

Evaluation of Anti-Depressant Activity of Ethanolic Extract of *Justicia gendarussa* Burm with Wister Rat

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Abstract

Objective: *Justicia gendarussa* Burm is an herbal plant that has several therapeutic effects. It also heals depression, grief, nervous stress and tension. In the present study we evaluated anti-depressant effect of ethanolic extract from *Justicia gendarussa* Burm by using Forced Swimming Test (FST).

Methods: Two doses of ethanolic extract of *Justicia gendarussa* Burm (250 mg/kg and 500 mg/kg) was injected intraperitoneally. Immobility time and swimming time were measured after 30 min of injection and compared with negative control and imipramine as a positive control.

Results: The ethanolic extract (500 mg/kg) was found to be effective and it exhibited activity similar to that of the conventional drug imipramine ($p < 0.001$) whereas 250 mg/kg dose showed higher activity with significantly increased swimming time and decreased immobility time than 500 mg/kg of ethanolic extract and imipramine.

Conclusion: These results proposed 250 mg/kg of ethanolic extract was showed higher anti-depressant activity than the standard.

Keywords: *Justicia gendarussa* Burm; Immobility time; Forced swimming test; Antidepressant-like effect

Introduction

Depression is a heterogeneous disorder that affects a person's mood, physical health and behavior. It is caused not only by changing lifestyle as perceived by the general public but also by some of the allopathic drugs for example, more than 15% of patients suffered in depression by using anti-hypertensive drug. Especially reserpine that depletes neuronal storage granules of nor epinephrine, serotonin and dopamine. This amounts to 12.3% of the global burden of disease, and will rise to 15% at 2020. Four hundred to five hundred million people suffer from a mental or behavioral disorder based on WHO report, yet only a small proportion of them receive even the basic treatment [1,2]. Various plants are being used in complementary and alternative medicines for management of depression. A review of literature revealed that *Justicia gendarussa* is highly reputed plant, and has been widely employed in herbal medicine but no significant work has been carried out on the anti-depressant activity of the plant extracts. So, the present study was designed to evaluate the antidepressant activity of ethanolic extract of *Justicia gendarussa* Burm and its belongs to acanthaceae family.

Materials and Methods

Collection and extraction

The aerial part of plant *Justicia gendarussa* Burm was collected from the pattnamthitta, kerala in the month of December 2013. The plant was then authenticated by the joint director, the botanical survey of India, Coimbatore, Tamilnadu, India. The aerial plant material were dried in shade and pulverized. The powder were passed through sieve no.40 and used for the extraction. The extract was prepared by the cold maceration method by using ethanol and water as solvent in the ratio of 30:70. Chloroform is used as preservative. This process was carried out with stirring the mass once daily for 14 days until the extraction was completed. After completion of extraction, the solvent was removed by distillation process the dark brown color residue was obtained.

Animals

Young adult Wister rat either sexes weighing 190-250 g were obtained from the animal house Swamy Vivekananda College of Pharmacy, Elayampalayam, Tiruchengode, Namakkal (Dt), Tamilnadu. They were caged in a room under standard laboratory conditions (temperature $23 \pm 1^\circ\text{C}$, relative humidity $55\% \pm 5\%$ and lighting 08:00 20:00 h). The animals were fed on a pelleted diet and water. The Institutional Animal Ethical Committee (IAEC) approved by the protocol of this study.

Phytochemical screening

The extract was screened for the presence of various phytochemical constituents employing standard screening test. The extracts were subjected to following chemical tests to detect the chemical constituents present in this study [3-5] (Table 1).

Anti-Depressant screening

Forced Swimming Test (FST): Either sex of rats were individually forced to swim in an open cylindrical container and container diameter is 10 cm, height is 25 cm. Cylindrical container filled by 19 cm of water at $25 \pm 1^\circ\text{C}$. Either sex of rats were divided in four different groups. The first group assigned as control receiving only vehicle (NaCl 5 ml/kg). The other two groups received acute dose based on acute toxicity studies of EJG (250-500 mg/kg). The Group II received standard drug Imipramine dose is 30 mg/kg. The total duration of immobility was recorded during the last 4 min of the 6 min period. Rats were ceased struggling and remained floating motionless in the water, making only those movements necessary to keep its head above water when each mouse judged to be immobile. A decrease in the duration of immobility is indicative of an antidepressant like effect [6-11].

Statistical analysis: Data were analyzed by Prism Install version software and presented as mean \pm SEM. The statistical tests used were one-way analysis of variance (ANOVA) followed by tukey-kramer Multiple comparison test. The level of statistical significant ranged from $p < 0.05$ to $p < 0.001$. The results were showed in the Table 2. The results were graphically expressed in Figure 1 [12].

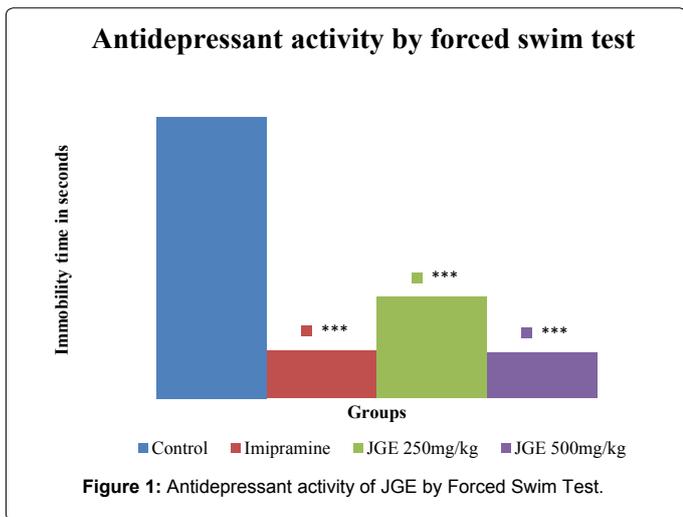


Figure 1: Antidepressant activity of JGE by Forced Swim Test.

S. No	Phytoconstituent	Inference
1	Carbohydrates	+
2	Glycosides	+
3	Saponins	-
4	Proteins	+
5	Alkaloids	+
6	Phytosterols	+
7	Flavanoids	+
8	Tannins	+

Table 1: Detection of the chemical constituents using chemical tests.

Group	Treatment	Immobility Time in Seconds
GI	Normal Saline 5 ml/kg (p.o)	142.33 ± 5.279
GII	Imipramine 30 mg/kg (i.p.)	24.17 ± 6.646***
GIII	JGE 250 mg/kg (p.o)	51.17 ± 17.915***
GIV	JGE 500 mg/kg (p.o)	23.17 ± 2.012***

Values are expressed in Mean ± SD. ***P<0.001 considered extremely significant when compared to control group (n=6) [12]

Table 2: Antidepressant activity of JGE by Forced Swim Test.

Results and Discussion

The plant extract at the dose of 250 and 500 mg/kg were used for the *in vitro* antidepressant activity. The doses were selected based on the acute toxicity studies from the literature. The antidepressant effect of *Justicia gendarussa* (250 and 500 mg/kg) and imipramine were studied and observing the change in the duration of immobility by

performing forced swim test. In this test *Justicia gendarussa* 250 and 500 mg/kg p.o produced significant reduction ($p < 0.05$ and $p < 0.001$ respectively) in the immobility period when compared with that of control group animals that received only the vehicle. The extract (500 mg/kg) was found to be effective and it exhibited activity similar to that of the conventional drug imipramine ($p < 0.001$). The results are tabulated in table.

The preliminary phytochemical screening indicated the presence of in *Justicia gendarussa* Burm, have been shown to possess antidepressant effect Flavonoids, Alkaloids and Glycoside. The effect of *Justicia gendarussa* extract may be due to the present of above said compounds. The present study proves the potential antidepressant activity of *Justicia gendarussa* in a dose dependent manner. We believe that *Justicia gendarussa* has the potential to be used as an adjuvant in the treatment of depressant and other mood disorder.

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