

Evaluation of Antidepressant Activity of *Bauhinia variegata* in Rats

¹Pragati Khare, ²Deepshikha, ²Lubhan Singh, ²Sweety, ²Shivani Chauhan and ²Ghanshyam Yadav

¹Department of Pharmacy, Shri Ram Murti Smarak (C.E.T), Bareilly, U.P., India

²Meerut Institute of Engineering and Technology (Dept. of Pharmacy), Meerut, U.P., India

Abstract: *Objective:* *Bauhinia variegata* (Caesalpiniaceae) also known as Mountain Ebony (English), Rakta kanchan (Marathi), Kachnar (Hindi). It is a medium-sized, deciduous tree, found throughout India, 1800m in Himalayas. *Bauhinia variegata* Linn. is traditionally used in bronchitis, leprosy and tumors. The stem bark is used as astringent, tonic and anthelmintic. *Methods:* This study was done to investigate the possible antidepressant effect of *Bauhinia variegata* plant extract (BVMEL) using Tail suspension test (TST), Forced swim test (FST) 24 Wistar Albino rats of either sex weighing between 150-200gm were randomly selected and divided into 4 equal groups. Group-I (control) received 1% gum acacia, Groups- II, III received BVMEL in doses of 100, 200 mg/kg orally (p.o.) respectively. Group IV (positive control) received Imipramine at doses of 15mg/kg p.o. Drug treatment was given for seven & fourteen successive days. After 60 minutes of the last dose of drug or standard the immobility period was recorded. Results revealed that in BVMEL produced significant antidepressant like effect at dose of 100 & 200 mg/kg administered for 7 & 14 consecutive days as indicated by reduction in immobility times of mice in TST & FST ($P<0.05$). The efficacy of BVMEL at 200mg/kg was found to be comparable to that of Imipramine at doses of 15mg/kg. In *Conclusion:* The results of the present study indicate that BVMEL possesses significant antidepressant activity compared to that of Imipramine.

Key words: *Bauhinia variegata* • Forced Swim Test • Tail Suspension Test • Antidepressants

INTRODUCTION

Bauhinia variegata (Caesalpiniaceae) also known as Mountain Ebony (English), Rakta kanchan (Marathi), Kachnar (Hindi). It is a medium-sized, deciduous tree, found throughout India, 1800m in Himalayas [1]. *Bauhinia variegata* Linn. is traditionally used in bronchitis, leprosy and tumors. The stem bark is used as astringent, tonic and anthelmintic [2, 3].

Depression affects about 9.5% of population. In the patients of depression, it has been reported that there are changes in the monoamine neurotransmitters [4]. The use of herbal medicines for the treatment of human ailments has been a natural approach to the health care. In the search for new therapeutic products for the treatment of neurological disorders, medicinal plants have proven to exhibit pharmacological effectiveness in variety of animal models [5].

Thus the present study has been done to investigate the antidepressant activity of *Bauhinia variegata* plant extract (BVMEL) in mice by using tail

suspension test (TST), forced swim test (FST) and Learned helplessness test. Standard antidepressant drug Imipramine has been used to standardize the animal models of depression.

MATERIALS AND METHODS

Preparation of *Bauhinia variegata* Plant Extract (BVMEL): The leaves of *Bauhinia variegata* were washed thoroughly in tap water, shade dried and powdered. This powder was packed into Soxhlet column and extracted with petroleum ether (60 - 80°C) for 24 h. The same marc was successively extracted with chloroform (50 - 60°C) and later with ethanol (68 - 78°C) for 24 h. The extracts were concentrated on water bath (50°C). After concentrated preparation, the dried powder extract was stored at room temperature. The yield of the petroleum extract, chloroform extract and methanolic extract were found to be 0.8 % (w/w), 0.8 % (w/w) and 1.0 % (w/w) respectively. Methanolic extract was used for the experimental study.

Plan of Study

Animals: Animals were procured from Central Animal House, MIET and Meerut. Animals were approved by Institutional Animal Ethic Committee (IAEC) of MIET, Meerut. Approval number (711/02/a/CPCSEA) was given for this work. The preferred rodent species included the rat. Wistar Albino strain of young healthy adult of either sex animals in equal numbers per group (n= 6) were taken. At the commencement of the study the weight variations of animals used was kept minimal and not exceeded $\pm 20\%$ of the mean weight of each animal. Normal weight of rats was 150-200 gm. The temperature of the experimental animal room was maintained to be 22°C ($\pm 3^{\circ}\text{C}$). Relative humidity was maintained between 50–60%. Lighting was artificial, the sequence being 12 hours light, 12 hours dark. For feeding, conventional laboratory diets were used with drinking aqueous supplied *ad libitum*. Animals of same group were caged together. Healthy young adult of either sex rats or mice were randomly assigned to the control, standard and treatment groups. The animals were identified uniquely (*i.e.*, via marking at the base of the tail) and acclimatized for not less than 5 days in their cages prior to the start of the study.

Drugs & Chemicals:

- Drugs: Imipramine (IMP) was purchased from Sigma Aldrich.
- Chemicals: Petroleum ether, Ethanol, Chloroform, Methanol, were purchased from Central Drug House Laboratory (CDH).
- Analytical reagent grade chemicals were used in the study.

Vehicle: 1% gum acacia.

Study Design: The animals were selected randomly for each experiment and divided into 4 equal groups. Drugs (gum acacia, BVME, Imipramine) administered orally (p.o.) for 7&14 successive days as depicted in (Table 1).

Laboratory Models for Testing Antidepressant Activity

Forced Swim Test (FST): The modified forced swimming test will be designed and used in accordance with the procedures described. Rats will be taken and placed individually in a cylinder (50×20 cm) filled to a depth of 30 cm, by fresh, non-choleric water ($22 \pm 2^{\circ}\text{C}$). During the 5 min, the climbing, swimming and immobility behaviors will be recorded at 5 s intervals. Two swim sessions will be conducted: a 15 min pretest, followed 24 h later by a

Table 1: Protocol of the study

Group	Drug	Dose
I	Control (1% gum acacia)	(1.0 ml/kg)
II	BVMEL	100mg/kg
III	BVMEL	200mg/kg
IV	Imipramine i.p.	15mg/kg

5 min test. The 5 min test sessions will be viewed at a later time by two raters blind to treatment. The raters have scored rat behavior for each 5 s period (60 times for the 5 min test) as one of the following:

- Immobility: making only those movements necessary to keep its head above water;
- Swimming: making active swimming movements
- Climbing: makes vigorous movements with the forepaws in and out of the water, usually against the cylinder. Tests will be done in the second week and were repeated at the end of the study at the sixth week to evaluate acute and chronic effect of extract [6].

Tail Suspension Test (TST): The animals were hung by the tail on a plastic string 75 cm above the surface with the help of an adhesive tape. The duration of immobility was observed for a period of 8 minutes. The duration of immobility was recorded during the last 6 minutes of the observation period. Animal were considered to be immobile only when they hung passively and were completely motionless [7].

Statistical Analysis: All the results are expressed as Mean \pm SEM. All the groups were analyzed using student's test.

RESULTS AND DISCUSSION

Depression and anxiety sounds low but these two are major problems which occupy their position in the present world very rapidly and are associated with lot of morbidity. In FST and TST methanolic extract of *B.variegata* Linn leaves (200 mg/kg) given by p.o. route produced a significant decrease in the immobility period in comparison to the control group although it was less potent in this regard than Imipramine (the reference drug). These models of depression are widely used to screen novel antidepressant drugs. The tests are quite sensitive and relatively specific to all major classes of antidepressant drugs including TCAs, SSRIs, MAOI, Atypical antidepressants. Early evidence of nor adrenaline in depression came from the discovery that

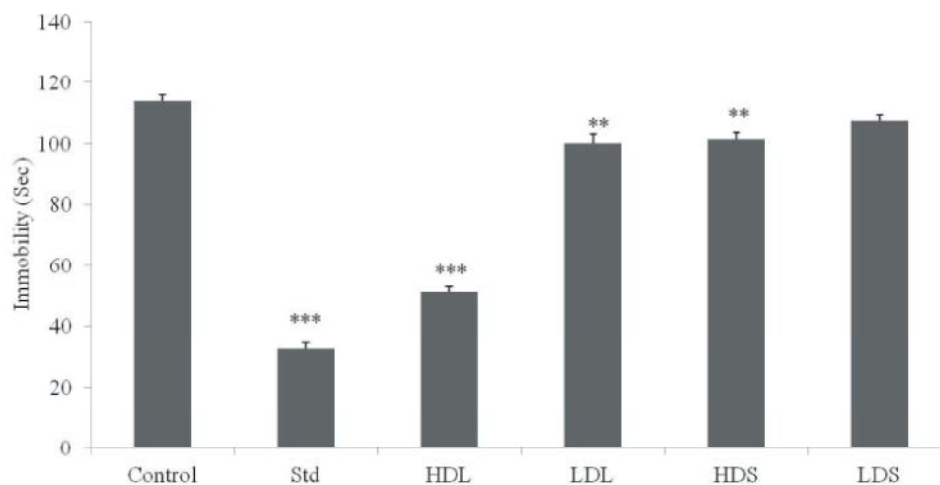


Fig. 1: Effect of leaves and seeds extract of *B. variegata* Linn on Forced swimming test in rats, after 14 days of treatment

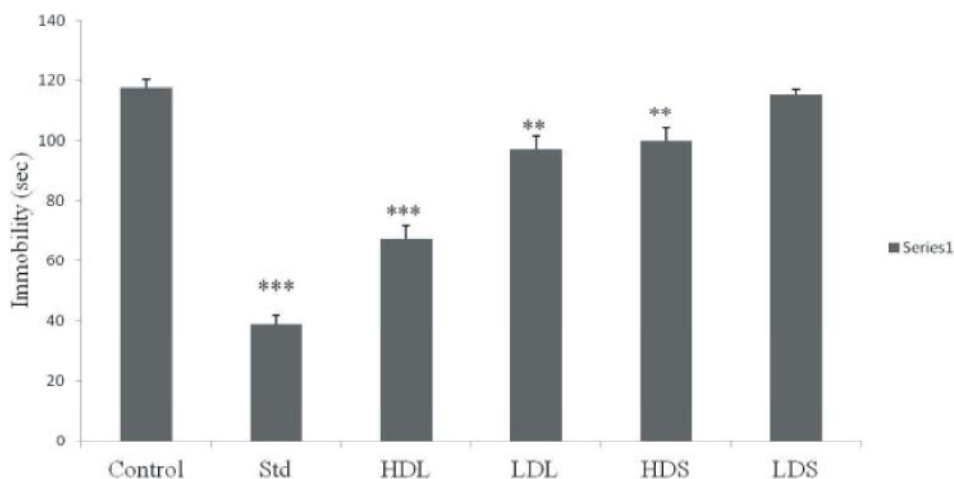


Fig. 2: Effect of leaves and seeds extract of *B. variegata* Linn on Tail suspension test in rats, after 14 days of treatment

drugs, either causing or alleviating depression, acted to alter the noradrenaline metabolism. Furthermore, depletion studies carried out in treated and untreated patients indicated a role for serotonin and nor adrenaline in depression [8]. Environmental factors and hereditary factors play a major role in producing deficient monoaminergic transmission in central nervous system thereby producing symptoms of depression [9].

CONCLUSION

The incidence of mental disorders such as depression and anxiety occur frequently in the present world and are associated with high rate of suicide cases. Many antidepressant drugs are available in the market but they all are associated with many side effects. So, present study is done to evaluate the antidepressant activity of

leaves of *Bauhinia variegata* Linn on rodents. This study is done on the basis of chemical constituents as leaf contains flavonoid such as kaempferol, Rutin, quercetin and ascorbic acid. It is reported in the earlier studies that flavonoid such as kaempferol, quercetin showed antidepressant activity. From the above observation we can conclude that methanolic extract of leaves at a dose of 200mg/kg possess antidepressant activity which is comparable to IMP.

ACKNOWLEDGEMENT

We are thankful to the Department of Pharmaceutical Technology, Meerut Institute of Engineering and Technology (M.I.E.T.), Meerut for providing chemicals and other infrastructure for doing this research work. The work is dedicated to all my teachers.

REFERENCES

1. Patil, J.K., M.R. Patel, H.Y. Sayyed, A.A. Patel, D.M. Pokal, H.P. Suryawanshi and R.A. Ahirrao, 2012. Pharmacognostic and phytochemical investigation of *Bauhinia variegata* (linn.) Benth. Stem bark. Pharma Science Monitor, 3(1): 1-12.
2. Ambasta, S.P., 1998. The wealth of India, Raw Materials, 2: 56-7.
3. Ram, P.R. and B.N. Mehrotra, 1980. In: Compendium of Indian Medicinal Plants, 3: 84-91.
4. Gold, P.W. and F.K. Goodwin, 1988. Clinical manifestations of depression in relation to neurobiology of stress. N Engl. J. Med., 319: 348-353.
5. Zhang, Z.J., 2004. Therapeutic effects of herbal extracts and constituents in animal models of psychiatric disorders. Life Science, 75: 1659-99.
6. Mishra, S., M. Jena and A. Pal, 2013. Evaluation of Antidepressant activity of *Eclipta alba* using animal models. Asian Journal of Pharmaceutical and Clinical Research, 6(3): 118-120.
7. Steru, L. and R. Chemat, 1985. The tail suspension test: A novel method for screening antidepressants in mice. Psychopharmacology, 85: 367-70.
8. Setty, B.S., V.P. Kamboj and N.M. Khanna, 1977. Screening of Indian Plants for biological activity Part. VII. Spermicidal activity of Indian plants. Indian Journal of Experimental Biology, 15: 231-232.
9. Dhingra, D. and A. Sharma, 2005. Evaluation of antidepressant-like activity of glycyrrhizin in mice. Indian Journal of Pharmacology, 37(6): 390-394.