVIII, Issue No. 01
  9. Bindu Modi, Kabita Kumari Shah, Jiban Shrestha, Prakash Shrestha, Anju Basnet, Injila Tiwari, Surya Prasad Aryal, *Morphology, Biological Activity, Chemical Composition, and Medicinal Value of Tinospora Cordifolia (willd.) Miers*, *Advanced Journal of Chemistry, Section B*, 2021; 3(1): 36- 53.
  10. Abhimanyu Sharma, Asmita Gupta, Sakshi Singh Amla Batra, *Tinospora cordifolia (Willd.) Hook. F. & Thomson - A plant with immense economic potential*, *J. Chem. Pharm. Res.*, 2010; 2(5): 327-333.
  11. Dinesh Kumar V, Geethanjali B, Avinash KO, Kumar JR, Chandrashekrappa GK, Kanthesh M Basalingappa, *Tinospora cordifolia: the antimicrobial property of the leaves of amruthaballi*, *Journal of Bacteriology & Mycology: Open Access*, 2017; 5: 5.
  12. Gitanjali Devi, Department of Nematology, Assam Agricultural University, Jorhat-13, Assam, India, *Medicinal Plant: Giloy*, *International Journal of Current Research*, 2020; 12(08): 12940-12941.
  13. Deepika Singh and Prabir K Chaudhuri, *Chemistry and Pharmacology of Tinospora cordifolia*, *Natural Product Communications*, 2017; 12 (2).
  14. Soham Saha & Shyamasree Ghosh, *Tinospora cordifolia: One plant, many roles*, *Anc Sci Life*, 2012; 31(4): 151-159.
  15. Vineeta Pandey\*, Jeetendra Kumar Vaishya, Padmapriya Balakrishnan and Tanuja Manoj Nesari, *Nutritional aspects of Tinospora cordifolia (Giloe)*, *Medicinal Plants*, 2020; 12(1): 158-160. [www.easyayurveda.com](http://www.easyayurveda.com), 2012/08/28.
  16. Priyanka Sharma, Bharat P. Dwivedee, Dheeraj Bisht, Ashutosh K. Dash a, Deepak Kumar a, *The chemical constituents and diverse pharmacological importance of Tinospora cordifolia*, *Heliyon*, 2019; 5: e02437.
  17. Md. Moniruzzaman Khan, M. Sa'dul Haque and Md. Saiful Islam Chowdhury, *Medicinal use of the unique plant Tinospora Cordifolia: evidence from the traditional medicine and recent research*, *Asian J. Med. Biol. Res*, 2016; 2(4): 508-512; doi:

10.3329/ajmbr.v2i4.30989.

18. S. K. Dwivedi and Enespa, *Tinospora cordifolia* with Reference to Biological and Microbial Properties, *Int. J. Curr. Microbiol. App. Sci*, 2016; 5(6): 446-465.
19. Devprakash, K.K.Srinivasan, T.Subburaju, Suhas gurav & Sachin singh, *Tinospora Cordifolia*:- A review on it's Ethnobotany, phytochemical & pharmacological profile, *Asian Journal of Biochemical and Pharmaceutical Research*, 2011; 4(1).
20. Charu Saxena and Geeta Rawat, *Tinospora cordifolia* (Giloy) - Therapeutic Uses and Importance: A review, *Current Research in Pharmaceutical Sciences*, 2019; 09(03): 42-45.
21. Vishwesh Kulkarni, Neha Sharma, Dipa Modi, Abnimanyu Kumar, Jaydeep Joshi, Nagamani Krishnamurthy, A Community-Based Participatory Research to Assess the Feasibility of Ayurveda Intervention in Patients with Mild-to-Moderate COVID-19, *Medrxiv*, the preprint server for health sciences.
22. <https://pharameasy.in>, 10 Health Benefits of Giloy – The Ultimate Immunity Booster.
23. <https://pharameasy.in>, Gulvel-Uses, Benefits, Side effects, precaution & more.