REVIEW OF RESEARCH
ISSN: 2249-894X
IMPACT FACTOR : 5.7631(UIF)
VOLUME - 11 | ISSUE - 4 | JANUARY - 2022

"STUDIES ON BENEFITS OF CLITORIA TERNATEA (APARAJITA) : A REVIEW"

Dr. Prakash Chandra Patel
Department of Botany, Govt. College Jaisinghnagar, Shahdol (M.P.).

ABSTRACT:

Clitoria ternatea commonly known as Butterfly pea is a medicinal plant belonging to the family Fabaceae. The plant is reported to be used in insect bites, skin diseases, asthma, burning sensation, ascites, inflammation, leucoderma, leprosy, hemicrania, amentia and pulmonary tuberculosis. It is commonly called "Shankpushpi" in the Sanskrit language where it is reported to be a good "Medhya" (brain tonic). The major phytoconstituents found in Clitoria ternatea are the pentacyclic triterpenoids such as taraxerol and taraxerone, ternatins, alkaloids, flavonoids, saponins, tannins, carbohydrates, proteins, resins and starch. Clitoria ternatea has been evaluated for its medicinal properties and shows promising effects as having antioxidant, antidiabetic and hepatoprotective activities.

KEYWORDS: *Antidiabetic, Antioxidant, Hepatoprotective and Clitoria ternatea.*

INTRODUCTION

Clitoria ternatea commonly known as Butterfly pea belonging to the family Fabaceae and sub-family Papilionaceae is a perennial leguminous twiner. *Clitoria* Linn. comprises 60 species distributed mostly within the tropical belt with a few species found in temperate areas. The mostly frequently reported species is *Clitoria ternatea*. The plant is mainly used as a forage as it is highly palatable for live-stock and it is well adapted to various climates. Native to the island of Ternate in the Molluca archipelago, this species is now widely grown as ornamental, fodder or medicinal plant. The plant originated from tropical Asia and later was distributed widely in South and Central America, East and West Indies, China and India, where it has become naturalized. *Clitoria ternatea* is commonly also called Clitoria, blue-pea, kordofan pea (Sudan), cunha (Brazil or pokindong (Philippines). This plant is known as Aparajit (Hindi), Aparajita (Bengali), and Kokkattan (Tamil) in Indian traditional medicine. It has several synonyms in Ayurvedic scriptures like: Sanskrit names: Aparajita, Girikarnu, Asphota and Vishnukranta. English names: Butter-fly pea, Mazerion and Winged leaved Clitoria. Local names: Aparajita (Hin), Aparajita (Beng), Gorani (Guj), Gokarna (Mar) and Buzrula (Arabic).

The juice of flowers is reported to be used in insect bites and skin diseases. The roots are useful in asthma, burning sensation, ascites, inflammation, leucoderma, leprosy, hemicrania, amentia, pulmonary tuberculosis, ophthalmology and reported as bitter, refrigerant, ophthalmic, laxative, diuretic, cathartic, aphrodisiac, tonic. Consequently they are used in the treatment of a number of ailments including body-aches, infections, urinogenital disorders and as antihelmintic and antidote to

animal stings. Seeds are cathartic and useful in visceralgia. They are considered safe for colic, dropsy and enlargement of abdominal viscera. The root, stem and flower are recommended for the treatment of snakebite and scorpion sting in India.

DISCUSSION:

From ancient times "Shankhpushpi" is known as reputed drug of Ayurveda and reported as a brain tonic, nervine tonic and laxative. It is considered as a "Medhya- Rasayana" in Ayurvedic texts. It comprises of entire herb with following botanicals viz. *Convolvulus pluricaulis* (Convolvulaceae), *Evolvulus alsinoides* (Convolvulaceae), *Clitoria ternatea* (Papilionaceae) and *Conscora decusata* (Gentianaceae). It is an Ayurvedic drug used for its action on the CNS (Central Nervous System), especially for boosting memory and improving intellect. The flowers of the plant *Clitoria ternatea* resemble a conch shell; therefore it is commonly called "Shankpushpi" in the Sanskrit language where it is reported to be a good "Medhya" (brain tonic) drug and, therefore, used in the treatment of "Masasika Roga" (mental illness). Extracts of this plant have been used as an ingredient in Medhya- Rasayana, are juvenating recipe used for treatment of neurological disorders.

PHYTOCONSTITUENTS:

Roots, seeds and leaves are the reported plant part used from ancient times. The major phytoconstituents found in *Clitoria ternatea* arethe pentacyclic triterpenoids such as taraxerol and taraxerone. Phytochemical screening of the roots shows the presence of ternatins, alkaloids, flavonoids, saponins, tannins, carbohydrates, proteins, resins, starch, taraxerol and taraxerone. A new simple, sensitive, selective and precise High Performance Thin Layer Chromatography method has been developed for the determination of taraxerol in *Clitoria ternatea* Linn. which was being performed on Thin Layer Chromatography aluminium plates. A wide range of secondary metabolites including triterpenoids, flavonol glycosides, anthocyanins and steroids has been isolated from *Clitoria ternatea* Linn..

ANTIOXIDANT POTENTIAL OF *CLITORIA TERNATEA:*

Antioxidants act as radical scavengers, inhibit lipid peroxidation and other free radical-mediated processes, and therefore they protect the human body from several diseases attributed to the reactions of radicals. Various phenolic antioxidants such as flavonoids, tannins, coumarins, xanthenes and, more recently, procyanidins have been shown to scavenge radicals in a dose-dependent manner and therefore are viewed as promising therapeutic drugs for free radical pathologies. Phenolic compounds are a large and diverse group of phytochemicals, which includes many different families of aromatic secondary metabolites in plants. They are known to exert various physiological effects in humans, such as inhibiting platelet aggregation, reducing the risk of coronary heart disease and cancer and preventing oxidative damage of lipid and low-density lipoprotein. Phenolic compounds have strong in vitro and in vivo antioxidant activities associated with their ability to scavenge free radicals, break radical chain reactions and chelate metals.

The antioxidant properties of *Clitoria ternatea* has also being assayed by using the free radical scavengers Feric reducing power assay, super oxide dismutase, Di phenyl picryl hydrazyl and total poly phenols. The study showed that methanolic extract showed good antioxidant activity than hexane and chloroform extracts. The antioxidant activities of the ethanol extract of *Clitoria ternatea* on acetaminophen induced toxicity in rats suggest that the ethanol extract of *Clitoria ternatea* can prevent renal damage from APAP (Acetaminophen) induced nephrotoxicity in rats and it is likely to be mediated through active phytoconstituents and its antioxidant activities. Acetaminophen (APAP) is a widely used analgesic and antipyretic drug that is safely employed for a wide range of treatments.

ANTI-DIABETIC POTENTIAL OF *CLITORIA TERNATEA:*

Diabetes mellitus is a syndrome characterized by chronic hyperglycemia and disturbances of carbohydrate, fat and protein metabolism associated with absolute or relative deficiency in insulin

secretion or insulin action. Diabetes mellitus is also associated with an increased risk for developing premature atherosclerosis due to independent risk factors such as hypertriglyceridemia and hypertension. Insulin therapy and oral hypoglycemic agents offer effective glycemic control; yet, their shortcomings limit their usage. The world health organization has also recommended the evaluation of the effectiveness of plants in conditions where we lack safe modern drugs. Phytochemicals isolated from plant sources are used for the prevention and treatment of cancer, heart disease, diabetes mellitus and high blood pressure. Plants are reputed in the indigenous systems of medicine for the treatment of various diseases, the available literature shows that there are more than 800 plant species showing hypoglycemic activity and *Clitoria ternatea* is one of them.

Chronic administration of plant extracts (100mg/kg) for 14 days reduces the blood glucose level of the diabetes induced animals (Wistar Albino rats) as compared to diabetic control group. There was significant decrease in the blood glucose level in the 7th and 14th days of the diabetes induction, showing antidiabetic effect. The effect was comparable to that of standard antidiabetic drug Glibenclamide. Hyperglycemia was induced by intra peritoneal injection of freshly prepared aqueous solution of alloxan monohydrate. Extensive damage to the islets of langerhans and reduced dimensions of islets were found in control animals. Restoration of normal cellular populatation and size of islets with hyperplasia were seen in extract treated groups. The partial restoration of normal cellular population and enlarged size of β-cells with hyperplasia were indicative of the antidiabetic potential of the plant. Aqueous extracts of *Clitoria ternatea* plant showed anti-hyperglycemic activity in streptozotocin treated rats and this effect is because of increase in glucose uptake and glycogen deposition in isolated rat hemi diaphragm. *Clitoria ternatea* leaf and flower extracts exhibit antihyperglycaemic effect in rats with alloxan-induced diabetes mellitus. The effect of orally administered aqueous extracts (400 mg/kg body weight) of *Clitoria ternatea* leaves and flowers on serum glucose, glycosylated hemoglobin, and insulin were examined in control and extract-treated diabetic rats. The aqueous extracts of *Clitoria ternatea* leaves and flowers significantly reduced serum glucose, glycosylated hemoglobin and the activities of gluconeogenic enzyme, glucose-6- phosphatase, but increased serum insulin, liver and skeletal muscle glycogen and the activity of the glycolytic enzyme, glucokinase. For all the biochemical tests performed, the leaf extract-treated rat showed essentially the same profile as those treated with the flower extract.

HEPATOPROTECTIVE POTENTIAL OF *CLITORIA TERNATEA:*

Despite remarkable advances in modern medicine, hepatic disease remains a worldwide health problem, thus the search for new medicines is still ongoing. Hepatic cells participate in a variety of metabolic activities; therefore the development of liver protective agents is of paramount importance in the protection from liver damage. The literature has constantly shown that hepatoprotective effects are associated with plant extracts rich in antioxidants. Many compounds and extracts from plants have thus been evaluated for hepatoprotective and antioxidant effects against chemically-induced liver damage. Many studies have been done on the hepatoprotective activity of *Clitoria ternatea.*

CONCLUSION:

The scientific research on *Clitoria ternatea* suggests a huge antioxidant, antidiabetic and hepatoprotective potential of this plant. The plant is a rich source of phytochemicals, with high levels of phenolic compounds and antioxidant activities. The study also indicates that the leaf and flower extracts of *Clitoria ternatea* have a hypoglycaemic effect. The extracts were effective in regulating the biochemical indices associated with diabetes mellitus. *Clitoria ternatea* possesses strong hepatoprotective potential. The hepatoprotective activity of *Clitoria ternatea* leaf may be due to its free radical-scavenging and antioxidant activity, resulting from the presence of some phenolic compounds in the extracts. Further studies are in progress to better understand the mechanism of action of *Clitoria ternatea* responsible for the observed hepatoprotective and antioxidant activity. The organic and aqueous extracts of *Clitoria ternatea* could be further exploited in the future as a source of useful phytochemicals compounds for the pharmaceutical industry and the antioxidant mechanisms and the

anti- Proliferative properties of the extracts should be further studied to gain more application for use as natural antioxidants.

REFERENCES :

- Agrawal, P., Deshmukh, S., Al,i A., Patil, S., Magdum, C.,S., Mohite, S., K. and Nandgude, T., D., Wild Flowers as Medicines, International Journal of Green Pharmacy, 1(1): 12, (2007).
- Barik, D., P., Naik, S., K., Mudgal, A., Chand, P.,K., Rapid plant regeneration through *in vitro* axillary shoot proliferation of butter-fly pea (*Clitoria ternatea* L.) – a twinning legume, In Vitro Cell.Dev.Biol.-Plant, 43 : 144-148, (2007).
- Choi, J.,H.; Choi, C.,Y.; Lee, K.,J.; Hwang, Y.,P.; Chung, Y.,C.; Jeong, H.,G., Hepatoprotective effects of an anthocyanin fraction from purple-fleshed sweet potato against acetaminophen-induced liver damage in mice. J. Med. Food. 12: 320-326, (2009).
- Daisy, P. and Rajathi, M., Hypoglycemic Effects of *Clitoria ternatea* Linn. (Fabaceae) in Alloxan-induced Diabetes in Rats. Tropical Journal of Pharmaceutical Research, 8 (5): 393-398, (2009).
- Gomez, S., M., Kalamani, A., Butter-fly Pea (*Clitoria ternatea*): A Nutritive Multipurpose Forage Legume for the Tropics- An Overview, Pakistan Journal of Nutrition, 2 (6): 374-379, (2003).
- Gunjam M., Ravindran, M., Sengamalam, R., Goutam, K., J., Jha, A., K., Pharmacognostic and antidiabetic study of *Clitoria ternatea.* International Journal of Phytomedicine 2: 373-378, (2010).
- Jain, N., N., Ohal, C., C., Shroff, S., K., Bhutada, R., H., Somani, R., S., Kasture, V., S., Kasture, S., B., *Clitoria ternatea* and the CNS, Pharmacology, Biochemistry and Behaviour, 75, 529-536, (2003).
- Jain R., A., Shukla S., H., and. Saluja A., K., Invitro evaluation of Clitoria ternatea stem extract for antioxidant property. IJPSR, Vol. 1 (12): 88-94, (2010).
- Jayachitra, A., and Padma, P., R., Antioxidant potential of Clitoria ternatea leaf extracts in vitro. Int J Pharm Bio Sci; 3(4): 753 – 763, (2012).
- Kaisoon, O., Siriamornpun, S., Weerapreeyakul, N., and Meeso, N., Phenolic compounds and antioxidant activities of edible flowers from Thailand. Journal of functional foods 3: 88-99, (2011).
- Kavitha, R., and Premalakshmi, V., Studies on the Synergetic Effect of *Trichosanthes dioica* and *Clitoria ternatea* Leaf Extract on the Streptozotocin-Induced Diabetic Rats. International Journal of Research in Pharmaceutical and Biomedical Sciences, 3 (3): 1056-1064, (2012).
- Kazuma, K., Noda, N., Suzuki, M., Malonylated flavonol glycosides from the petals of *Clitoria ternatea*, Phytochemistry, 62 :229-237, (2003).
- Kumar, V., Mukherjee, K. , Kumar, S., Mal, M., Mukherjee, P., K., Validation of HPTLC Method for the Analysis of Taraxerol in *Clitoria ternatea*, Phytochemical Analysis, 19: 244-250, (2008).
- Madhavarao, B., Sabithadevi, K., Vinnakoti, *In -vitro* antimicrobial and free radical scavenger assay of two medicinal plants *Clitoria ternatea* and *Cardiospermum halicacabum,* International Journal of Chemical and Analytical Science. 2(11): 1253-1255, (2011).
- Mathada, R., V., Jevoor, P., R., Ravishankar, R., Effect of Clitoria ternatea Linn. Root extract on the hippocampal area Ca3 and pancreas of juvenile diabetic rats- A preliminary investigation. Spatula DD, 2(1): 9-16, (2012).
- Mukherjee, P., K, Kuma,r V., Kumar, N., S., Heinrich, M., The Ayurvedic medicine *Clitoria ternatea*-From traditional use to scientific assessment, Journal of Ethnopharmacology, 120 :291-301, (2008).
- Nithianantham, K., Shyamala, M., Chen, Y., Yoga Latha, L. Subramanion, L., J. and Sreenivasan , S., Hepatoprotective Potential of *Clitoria ternatea* Leaf Extract Against Paracetamol Induced Damage in Mice. Molecules, 16: 10134-10145, **(**2011).
- Parimaladevi, B., Boominathan, R., Mandal, S., C., Anti-inflammatory, analgesic and anti-pyretic properties of *Clitoria ternatea* root, Fitoterapia 74: 345-349, **(**2003).
- Patil, A., P., and Patil, V., R., Comparative Evaluation of *in vitro* Antioxidant Activity of Root of Blue and White Flowered Varieties of *Clitoria ternatea* Linn. International Journal of Pharmacology, 7: 485-491, (2011).

- Rabeta, M. S. and An Nabil, Z., Total phenolic compounds and scavenging activity in *Clitoria ternatea* and *Vitex negundo* linn. International Food Research Journal 20(1): 495-500, (2013**).**
- Ramaswami, V., Varghese, N., Simon, A., An investigation on cytotoxic and antioxidant properties of Clitoria ternatea L. International Journal of Drug Discovery. 3(1) : 74-77, (2011).
- Sarumathy, K., Dhana Rajan M. S., Vijay,T., Jayakanthi J., Evaluation of phytoconstituents, nephro-protective and antioxidant activities of *Clitoria ternatea.* Journal of Applied Pharmaceutical Science 01 (05): 164-172, (2011).
- Somania, R., Vadnala, P., Deshmukhb, S., Patwardhana, S., Hepatoprotective activity of *Clitoria ternatea* L. leaves against carbon tetrachloride induced hepatic damage in rats. Journal of Pharmacy Research, 4(10): 3540-3544, (2011).
- Uma, B., Prabhaka, K., Rajendran, S., Phytochemical Analysis and AntiMicrobial Activity of *Clitoria ternatea* Linn against Extended Spectrum Beta Lactamase Producing Enteric and Urinary Pathogens, Asian Journal of Pharmaceutical and Clinical Research, 2(4): 94- 96, (2009).

Dr. Prakash Chandra Patel
Department of Botany, Govt. College Jaisinghnagar, Shahdol (M.P.).