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EVALUATION OF ANTI-DEPRESSANT ACTIVITY OF ETHANOLIC EXTRACT OF GLIRICIDIA SEPIUM LEAVES IN MICE

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ABSTRACT

Medicinal plants serves as vital source of developing effective therapy to prevent a variety of CNS problems. Depression is prevalent psychiatric disorder which affects most of the population in this decade. The active components like flavonoids, alkaloids, saponins, amines, carbohydrates, terpenes and terpenoids are found to possess antidepressant activity. *Gliricidia sepium* is one of the important plants in the medicinal field because it serves as a reservoir for potent bioactive compounds and known for numerous activities. The phytochemical constituents present in them helps to assume that this plant may have anti-depressant action. So the current study is focusing on evaluation of antidepressant activity of *Gliricidia sepium* leaves belonging to the family fabaceae, by using the animal mice.

KEYWORDS: *Gliricidia sepium*, Fabaceae, Phytochemical constituent, Anti-depressant.

NEED FOR THE STUDY

Depression is neuropathic disorder associated with many behavioural and psychological changes like low mood, diminished interest or pleasure, weight loss or gain, changes in appetite, insomnia, psychomotor retardation.[1] Depression disorder is a prevalent psychiatric disorder which affects 21% of the population. During the last decade, there is growing interest in therapeutic effects of natural products on mental disorders.[2]

According to the World Health Organization report, mood disorders are the second leading cause worldwide of disability adjusted life years and the leading cause of years lived with disability in all ages. Each drug used used to treat has a success rate of about 60%.[3]

Most therapies require several weeks of treatment for improvement of signs and symptoms is observed and there are numerous side effects caused by antidepressants. Thus, high prevalence of depression and the fact that do not respond well to any currently marketed antidepressants support the need for new therapeutics to treat depression. Numerous antidepressant compounds are now available acting via different mechanisms including seratonergic, noradrenergic and dopaminergic systems. Medical plant therapies may be effective alternatives in the treatment of depression and has progressed significantly in the past decade.[4]

Medicinal plants serves as a vital source of potentially useful agents for developing effective therapy to prevent a variety of CNS problems. A variety of medicinal plants and plant extracts have been reported for their anti-depressant activity. Medicinal herbs contain mixture of active components or phytochemicals like flavonoids, alkaloids, saponins, amines, carbohydrates, terpenes and terpenoids which is found to possess antidepressant activity.[5]

Therefore, the present work aimed to evaluate firstly the antidepressant-like effect of the ethanolic extract of *Gliricidia sepium* in the models predictive of antidepressant action because it has the phytochemical constituents responsible for the antidepressant effect. The plant is the topic of much research due to its numerous traditional applications.

CRITERIA FOR SELECTION OF THE PLANT

Gliricidia sepium is an adaptable, fast growing, nitrogen-fixing tree belongs to the family Fabaceae. It is a tree with the ability to disperse seeds upto 40m from the parent tree from exploding pods.[6] The plant have many medicinal uses discovered over time like cytotoxic activity, anti-microbial, anti-inflammatory, antioxidant, thrombolytic, antisickling, wound healing, mosquitocidal and antihelmintic activity.[7]

Fourty two plants contain many active compounds such as alkaloids, flavonoids, cardiac glycosides, steroids, tannins, carbohydrates and proteins. 42 known compounds are found in the leaves and flowers of *G.sepium*. Presence of these phytochemical constituents makes this feasible to investigate the antidepressant activity. Secondary metabolites play a major role in treatment of diseases.[8] The present study is designed to evaluate the anti-depressant activity of ethanolic extract of *Glicricidia sepium* in mice using imipramine as the standard drug.

Taxonomical classification[9]	
Kingdom	Plantae
Division	Speramtophyta
Subdivision	Angiospermae
Class	Dicotyledonae
Order	Fabales
Family	Fabaceae
Subfamily	Faboideae
Genus	Gliricidia
Species	Gliricidia sepium

CHEMICAL CONSTITUENTS

Gliricidia sepium serves as a reservoir for potent bioactive compounds such as saponins, flavonoids like astragaline, robinine, trifoline, essential oils like coumarins, hydroquinone, myrtenol, maltol. Various phytochemicals like flavones, chalcones, coumarin, o-coumaric acid, melitolic acid, ceryl alcohol, kaempherol glycosides, hydrocarbons, quercetin glycosides, hydrocarbons, quercetin glycosides, canavanin, triterpinoid saponins and rotenoids from various parts of this plant have been isolated and characterized.[10]

The major compounds of the leaf oil are found to be propyleneglycol, coumarin, beta-farnesene, hexenol.

Vernacular names or Common names[11]	
English	Mother of cocoa spotted
Hindi	Saranga
Kannada	Gobbaradgidda
Tamil	Seemai agathi
Telugu	Madri
Malayalam	Siima konna

REVIEW OF LITERATURE

1. C. Morales Cifuentas, M.P Gomez-Serranillos _et al demonstrated that different extracts of aerial parts of plants like *Gliricidia sepium, T. procumbens, N. lobata, B. crassifolia and* possess neuropharmacological activity such as decrease in motor activity, back tonus,

parpebral ptosis, catalepsy and strong hypothermia. These extracts were assayed for effects on CNS and they caused to have significant reductions in spontaneous locomotor activity, exploratory behavior; Neuropharmcological profile of ethnomedicinal plants of Guatemala; Journal of Ethnopharmacolgy, August 2001; 76(3): 223-228.

2. Roodabeh Bahramsoltani, Mohammed Hosein Farzaei et_al claimed that plant metabolites from different categories including polyphenols (flavonoids, phenolic acids, lignans, coumarins), alkaloids, terpenes and terpenoids, saponins and sapogenins, amines and carbohydrates were found to possess antidepressant activity; Phytochemical constituents as a future antidepressants: a comprehensive review; National Library of Medicine, 2015; 26(6): 699-719.

3. B. S Ashok Kumar, K Lakshman et_al screened the antidepressant activity of methanolic extract of *Amaranthus spinosus* by using forced swimming test and Tail suspension test models. Escitalopram and Imipramine is used as standard; Antidepressant activity of methanolic extract of *Amaranthus spinosus*; National Library of Medicine, 2014; 5(1): 11-17.

4. Taofeeq Oduola, Abdulahi Abubakar Ngaski et_al performed the extraction of *Gliricidia sepium* by maceration technique using 80% methanol; Journal of Pharmacognosy and Phytochemistry, 2018; 7(4): 2436-2441.

5. Dubal R.S, Kamble K.J et_al performed the he plant leaf extraction in soxhlet apparatus with 200ml of each of following solvents, ethanol, acetone and distilled water; Phytochemical analysis of leaf extracts of *Gliricidia sepium;* Journalijcar.org, 2020; 9(12):(B); 23475-23476.

6. Uma Bhosale, Ph.D, Radha Yegnanarayan et_al monitored the locomotor behavior using actophotometer and decreased activity score was taken as an index of CNS depression; Study of CNS depressant and behavioural activity of ethanol extract of Achyranthes aspera in mouse model; Annals of Neurosciences, January 2011.

MATERIALS AND METHODS

Source of data

The source of data are

1. Books and Journals
2. Literature survey
3. Laboratory equipments
4. Laboratory experiments on animals
5. J-Gate@Helinet(RGUHS)

Method of collection of data

- The normal healthy mice (18-35g) of either sex will be procured from central animal house of Karavali college of pharmacy.
- Standard drug imipramine will be procured from reputed manufacturer.
- *Gliricidia sepium* leaves will be procured from our native place.
- All other laboratory grade chemicals will be procured from standard companies and laboratory of the college.

The study will be conducted on normal healthy mice and work will be designed in following steps.

- Treatment wil be given in higher and lower dose of *Gliricidia sepium.* The effect of different treatments will be evaluated against imipramine[12] treated and normal group mice.

Extraction

Fresh leaves of *Gliricidia sepium* will be collected and air dried at room temperature over a period of six weeks. The dried leaves will be ground. One gram of the ground plant material will be soaked in 5ml of ethanol for 24hours on a mixer to ensure maximum extraction by maceration technique at room temperature. This will be followed by periodic stirring. Resulting crude extract will be filtered using whatman filter paper and the filtrate to be concentrated in an oven at 40^0C to obtain crude extract.[12]

Dose Selection

Dose will be selected from previous research work done which is 250mg/kg and 500mg/kg.

METHODS FOR ANTIDEPRESSANT ACTIVITY

Three screening methods will be used such as.

1. Forced swimming test.
2. Tail suspension test.
3. By using actophotometer.

The mice of either sex weighing between 20-36g were divided into 4 groups with each containing 3 mice, animals will be fasted overnight prior to the test but water will be supplied ad libitum.

Group 1: will receive Control, Normal saline 2ml/kg orally.

Group 2: will receive Standard, Imipramine 10mg/kg orally.

Group 3: will receive Test dose 1 - ethanolic extract of *Gliricidia sepium* leaf extracts extracts 250mg/kg orally.

Group 4: will receive Test dose 2 - ethanolic extract of *Gliricidia sepium* leaf extracts 500mg/kg orally.

FORCED SWIMMING TEST (FST)

Mice will be individually forced to swim in an open cylindrical container (diameter 10cm, height 25cm) containing 19cm of water 25±1^{0}C. Treatment to be given 60min prior to the study. All animals will be forced to swim for 6min and duration of immobility will be observed and measured during the final 4min interval of the test. Each mouse will be judged to be immobile when it ceases struggling and remain floating motionless in the water and make the movement only to keep the head above water.

Evaluation

A reduction in the duration of immobility will be an indicative of an antidepressant like effect.

TAIL SUSPENSION TEST (TST)

Treatment will be given prior to the study. Mice will be suspended on the edge of the table 50cm above the floor with the help of adhesive tape placed approximately 1cm from the tip of the tail. The total duration of immobility induced by tail suspension to be recorded during 6min period. Animal will be considered to be immobile when it does not show any movement of the body, hanged passively and completely motionless.[13]

Evaluation

A reduction in the duration of immobility will be an indicative of an antidepressant like effect.

BY USING ACTOPHOTOMETER

Actophotometer provided digital counter, photocell and light source will be used to measure locomotor activity (horizontal movement) of animals. Each animal will be placed in actophotometer for 5 minutes and basal activity score will be recorded. Each group of animals will be treated with control, test and standard drug and activity score will be recorded after min and 1 hour.[14]

Evaluation

A decreased activity score will be taken as an index of CNS depression.

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