
REVIEW CONCERNING THE THERAPEUTIC APPLICATIONS OF CLITORIA TERNATEA

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ABSTRACT

Medicinal and aromatic herbs have been used for centuries owing to their effectiveness and limited adverse effects. As a result, the pursuit of knowledge has reached its highest point. The climbing plant "Clitoria ternatea" (CT), which belongs to the family of Fabaceae and is commonly referred to as "Butterfly pea" and "Shankpushpi," witnessed this phenomenon. Clitoria ternatea has been used to extract a wide variety of secondary metabolites, including triterpenoids, flavanol glycosides, anthocyanins, and steroids. Its extracts provide a wide range of therapeutic benefits, including antibacterial, antipyretic, anti-inflammatory, analgesic, diuretic, anaesthetic, antidiabetic, insecticidal, blood platelet aggregation-inhibiting and relaxing effects on vascular smooth muscle tissue. Scientific and clinical research investigations have shown the efficacy of this plant in treating a number of ailments that have a long history in Traditional Ayurvedic medicine. Numerous active substances found in the plant include alkaloids, glucosides, flavonoids, saponins, tannins, carbohydrates, and others. Clitoria ternatea has continued to be used professionally in the Ayurvedic system of medicine. This review is an initiative effort to explore its phytochemical properties and pharmacological investigations, as well as an in-depth assessment of its future ethnopharmacological potential, on the basis of several recent discoveries that have implications for the renowned plant species.

Keywords: Clitoria Ternatea, Antidiabetic, Antioxidant, Antimicrobial.

I. INTRODUCTION

Many patients, both new and old, employ herbs and medicinal plants to improve their health. Consequently, it is essential to assess their therapeutic potential, biological characteristics, and safety. Making judgements about their use based on this information would be very helpful. Hundreds of extraordinary medications and biologically active molecules have been created from traditional medicinal herbs [1]. Many plants were employed as medicinal herbs before the Prehistoric era because of their therapeutic qualities. India has a wide variety of medicinal plants. Ayurveda, Unani, Siddha, AYUSH, and tribal medicine all use herbal plants as medication in India. About 8000 herbal medicines have been codified by the AYUSH system among these. Ayurveda and Unani are two frequently used medical systems in India. According to the WHO (World Health Organisation), 80% of the global population uses herbal medicines for primary healthcare. Approximately 21000 species of herbal plant are utilised for therapeutic purposes, according to the WHO. The use of medicinal herbs is seen to be quite safe because there are rarely any negative side effects [2].

The plant Clitoria ternatea has a variety of pharmacological actions, including antibacterial, antioxidant, anticancer, hypolipidemic, cardiovascular, respiratory, immunological, anti-inflammatory, analgesic, and antipyretic. Clitoria ternatea contained tannins, phlebotomine, sugars, saponins, triterpenoids, phenols, flavonoids, flavanol glycosides, proteins, alkaloids, anthraquinone, anthocyanins, cardiac glycosides, volatile oils, and steroids, according to preliminary phytochemical screening. The plants also showed a wide range of pharmacological actions, such as insecticidal, antimicrobial, anticancer, anti-inflammatory, analgesic, antipyretic, CNS, antimicrobial, gastro-intestinal antiparasitic, and many more [3].

Treatments with medicinal plants are very safe because they don't cause any negative effects when used sparingly. Some common ailments can be treated with Aloe, Tulsi, Neem, Turmeric, Ginger, and Omavalli. In addition to the herbs described above, numerous other herbal plants are employed as natural treatments. Medicines are made from tulsi. Many herbs are used to worship the gods and are also planted in homes as a sign of luck. Tea for Pooja purposes, etc. Herbs are used for a variety of things besides medicine, such as natural colouring, pest control, food, perfume, and tea. Additionally, it serves as a crucial resource for pharmacies to

manufacture pharmaceutical goods [4]. It is our responsibility to save these species, transmit these abundant resources to the future generation, and clear the path for new discoveries. Keeping all of the above in mind, this review focused on the significance of the chemical and pharmacological properties of *Clitoria ternatea*.

II. CLITORIA TERNATEA

Clitoria ternatea has its origins in Asia and Latin America. Today, it is found in all semi-arid and subtropical regions of Asia, America, Africa, and Australia. It can be naturally seen in grassland, river lines, bush, vegetation, etc. It is the fastest-growing summer legume. The German botanist Johann Philipp Breyne discovered and named the plant in the 1800s. *Clitoria ternatea* is a type of evergreen perennial plant. Its height ranges from 6 to 10 feet. It grows well in sandy soil and has a PH range of 6.6–7.5. It can grow in low sun exposure or Partial shade. Sangu poo acts as a curative herb as it helps to increase memory [5].

Scientific Classification

Kingdom : Plantae
 Order : Fabales
 Family : Fabaceae
 Genus : *Clitoria*
 Species : *Ternatea*

The flowers, leaves, young shoots, and tender pods are edible, and the leaves are used as green colourants. The Genus *Clitoria* has about 178 species out of 64 accepted species names. Some commonly known species are *Clitoria Mariana*, *Clitoria Triflora*, and *Clitoria Annua* [4].



Figure1: *Clitoria ternatea* Flower.

Nutrient Content

Seed

Carbohydrates	- 36.69%
Total Sugars	- 4.92%
Crude Fat	- 12.26%
Crude Protein	- 40.59%
Sodium	- 76.29 mg/g

Protein content of butterfly peas ranges from 14 to 20%, and the fibre content of the leaves is between 21.5 and 29% dry matter. *Clitoria* are the source of 70% of high-quality hay. The Butterfly Pea's vivid blue colour is caused by the presence of Ternatin, an anthocyanin component. Inhibiting the development of cancer cells and reducing inflammation are two benefits. Antioxidants abound in this plant.



Figure 2: Seeds of *Clitoria ternatea*.

1. Delphinidin-3, 5-glucoside. This helps to improve immune response and leads to death of cancer cells in colorectal.
2. Kaempferol- Kaempferol is antioxidant, anti-inflammatory, anti-microbial, cardiovascular & neuroprotective properties. It may be used for the therapy of hormone regulated cancers such as ovarian etc..
3. P-Coumaric acid: - It is a phenolic acid. It is useful in many biological functions such as anti-oxidant, anti-inflammation, anti-diabetic, anti-ulcer, anti-platelet, anti-cancer activities.
4. The Ternatin content extracted from flower has revealed that it has a ability to arrest the synthesis of fat cell in human body. Researchers also found that butterfly pea flower extracted beverage helps to raise the anti-oxidant levels and helps to decrease blood sugar levels. This anti-oxidant property prevents cell damage [6].

III. MEDICINAL USES

Clitoria is widely used in traditional medicine as a supplement to improve cognitive functions and alleviate symptoms including Fever, inflammation, pain, and Diabetes. It was discovered that all parts of Clitoria Ternatea (Butterfly pea) have various positive Impacts on human health.

- Improves Skin Health: Clitoria is rich in antioxidants, which help slow down a bit of the ageing process, improve overall skin tone, and prevent premature ageing.
- Regulate Glucose Level in the Blood: Clitoria Ternatea tea helps in the regulation and absorption of sugar into the bloodstream. Thus, it can have a positive impact on diabetic patients as it regulates the blood sugar level.
- Fight against Cancer: Clitoria Ternatea tea may help us arrest the growth of cancer cells; thus, its substances seem to have anticancer activities. It enters the cancer cell and arrests its Growth.
- Reduces Blood Pressure: When we consume this butterfly pea flower tea, it helps us to lower our blood pressure (BP). It is helpful for patients with Hypertension.
- Improves Brain Health: It boosts a chemical in the brain (acetylcholine). This chemical substance is essential for good brain health. A high level of this chemical substance in the brain can reduce memory loss and thinking ability, even when we are older. We can avoid these age-associated problems.
- Antipyretic: It reduces fever as it dilutes the blood vessels.
- Detoxify the Body
- Enhance The Immune System.
- Blue tea is helpful in maintaining eye sight.
- Blue tea has many health benefits as it acts as an anti-stress and anti-depression agent [7].

IV. PHARMACOLOGICAL PROFILE

Clitoria ternatea has a wide spectrum of biological effects, some of which are particularly exciting for future development, according to medical studies.

Anti-Stress Activity

Using the cold restraint test (CRS), which causes ulcers, lithium-induced head twitches, clonidine-induced hypothermia, sodium nitrite-induced breathing apprehension, and haloperidol-induced catalepsy in rats and mice, researchers assessed the anti-stress effect of airborne components of Clitoria ternatea.

Anti-Blood Platelet Aggregation Activity

Anthocyanin ternatins D1 extracted from Clitoria ternatea petals were tested for their ability to inhibit platelet aggregation in rabbits in vitro. The results of numerous published research investigations showed significant reduction of platelet aggregation caused by adenosine diphosphate (ADP) and collagen.

Anti-Microbial Activity

Finotin, a protein with a low molecular weight and high cystein content that is obtained from the seeds of the plant Clitoris ternatea, has been recognized for its antifungal properties. Clitoria ternatea seeds were used to make the crude extract, which shown strong antifungal activity against the test fungi Aspergillus niger and Aspergillus ochraceous, as well as a number of other microorganisms.

The pathogens that cause enteric fever, *Shigella dysenteriae* and *Salmonella* spp., were the targets of antibacterial activity. Additionally, the crude methanol extract also showed anti-bacterial efficacy against *Pseudomonas aeruginosa* and *Klebsiella pneumonia* [8].

Anti-Diabetic Activity

Researchers found that taking an aqueous extract of *Clitoria ternatea*'s leaves and flowers for 84 days significantly reduced blood sugar, glycosylated haemoglobin, total cholesterol, triglycerides, urea, and creatinine levels, as well as the activity of the gluconeogenic enzyme glucose-6-phosphatase. However, serum insulin, HDL cholesterol, protein, liver, and skeletal muscle glycogen levels were significantly increased. Rats treated with *Clitoria ternatea* leaves displayed somewhat superior activity than rats treated with *Clitoria ternatea* flowers for all the aforementioned biochemical parameters that were examined [9].

Antioxidant Activity

The DPPH free radical technique was utilized to assess the antioxidant activity. A strong antioxidant activity was demonstrated by the extract, with an EC₅₀ value of 36.5 g/ml. For each of the tested concentrations, the antioxidant activity increased in a dose-dependent manner.

Antioxidative Activity

The link between oxidative stress and a number of chronic and degenerative diseases has been established. It has been established that the petals of *Clitoria ternatea* have antioxidant properties. In Thailand, *Clitoria ternatea* flower extracts are used in cosmetic products, and based on their chemical makeup; it's possible that the extracts have antioxidant properties. Compared to ethanol extracts, *Clitoria ternatea* aqueous extracts have higher antioxidant activity. The amount of enzymatic and non-enzymatic antioxidants in the *Clitoria ternatea* extract in aqueous form was evaluated for its antioxidant potential. By using a variety of assays, including the ferric reducing power assay (FRAP), the reducing activity assay, the diphenylpicrylhydrazyl (DPPH) assay, and the hydroxyl radical scavenging activity assay, in-vitro antioxidant capacity was also established. The results were comparable to those obtained with common antioxidants like butylated hydroxytoluene (BHT), ascorbic acid, and rutin [10].

Cytotoxic Activity

The plant's cytotoxic and antioxidant properties were confirmed by a study using an ethanolic extract of *Clitoria ternatea*. The extract demonstrated strong cytotoxic activity using DLA cell lines using the trypan blue dye exclusion method, with EC₅₀ values of 305 g/ml. It also showed a dose-dependent reduction in cell count for all concentrations tested [11].

V. CONCLUSION

The paper reviewed *Clitoria ternatea* as promising medicinal plant with wide range of pharmacological activities which could be utilized in several medical applications because of its effectiveness and safety. *Clitoria ternatea* has a lot of biological potential, according to a clinical investigation. *Clitoria ternatea*'s safety and efficacy are supported by the reported evidence and studies, but the quality of the evidence is insufficient with regard to its bioactive secondary metabolites, bioavailability, pharmacokinetics, and therapeutic value, consisting of clinical trials, on which sufficient information has not yet been discovered.

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