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Tinospora Cordifolia and Pterocarpus Marsupium: An Anti-Diabetic Plant with Multipurpose

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Abstract:- Natural materials with medical potential are becomes more important in clinical researchs, because they are recognised to have no negative effects as compared to medicines. A common restorative herb called Tinospora cordifolia is used in a few common medications to treat different types of contamination. The traditional ayurvedic literature recognizes Tinospora cordifolia, sometimes known as "Guduchi," for its extensive use in the treatment of numerous ailments. The plant has recently attracted attention from all over the world due to the discovery of its active components and their biological role in disease control. This evaluation includes our current investigation. Traditional medicine systems including Ayurveda, Siddha, Uninai, and Homeopathy (AYUSH) have been used for a long time. The usage of folk drugs in the current script is evidence of the increased emphasis on using factory accessories as a source of drugs for a wide variety of mortal affections due to factors such as population growth, the scarcity of medicines, the prohibitive cost of treatments, side effects of several allopathic medicines, and the emergence of resistance to currently used medicines for conditions.

Keywords:- *Medicinal Plants, Plant Extract, Therapeutic Effects.*

I. INTRODUCTION

Tinospora cordiflolia is a herbaceous plant endemic to the Indian subcontinent that is a member of the Menispermaceae family.. The Giloy plant is also referred to as gulvel in Marathi, guduchi, amrita, somavalli in Sanskrit, and gurcha, giloe, and gulancha in Hindi. The giloy is a big, deciduous climbing shrub with a characteristic greenish yellow blossom that is found at higher altitudes and has a complex genetic makeup [1]. India has a large variety of healing herbs. The significance of recovery indicates that Tinospora cordifolia possesses a wide variety of bioactivity criteria among them, which have not yet been widely and rationally examined [2]. It is believed that this plant has health benefits in all sections. Additionally, that plant is utilized to lower the risk of complications and raise the platelet count in cases of dengue fever. To enhance the platelet count, boil the giloy juice together with a few Tulsi leaves and consume it [3]. Additionally, the Giloy can be very helpful in preventing diabetes and controlling blood sugar levels [4]. It is called "Madhunashini" in Ayurveda, which translates to "destroyer of sugar." It makes it easier for more insulin to be synthesized, which controls blood sugar levels.. It is used to treat renal problems and ulcers caused by diabetes [5].

Pterocarpus marsupium is a medium- to large deciduous tree that may grow up to 31 meters (102 ft) in height. It is also known as Indian kino, Malabar kino, vijayasar, or venkal. Pterocarpus marsupium helps regulate blood glucose by reducing oxidative damage to the pancreas and via the Nrf 2-medicated antioxidant pathway. Pterocarpus marsupium belongs to the family Fabaceae. The plant parts that are most frequently employed are heartwood, leaves, flowers, bark, and gum. Growing extraordinarily well in India, Sri Lanka, and Nepal is Pterocarpus marsupium. It is a plant-based Ayurvedic medicine. For thousands of years, people have utilized it to heal a wide range of ailments. Among the many nutrients and chemical components found in Pterocarpus marsupium are lipids, carbohydrates, glycosides, flavonoids, alkaloids, saponins, andtannins. It has a lot of polyphenols as well.[7]


Fig 1: Giloy Plant


Fig 2: Vijaysar Plant

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II. MORPHOLOGY OF PLANT

A. Giloy Plant:

- Stem: green in colour, not having small rounded projection, no milky secretion
- Leaves: heart shaped with groovy notch at the base
- Fruit: spherical or ball shaped, red in colour
- Seed: brown in colour.
- Synonym: Guduchi, Gurbel, Giloy.

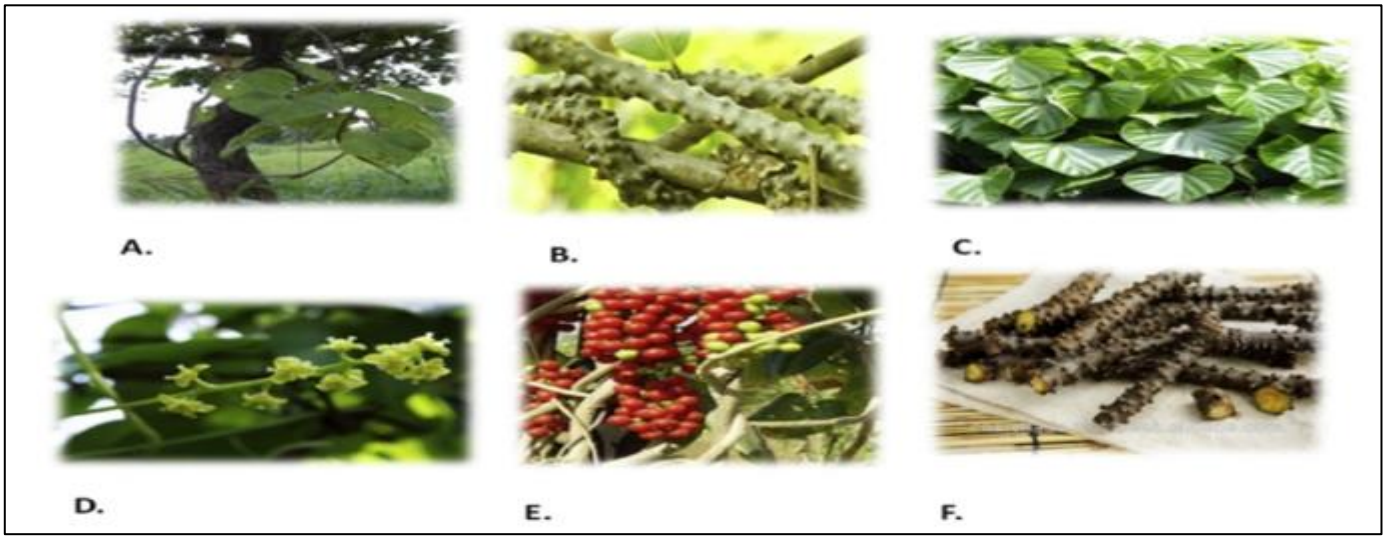

Fig 3: Morphology of Tinospora A) Steam B) Root C) Flower E) Fruit F) Seeed

B. Vijaysar Plant:

- Stem: dark brown to grey in color, scaly, rough, and longitudinally fissured
- Leave: imparinnate, oval, with five or seven 8–13 cm long leafletsSeed: bony and convex
- Flower: white with slight yellow tings and are produced in large panicles.
- Synonym: Indian kino tree, Malabar kino tree, Bija, Asana.

➢ *Vernacular Names [27, 28]:*

- English–, Indian Kino, Indian Malabar Kino
- Gujarati – Biyo
- Hindi – Vijayasara Bijasal
- Sans. – Pitasala, Asana, Sarfaka, Pijaka

➢ *Plant Profile [28, 29]*

- Family: Fabaceae
- Kingdom: Plantea
- Subkingdom: Viridaeplantae
- Class: Magnoliopsida
- Subclass: Rosidae
- Order: Fabales
- Genus: Pterocarpus
- Species: Marsupium

➢ *Geographical / Biological Source*

- *Pterocarpus marsupium (Indian Kino)*

✓ *Geographical Source:*

- Indigenous to Southeast Asia, India, and Sri Lanka.
- Grown in: Asiatic tropical climates, such as Bangladesh, Nepal, India, and portions of Southeast Asia.

✓ *Biological Source:*

- Part used: Heartwood, stem bark, and leaves.[8]

C. Tinospora cordifolia (Guduchi)

- *Geographical Source:*

✓ Native to: Southeast Asia, Bangladesh, Nepal, India, Sri Lanka, and other tropical Asian countries.
✓ Grown in tropical areas of the Pacific Islands, Africa, and Asia.

- *Biological Source:*

✓ Part used: Stem, leaves, and roots.[8]

- *Habitat and Distribution*

- Pterocarpus marsupium: Found in tropical deciduous forests, up to 1,500 meters elevation.
- Tinospora cordifolia: Found in tropical forests, scrublands, and along rivers, up to 1,200 meters elevation.

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- *Cultivation and Collection:*

- Pterocarpus marsupium: Cultivated for its timber and medicinal properties. Heartwood harvested after 50-60 years.
- Tinospora cordifolia: Cultivated for its medicinal properties. Stem and leaves harvested throughout the year.

➢ *Microscopic Characteristics of Tinospora cordifolia and Pterocarpus marsupium:*

- *Tinospora cordifolia (Guduchi)*

✓ *Stem:*

- Transverse section: Circular or oval, showing distinct regions.
- Epidermis: Uniseriate, rectangular cells with thick cuticle.
- Cortex: Wide, parenchymatous, with scattered sclerenchyma cells.
- Phloem: Well-developed, with phloem fibers.
- Xylem: Wood consists of vessels, xylem fibers, and xylem parenchyma.

✓ *Leaf:*

- Lamina: Simple, heart-shaped, with entire margin.
- Venation: Reticulate, with prominent midrib.
- Epidermal cells: Rectangular, with wavy walls.
- Stomata: Paracytic, scattered on both surfaces.
- Trichomes: Simple, unicellular, scattered on both surfaces.

✓ *Root:*

- Transverse section: Circular or oval.
- Epidermis: Uniseriate, with thin-walled cells.
- Cortex: Wide, parenchymatous.
- Endodermis: Distinct, with casparian strips.
- Pericycle: Narrow, with sclerenchyma cells.

✓ *Powder Characteristics:*

- Greenish-yellow color.
- Characters: Fragmented tracheids, vessels, xylem fibers, and parenchyma.
- Starch grains: Simple, spherical, 2-5 µm in diameter.

D. Pterocarpus Marsupium (Indian Kino)

➢ *Stem:*

- Transverse section: Circular or oval.
- Epidermis: Uniseriate, with thick-walled cells.
- Cortex: Narrow, parenchymatous.
- Phloem: Well-developed, with phloem fibers.
- Xylem: Wood consists of vessels, xylem fibers, and xylem parenchyma.

➢ *Leaf:*

- Lamina: Imparipinnate, with 5-7 leaflets.
- Venation: Reticulate, with prominent midrib.
- Epidermal cells: Rectangular, with straight walls.
- Stomata: Paracytic, scattered on both surfaces.
- Trichomes: Simple, unicellular, scattered on both surfaces.

➢ *Heartwood:*

- Transverse section: Showing characteristic "flame" pattern.
- Vessels: Large, solitary or in radial rows.
- Xylem fibers: Long, slender, thick-walled.
- Parenchyma: Scattered, with crystals of calcium oxalate.

➢ *Powder Characteristics:*

- Yellowish-brown color.
- Characters: Fragmented vessels, xylem fibers, and parenchyma.
- Starch grains: Compound, 10-20 µm in diameter.

III. EXTRACTION

A. Giloy Plant –

To extract giloy constituents various extraction method are used like maceration, Soxhlet method, etc.

- Collect giloy stems.
- Peel off their outer skin and wash it.
- Sun drying for 8hour.
- Grind it in mixer and collect giloy powder.
- Then it either extract with water (Aqueous extract) or ethanol (alcoholic extract) in 1:10 proportion.
- Stirr it with magnetic stirrer (25° C & 40° C) at 12hour interval.
- First dry it in rotary evaporator (50° C) and then in tray dryer (40 - 50° C).
- Finally the dried extract collected in glass vials.[9]

B. Vijaysar Plant

- Weigh 100 kg crushed heartwood of vijaysar and transfer in reflux condenser fit with extractor.
- Add 500 L water to it and provide heat.
- The mixture is boiled and reflux it for 5 hours.
- Filter it and pour into wiped film evaporator for vacuum concentration.
- Again add 500 L water to above extract and reflux for 5hour. Then filter it and send in wiped film evaporator for vacuum concentration. (50° C & 100 mmHg pressure)
- Filtrate contains 1% solids of water solubles. Concentration of these solubles increased by 25 – 30% by evaporating 860 L of water.
- Then concentrate is dried using spray dryer to yield dry powder as aqueous extract of Vijaysar.[10]

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IV. CHEMICAL CONSTITUENTS

A. Tinospora Cordifolia [Fig.no.3]

➢ *Alkaloids:*

- *Berberine:*

✓ Antimicrobial, anti-inflammatory, antioxidant
✓ Anti-diabetic, cardio-protective, immunomodulatory

- *Palmatine:*

✓ anti-inflammatory, antioxidant, Antimicrobial
✓ neuroprotective, Anticancer

- *Tetrandrine:*

✓ antioxidant, immunomodulatory
✓ cardio-protective

➢ *Glycosides:*

- *Tinosporide:*

✓ Anti-inflammatory, antioxidant, immunomodulatory
✓ Anti-diabetic, cardio-protective

- *Cordifolioside:*

✓ Anti-cancer, neuroprotective

➢ *Flavonoids:*

- *Quercetin:*

✓ antimicrobial
✓ Cardio-protective, neuroprotective

- *Kaempferol:*

✓ anti-inflammatory, antimicrobial
✓ cardio-protective

➢ *Phenolic Compounds:*

- *Gallic Acid:*

✓ Anti-cancer, cardio-protective

- *Ellagic acid:*

✓ Antioxidant, antimicrobial
✓ Anticancer, cardioprotective

➢ *Terpenoids:*

- *β-Sitosterol:*

✓ Antioxidant, anti-inflammatory, immunomodulatory
✓ Cardio-protective, anti-cancer

- *Lupeol:*

✓ Anti-inflammatory, antioxidant, immunomodulatory
✓ Anti-cancer, cardio-protective [11]

B. Pterocarpus Marsupium [Fig.no.4]

➢ *Flavonoids:*

- *Quercetin:*

✓ antimicrobial
✓ anticancer
✓ Neuroprotective, antidiabetic

- *Kaempferol:*

✓ Antioxidant, antimicrobial
✓ Neuroprotective, anti-diabetic

- *Isoquercitrin:*

✓ Antioxidant, anti-inflammatory
✓ Antimicrobial, anti-diabetic
✓ Hepatoprotective

➢ *Phenolic Compounds:*

- *Gallic Acid:*

✓ anti-inflammatory
✓ Antimicrobial
✓ Neuroprotective

- *Ellagic Acid:*

✓ Antioxidant, anti-inflammatory
✓ cardio-protective
✓ Neuroprotective

➢ *Terpenoids:*

- *Lupenone:*

✓ Anti-inflammatory, antimicrobial
✓ Anticancer, cardio-protective
✓ Hepatoprotective

- *Betulinic Acid:*

✓ Anti-inflammatory, antimicrobial
✓ Anticancer, neuroprotective
✓ Hepatoprotective

- *Sitosterol:*

✓ Antioxidant, anti-inflammatory
✓ Cardio-protective, anti-diabetic

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✓ Neuroprotective

➢ *Glycosides:*

✓ *Pterocarposide:*

✓ Anti-diabetic, anti-inflammatory
✓ Antimicrobial, cardio-protective
✓ Neuroprotective

✓ *Marsuposide:*

✓ Antimicrobial
✓ Hepato-protective

➢ *Volatile Oils:*

- *α-Pinene:*

✓ Antimicrobial, anti-inflammatory
✓ Bronchodilator, anti-asthmatic
✓ Insecticidal

- *β-Pinene:*

✓ Antimicrobial, anti-inflammatory
✓ Bronchodilator, anti-asthmatic
✓ Insecticidal

- *Limonene:*

✓ Antimicrobial, anti-inflammatory
✓ Anticancer, cardio-protective
✓ Neuroprotective.[12]

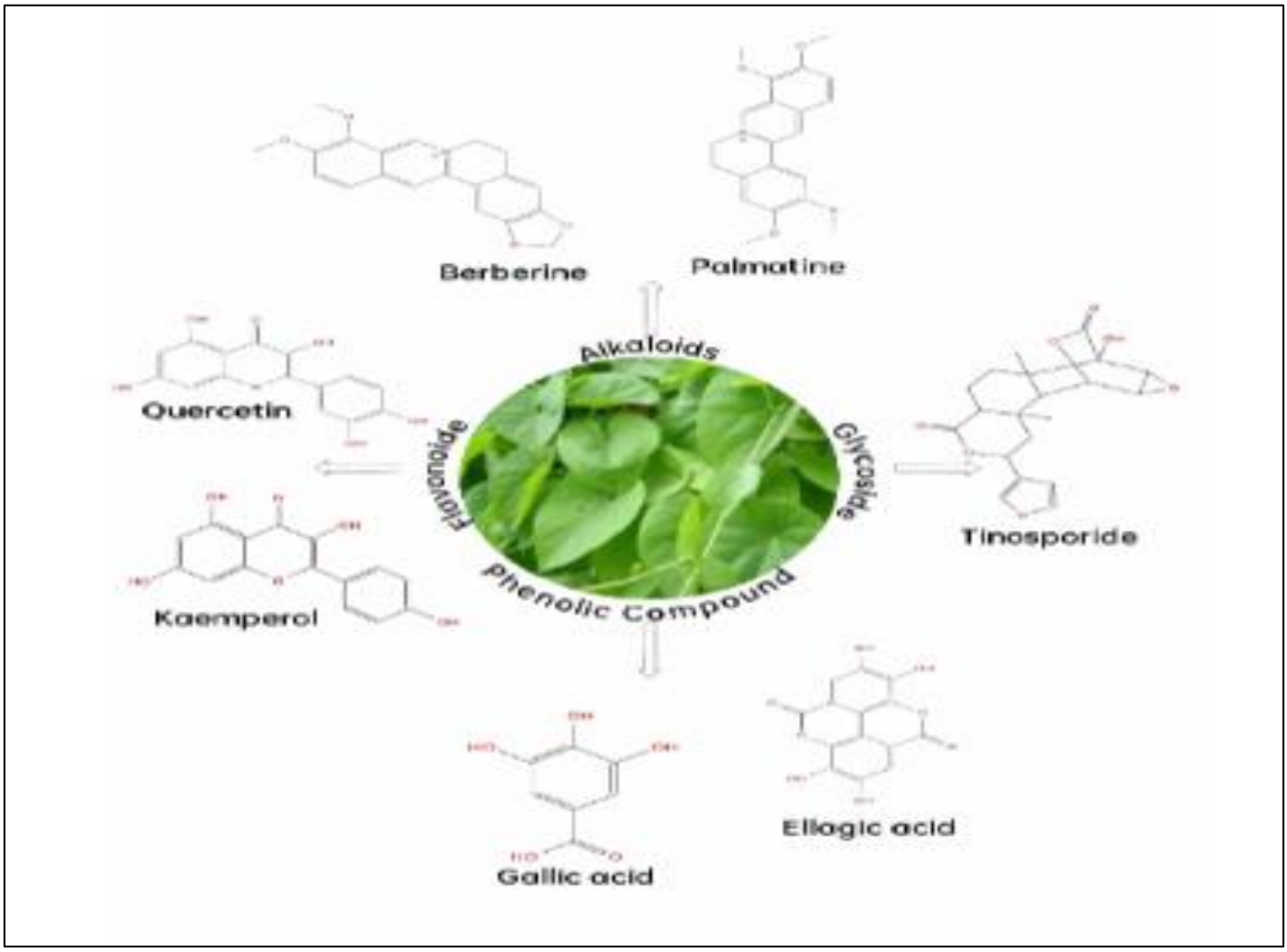

Fig 4: Chemical Constituents Structure Tinospora Cordifolia

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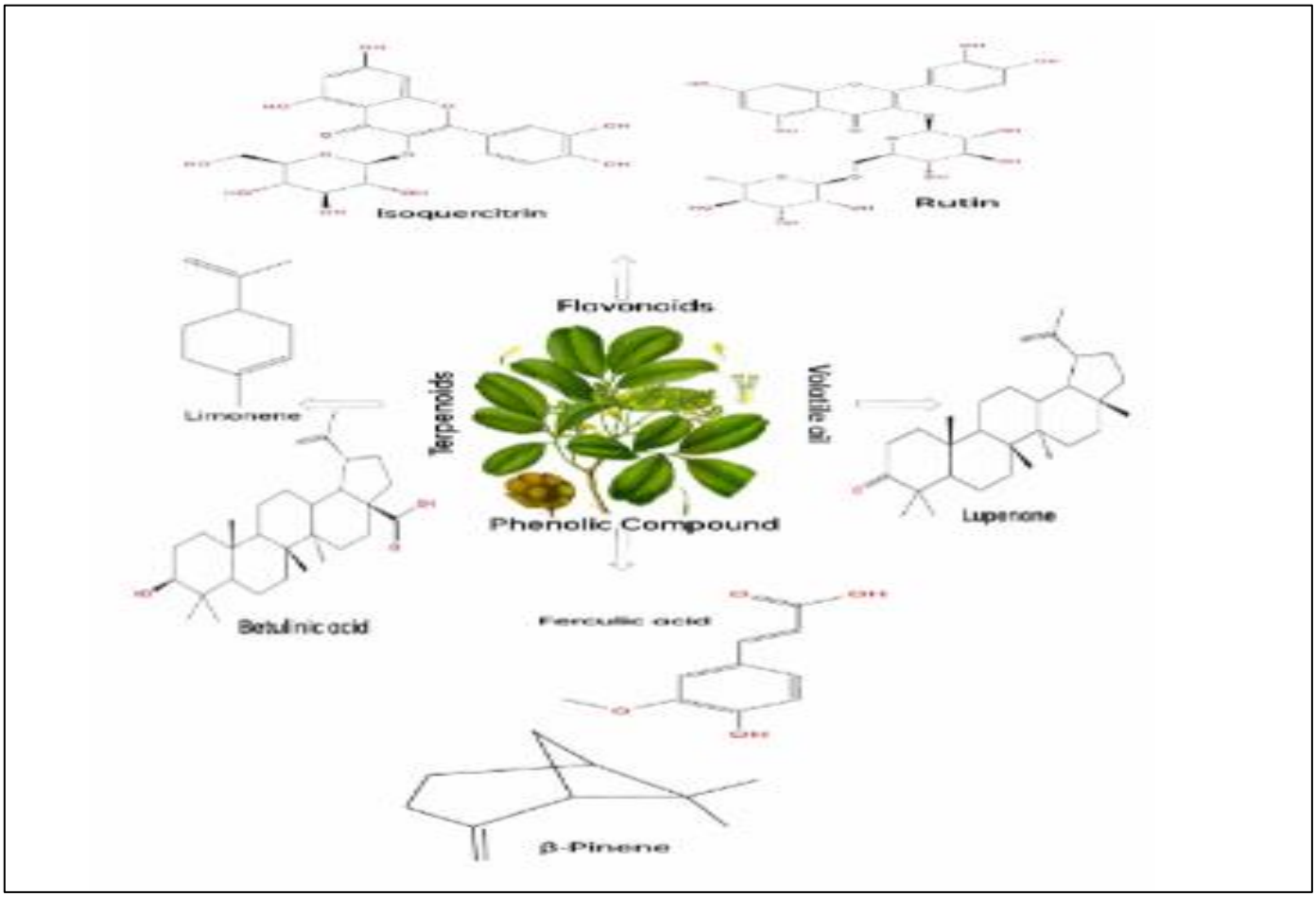

Fig 5: Chemical Constituents Structure Pterocarpus Marsupium

➢ *Traditional Uses:*

➢ *Tinospora cordifolia has been used in Ayurveda for:*

✓ Fever reduction
✓ Rheumatism treatment
✓ Digestive issues (e.g., diarrhea, dysentery)
✓ Skin disorders (e.g., eczema, acne)
✓ Immune system support

➢ *Modern Research:*
Research has validated its potential in:

✓ Immunomodulation
✓ Anti-inflammatory and antioxidant activities
✓ Anti-cancer and cardio-protective effects
✓ Neuroprotection and cognitive enhancement
✓ Anti-diabetic and metabolic syndrome management

➢ *Traditional Uses:*

➢ *Pterocarpus Marsupium used in Traditional Medicine:*

✓ Diabetes management
✓ Fever reduction
✓ Rheumatism treatment
✓ Skin disorders (e.g., eczema, acne)
✓ Digestive issues (e.g., diarrhea, dysentery)

➢ *Modern Research:*

✓ Diabetes management
✓ Cancer therapy
✓ Neuroprotection
✓ Wound healing
✓ Cardiovascular health

V. THERAPEUTIC EFFECTS

A. Giloy Plant

➢ *Anti-Cancer Effect:*
By inducing apoptosis, eliminating free radicals, and having antioxidant effects, inhibiting angiogenesis, and causing cell cycle arrest, medicinal plants and their bioactive ingredients have an anti-cancer effect.[13] One of vitamin D's anticancer properties is its ability to prevent tumour growth and angiogenesis, both of which are very helpful in producing tumour regression.[1]

➢ *Anti-Diabetic Effect:*
A useful plant for diabetes, giloy is a hypoglycemic agent that lowers blood glucose levels. Additionally, its anti-diabetic qualities promote insulin release. Additionally, by delaying the digestion and absorption of carbohydrates, the high fiber content aids in blood sugar regulation.[14] "Madhunashini" is the Ayurvedic term for giloy, meaning

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"destroyer of sugar." Giloy is also beneficial for diabetic complications like ulcers and kidney problems. It helps to enhance the production of insulin, which controls blood sugar levels. [5]

➢ *Anti-Toxic Effect:*

Packed with antioxidants, it aids in the body's removal of pollutants. Additionally, giloy juice improves and detoxifies skin. Giloy is also used to treat heart-related conditions, liver disorders, and UTIs.[5] It is considered the most revitalizing herb in Ayurveda. Studies on the acute toxicity of guduchi aqueous extract have shown no harmful effects.[15]

➢ *Antimicrobial Action:*

Salmonella type, Salmonella typhimurium, and Proteus vulgaris10 are somewhat affected by giloy, but harmful bacteria such Staphylococcus epidermis, Staphylococcus aureus, Escherichia coli, Pseudomonas saeruginosa, and Enterobacter aerogenes are inhibited.[16] Escherichia coli (E. coli), Staphylococcus aureus (S. aureus), Klebsiella pneumoniae (K. pneumoniae), and other bacterial organisms have been demonstrated to be susceptible to the antibacterial properties of tinospora cordifolia extracts. [17]

➢ *Anti-Arthritic Effect:*

Giloy's anti-inflammatory and antiarthritic properties help reduce the pain and inflammation associated with gout and arthritis by inhibiting the production of proinflammatory cytokines, which are proteins that regulate the growth and function of other immune and blood cells.[18] Reports from Science: By altering the synthesis of inflammatory cytokines and hepcidin, Tinospora cordifolia shields male Wistar rats from inflammation-associated anemia.[19]

➢ *Antioxidant Activity:*

During aflatoxicosis, free radicals are created. The antioxidants in Giloy aqueous extracts can scavenge these radicals. Liver damage brought on by lead nitrate was avoided by the Giloy extract.[20] Many significant plant chemicals, including lignans, steroids, alkaloids, and terpenoids, can be found in giloy. According to lab research, these substances may also have antibacterial, anti-inflammatory, antioxidant, and antidiabetic qualities.[3] Most of these naturally occurring antioxidants that come from plant sources are composed of polyphenols (phenolic acids, flavonoids, anthocyanins, lignans, and stilbenes), carotenoids (xanthophylls and carotenes), and vitamins E and C.[1]

B. Vijaysar Plant:

➢ *Anti-Cancer Effect:*

It was discovered that two components of the extract prevented cancer cells from proliferating and spreading to other organs. According to reports, vijaysar has anti-cancer qualities and has the ability to cause cancer cells to die. It can also be applied to the treatment of breast and prostate cancer.[21]

➢ *Anti-Diabetic Effect:*

Vijaysar has been a highly efficient antidiabetic medication since ancient times. Through the preservation and regeneration of insulin-producing cells, it may reduce blood sugar levels. Studies on a variety of species have demonstrated that it can repair damaged beta cells, which produce insulin, and return insulin levels to normal. According to clinical research, vijaysar lowers blood sugar levels without having any negative side effects. But diabetes is a dangerous medical condition, therefore you have to follow your doctor's instructions and treatment plan exactly. Do not treat diabetes with natural treatments without first consulting your healthcare physician.[21]

➢ *Anti-Microbial:*

Lab tests have shown that Vijaysar stem and bark extract has antibacterial qualities. The stomach infection-causing bacteria Bacillus coagulans and Escherichia coli were both susceptible to antibacterial action from stem extract.Vijaysar's antibacterial activity against a variety of bacteria, such as Streptococcus pyrogens, Staphylococcus aureus, Enterococci, Escherichia coli, and Pseudomonas aeruginosa, has been examined in both laboratory and animal studies..1. Nonetheless, contact your healthcare practitioner and receive treatment if you have a bacterial illness. Do not treat infections with herbs or treatments without first seeing a doctor.[21]

VI. SIDE EFFECTS

A. Giloy Plant:

Although giloy has numerous advantages, it also has drawbacks. Gilogy consumption irritates the stomach and produces constipation. These adverse effects will manifest regardless of the type of giloy you ingest—juice or supplement capsules. Additionally, giloy can reduce blood sugar. Patients with diabetes should use caution when ingesting giloy. Giloy may also cause the immune system to become overstimulated and hyperactive. This leads to a rise in the symptoms of conditions such as multiple sclerosis, rheumatoid arthritis, and lupus. It is advisable to stay away from giloy if you have any of these conditions.[6]

B. Vijaysar Plant:

This plant has been shown to be safe to eat and does not have any significant negative effects. To prevent adverse effects, it should be important to take vijaysar at the recommended dosage. It is not recommended for constipation if used for diarrhea. To minimize adverse effects, a person should speak with a doctor before using Vijaysar.

VII. DOSAGE FORMS

A. Giloy Plant:

The Giloy plant comes in the following dosage forms:

➢ *Powder*
➢ *Liquid*
➢ *Capsule*
➢ *Tablets*
➢ *Powder form: Giloy Satva Powder*

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The powerful ayurvedic solution known as giloy satva powder is made by macerating the aqueous extract of the magnificent giloy plant.

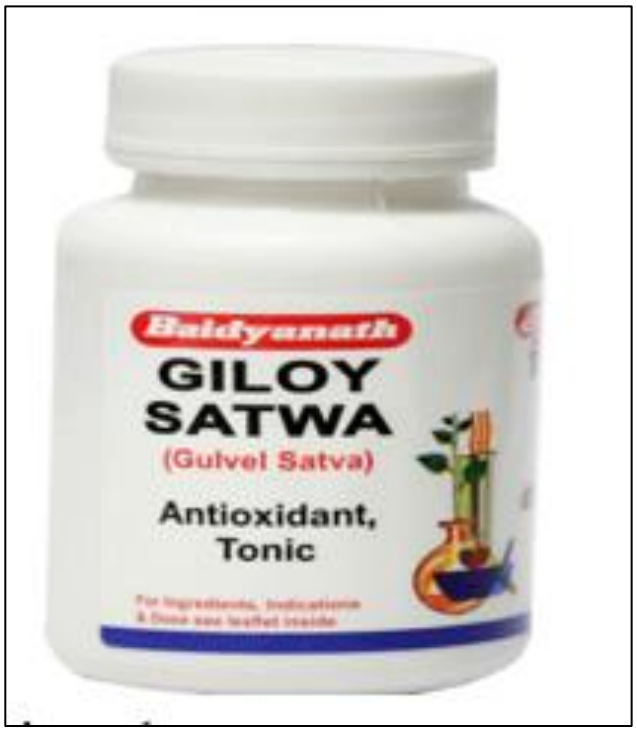

Fig 6: Giloy Satva Powder

- *Application Guidelines*

✓ Pour yourself a glass of warm water.
✓ Combine one or two teaspoons of the powder.
✓ Take it twice day, just after eating.

- *Advantages:*

✓ Increase your strength.
✓ Encourages serenity
✓ Encourages more restful sleep
✓ Increase stamina.
✓ Increase defenses against illness.[24]

➢ *Liquid form: Giloy Juice*

Giloy stems and branches can be used to make juice. First, you'll need some clean plant branches to make giloy juice. Then, to form a fine green liquid paste, chop and combine those branches with one cup of water. Finally, strain the paste and drink the liquid like a cool giloy juice.

Fig 7: Giloy Juice

- *Application Guideliness:*

✓ Milk or ginger should be consumed with giloy juice.
✓ Herbal lassi is prepared with the juice of giloy stems.
✓ To make herbal kadha, combine giloy juice with ashwagandha, ginger, and other ingredients.

- *Advantages:*

✓ It might have anti-toxic, anti-stress, anti-wound healing, blood glucose-lowering, and other properties.
✓ It can function as an antioxidant, an anticoagulant, etc.
✓ The antimicrobial properties of giloy juice provide protection against illnesses.
✓ It helps prevent a variety of illnesses by boosting the body's immunity naturally.[20]

➢ *Capsule form - Giloy Capsule (Jiva giloy capsule)*

It is made using guduchi extract. It is made by sun-drying the giloy extract, which is taken from the plant's stem. Acacia is utilized as a binding agent and fresh cut and cleaned giloy stems are the ingredients used in the preparation.

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Fig 8: Giloy Capsule

Fig 9: Giloy Tablets

- *Application Guideliness:*

Two 250 mg capsules taken once or twice daily with a meal, or one 500 mg capsule taken on a regular basis with a meal, is the recommended dosage.

- *Advantages*

✓ Prevents viral infections and fever.
✓ Gout is treated.
✓ Relieves arthritic pain.
✓ Combats skin conditions.
✓ Reduces tension.
✓ Immunity booster.
✓ Regulates blood sugar.

➢ *Tablets - Giloy Tablets*

The Wet Granulation Method can be used to make T. cordifolia tablets. First, the extract and 90 mg of lactose were let to flow through sieve number 20 and combine in a mixing tray. Subsequently, the dry mixture was combined with a 5% starch solution to generate the wet mass. After being turned into dough, the moist mass was made to go through the sieve.[21]

For thirty minutes, the moist granules were dried in a tray dryer set at 450 degrees Celsius. Following that, when the granules were dried, 60 mg of microcrystalline Na, 0.9 mg of cross-caramalose sodium, 1 percent of magnesium stereate, and 1 percent of talc were added. They were then put through a screen and milled. As a result, the granules were prepared for compression to provide 500 mg tablets.

- *Application Guidelines*

✓ Take one or two Giloy tablets. After eating twice a day, swallow it with water.
✓ Children between the ages of five and ten should receive half to one pill every day, while adults should take two tablets daily.
✓ Children older than ten years old may receive one pill each day.[25]

- *Advantages:*

✓ Boosts immunity.
✓ Decreases cold, fever, and cough.
✓ It has qualities that strengthen immunity.
✓ Strengthens the respiratory system and aids in the treatment of COPD, asthma, cough, and other respiratory conditions.[26]

B. Vijaysar Plant:

There are some dosage forms of vijaysar

➢ *Powder*
➢ *Capsule*
➢ *Syrup*

➢ *Powder*

- *Vijaysar Powder*
- *Vijaysar Churna*

Fig 10: Vijaysar Powder

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- *Vijaysar Powder:*

By mixing 1 teaspoon of powder with water to make a paste, you can lessen swelling and inflammation. For 5-7 minutes, apply this paste to the affected region. Use the water to wash. Doing this process again one or two times can produce better outcomes.

- *Vijaysar Churna:*

Take a half-teaspoonful twice a day, before meals, with lukewarm water, or as directed by a physician.

- *Advantages:*

✓ The astringent quality of vijaysar powder or churna makes it a great treatment for skin infections.
✓ It provides analgesia.
✓ Attend to cuts and sores.
✓ It encourages skin care.[25]

➢ *Capsule:*

There are also Vijaysar capsules available. Although it has been declared safe to eat, a doctor's prescription is still required. Take one or two capsules before meals, twice a day.

- *Advantages:*

✓ Because of its astringent and pitta-balancing qualities, it prevents premature greying of hair.
✓ It facilitates blood glucose control.
✓ It facilitates better digestion.
✓ It eases hair-related issues

Fig 11: Vijaysar Capsule

➢ *Syrup (Juice):*

Vijaysar leaves can be used to make juice. Combine one to two teaspoons of the juice from Vijaysar leaves with honey. Use it for five to ten minutes on the affected region. This promotes quicker healing of wounds. Vijaysar juice can also be taken orally in another method with the aid of a glass or tumbler. Fill a tumbler or glass crafted from Vijaysar plant wood with water. Let the water sit for a minimum of eight to ten hours, or overnight. The water's hue changes to a brownish tint after the designated duration or overnight. Drink this water first thing in the morning on an empty stomach. It can help control diabetes.

Fig 12: Vijaysar Syrup

- *Advantages:*

✓ It exhibits antibacterial activity against the germs that cause gastrointestinal infections.
✓ It aids in lowering blood sugar and diabetes.
✓ It lowers bad cholesterol, which increases the risk of heart issues.
✓ It exhibits antidiarrheal properties.[26]

VIII. CONCLUSION

Giloy (Tinospora Cordifolia) and vijaysar (Pterocarpus Marsupium) both the plants contain various useful secondary metabolites like alkaloids, glycosides, flavonoids, etc., as chemical constituents which have been discussed. Present review represent the plants having anti-diabetic property along with many other activity like anticancer, antioxidant, antiarthritic, antimicrobial, etc. Since ancient era, their products was used in ayurveda system for better economic and therapeutical utilization. It can be explore further in order to prevent disease like diabetes and other. This review can be useful for further studies in development of novel drugs in the future.

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