

Research Article

Evaluation of antidepressant activity of aqueous extract of *Prosopis cineraria* leaves by using tail suspension test in Swiss albino mice

Parigala Madhavi, B. L. Kudagi*, Madhavulu Buchineni, Rama Mohan Pathapati

Post graduate, Head of the Department,

Department of Pharmacology, Narayana Medical College, Nellore, Andhrapradesh, India

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Abstract

Objectives: To evaluate antidepressant activity of aqueous extract of *Prosopis cineraria* leaves by using Tail suspension test in Swiss albino mice. **Materials and Methods:** 24 Swiss albino mice of 6-8wks old weighing in the range of 20 to 25gms were selected for the study and administered the drugs, viz Control- normal saline (2ml/kg) oral, Standard- amitriptyline (10mg/kg) oral, and Test drug *Prosopis cineraria* (100 & 200mg/kg) oral. All the drugs were administered, screened for antidepressant activity at 0, 20, 60, 90 min by suspending them from a rod 50cm above the ground level and duration of immobility time was recorded over a period of six minutes (discarding initial two minutes to avoid bias). **Results:** *Prosopis cineraria* at 100 & 200 mg/kg has shown significant antidepressant activity with decrease in duration of immobility with 97.00 ± 2.30 & 94 ± 3.23 sec at 90min with a p value of <0.0001 respectively. **Conclusion:** In our study, we identified the potent and efficacious antidepressant activity of aqueous extract of leaves of *Prosopis cineraria*.

Keywords: Antidepressant, *Prosopis cineraria*, Tail suspension test

Introduction

Depression is a significant contributor to the global burden of disease and affects people in all communities across the world (Ohayon, 2007). This burden is more severe in some areas where diagnosis and medications for treatment are inadequate and relatively expensive. In contrast, mostly current treatment regimen available has proven less efficacious at ameliorating the condition. This has made the search for molecules with superior pharmacological profile and possibly effective at multiple related targets.

Plants have served as a rich source of new molecules with pharmacological properties that fill an essential gap in the search for superior therapeutic agents. Local remedies, over the years, have served as a relatively cheap source of therapy and have been employed in the management of disorders such as anxiety, schizophrenia. The therapeutic claims of preparations

from local herbs have over the years provided valuable clues for the direction of pharmacological investigations (Adongo and Kukuia, 2015; Adongo and Mante, 2017).

Prosopis cineraria is a leguminous multipurpose tree. It is a very useful tree and famous especially in desert area due to its spreadability and importance. It has important pharmacological activities like antibacterial, antihyperglycemic, antihyperlipidemic, antidepressant, skeletal muscle relaxant, bronchodilator, vasodilatory, detoxifying, anticancer analgesic, anticonvulsant, anticancer activity (Biney et al., 2016).

Despite the plants popular use, there is sparse scientific evidence supporting its purported CNS activity. Hence, it is important to investigate the potential of *Prosopis cineraria* aqueous leaf extract in depression in order to provide some scientific evidence for the plants use. The current work assessed the antidepressant potential of *Prosopis cineraria* aqueous leaf extract in the tail suspension test in mice.

Latest neurobiology suggests that stress in social life and release of stress hormones like, norepinephrine, serotonin, gamma amino butyric acid (GABA) etc. plays a significant

*Address for Corresponding Author:

Dr. B. L. Kudagi,
HOD, Department of Pharmacology,
Narayana Medical College, Nellore, Andhrapradesh, India, 524003
Email: blkudagi@rediffmail.com

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role in the pathogenesis of depression (Pareek et al., 2015). Tricyclic antidepressants (TCAs), Selective serotonin reuptake inhibitors (SSRIs), Monoamine oxidase inhibitors and atypical antidepressant drugs are some of the different class of drugs used in depression even though it carries drawbacks like delay in onset of action and having its own adverse effects involving almost all the system of the body (Adongo and Kukuia, 2015). It was observed that, depressed patients will have increased tendency of suicidal thoughts and carry increased risk of stroke and heart attack (Marta and Benjamin, 2017).

Nevertheless, current antidepressants are still the option for treating depression despite of few drawbacks, but still there is search to find new drugs as an add on therapy to increase efficacy and decrease adverse effects of current antidepressant drugs.

Materials and Methods

As per protocol, permission was obtained to conduct this research from the institutional animal ethics committee of Narayana Medical College Animal Ethics Committee (IAEC). All the selected animals (Swiss albino mice) were housed for 10 days to acclimatize for the experimental lab before the study.

Preparation of *Prosopis cineraria* aqueous extract

The fresh leaves of *Prosopis cineraria* were collected from Nellore district and identified, authenticated by a Botanist. The leaves were thoroughly washed with tap water, dried in shade and grounded to make powder. 100mg of powder was filled in thimble and extracted using 500ml distilled water in soxhlet apparatus for 2hrs and concentrated to dryness at 40-45°C in hot air oven till solid to semisolid mass was obtained (George and Sharma, 2011). Care was taken to avoid charring. Then the extract was cooled at room temperature, weighed to calculate extractability percentage and finally stored in desiccators in a cool and dry place.

Antidepressant activity

The 24 Swiss albino mice of 6-8wks old weighing in the range of 20 to 25gms were grouped for the study and administered the drugs, viz Control - Normal saline (2ml/kg)oral, Standard- Amitriptyline (10mg/kg) oral, and Test drug - *Prosopis cineraria* (100 & 200mg/kg) oral, screened for antidepressant activity at 0, 20, 60, 90min by suspending them from a rod 50cm above the ground and duration of immobility was recorded over a six minutes (discarding initial two minutes observation to avoid bias). All the animals were handled as per CPCSEA guidelines, New Delhi, India.

Results and discussion

Both *Prosopis cineraria* and Amitriptyline decreased the duration of immobility very significantly ($p < 0.0001$) when compared with control.

The present study demonstrates that the aqueous extract of leaves of *Prosopis cineraria* shows significant antidepressant activity. Anxiety and depression are intimately linked and usually appear as comorbid states and treatment of both states positively affects the outcome of therapy (Outhoff, 2010). Selective serotonin reuptake inhibitors are usually considered as first-line treatment for patients with depression. Several classes of drugs that modify serotonin (5-HT) neurotransmission have previously been explored for their possible role in depression and schizophrenia (Pollack, 2005; Levy and Van de Kar, 1992).

Based on the above premise, the potential antidepressant effect of aqueous extract of leaves of *Prosopis cineraria* was assessed by one acute depression model in mice: Tail suspension test. This model works on the principle that when mice were subjected to unavoidable, inescapable

Table 1. Effect of *Prosopis cineraria* on duration of immobility (sec) in mice by using Tail suspension test

Duration	Drugs							
	C		S		T1		T2	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline	122	6.29	120	6.10	118	3.23	124	4.95
@20min	118	4.89	106	5.78	110	3.21	108	4.34
@ 60min	112	4.27	96	5.57	102	3.16	98	3.41
@ 90min	107	3.21	90	5.77	97	2.30	94	3.23
P value	NS		P < 0.0001		P < 0.0001		P < 0.0001	

Mean±SD, One way ANOVA test, * $p < 0.05$ -Significant, *** $p < 0.0001$ - very significant

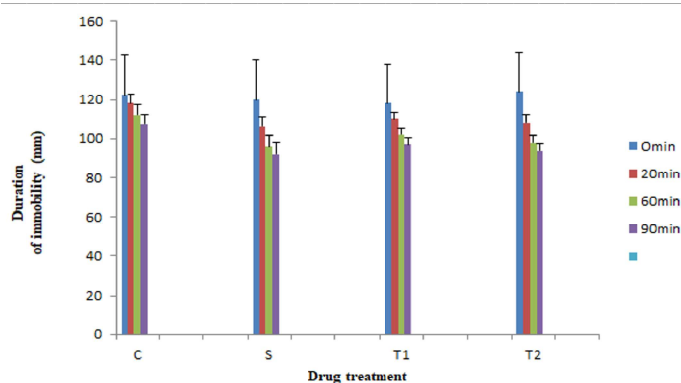


Figure 1. Effect of *Prosopis cineraria* on duration of immobility (sec) in mice by using Tail suspension test. C = Control- Normal saline (2ml/kg), S = Standard – Amitriptyline (10mg/kg), T1 = PC (100mg/kg), T2 = PC (200mg/kg)

stress, they assume escape oriented behaviors with intermittent moments of despair usually in the form of immobility (Steru et al., 1985). Period of immobility is known to model some aspects of depressive symptoms and hence most antidepressants were known to decrease the duration of immobility. Consequently, this test has been employed in the screening of potential antidepressant drugs.

In the TST, significant decrease in immobility duration was achieved after aqueous extract of leaves of *Prosopis cineraria* (100 & 200 mg/kg), Amitriptyline (10 mg/kg) treatment suggesting antidepressant activity. Antidepressants that inhibit serotonin and/or NA reuptake decrease immobility and increase swinging behavior of mice in the Tail suspension test.

Conclusion

Results from this study indicate that the aqueous extract of leaves of *Prosopis cineraria* possess antidepressant effects which might be due to interaction with noradrenergic and serotonergic systems.

Conflicts of interest: Not declared.

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