Pharmacognostical aspects of *Clitoria ternatea*, an indigenous herb

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ABSTRACT

The present paper deals with phytochemical studies in *Clitoria ternatea* Linn.. It is commonly known as 'butterfly pea' and “shankhapushpi”. It is a traditional Ayurvedic medicinal plant belonging to the family Fabaceae. The plant extracts were subjected to phytochemical analysis for screening of medicinal constituents. Valuable data has been collected pertaining to the presence of various phytochemicals like Alkaloids, Tannins, Glycosides, Resins, Steroids, Saponins, Flavonoids and Phenols. Further, quantitative estimation of total Flavonoids, Saponins and Phenols was also carried out which has provided information regarding the medicinal potential of the plant.

Key words: *Clitoria ternatea*, phytochemical analysis, qualitative analysis, quantitative analysis.

INTRODUCTION

Stress is known to induce alterations in various physiological responses, leading to a pathological state. Stress causes disturbance in the body’s normal physiological equilibrium and results in threatened homeostasis. Every human

today faces stressful situations in day-to-day life and overstress has been postulated to be involved in the pathogenesis of a variety of diseases,such as depression and anxiety, cognitive dysfunction, immune-suppression, endocrine disorder including diabetes mellitus, male sexual dysfunction, peptic ulcers, hypertension and ulcerative colitis. There is an increasing evidence that severe stress affects cognitive functions and leads to the pathogenesis of various neurodegenerative disorders such as Alzheimer's disease, Parkinson's disease and aging. Alzheimer's disease is the most common cause of progressive loss of memory and dementia in the elderly. In 2006, the worldwide prevalence of Alzheimer's disease was 26.6 million and by 2050, it has been projected to quadruple.

Literature also indicates that the role of free radicals in the pathogenesis of cancer, aging, Alzheimer's disease, diabetes and the compounds having capacity to scavenge these free radicals has great potential in mitigation of these disorders. Antioxidant based drugs and formulations for the prevention and treatment of Alzheimer's disease have appeared during last three decades. *Clitoria ternatea* Linn, belonging to the family Fabaceae, is a perennial twining herb found in India, China, Philippines and Madagascar. This plant is known as Aparajit (Hindi), Aparajita (Bengali), Kakkattan (Tamil), and Dintena (Telugu) in Indian traditional medicine. Roots, seeds and leaves of *Clitoria ternatea* are commonly used in the Ayurvedic system of medicine.

The roots have laxative, diuretic, anthelmintic,intellect promoting, anti-inflammatory properties and they are useful in severe bronchitis, asthma and dementia, hemicrania, burning sensation, leprosy, inflammation, leucoderma, pulmonarytuberculosis, ascites and hectic fever .The various activities of methanolic extract of *Clitoria ternatea* on CNS were reported .The preliminary phytochemical screening of the roots revealed the presence of alkaloids, glycosides, flavanoids, resins, saponins, phenols, triterpenes, proteins & carbohydrates.Till now there is no scientific work is reported on protective effect of Clitoria ternatea against oxidative stress induced brain

damage, hence we carried out this scientific study [1].

Plant profile:

Synonyms:

Clitoria albiflora Mattei, *Clitoria bracteata* Poir., *Clitoria mearnsii* De Wild., *Clitoria tanganicensis* Micheli, *Clitoria zanzibarensis* Vatke. **Taxonomic classification: Kingdom**: Plantae; **Subkingdom**: Viridaeplanta; **Infrakingdom**: Streptophyta; **Division**: Tracheophyta; **Subdivision**: Spermatophytina; **Infrodivision**: Angiospermae; **Class**: Magnoliopsida; **Superorder**: Rosanae; **Order**: Fabales; **Family**: Fabaceae; **Genus**: Clitoria L.; **Species**: *Clitoria ternatea*.

Common names:

Arabic: Mazerion Hidi, Baslat el-Zuhoor; **Bengali** : Aparajita, **Chinese:** die dou**; English:** blue-pea, bluebellvine, butterfly-pea, cordofan-pea, Darwin-pea**; French:** honte**; German:** blaue Klitorie**; Hindi** : Aparajita, **Portuguese:** clitória-azul, clitória; **Punjabi**: Koyal; **Sanskrit**: Girikarnika, Vishnukranta; **Spanish:** conchitas papito, azulejo, zapatico de la reina, zapotillo; **Swedish:** himmelsärt; **Tamil**: Kakkanam and **Telugu** : Dintena.

Distribution:

The plant originated from tropical Asia and later was distributed widely to **Africa**: (Chad, Djibouti, Ethiopia, Somalia, Sudan, Sudan, Kenya, Tanzania, Uganda, Burundi, Cameroon, Gabon, Sao Tome, Zaire, Benin, Cote D'Ivoire; Gambia, Ghana, Guinea, Guinea-Bissau, Niger, Nigeria, Senegal, Sierra Leone, Togo, Angola, Malawi, Mozambique, Zambia, Zimbabwe and South Africa; **Asia:** Madagascar**,** Saudi Arabia, Yemen, Iran, Iraq, China Taiwan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, India, Maldives, Cambodia, Laos; Myanmar, Thailand, Vietnam, Indonesia, Malaysia, Philippines and Singapore; **Australia**; **North America:** USA and Mexico; **Northwestern Pacific:** Guam, Northern Mariana Islands, Palau, **South-Central Pacific:** French Polynesia - Society Islands; **Southwestern Pacific:** Fiji, New Caledonia, Samoa, Solomon Islands, **Southern America:** Antigua, Barbuda, Aruba, Bahamas, Barbados, Cayman Islands, Cuba, Dominica, Dominican Republic, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Netherlands

Antilles, Puerto Rico, St. Kitts and Nevis, St. Vincent and Grenadines, Virgin Islands (British), Virgin Islands (U.S.), French Guiana, Suriname, Venezuela, Brazil, Bolivia, Colombia, Ecuador - Galapagos Islands, Peru, Paraguay and Uruguay [2]

Description:

Perennial climbing or trailing herb, growing from a woody rootstock. Leaves imparipinnate with 2-4 pairs of leaflets and a terminal leaflet. Leaflets ovate to elliptic-oblong, up to 6.5 × 4 cm, mostly hairless above, pubescent below. Flowers axillary, solitary or 2 together, resupinate, large and showy, bright blue. Pod linear-oblong, 6-13 cm long, flattened, mucronate at the apex, hairless or finely pubescent.

Traditional uses: Root was used for the treatment of ascetics, enlargement of the abdominal viscera, sore throat and skin diseases. They were also used as purgative, but because, they cause griping and tenderness, they were not recommended. Root was administered with honey and ghee as a general tonic to children for improving mental faculties, muscular strength and complexion tonics. Roots were also used in epilepsy and insanity. Seeds and leaves were widely used as a brain tonic and to promote memory and intelligence. Juice and flowers were used as an antidote for snake bite. Seeds were used in swollen joints, crushed seeds are taken with cold or boiled water for urinary problems.**Plant parts used:** Leaves, seeds, bark, fruits, sprouts and stems were used medicinally [3].

Pharmacological activity:

Nootropic activity: *Clitoria ternatea*, a traditional Ayurvedic medicine, has been used for centuries for neurological disorders. Taranalli and Cheeramkuzhy evaluated the influence of CT extracts on memory and central cholinergic activity in rats .The memory in rats was screened by using passive avoidance test. The results of this study indicate that the extract of aerial parts showed 66.66% memory retention in electroshocked rats at the dose of 300 mg/kg, p.o. The extract of aerial part of CT (300 mg/kg, p.o.) significantly increased the acetylcholine (ACh) content in whole rat's brain whereas acetylcholinesterase (AChE) activity was increased in cortex and

midbrain but there was no significant change in medulla oblongata and cerebellum. The aerial extract of CT at the dose of 500 mg/kg showed only 50% memory retention without affecting the cholinergic markers as compared to normal rats. The extract of CT root exhibited equal memory retention in electroshocked rats at doses of 300 mg/kg and 500 mg/kg, p.o as compared to electroshocked control rats. The extract of CT root (300 mg/kg, p.o) also significantly increased Ach content. The AChE activity in midbrain and medulla oblongata was decreased but decrease in AChE activity was not significant. There was no change in the AChE activity in cerebral cortex and cerebellum. The root extract of CT at dose of 500 mg/kg, p.o. significantly increased the ACh content in whole rat's brain. It was found that root extract of CT at a dose of 500 mg/kg caused significant increase in AChE activity in cerebral cortex whereas in medulla oblongata, AChE activity was significantly decreased. Slightly decrease in AChE activity in midbrain and no change in AChE activity in cerebellum was observed at a dose of 500 mg/kg of root extract of CT. The results of this study suggest that roots of CT were found more beneficial in attenuating memory deficits as compared to aerials parts. The cathartic effect of root extract of CT was observed in mice.

Anti-anxiety effect: CT exhibited a weak anti-anxiety in the elevated plus maze and light/dark exploration test. The methanolic extract of CT has shown the dose (100-400 mg/kg, p.o) dependant anti-anxiety effect in mice when administered 60 min before the test. The oral administration of CT (100-400 mg/kg) dose dependently increased the time spent in the open arm. In light/dark exploration test higher doses of CT (100, 200 and 400 mg/kg, p.o) increased the time spent in the lit box. The duration of time spent in dark box decreased in dose dependant manner [4].

Anti histaminic activity:

Clonidine, a α2 adrenoreceptor agonist induces dose dependent catalepsy in mice, which was inhibited by histamine H1 receptor antagonists but not by H2 receptor antagonist. Clonidine releases histamine from mast cells which is responsible for diff erent asthmatic

conditions. Catalepsy produced by clonidine is mediated by histamine via H1 receptors. In present study it was found that Chlorpheniramine maleate (10 mg/kg, i.p.) and ECTR at doses (100, 125 and 150 mg/kg i.p) inhibit catalepsy in dose dependent manner. Dhanalakshmi et al., (2004) showed that extracts having antihistaminic or mast cell stabilizing eff ect inhibit clonidine-induced catalepsy . Haloperidol, a non-selective D2 dopamine antagonist induces catalepsy is primarily due to blockade of dopamine receptors in the straiatum. Th e agents increasing dopamine transmission inhibits haloperidol-induced catalepsy. An antihistaminic drug chlorpheniramine maleate and ECTR fail to inhibit haloperidol induced catalepsy. It indicate that haloperidol induced catalepsy is not mediated by histamine release as antihistaminic drug does not inhibit catalepsy but clonidine induces catalepsy by the release of histamine as it is inhibited by antihistaminic drug. Some plants were investigated for antihistaminic activity inhibit clonidine induced catalepsy in mice *Allium sativum* and *Terminalia belerica* ,*Clerodendrum serratum*, *Tamarindus Indica* , *Clitoria ternatea*, *Ficus bengalensis* etc. Present study concluded that the drugs having antihistaminic potential inhibit clonidine induced catalepsy, so ethanol extract of *Clitoria ternatea* roots possesses antihistaminic activity. Future scope of present investigation is isolate active phytoconstituents which is responsible for antihistaminic activity[5].

CONCLUSION

It is concluded that *Clitoria ternatea* is a plant with a variety of ethnic medicinal uses. The qualitative analysis of *Clitoria ternatea* shows the presence of bioactive compounds such as Alkaloids, Tannins, Glycosides, Resins,Steroids, Saponins, Flavonoids and Phenols. The quantitative estimation of total Saponins, Flavonoids and Phenols in roots and of Flavonoids in shoots, flowers and seeds is also reported which is very important for the pharmaceutical industry. This is valuable information for preparation of drugs in pharmaceutical industry and stress the need for more intensive research in this medicinal plant since the compounds play a great role in healthcare.

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