

Evaluation of Anti-Depressant Activity of Ethanol and Aqueous Extracts of *Plumeria Rubra* in Mice Model

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Abstract: Depression is the most predominant mental illness which is recognized to be symptomatically, biologically and psychologically heterogeneous. Apathy, retardation of thinking and activity, loss of energy, feelings of gloominess and suicidal tendency are some of the characteristics of this disorder. Different species of *Plumeria* have diverse kinds of medicinal property and have a long history of use in the folk medicine. The present study is aimed to evaluate the anti-depressant activity of ethanol and aqueous extracts of *plumeria rubra* [apocynaceae] leaves using phenobarbitone induced mice model. Ethanol and aqueous extracts of *Plumeria rubra* (EEPR AND AEPR) at the dose of 100 mg/kg and 200 mg/kg were evaluated for anti-depressant activity in mice by phenobarbitone induced model. The anti-depressant activity of the ethanol extract and the aqueous extract (100mg/kg and 200mg/kg) were studied in the phenobarbitone induced mice model. The parameters like onset of sleep and duration of sleep were studied by comparing it with the standard phenobarbitone drug (75mg/kg). The experimental result were expressed as mean \pm S.E.M. Data were analysed by one way ANOVA using Dunnett's test. P values of <0.05 were considered as statistically significant. The toxicity studies reported 2000 mg/kg as toxicological dose and 1/10th of the same dose and half of 1/10th dose were taken as therapeutic dose. Intraperitoneal injection of ethanol and aqueous extracts at dose of 200mg/kg and 100 mg/kg significantly prolonged the onset and increased the duration of sleeping time in phenobarbitone induced mice. The higher dose (200mg/kg) of ethanol extract of *Plumeria rubra* showed significant increase in the onset of sleep and duration of sleep in the phenobarbitone induced experimental model. The drug can be subjected to various other models to evaluate the anti depressant activity of *Plumeria rubra*.

Keywords: Phenobarbitone, *Plumeria rubra*, anti-depressant

1. Introduction

In modern years, a lot of plants used in Ayurvedic formulations are being researched to give anti-depressant activity in the area of psycho-pharmacology.¹ Depression is a psychiatric condition in which there is loss of interest in all pleasurable outlets like food, sex, work, friends, hobbies and entertainment. The occurrence rate of the sickness is 6-8% in women and 3-5% in men. Ayurveda, the science of life, provides systematic management principles for depression. With this aim the present study was planned to evaluate the anti-depressant activity of the medicinal plant *Plumeria rubra* Linn.

Plumeria rubra linn commonly known as temple tree belongs to the family apocynaceae, is native to Mexico, central America, Colombia and Venezuela. The plant is widely cultivated in tropical and subtropical climates in worldwide. It grows as a spreading tree to 2-8 m high and is flushed with fragrant. *Plumeria rubra* linn traditionally used for the treatment of dysentery, diarrhoea, typhoid. The protease obtained from *plumeria rubra* linn is used as anti-inflammatory and wound healing activities, itching, swelling, amoebic dysentery, venereal disease, coughs, febrifuge, purgative, other skin problem, anti ulcer, antifungal agents. *Plumeria rubra* linn containing fulvoplumerin act as inhibitors of HIV type-1 reverse transcriptase. The leaves of *plumeria rubra* linn used in ulcer, leprosy, inflammation, rheumatism, bronchitis, cholera, rubifacient, cold and cough. Flavone glycoside isolated from *plumeria rubra* linn shows antioxidant and

hypolipidemic activity. The decoction of bark and root of *plumeria rubra* linn is traditionally used to treat asthma, constipation, promotes menstruation and reduced fever. The latex is used for soothe irritation. Fruits used in abortifacient.[2] Thus the present study evaluates the anti-depressant activity of ethanol and aqueous extract of *Plumeria rubra* in phenobarbitone induced mice model.²⁻⁴

2. Subjects and Methods

Plant Material

The leaves of *Plumeria rubra* were collected from the Palakkad region in Kerala. The plant material was identified and authenticated by the botanist. The plant material was shade dried for 10 days and pulverized.

Preparation Of Extract

The dried plant material was crushed into fine particles (powder) using a pulveriser. The powdered plant material (500 g) was packed in a Soxhlet apparatus and subjected to continuous hot percolation for 8h using ethanol as solvent. Extract obtained was passed through the Whatman filter paper No.1 and the ethanol was evaporated with the help of heating mantle and the extract is dried in a desiccator. The aqueous extract was prepared by soaking 50g of the powdered drug in 1000ml of chloroform water. It was kept aside for 24h with occasional stirring. It was then filtered and concentrated under vacuum to get brown colour residue of aqueous extract.

Animals

Male Swiss albino mice weighing between 20 – 25 g were used for the present study. The animals were maintained under standard environmental conditions (25 + 2° C and relative humidity of 45 to 55%) and were fed with standard pellet diet and water ad libitum.

Drugs & Chemicals

Phenobarbitone (Sigma-Aldrich, St. Louis, USA) was used reference standards for anti-depressant activity.

3. Phenobarbitone Induced Sleeping Time

Experimental Protocols

Overnight fasted animals were selected randomly on the day of experiment for administration of vehicle, standard drug and study drug. The animals were acclimatized one hour before for behavioral tests. Thirty minutes and 1 hour time interval between drug administration and behavioral tests were maintained in case of intraperitoneal and oral administrations respectively. The test was performed as per Vogel (17).⁵ Healthy albino mice weighing between 20-35gms were fasted for 24 hrs before the experiment and were divided into five groups of 6 animals each.

Group I (n=6) – Control, received distilled water, i.p

Group II (n=6) – EEPR 100 mg/kg, i.p

Group III (n=6) – EEPR 200 mg/kg, i.p

Group IV (n=6) – AEPR 100 mg/kg, i.p

Group V (n=6) – AEPR 200 mg/kg, i.p

The first group served as control and was treated with normal saline through intra peritoneal route. After 30minutes of administration of test drugs, phenobarbitone sodium at a dose of 40 mg/kg body weight was administered intraperitoneal to all groups of animals to measure phenobarbitone (PB) induced sleeping time. The PB induced

sleeping time was measured as the time interval between the loss and regain of the righting reflex. The sleep latency is the duration of the time between the administration of the PB and loss of righting reflex. The righting reflex was considered to be lost when the animal was placed on its back and failed to regain its normal posture within 10 sec. The treatment of the experimental mice was made 4 hr before the intraperitoneal administration of PB and control mice received only PB (table 1).

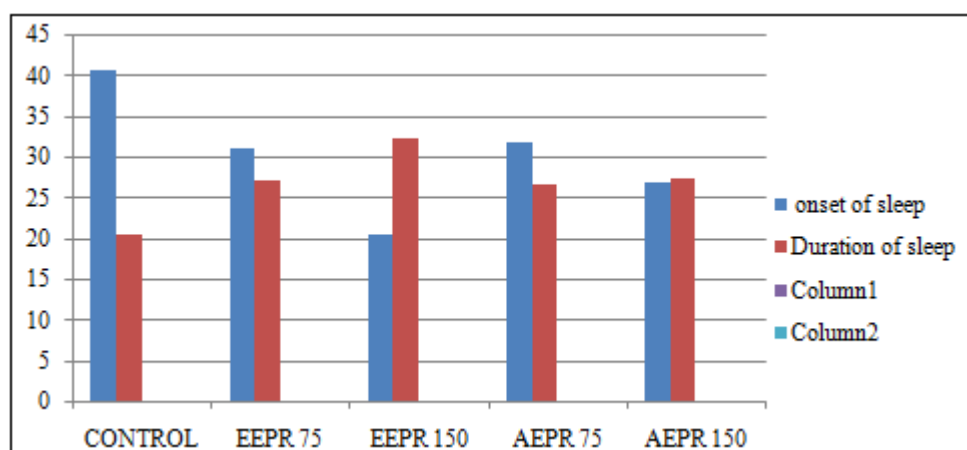
Statistical Analysis

The experimental result were expressed as mean \pm S.E.M. Data were analyzed by one way ANOVA using Dunnett's test. P values of <0.05 were considered as statistically significant **RESULTS:**

The pharmacological screening of ethanolic and aqueous extracts of sedative activity were studied. 100mg/kg and 200mg/kg of ethanolic and aqueous extract shows more sedative compared with control. From this present study it is observed that the 200mg/kg of ethanol extract showed more sedative activity than 100mg/kg and 200mg/kg of aqueous extract of *plumeria rubra* linn.

Table 1: Effect of EEPR and AEPR on Phenobarbitone induced narcosis in mice

Group no.	Drug treatment	Dose mg/kg	Sleep latency (Sec)	Sleeping time (min)
1	Saline	10mg/kg	254.7 \pm 2.8	30.5 \pm 3.7
2	EEPR	250 mg/kg	221.2 \pm 5.67*	37.16 \pm 1.98*
3	EEPR	500mg/kg	194.6 \pm 3.30**	42.33 \pm 2.05**
4	AEPR	250mg/kg	157.0 \pm 1.52*	38.76 \pm 1.68*
5	AEPR	500mg/kg	125.0 \pm 1.52**	43.33 \pm 2.68*



4. Discussion

Effect of Extract on Phenobarbitone and Alcohol-Induced Sleeping Time

The test extracts significantly potentiate the phenobarbitone sodium-induced sleeping time ($p < 0.01$) while compared with control. The duration of sleeping time in both EEPR and AEPR in phenobarbitone induced experimental models increases in a dose dependent manner as shown in the Table

1. The sleep latency on the other hand found to decrease in a similar sequence as that of increase in sleeping time.

5. Conclusion

The result clearly demonstrates that the EEPR at 200mg/kg, dose of *plumeria rubra* showed potent anti depressant activity compared to AEPR extracts. The efficacy of alcoholic extract at a dose of 100mg/kg and 200mg/kg

increases the duration of sleep in the dose dependent manner.

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References

- [1] Yogesh S. Deole, Sulakshan S. Chavan, B. K. Ashok, B. Ravishankar, A. B. Thakar, and H. M. Chandola. Evaluation of anti-depressant and anxiolytic activity of *Rasayana Ghana* Tablet (A compound Ayurvedic formulation) in albino mice. *Ayu*. 2011; 32(3): 375–379.
- [2] Shinde P. R., Patil P. S., Bairagi V. A. Phytopharmacological Review of *Plumeria species*. *Scholars Academic Journal of Pharmacy*. 2014; 3(2): 217-227.
- [3] Devprakash, Rohan Tembare, Suhas Gurav, Senthil Kumar G.P, Tamizh Mani. An Review of Phytochemical Constituents & Pharmacological Activity of *Plumeria Species*. 2012;4(6):1-6.
- [4] Hafizur Rahman, Vijaya Badra Reddy, Soumya Ghosh. Sandeep Kumar Mistry, Geetika Pant, Sibi G. Antioxidant, cytotoxic and hypolipidemic activities of *Plumeria alba* L. and *Plumeria rubra* L. *American Journal of Life Sciences*. 2014; 2(4): 11-15.
- [5] Vogel HG, Vogel WH. Psychotropic and neurotropic activity. In *Drug discovery and evaluation: Pharmacological assay* (Springer-Verlag Berline Heidelberg, New york). 1997: 204.