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THE EVALUATION OF CNS STIMULANT ACTIVITY OF *MELOCHIA CORCHORIFOLIA* LEAF EXTRACT BY USING DIFFERENT ANIMAL MODELS

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ABSTRACT

The aim of the present study was designed to evaluate the CNS Stimulant activities of *Melochia corchorifolia* using different animal models. CNS stimulant activity was tested using various methods like Photo-actophotometer, Rotarod, Tail Suspension Method. Pharmacological studies have been conducted on the ethanol extracts of *Melochia corchorifolia* L. leaves to evaluate their effects on the central nervous system (CNS). In photoactometer method, *Melochia corchorifolia* (200mg/kg p. o.) has exhibited slight decrease in locomotor activity. In rotarod method, *Melochia corchorifolia* (200mg/kg p.o.) has exhibited slight increase in fall off time, In Tail suspension test *Melochia corchorifolia* (200mg/kg p.o.) has produced significant reduction in immobility period, when compared with that of animals receiving vehicle. Caffeine was used as a standard and diazepam was used as a negative control. The observations suggest that the extract of *Melochia corchorifolia* possesses a potent CNS stimulant activity especially in the case of the ethanolic extract. The experimental results conclude that ethanol extract of leaf of the *Melochia corchorifolia* plant has CNS stimulant activity.

KEYWORDS: *Melochia corchorifolia*, Actophotometer, Rotarod, Tail Suspension Method, Stimulant.

INTRODUCTION

Plants played vital role in man's existence on this earth. Nature has always been standing as a golden mark to improve its best to the phenomenon of symbiosis. Medicinal plants exist on

the earth even before human appears on the earth.[1] Natural products are obtained from plants, microbes or animals and they may be marine or terrestrial origin.

CNS stimulants are the psychoactive drugs which induce temporary improvements in mental and physical function by enhancing the activity of central nervous system (CNS). They provide great benefits for a range of disorders but still they are widely used as illicit substances of abuse.

Melochia corchorifolia (family: Sterculiaceae), In India and Malaysia the *Melochia corchorifolia* roots and leaves are used in dysentery, swelling in abdomen, urinary disorders, and sores[2] and water snake bites.[3]

Phytochemical screening of *Melochia corchorifolia* leaves has revealed the presence of triterpenes (friedelin, friedelinol and β-amyrin), flavonol glycosides (hibifolin, trifolin and melochorin), flavonoids (vitexin and robunin), aliphatic compounds, β-D-glucoside and alkaloids, β-D-sitosterol and its stearate.[4] The cyclopeptide alkaloids franganine, adouetine-y and frangufoline[5] and new cyclopeptide alkaloid and melofoline[6] have been reported earlier from this plant. A pyridine alkaloid, 6-methoxy-3-propenyl-2-pyridine carboxylic acid, may be important as related pyridine derivatives are physiologically active.[7] The plants are folklorically used in Headache, Ulcers, Helminthiasis, Abdominal swellings, Poisonings, Dysentery.[2,3] Pharmacologically the leaf extract has Antioxidant, Anticancer, Diuretic and antiurolithiatic activity, Antibacterial activity and anthelmintic activities.[8,9, 10,11]

The present work was aimed to evaluate the CNS Stimulant activity of *Melochia corchorifolia* leaf extract using various methods on experimental animals.

MATERIALS AND METHODS

Plant material

The fresh leaves of *Melochia corchorifolia* was collected near Surampalem, East Godavari dist, Andhrapradesh. It authenticated and confirmed by Botanist Mr. T.V. Raghava Rao, Lecturer, Department of Botany SRVBSJB Maharanee College, Peddapuram, East Godavari district, Andhra Pradesh.

Preparation of extracts

The *Melochia corchorifolia* leaves were collected near Surampalem, East Godavari district Andhrapradesh India. They were dried, powdered and passed through 40mesh. The obtained

powder weighed 100gram of (*Melochia corchorifolia*) were macerated with ethanol for 3 days, and then filtered. The filtrate was evaporated to obtained constant weight of gummy exudates under reduced pressure at 45°C. The ethanol extract yields 7.5%. The obtained crude extract was stored at 10–15°C.

Experimental Animals

About 30 Albino mice of either sex weighing between 25-35gms are procured from disease free animal house of Aditya College of pharmacy, Surampalem were used for the present study.

Housing

The bedding material is replaced every third day with fresh material to keep the animals clean and dry. Drinking tubes were examined routinely to ensure their proper function.

Experimental Design for CNS stimulant activity

Animals had free access to food and water and maintained under standard laboratory conditions with a natural light and dark cycle. The animals were acclimatized for at least five days before behavioral experiments. The mice were grouped into four groups.

Group I: (Control) group receives only vehicle, 0.1% acacia orally.

Group II: negative control Diazepam (10mg/kg p.o) dissolved in vehicle.

Group III: (Standard) group receives Caffeine (10mg/kg p.o) dissolved in vehicle.

Group IV: (LD) group receives ethanolic extract of *Melochia corchorifolia* (100 mg/kg p.o) dissolved in vehicle.

Group V: (HD) group receives Ethanolic extract of *Melochia corchorifolia* (200 mg/kg p.o) dissolved in vehicle.

1. CNS Stimulant activity using Photoactometer

Photoactometer is a chamber that was used to observe locomotor activity of the mice. Animals were placed in a photoactometer which has continuous beams of lights, criss-crossing the chamber and falling on corresponding photoelectric cell.[12, 13]

The grouped animals were treated with drugs and placed individually in activity cage. The light beams would get interrupted when the mouse crosses them and these interruptions were recorded for a period of 5 minutes. An interval of 30 minutes re-tests each animal for activity scores for 5 minutes.

2. CNS Stimulant activity using Rotarod method

Rota rod apparatus consists of horizontal rod, which rotates about its long axis. The rod was divided into five equal sections by four disks. The animals were pre-selected in a training session based on their ability to remain on the bar for 5 minutes and then allowing five mice to walk on the rod at the ideal speed (20-25rpm) at the same time observed over a period of 10, 20, 30 and 60 minutes.[14]

Intervals between the mounting of the animal on the rotating bar and falling off of it were registered automatically as the performance time. Time spent in the apparatus was observed for 5 minutes duration.

3. CNS Stimulant activity using tail suspension test

The Tail suspension method used in this study was similar to those described by Steru et al.[15] Treatment was given 60 min prior to study as described by study design. Mice were suspended on the edge of the table, 50 cm above the floor, with the help of rope tied approximately 1 cm from the tip of the tail. The total duration of immobility induced by tail suspension was recorded during a 6 min time period. Animal was considered to be immobile when it did not show any movement of the body, hanged passively and completely motionless.

RESULTS

1. CNS Stimulant activity using Photoactometer

Melochia corchorifolia (200mg/kg p. o.) has exhibited slight increase in locomotor activity, when compared with that of animals receiving vehicle. The caffeine treated group, exhibited statistically significant increase in locomotor activity, when compared with control. The results are tabulated in table: 1.

Table no. 1. CNS Stimulant activity using Photoactometer.

Group number	Drug treatment	Dose (mg/kg p.o)	Locomotor activity (30mins)	
			Before	After
I.	Control	-	286.80±1.35	286.06±1.32
II.	Diazepam	4	372± 1.69	144.2±1.58
III.	Caffeine	10	269.14±1.5	314.9±1.7
IV.	Low dose	100	304.96±1.27	341.71±1.5
V.	High dose	200	245±1.74	357±1.86

Values were expressed in mean ± SEM n=6

2. CNS Stimulant activity using Rotarod method

Melochia corchorifolia (100-200mg/kg p.o.) has exhibited slight increase in fall off time, when compared with that of animals receiving vehicle alone. The caffeine treated group, exhibited statistically significant increase in fall off time, when compared with control. The results are tabulated in table: 2.

Table no. 2. CNS Stimulant activity using Rotarod 5 compartment method.

Group number	Drug treatment	Dose (mg/kg p.o)	Fall off time (sec)	
			Before	After
I.	Control	-	121.04±1.26	121.04±1.26
II.	Diazepam	4	127.10±1.56	25.33±1.26
III.	Caffeine	10	124.56±1.98	165.32±0.26
IV.	Low dose	100	125.80±1.32	144.83±0.66
V.	High dose	200	123.57±1.86	155.43±2.02

Values were expressed in mean ± SEM n=6

3. CNS Stimulant activity using tail suspension test

CNS Stimulant activity of *Melochia corchorifolia* (100-200mg/kg.p.o), caffeine where studied by observing the changes in duration of immobility in tail suspension. In Tail suspension test *Melochia corchorifolia* (100-200mg/kg p.o) produced significant reduction in immobility period. The results are tabulated in table: 3.

Table no 2.3: CNS Stimulant activity using tail suspension test.

Group number	Drug treatment	Dose (mg/kg p.o)	Immobility period (mins)	
			Before	After
I.	Control	-	140.2 0.73	142.05±0.46
II.	Diazepam	4	136.3±0.17	143.78±0.55
III.	Caffeine	10	129.9±1.92	98.29±.033
IV.	Low dose	100	136±1.32	111.46±0.6
V.	High dose	200	124.5±1.94	109.13±0.87

Values were expressed in mean ± SEM n=3

DISCUSSION

CNS disorders can affect either brain or the spinal cord resulting in neurological or psychiatric disorders. Causes of CNS diseases are trauma, infection, degeneration, autoimmune disorders, structural defects, tumours and stroke, neurodegenerative diseases, mood disorders, schizophrenia and autism. Central nervous system (CNS) stimulants are medicines that speed up physical and mental processes. Central nervous system stimulants are used to treat conditions characterized by lack of adrenergic stimulation, including

narcolepsy and neonatal apnoea. The majority of CNS stimulants is chemically similar to the neurohormone, norepinephrine and simulates the traditional "fight or flight" syndrome associated with sympathetic nervous system.

The CNS depressant drugs such as barbiturates and alcohol reduce the motor activity while the stimulants such as caffeine and amphetamine increase the activity.

The locomotor activity (horizontal) can be easily measured using an actophotometer which operates on photoelectric cells which are connected in circuit with a counter. When the beam of light falling on the photocell is cut off by the animal, a count is recorded.

Performance of mice on a rotarod is a widely used method for assessing balance and coordination aspects of motor function.[16] In comparison with diazepam (0.1mg/kg), a known sedative, its effect was also significantly lower than that produced by diazepam. The extract's CNS stimulant effect was further confirmed by its ability to maintain the animals on the Rota rod, thus indicating muscle co-ordination.

In the tail immersion test, *Melochia corchorifolia* extract caused a prolonged latency period, indicating an increase in the nociceptive threshold. This test is able to differentiate between central opioid-like analgesics and peripheral analgesics. The response to the tail-immersion test is a spinal reflex, but may also involve higher neural structures. The antinociceptive effect of *Melochia corchorifolia* extract in this test is a further confirmation of analgesia observed in the Irwin test.[17]

The earlier studies revealed that the plant *Melochia corchorifolia* has phytosterols, tannins, flavonoids, saponins, glycosides etc., these constituents may contribute to its CNS stimulant activities on the mice.[8] The results obtained in this study indicate that the extract possesses CNS stimulant properties which probably act via competitive antagonism at adenosine receptors leading to increase in nor-epinephrine secretion and enhanced neural activity in numerous brain areas since the extract's effect was compared to caffeine. This could provide a rationale for the use of this plant in situations of dizziness, drowsiness and sedation in folk medicine**.**

CONCLUSION

The experimental results conclude that ethanol extract of leaf of the *Melochia corchorifolia* plant has CNS stimulant activity. But in contrast to standard drug i.e. caffeine hydrochloride it was found to be less. Therefore the plant extracts may be considered as CNS stimulant for further study.

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