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AN OVERVIEW OF PLANT BASED DRUG - CLITORIA TERNATEA (SHANKAM PUVVU)

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ABSTRACT

In this article we come to know about overview of the *Clitoria ternatea*,(CT) commonly known as butterfly pea, is a medicinal plant known for its rich bioactive composition, including anthocyanins, tannins, flavonoids, and alkaloids. These compounds contribute to its pharmacological significance and potential applications in various fields. The extraction of these bioactive constituents is performed through maceration using ethanol and concentrated HCl, followed by vacuum filtration for purification. This method ensures an efficient and simplified extraction process, yielding high-quality phytochemicals. Identification of anthocyanins, responsible for the plant's characteristic blue pigmentation, along with tannins and flavonoids, is carried out through phytochemical screening and advanced analytical techniques. Due to its ease of availability and significant bioactive potential, *Clitoria ternatea* is gaining attention in pharmaceutical and scientific research. This study highlights an efficient extraction process and the identification of key phytochemicals, emphasizing its importance in natural product research.

INTRODUCTION

Description: It is an herbal plant, which is commonly found in our local places. It grows in the tropical and sub tropical regions like india , caribbean, central America , Africa, southeast asia .Which has various names as butterfly pea flower ,asian pegion wings, bluebellvine, blue pea , cordofan pea or Darwin pea , telang , shankam puvvu .CT belongs to the fabaceae family**.** The name clitoria is given to CT is due to its appearance like the females reproductive part as the human vulva.

Types of Clitoria ternatea: *Clitoria ternatea* has different types based on flower color and variety, primarily categorized into the following:

1. Based on Flower Color: Blue *Clitoria ternatea* – The most common variety, rich in anthocyanins, widely used in herbal medicine and tea.

- White *Clitoria ternatea* – Less common, with similar medicinal properties but lower anthocyanin content.
- Purple *Clitoria ternatea* – A rare variety with a mix of anthocyanins and flavonoids.
- Pink *Clitoria ternatea* – A very uncommon variety, sometimes found in hybrid species.

Images are mentioned in fig- 1

2. Based on variety: Single-petal variety – Typically found in the wild areas and used for medicinal and ornamental purposes.

- Double-petal variety – A cultivated form with more petals, often used for decoration and hybrid breeding.

Blue ct **White ct** **Purple ct** **Pink ct**

Fig-1

Single petal **Double petal**

Fig-2

Extraction Process of *Clitoria ternatea:*

Process 1: Maceration

1. Collection & Weighing:
   - Take *Clitoria ternatea* flowers.
   - Weigh 10 grams of the flowers.
2. Solvent Addition:
   - Measure 100 ml of ethanol and pour it into the container with the flowers.
   - Add 1 ml of concentrated HCl to enhance extraction.
3. Maceration Duration:
   - Allow the mixture to sit for 24 to 48 hours for effective extraction.

Process 2: Filtration

4. Preparation for Filtration:
   - Take the macerated fluid containing the extracted compounds.
   - Ensure the vacuum pump is clean by washing it with water.
5. Vacuum Filtration:
   - Pour the extracted macerated fluid into the vacuum pump setup.
   - Let the system run for 30 minutes to complete the filtration process.
6. Final Product:
   - The filtration mechanism ensures an efficient and easier extraction of *Clitoria ternatea* compounds.

This method provides a simple, effective, and rapid way to extract bioactive compounds from *Clitoria ternatea*.

The extraction process is shown in fig-3

Components of ct: tannins, anthocyannin, flavonoids, alkaloids , saponins,etc

Tannins and anthocyannins are helpful for the inhibiting of the biosynthesis of the cholesterol and lipid – antiobese and dyslipidemia.

Preparation of solutions :

For flavonoids:

1. To prepare dil Naoh preparation: 3gms Naoh in 30ml water

2. To prepare dil Hcl preparation : 3ml Hcl in 3oml water

For tannins:

Nacl-gelatin solution: Nacl-1gm + 100ml water + gelatin – 1gm – heat(waterbath) – upto gelatin solubulise.

How to determine and identify the Tannins, saponins, flavonoids and anthocyannins presence in extraction is shown in the Results and discussion.

The identification images are shown in Results and discussion – Fig-4

Pharmacological Benefits of *Clitoria ternatea*:

Anti-obese:

1. *It* suppresses the differentiation of pre-adipocytes (immature fat cells) into mature adipocytes.
2. Regulates **leptin** (satiety hormone) and **ghrelin** (hunger hormone), reducing excessive food intake.
3. Reduces inflammation in adipose tissue by lowering levels of **TNF-α (Tumor Necrosis Factor-alpha)** and **IL-6 (Interleukin-6)**, which are linked to obesity-related metabolic disorders.
4. Reduces **cholesterol and triglyceride levels**, preventing excessive fat accumulation.
5. Stimulates the breakdown of triglycerides stored in fat cells.

Anti-diabetic:

1. Stimulates **pancreatic β-cells**, enhancing **insulin secretion**.
2. Promotes **fat oxidation**, preventing lipid accumulation that contributes to insulin resistance.
3. Inhibits **gluconeogenesis** (glucose production in the liver), preventing excessive glucose release into the bloodstream.

Anti-inflammatory: Suppresses the release of inflammatory mediators such as:

TNF-α (Tumor Necrosis Factor-alpha)

IL-6 (Interleukin-6)

IL-1β (Interleukin-1 beta)-This helps reduce chronic inflammation associated with autoimmune diseases, arthritis, and metabolic disorders.

Anti-depressant: Enhances the levels of serotonin (5-HT), dopamine (DA), and norepinephrine (NE) in the brain. Inhibits monoamine oxidase (MAO-A and MAO-B), enzymes responsible for neurotransmitter breakdown, leading to prolonged neurotransmitter action. This results in improved mood, reduced anxiety, and enhanced cognitive function.

Laxative: The alkaloids and flavonoids in *Clitoria ternatea* stimulate the enteric nervous system, increasing peristalsis (wave-like muscle contractions in the intestines). This accelerates bowel movement and relieves constipation.

Diuretic: The flavonoids and saponins act as natural diuretics, promoting urine formation by enhancing renal blood flow and glomerular filtration rate (GFR). This leads to increased urine volume and frequency, helping in conditions like water retention and mild hypertension.

Atheroscerosis: The anthocyanins and flavonoids in *Clitoria ternatea* act as potent antioxidants, preventing the oxidation of low-density lipoprotein (LDL) cholesterol. LDL oxidation is a key trigger in plaque formation and artery hardening. This helps protect endothelial cells (blood vessel lining) from oxidative damage, reducing plaque development.

Snake bite treatment: Snake venoms contain toxic enzymes like phospholipase A2 (PLA2), proteases, and hyaluronidase, which cause tissue damage and systemic toxicity.Flavonoids and tannins in *Clitoria ternatea* inhibit these enzymes, preventing venom-induced tissue destruction.

This helps reduce local swelling, necrosis, and muscle damage caused by snake venom. *Clitoria ternatea* extract contains polyphenols and alkaloids that bind to venom toxins, reducing their ability to spread through the bloodstream.This prevents systemic effects such as neurotoxicity, cardiotoxicity, and coagulopathy.

Stimulation of follicle stimulating hormone(FSR): *Clitoria ternatea* stimulates the hypothalamus, leading to increased secretion of gonadotropin-releasing hormone (GnRH).GnRH stimulates the anterior pituitary gland to release FSH and LH (luteinizing hormone).This enhances ovarian follicle

growth in females and spermatogenesis in males.

Anti-asthma: Saponins in *Clitoria ternatea* act as natural expectorants, helping to break down thick mucus in the airways.Improve cough clearance and ease breathing.this prevents airway blockage due to mucus plugs.

Poly cystic ovarian syndrome(pcos): PCOS is linked to chronic inflammation and oxidative stress, damaging ovarian follicles.*Clitoria ternatea* has anthocyanins and flavonoids, which reduce pro-inflammatory cytokines (TNF-α, IL-6, IL-1β).Protect ovarian cells from oxidative damage, improving egg quality and ovulation.this helps restore normal ovarian function and prevents ovarian cyst formation.

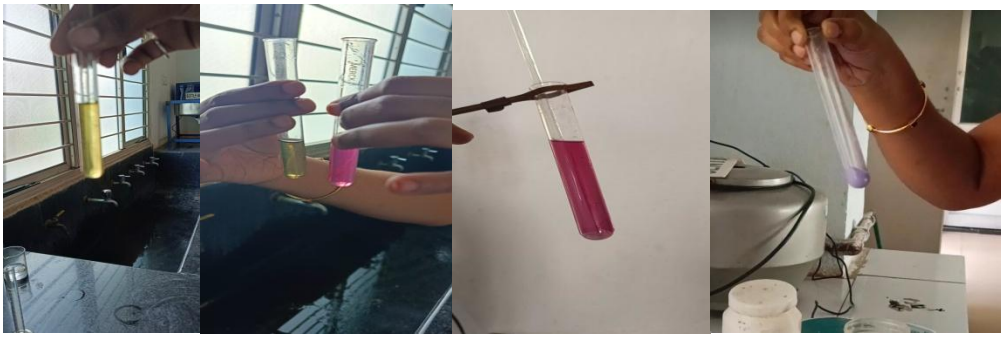
Anti-neoplastic: Cancer cells evade apoptosis, allowing uncontrolled growth. *Clitoria ternatea* induces apoptosis via:Upregulating pro-apoptotic proteins (Bax, caspase-3, caspase-9).Downregulating anti-apoptotic proteins (Bcl-2, survivin).Triggering mitochondrial membrane depolarization, leading to caspase-dependent apoptosis. This selectively eliminates cancerous cells while sparing normal cells.

Weighing Addition Of Solvent Maceration Vaccum Filtration Prepared Extract

Fig-3

RESULTS AND DISCUSSION:

TYPE OF COMPONENT	CONTENTS	QUANTITY	OBSERVATION	PRESENCE
FLAVONOIDS	1.DilNaoh (prepared above) 2.DilHcl (prepared above)	1. 2ml 2. 2ml	Green color to pale yellow color	Presence of flavonoids.
ANTHOCYANNIN	1.DilNaoh (prepared above) 2.DilHcl (prepared above)	1st test tube – 2ml 2nd test tube – 2ml	1st –green color 2nd- pink color	Presence of anthocyannins
TANNINS	Stock of tannin (prepared above)	4ml	Precipitation	Presence of tannins
SAPONINS	Lead acetate	Quantity sufficient	Precipitate formation and color change	Presence of saponins



Flavonoid Anthocyannin Tannins Saponins

Fig-4

CONCLUSION:

Clitoria ternatea is a versatile herbal plant with significant medicinal potential. Its bioactive compounds, including anthocyanins, flavonoids, tannins, and saponins, contribute to anti-diabetic, anti-obesity, anti-inflammatory, hepatoprotective, antidepressant, and cardioprotective effects. Additionally, it exhibits diuretic, laxative, and anti-atherosclerotic properties, making it a valuable natural remedy. The plant's therapeutic applications extend to modulating gut microbiota, balancing hormones, treating asthma, and stimulating follicle-stimulating hormone (FSH). In traditional medicine, *Clitoria ternatea* extract has been utilized for snakebite and scorpion sting treatments due to its enzyme-inhibiting properties.Furthermore, its anti-neoplastic properties make it a promising natural cancer-fighting agent by inducing apoptosis and inhibiting tumor progression. The plant's widespread availability, easy extraction methods, and multiple pharmacological actions make it a valuable medicinal herb for modern therapeutic applications.Further scientific research and clinical trials will be essential to explore its full potential and establish standardized dosages for pharmaceutical use.

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