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Pharmacognostic Standardization of Clitoria Ternatea: A Review

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ABSTRACT :
Butterfly pea or clitorea ternatea is a medicinal plant mostly found in Asian countries and other places. It is rich in phytoconstituent hence this plant is used in many traditional medicines. Clitoria ternatea contained tannins, phlobatannin, saponins, triterpenoids, phenols, flavanoids, flavonol glycosides, proteins, alkaloids, antharaquinone, anthocyanins, cardiac glycosides, volatile oils and steroids etc.
This review artical inclued various pharmacological activities of CT including anti-oxidant, anti-microbial, anti-cancer, anti-anxiety, anti-convulsant, anti-depression, anti-pyretic, local anesthetic, anti-inflammatory and nootropic and many other pharmacological effects. This artical will concentrates on study of physico-chemical aspects of Clitorea ternatea and various physiological uses.
Keywords : Clitoria ternatea, memory enhancer, anthocyanin, aqueous root extraction, anti inflammatory

I. INTRODUCTION:

Butterfly pea is also known as Clitoria ternatea. This is the scientific name of the butterfly pea or blue pea.It belongs to the family of Fabaceae.This flower is also known as Bunga Telang by Malaysian locals. Chronicbronchitis, dropsy, leprosy,Goiter,Mucous disorder, etc. are cases where CT is used for their treatment.It is a perennial herbaceous plant that is used in the Indian Ayurvedic medicinal system for the treatment of various diseases.(1)For garden lovers,CT is an essential ornamental plant.Ct is used as food colourant because anthocynin is present in its petal,which forms a vivid blue colour.It has high antioxidant properties and several pharmacological effects, like anti-inflammatory,anti-diabetic,anti-cancer due to presence of anthocyanin pigments.(2)Shankhpushpi is another name of butterfly pea. It is also known as reputed drug of ayurveda which works as laxative nervine tonic anx brain tonic.(3)Clitoria ternatea is use as one to four traditionally herb which is use as shanka pushpi which promotes neurological health.(4)Anthocyanin as glycoside are present in plant which are bound to the sugar group. They comes under flavonoid group where colour of vegetables fruits flower and leaves are red and blue colour.(5)Roots of ct are use in ayurvedic preparation called "sulak" for leprosy treatment(6)

Few parts of Clitoria ternatea has following actions:
1: flower juice shows action for insect bites
2: roots are use for asthma burning sensation leprosy ect
3: seeds gives effect for visceralgia
4: root stem are use for snake bite and scorpion sting treatment(7)

Synonym:
Marathi- Gokarna
Hindi- Koyala
English- Butterfly Pea,Blue Pea Vine,Pigeon Wings
Sanskrit- Shankhpushpi,Aparajita
Geographical Source: India,South America,NorthAmerica,Asia,Australia,Africa(8)
Phytocostituents: Flavonols,Glycoside,Myricetin, Quercetin,Phenolic acid,Anthocynins

Scientific Classification:
Kingdom: Plantae
Division: Spermatophyte
Sub-division: Angiospermae
Class: Fudicots
Sub-class: Rosids
Order: Fabales
Family: Fabaceae
Sub-family: Papilionoideae
Tribe: Phaseoleae
Sub-tribe: Cliporiinae
Genus: Clitoria
Species: Clitoria ternatea L

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Structure Of Chemical Constituents:

Anthocyanin : C. Ternatea have various phytoconstituent. The flower consisting of deep blue colour petal contain main constituent anthocyanins. Anthocyanin words is derived from the greek word anthos ie. "Flower" and kyanos ie "blue"(9)

Morphology :

1)Plant height: The height of the purple butterfly pea is 8.10 cm. The light blue butterfly pea has the tallest height given as 21.60 cm. Whereas the blue butterfly pea has a height of 37 cm.

2) Plant characteristics: In the purple flower plant, the leaves have high intensity with dark green leaves. The leaves have a rounded tip and a nearly circular shape. The white flower plant Leaves have a bright, light colour with high intensity. They have rounded tips and an oval shape. The light blue flower plant has light intensity with green leaf color. It has a sharp tip without sharp edges. The blue flower plant has high intensity with dark green leaves. It has blunt tips and an imperfectly round shape.

3) Flower characteristics: longest flower length was found in blue flower; white and light blue flower has widest flower; highest petal number was observed in purple and white flower. (10)

	T_1(Purple flower)	T_2(White flower)	T_3(Light Blue Flower)	T_4(Blue flower)
Plant Height	8.10 cm		21.60	37 cm
Leaves : 1.Colour	Dark Green colour	Bright light green colour	Bright colour	Dark green leaves
2.Shape	Nearly Circular shape	Rounded tip and oval shape	Sharp but blund tip, oval shape	Blunt tip and imperfect round shape

Table 1: Morphological Characteristics of clitorea ternatea

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Fig: Clitorea ternatea(Butterfly Pea)

Pharmacological action :

1.Nootropic Activity : Nootropic drugs enhace the learning ability and memory retention. GABA and DA are neurotransmitter which decrease their conc. in brain after paracitam drug administered. CT act on Cental nervous system. After administration of oil of Celastrus paniculatus, dopamine level is decreased.(11)

Celastrus paniculatus drug posses nootropic activity and it can increase IR and discriminaation index by CT . In other experiment aq. methanolic exctract enhances the memory.

2.Anxiolytic Activity : CT shows weak anxiolytic activity. EPM is the behavioral test which is used for anxiolytic behaviors in rodents.(11) This experimenatal apparatus consist two arms that are close arm and open arm. The time spend in open arm by the animal is increases by the oral dose (100-400 mg/kg) of CT. It reduces the anxiety by the dose dependent manner.(12)

3.Anti-Depressant Effect : Depression is effective disorder which causes mannia. In Clinical and animal studies it involves the role of 5-HT1A, 5-HT1B and 5-HT2A receptors which shows anti-depressant activity.(12)Fluoxetine, decreases the total duration of immobility. The defficiency of DA and 5-HT causes the depression. CT reduces the total duration of immobility and do not produce sedation and toxicity.(13)

4.Anti- Convulsant Effect : Convulsion is a involuntary spasmodic contraction of skeletal musculature. Seizures results from sudden excessive firing of neurons.(11) The maximal electical shock (MES) is used to check the potency of anti epileptic drugs.The ethanolic extract of aerial portions of CT (dose 230 mg/kg) was tested on rats by MES and PTZ test. The methanolic extract of aerial part of CT shows anti convulsant activity at dose of 100mg/kg in both PTZ and MES induced seizures in mice.(14)

5.Anti-asthamatic ativity : Asthma is common respiratory disorder , characterised by airways obstraction and inflammation in passage. In this bronchial construction is induced by histamine which is immunological distruction of airways .The ethanolic extract of CT roots are used to decrease the cutaneous anaphylaxis in rats.(11)

6.Anti-inflammatory Action :Inflammation is the response towards injury. The cyclooxygenase (COX) and lipooxygenase (LOX) both are the enzymes which inhibit the PEG2 (prostaglandin) synthesis. Generally COX1 and COX2 reduced the inflammation. (16)At the dose of 200-400 mg/kg of methanolic extract, the clitoria ternatea roots are used orally. This was given to the rats which reduces the oedema in rat's paw. Intense pain is induced by the acetic acid , the extract of CT decrease the number of writhings at dose of 200 and 400 mg/kg in mice.(17)

7.Anti-ulcer Activity :Peptic ulcer is the terminology related gastrointestinal disorder .There is hypersecretion of gastric acid into the parietal cell of gastric mucosa of the stomach. It increased the level of H+ ions through the H+/ K+ ATPase. In peptic ulcer, an epithelial layer of mucosa is lossed. CT suppress chronic gastric damage which is induced by administration of Indomethacin and accumulation of pyloric acid. The cytoprotective effect with gastric antisecretory action is shown by the CT due to the presence of flavonoid , tannins or antioxidants content in it. The chloroform and ethanolic extract of CT at the concentration of 250 mg/kg induces the effect on ulcer induced model which is compared with the standard drug Omeprazole (20 mg/kg p.o.).(18)

8.Anti-histaminic activity :Histamine is the chemical mediator of hypersensitivity reactions and

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allergic inflammatory reaction. CT acts on H1 receptor rather than other histaminic receptor subtypes like H2, H3, H4 etc. Histamine is released by the mast cell which responsible for different asthmatic conditions. (19)The catholic extract of CT root at the dose of 100th, 125, 150 mg/kg is used. Chlorpheniramine maleate is the antihistaminic drug and ethanolic extract of CT roots do not inhibit the haloperidol induced catalepsy. But clonidine induced catalepsy is decreases by antihistaminic drug.(20)

9.Anti-Microbial Activity : Due to the high environmental pollution, it is the main cause of health problems. Local climate change and the presence of various microorganisms are transmitting the diseases. The respiratory system is affected by infectious diseases. Gram-positive and gram-negative pathogens are resisted by Clitoria ternatea. Escherichia coli, Staphylococcus aureus, and Vibrio cholera are the microbes that produce the illness. Root extract is less effective than the leaf extract of Clitoria ternatea as an antibacterial agent. The leaf extract shows anti-microbial activity, and they are used as antibiotics. (fish pathogen) The methanolic extract of CT leaves or whole plant shows the maximum inhibition on Shigella dysenteriae. It shows bacteriocidal activity, and a root and leaf extract of Clitorea ternatea showed bactericidal potential. (21)

10.Anti-Cancer Activity : Cancer is diseases characterized by uncontrolled growthof cells, invasion of surrounding tissue, metastasis.Methanolic extract of Clitorea ternatea was demonstrated antitumor activity as indicated by a decrease in tumor volume and an increase in the percentage increase in life span (%ILS) in DLA tumor-bearing mice. The antioxidant enzyme levels were increased when MECT at 100mg/kg and 200mg/kg was administered in comparison with DLA control animals. In vitro cytotoxicity assay revealed that MECT induced cell death in DLA cells at concentrations above 75 µg but had no or little effect on normal lymphocytes.(22)

Extraction:

It is the method of isolation or separating the active constituents from s solid or liquid by means of liquid solvent.

It is a process where Plant or animal tissue are treated with specific solvent.

Through Pre- extraction and extraction procedures we study various medicinal plants. This two are important step for the extraction of bioactive constituent from the plant.

Maceration and soxhlet extraction are the traditional methods and also most commonly use at small research setting.(23)

Methods of extraction :

1) Maceration
2) percolation
3) Infusion
4) decoction
5) water distillation
6) steam distillation
7) ultrasound
8) supercritical fluid extraction
9) microwave assisted extraction

The solvents uses:

polarity preference can be given as:

petroleum ether < chloroform < methanol < Ethyl acetate < water

petroleum ether extract gives lipid fatty acid steroids or aglycone moiety

chloroform gives sugar or alkaloid product

methanol gives glycoside saponins and other few phenolic constituents

ethyl acetate gives flavonoids tannis

The soxhlet or decoction method is used or preferred for hard plant material like bark or stem

For soft plant material hot or cold maceration methods are used

For thermolabile constituents ultrasound or SCF method is extraction is used.(24)

Aqueous Root extraction:

fresh root of ct was collected, cleaned, cut into small pieces and dried powdered it

Those pieces are weighted and mix with distilled water with the ratio of 1:10 which is boil for 1/2 hour on low flame

Later on it is cooled and decanted

The residue obtain is mix with distilled water in 1:10 ratio

It is boiled for 30 mins cooled and decanted

the process is repeated twice

clear supernatant was decanted and centrifuge on 3000 rpm for 5 mins

It was evaporated on low flame to obtain thick paste like extract

It is dried in incubator and the dried Powder is stored in desiccator

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MOA of Pharmacological Action :

Sr.No.	Property	MOA
1. a)	CNS Effect Neurological Disorder	There is incraese acetylcholin in brain, middle brain cortex except medulla ablongata and cerebrum which is obtain by extraction of acetylcholin .Notable increment of acetylcholin content was in CT extraction. Midbrain and medulla ablongata shows decease activity. The root extraction of CT was given to rats and shows incease ACHE in brain cerebral cortex but also decrease activity is seen in medulla oblongata and cerebral cortex.
b)	Seizures	Leaves and Flowers obtained from methanolic exraction shows anticovulsant activity which shows reducing effect on limb extension.
c)	Depression	Antidepresant activity obeserved in ethanolic root extraction two compound namely 23-9,1.7 octadecadienal and n- hexdecanoic acid shows MAO-A inhibitors ability.
d)	anxiety	Anti-anxiety activity is obeserved in methanolic extraction. There is increase dark or light exploration test when CT is administer orally.
2.	Ulcer	Anti-Ulcer activity is calculated by ulcer index in rat. Anti-stress activity is obeserved when methanolic extract of CT was administered 60 min. before the test.
3.	Diabetes	Leaves Ethanolic extract of CT shows anti-diabetic activity. Blood glucose level is decrease in rats when it is continously administered for 28 days orally.
4.	Pyrexia	Aerial part of which is ethanolic extract of CT shows antipyratic effect. Also the CT leaves which have ethanolic and aceton extract shows anti-pyretic effect in yeast.

Table 2: Pharmacological Action of clitorea ternatea

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