

Original Article

EVALUATION OF ANTIDEPRESSANT ACTIVITY OF ETHANOLIC EXTRACT OF *DIPTERCANTHUS PROSTRATUS* NEES

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ABSTRACT

Objective: The major objective of the study is to evaluate the antidepressant activity of ethanolic extract of *Dipteracanthus prostratus* Nees using rats. The study also aims to assess the effect of the extract on behavioural pattern of treated rats.

Methods: The antidepressant activity of the ethanolic extract of *Dipteracanthus prostratus* was evaluated using Forced swim test (FST). The effect of the extract on the behavioral pattern was assessed by an Open field test. The oral doses of 500 mg/kg and 250 mg/kg of the extract were fixed after conducting acute toxicity studies. Imipramine (30 mg/kg) was used as the standard.

Results: It was observed from the study that the ethanolic extract of *Dipteracanthus prostratus* at higher concentration showed significant ($p < 0.01$) reduction in immobility in forced swim test model of depression after repeated administration for 14 days. The results were comparable to the standard drug Imipramine. However, the extract did not show any significant activity after acute administration. Neither the ethanolic extract of *Dipteracanthus prostratus* nor the standard drug imipramine produced any overt behavioural change or motor dysfunction in the open field test.

Conclusion: The present study demands a further detailed investigation on the antidepressant and other possible CNS activities of *Dipteracanthus prostratus*.

Keywords: Antidepressant activity, Forced swim test, Open field test, *Dipteracanthus prostratus*.

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INTRODUCTION

Depression is the most prevalent mental disorder and depression is recognized to be symptomatically, psychologically and biologically heterogeneous. The disorder was characterized by apathy, loss of energy, retardation of thinking and activity, as well as profound feelings of gloominess and despair [1].

Dipteracanthus prostratus Nees (Family: Acanthaceae) is an erect hoary pubescent, up to 50 cm tall, basally woody and much-branched shrub locally known as Haadjud by tribal peoples. It is a widely distributed plant in Africa, Arab, Srilanka, Pakistan and India.²The plant is reported to have, anti-inflammatory, analgesic, wound healing [2, 3] and anticancer⁴activities. The present study aims to evaluate the antidepressant activity of the plant.

MATERIALS AND METHODS

The plant *Dipteracanthus prostratus* Nees. was collected from Kizhattur village of Malappuram dt during the month of November 2015. The plant was authenticated by plant taxonomist of Kottakkal Arya vaidya sala. A voucher specimen was deposited in institution herbarium. The whole plant was shade dried and coarsely powdered and passed through sieve no 22 to get coarse powder. The extraction was done by simple maceration using 70 % ethanol. The extract was concentrated to dryness in a vacuum.

Animals

The experiment started after getting IAEC approval. Male albino wistar rats were used for both Forced swim test open field test. Male albino mice were used for tail suspension test. The animals were kept in a light-dark cycle with free access to food and water. The animals were divided randomly to control and experimental groups.

Acute toxicity studies

The methanol extract of *A. spinosus* (was studied for acute oral toxicity as per revised OECD (2002) guidelines No. 423. Animals were observed for four hours hourly for behaviour changes and daily for fourteen days. The extract was devoid of any toxicity in rats

when given in dose up to 2000 mg/kg by the oral route. Hence, for further studies 200-400 mg/kg doses of extract were used.

Drug treatment

Imipramine HCl, and ethanolic extract of *Dipteracanthus prostratus* were dissolved in deionised water. Control animals received deionized water only.

Forced swim test

Rats were placed in a cylinder of 40 cm diameter containing a column of 17 cm of water at room temperature. The rats learned from a pre-test session of 15 min that they could not escape from the cylinder. In the test period 24 h later. The animals were exposed to the experimental condition for 5 min. A rat was assessed to be immobile whenever it remained floating in water in an upright position making only small movements to keep its head above the water level. The forced swim test for control and test groups were performed between 1 to 3 pm [5, 6].

FST after acute pre-treatment

The solutions were administered before 24, 5 and 1 hour before the test. (Standard group-30 mg/kg imipramine, test group 1-500 mg/kg extract, test group 2-250 mg/kg extract control group-deionised water only)

FST after repeated treatment

Test solutions were administered once daily over a period of one month. The administration was performed between 3 to 4 pm every day. (Standard group-30 mg/kg imipramine, test group-500 mg/kg extract, control group deionized water only)[5]

Measurement of locomotor activity

For measurement of locomotor activity, the rats were placed in an open field apparatus. The open field apparatus was an arena 70 cm in diameter divided into 18 equal areas. A number of line crossings in five minutes and rearing frequencies were noted. In this

experiment the animal's received the same drug treatment and doses as used for forced swim test. Each rat was individually placed in the center of the arena 15 h later the last drug treatment. The apparatus was washed with soap solution before each behavioral test to avoid the chance of influence by the odour of the previous rat tested [5].

RESULTS

Preliminary phytochemical screening

From the preliminary phytochemical screening, it was found that the plant extract contains alkaloids, saponins, and flavonoids. The presence of alkaloids was confirmed by positive results of Dragandroff's test Mayer's test, Hager's test and Wagners's test and the presence of saponins was confirmed by foam test.

Acute toxicity studies

Ethanol extract of *Dipteracanthus prostratus* was studied for acute oral toxicity as per revised OECD (2002) guidelines No. 423. After the oral administration of extract, the animals were observed for four hours hourly for behavior changes and daily for fourteen days. The animals did not any symptom of toxicity in rats when given in dose up to 2500 mg/kg by the oral route. Hence, for further studies 250-500 mg/kg doses of extract were used [7].

Table 3: Effect of ethanolic extract of *Diptera canthus prostratus* on locomotor activity in open field test

Treatment	Locomotion	Rearing	Defecation
Control	22.66±5.03	2±1.27	3.66±0.577
Imipramine	19±3.605	3±0.67	4.66±0.57
EEDP 500 mg/kg	19.66±2.08	2±1.05	6.33±1.527
EEDP 250 mg/kg	20.2±2.5	3±1.05	3.54±1.25

Values are expressed as mean±SEM, n=6. **p<0.05 compared with control

In our present study, ethanolic extract of *Dipteracanthus prostratus* significantly reduced (p<0.05) reduced immobility time in FST after repeated administration for 14 d at doses of 250 mg/kg and 500 mg/kg. The effect was comparable to that of the standard drug Imipramine at a dose of 30m/kg. (table 1). However, there was no significant reduction in immobility after acute administration (table 2).

Neither imipramine nor the extract at various doses produced any overt behavioural changes or motor dysfunction in the open field test. So, it can be assumed that the effects in FST were not due to stimulation of locomotor activity (table 3).

DISCUSSION

Depression is an important psychiatric disorder that affects individuals' quality of life and social relations directly⁶. The forced swimming test is a behavioural despair test useful for probing the pathological mechanism of depression and for the evaluation of antidepressant drugs. This test is sensitive to all major classes of antidepressant drugs including tricyclics, serotonin reuptake inhibitors, monoamine oxidase inhibitors, and atypical⁸. In the present study, the effect of the ethanolic extract of *Dipteracanthus prostratus* on immobility in FST was studied both after acute and chronic treatment. Most of the antidepressant drugs takes the time to develop their clinical efficacy. Even though the extract did not show any significant effect after acute administration, it produced significant effect after chronic administration. In the preliminary phytochemical screening, the extract showed the presence of flavonoids. The activity may be contributed by the flavonoids present, as many studies have reported the antidepressant activity of flavonoids. In order to see whether changes in immobility were associated with changes in motor activity as described by Porsolt et al.⁹ It was found that the extract treatment produced no change in behavioral parameters of the rats. This confirms that the antidepressant effect of the extract is specific.

CONCLUSION

In the present study, the effect of ethanolic extract of *Dipteracanthus prostratus* was evaluated.

Table 1: Effect of ethanolic extract of *Dipteracanthus prostratus* on immobility in forced swim test after acute treatment

Treatment	Duration of immobility
Control	115.5±6.618
Imipramine (standard)	92.23±2.295
EEDP 250 mg/kg	103.52±3.427
EEDP 500 mg/kg	105.66±3.372

Values are expressed as mean±SEM, n=6. **p<0.05 compared with control

Table 2: Effect of ethanolic extract of *Dipteracanthus prostratus* on immobility in forced swim test after repeated treatment

Treatment	Duration of immobility (in sec)
Control	113.66±5.213
Imipramine (standard)	73.16±4.31**
EEDP 500 mg/kg	82.83±1.53**
EEOB 250 mg/kg	94.32±2.34**

Values are expressed as mean±SEM, n=6. **p<0.05 compared with control.

Even though in the acute study, it did not show any significant activity, after repeated administration for a period of 14 d, it showed a significant reduction in immobility in FST. The present study demands a further investigation on an antidepressant and other possible CNS activities of *Dipteracanthus prostratus*.

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CONFLICT OF INTERESTS

Declare none

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