

Pharmacological Evaluation of Antidepressant Activity of Brahmi Lehyam on Albino Mice

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Abstract: Plants have been used as treatments for thousands of years, In various traditional medicinal plants *Bacopa monniera* (commonly known as Brahmi in India) is one of the most useful plants seen in Ayurveda medicines. *Bacopa monniera* has been used as a cure for This herb is recommended for the treatment of various skin such as leprosy, lupus, varicose ulcers, eczema, psoriasis, diarrhoea, fever, amenorrhoea, diseases of the female genitourinary tract and also for relieving anxiety and improving cognition. According to this background, the aim of the study was to evaluate the antidepressant-like effect of the lehyam of *B. monniera* in different behavioral models such as forced swimming test (FST), and tail suspension test (TST) on mice. Mice were divided into four groups ($n = 5/\text{group}$): control group (deionized water), standard group where Imipramine hydrochloride (10 mg/kg) was used as standard drug and three test groups where three doses of the lehyam of *B. monniera* (20, and 30 mg/kg) was used. All the drug and test samples were administered through oral route. To assess the antidepressant-like effect of lehyam of BM forced swimming test (FST) and tail suspension test (TST) measurement of have been done in mice. The main findings of the lehyam of BM significantly reduced the duration of immobility times in the forced swimming test ($p < 0.01$). Likewise, the extract significantly decreased the immobility time in the tail suspension test ($p < 0.01$). The extract also considerably increased the locomotion, rearing and defecation effects in comparison to the control group. The present results clearly demonstrate that the Lehyam of *B. monniera* possesses antidepressant-like activity in the animal behavioral models.

Keywords: Antidepressant activity, *Bacopa monniera*

1. Introduction

Depression is a common mental disorder that presents with depressed mood, intense feelings of sadness, hopelessness, and despair as well as the inability to experience pleasure in usual activities, changes in sleep patterns and appetite, loss of energy, and suicidal thoughts [1], [2] which affects 21% of the world population. Currently depression contributes 10.5% to mortality index of Global Burden of Diseases, which is projected to increase to 15% by the year 2020 [3]. Plants have been used as treatments for thousands of years, in various traditional medicinal plants *Centella asiatica* (commonly known as Brahmi in India) is one of the most useful plants seen in Ayurveda medicines. This herb is recommended for the treatment of various skin such as leprosy, lupus, varicose ulcers,

eczema, psoriasis, diarrhoea, fever, amenorrhoea, diseases of the female genitourinary tract and also for relieving anxiety and improving cognition [4].

Brahmi plants have significant results on learning and memory enhancer. It helps to decrease the level of norepinephrine and dopamine in the brain that results increased cognitive ability. Aquatic extract of Brahmi decreased the pentylenetetrazole kindled seizure and show improvement in the learning. The active constituents responsible for *B. monniera*'s cognitive effects are bacosides A and B, moreover, triterpenoid saponins are responsible to enhance nerve impulse transmission [5]. The bacosides also aid in repair of damaged neurons by enhancing kinase activity, neuronal synthesis, restoration of synaptic activity, and nerve impulse transmission [6]. *B. monniera* suppresses acetylcholinesterase activity resulting in enhanced cholinergic function, which in turn enhances attention and memory processing and increases working memory in elderly people [7]. Effects of 12-Week *Bacopa monniera* consumption on attention, cognitive processing, working memory, and functions of both cholinergic and monoaminergic systems in healthy elderly volunteers [8].

2. Materials

A. Collection of Plant Materials

The plant *Bacopa monniera* (Brahmi) dried leaves are procured in Gudivada Hanumantha Rao Ayurvedic shop at Tenali.

B. Preparation of Brahmi lehyam

The dried leaves are grind and sieve through the Sieve No122. Then the very fine powder was mixed with 66.5% syrup solution. To that add 2% ghee and mix.

3. Animals

Swiss albino mice (weighing 20-25gms & age 7-9 weeks) of either sex were used in this study. They were housed in poly propylene cages and maintained at $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$ under 12 hrs dark / light cycle. They were fed with standard rat pellet feed and water ad libitum was provided. The husk in the cages was renewed thrice a week to ensure hygiene and maximum

comfort for animals.

4. Methods

A. Experimental models

Control animals were treated with distilled water. Drugs like imipramine, test drug brahmi lehyam (10mg, 20mg, 30mg/kg) were dissolved in distilled water and administered orally.

1) Forced swimming test

Mice were forced to swim individually for 15 min, in a glass beaker of 11cm diameter, 15cm height containing fresh water up to a height of 6cm, at a temperature of $27 \pm 2^\circ\text{C}$. Each mouse was forced to swim in a similar environment for a period of 6 min in a “test-session”. The test-session was conducted before and after the drug treatment. The mouse was considered immobile when it floats motionlessly or made only those movements necessary to keep its head above the water surface. The total duration of the immobility during the last 4 min of the 6 min test was recorded [9].

2) Tail suspension test

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 adhesive tape placed approximately 1 cm from the tip of the tail. The total duration of immobility induced by tail suspension was recorded during a 6 min of the 10 min period. Animal was considered to be immobile when it did not show any movement of the body, hanged passively and completely motionless [10].

5. Results

Table 1
Preliminary phytochemical Screening of Brahmi

Test for Chemical constituents	Result
Saponins	Positive
Proteins	Negative
Flavonoids	Positive
Terpenoids	Positive
Glycosides	Positive
Tannins	Positive
Phenolic compounds	Positive

Table 2
Effect of Brahmi (20 and 30 mg/kg) on Tail suspension test in mice

Groups	Treatment	Onset of immobility time in sec	Duration Time in sec	Difference b/w onset and duration	% inhibition
I-Normal control	Distilled water	109	142	33 sec	-
II- Std	Imipramine 10mg/Kg (p.o)	150	163	13 sec	60.7
III-1 st test dose	Brahmi 20mg/Kg (p.o)	96	126	30sec	9.1
IV-2 nd test dose	Brahmi 30mg/Kg (p.o)	64	89	25sec	24.3

Each value represents Mean \pm S.E.M., n=6. **p<0.051 and **p<0.05 compared with control

Table 3
Effect of Brahmi (20 and 30 mg/kg) on Forced swimmmed test in mice

Groups	Treatment	Onset of immobility time in sec	Duration Time in sec	Difference b/w onset and duration	% inhibition
I-Normal control	Distilled water	160	207	47 sec	-
II- Std	Imipramine 10mg/Kg (p.o)	151	171	20 sec	57.5
III-1 st test dose	Brahmi 20mg/Kg (p.o)	187.5	219.5	32 sec	32
IV-2 nd test dose	Brahmi 30mg/Kg (p.o)	141	165	24sec	49

Each value represents Mean \pm S.E.M., n=6. **p<0.05 compared with control

6. Experimental models

A. Antidepressant activity

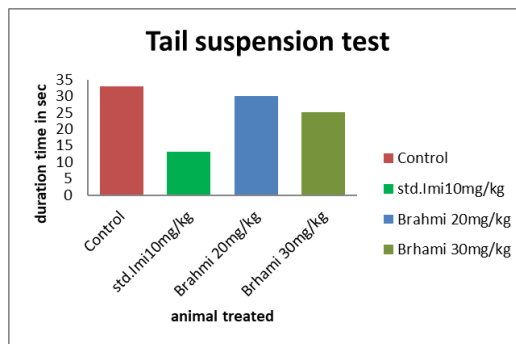


Fig. 1. Effect of Brahmi (20 and 30 mg/kg) on Tail suspension test in mice

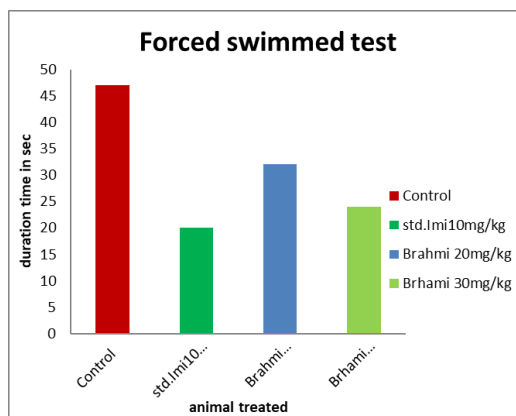


Fig. 2. Effect of Brahmi (20 and 30 mg/kg) on Forced swimmmed test in mice

7. Discussion

A. Phytochemical substances

The lehyam of *B. monnieri* was revealed the presence of tannins, glycosides, terpenoids, saponins, bacosides, bacopasides, bacopasaponins, and steroids. The major chemical constituents isolated and characterized from *B. monnieri* are dammaranes of triterpenoid saponins with pseudojubilogenin glycosides or jujubogenin glycosides, Flavonoids.

This study is report related to antidepressant activity of *B. monnieri* lehyam. The antidepressant activity was evaluated through tail suspension, and forced swimmwed tests assays in mice.

In the Tail suspension and forced swimmwed method, the depression is considered as immobile time. The lehyam show significant (**P<0.01 and ***P<0.05) decrease in reaction time at the doses (20, and 30mg/Kg p.o.) compared to normal group. The maximum effects of lehyam 30mg/Kg and standard were observed. Standard Imipramine (10mg/Kg), showed duration of immobility time 13sec, whereas brahmi doses showed 30 and 25sec. The actual standard duration of immobility recorded for a period of 5 min [11]. Tail immersion method usually may act through opiod receptor [12].

Whereas the Forced swimmwed model also employed for antidepressant response which is noted by the immobility time in water. The percent decrease in immobility time of the standard Imipramine (10mg/Kg) and Bacopa doses were (20 and 30mg/Kg p.o.) 57%, 132%, 49%, and respectively. The results of the test and standard doses were given significant (**P<0.001) activity. Hence Brahmi proved anti-depressant response compare to control. Medications such as tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), selective reversible inhibitors of monoamine oxidase A (RIMAs), and specific serotonin–noradrenaline reuptake inhibitors (SNRIs) are clinically employed for drug therapy [13]. Imipramine prevents reuptake of nor adrenaline and serotonin resulting in their increased availability in the synapse and therefore an increase in adrenergic and serotonergic neurotransmission [14]. In this study, we used two animal models, FST and TST. Both the paradigms are widely accepted behavioral models for assessing pharmacological antidepressant activity [15], [16].

8. Conclusion

In conclusion, the present study proves that *Bacopa monnieri* possess antidepressant effect, comparable to those observed with standard drugs. Plant extracts and isolated Bacosides have been extensively investigated in several laboratories for their neuro pharmacological effects and numbers of reports are available confirming their Nootropic action. Preliminary studies established that treatment with plant lehyam of BM plant enhanced learning ability in mice. The cognition-

facilitating effect may be due to presence of Bacosides A and B. The mechanism of these pharmacological actions remains imaginary. Further isolation of active constituents and investigation of Brahmi is required to study the detailed mechanism of action with different antidepressant models in relation to cognition.

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