

## To evaluate and compare antidepressant activity of *Rosa damascena* in mice by using forced swimming test

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### ABSTRACT

**Background:** *Rosa damascena* mill L (*R. damascena*) is an ornamental plant that has several therapeutic (such as sedative and hypnotic) effects. It also heals depression, grief, nervous stress and tension. In the present study we evaluated antidepressant-like effect of *R. damascena* using forced swimming test (FST). The forced swim test is a commonly used stressor test, where mice are forced to swim in specially constructed tanks for a particular period and looked for behavioural activation characterized by vigorous swimming and diving to search for alternate routes to escape. Animal health including human has been shown to be affected by the stressful events of the life inducing situation which alters cognition, learning memory and emotional responses, causing mental disorders like depression and anxiety and stress in mice.

**Methods:** The experiment was carried out with 24 healthy albino mice of either sex weighing about 25-30 gm. These were acclimatized to their environment for one week prior to experimentation. Two doses of aqueous extract (20 and 40 mg/kg) were injected intraperitoneally. After 30 min of injection, immobility and swimming times were measured and compared with control (negative control) and imipramine (positive control).

**Results:** In the present study *R. damascena* in the doses of 20 mg and 40 mg/kg significantly decreased the immobility time compared to the control than standard, thereby proving that it has antidepressant activity. The dose of 40 mg/kg body weight showed anti-depressant activity almost similar to the standard drug imipramine (10 mg/kg).

**Conclusions:** Antidepressant activity of *R. damascena* was studied by forced swimming test in mice in the doses of 20 mg/kg and 40 mg/kg. This test shows that *R. damascena* significantly decreased the immobility time in mice. The results suggest that *R. damascena* has dose dependent antidepressant activity comparable with imipramine.

**Keywords:** *Rosa damascena*, Mice, Immobility time, Antidepressant like effect

### INTRODUCTION

*Rosa damascena* mill L (*R. damascena*), commonly known as Damask rose, is one of the most important species of Rosaceae family which is a well-known ornamental plant in the world that has been referred to as the king of flowers.<sup>1-3</sup>

The major cultivation areas of *R. damascena* in Iran are Kashan, Fars and Azerbaijan, among them Kashan is the most famous one.<sup>4</sup> The most therapeutic effects of *R. damascena* in ancient medicine are treatment of abdominal and chest pain, strengthening the heart, treatment of menstrual bleeding and digestive problems and reduction of inflammation, especially of the neck.<sup>5,6</sup>

North American Indian tribes used a decoction of the root of *R. damascena* plant as a cough remedy to ease children's cough.<sup>7</sup> This plant is also used as a gentle laxative.<sup>8</sup> Rose oil heals depression, grief, nervous stress and tension. It helps in the reduction of thirst, old cough, special complaints of women, wound healing, and skin health. Vapour therapy of rose oil is helpful for some allergies, headaches, and migraine.<sup>8,9</sup> Several components were isolated from flowers, petals and hips (seed-pot) of *R. damascena* including terpenes, glycosides, flavonoids and anthocyanins. This plant contains carboxylic acid, myrcene, vitamin C, kaempferol and quercetin.<sup>10-16</sup>

The antidepressant activity of *R. damascena* was also reported. *R. damascena* contains several components

such as flavonoids and kaempferol responsible for its antidepressant activity. Based on this evidence, in the present study antidepressant effects of aqueous extract of *R. damascena* was evaluated by forced swimming test (FST).

## METHODS

### **Plant material and preparation of extract of *Rosa damascena***

Plants were collected from Nellore district, Andhra Pradesh, India. The plant was authenticated for its correct botanical identity by the chief botanist. The aqueous extract of plant was prepared as follows: 400 gms of the chopped, dried flowers of plant were extracted with 2 L of distilled water by the soxhlet apparatus. The solvent used for obtaining extract was evaporated by a rotator evaporator under reduced pressure at 50°C. The final extracted material weighed 10 gm that was prepared by dissolving final product in distilled water.<sup>17</sup>

### **Animals**

Swiss albino mice weighing 25-30 grams of either sex were obtained from the central animal house of Narayana Medical College, Nellore.

They were housed in standard polypropylene cages with paddy husk as bedding and kept under controlled room temperature (21-23°C; relative humidity 60-70%) in a 12 h light-dark cycle. Animals were given a standard laboratory diet and water ad libitum. All experiments were performed between 09:00 AM and 3:00 PM in order to minimize the effect of circadian rhythms. Animals were acclimatized to laboratory conditions one week prior to initiation of experiments.

### **Force swimming test**

Albino mice of either sex weighing from 25 to 30 g were used in this study. These were acclimatized to their environment for one week prior to experimentation. The animals were randomly distributed into four different groups. Each experimental group consisted of a 6 animals. Each group is caged separately after recording its body weight and the animals were marked with marker for identification.<sup>18</sup>

### **Equipment**

Glass chamber, stop watch

### **Experimental groups**

The experimental animals were weighed, and randomly divided into four groups, each group consisting of six animals (n=6) were used.

Group I - Control group (saline) - 0.5 ml.  
Group II - Standard group (Imipramine) -10 mg/kg.  
Group III - Test group (aqueous extract of *R. damascena*) - 20 mg/kg.  
Group IV - Test group (aqueous extract of *R. damascena*) - 40 mg/kg.

### **Principle**

When an animal is forced to swim, it tries to escape by making rigorous movements. When it cannot escape from the glass chamber, the animal surrenders to the situation and floats making very little or no movements (immobility) in glass chamber. Thus forced swimming-induced immobility is considered as helplessness or a state of depression in animals. Antidepressant drugs reverse or reduce immobility period.

### **Procedure**

Normal saline, Imipramine in the dose of 10 mg/kg (I.P) and *R. damascena* was administered intraperitoneally at different doses (20 and 40 mg/kg, I.P) to mice of either sex. Forced swimming test was conducted after half an hour of drug administration. Mice were allowed individually to swim inside the glass chamber (25-12-25 cm) containing water up to 15 cm height for 6 min at room temperature. After initial struggle to escape for 1-2 min the animal became immobile or had little movements to keep floating in the water. Total immobility period was measured during the 6 min in all groups. Later immobility period was compared in all groups. All the experimental procedures and protocols used in this study were carried out according to the guidelines of institutional animal ethical committee and ethical committee clearance was obtained from IAEC (Institutional Animal Ethics Committee).

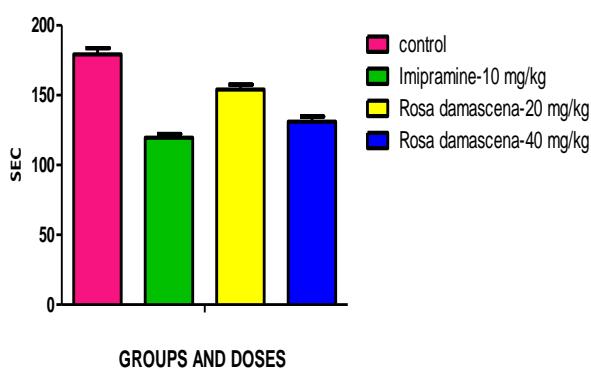
## RESULTS

The mean immobility time of control group was  $179.33 \pm 4.5$ . For imipramine it was  $119.6 \pm 2.65$ . Immobility time of *R. damascena* in the dose of 20 mg and 40 mg was  $154 \pm 3.57$  and  $131 \pm 3.7$  respectively. The mean immobility time was decreased significantly as given in Table 1 and Figure 1.

**Table 1: Antidepressant activity of *R. damascena* using forced swimming test.**

S.No.	Groups	Mean immobility time (sec)
1.	Control (normal saline)	$179.33 \pm 4.5$
2.	Standard (imipramine 10 mg/kg)	$119.6 \pm 2.65^{***}$
3.	<i>R. damascena</i> (20 mg/kg)	$154 \pm 3.57^{***}$
4.	<i>R. damascena</i> (40 mg/kg)	$131 \pm 3.7^{***}$

\*\*\*p <0.001 with *R. damascena* as compared to control



**Figure 1: Mean time of immobility of *R. damascena*.**

## DISCUSSION

Porsolt's forced swimming test (Porsolt et al, 1977) is the animal model used in mice to check antidepressant properties. In this model immobility period was considered as a state of depression in mice. They proposed this behavioural model for the screening of new antidepressant compounds, concluded that the immobility time observed in the test reflected a state of lowered mood or hopelessness in animals, thus, this animal model is the most widely used tool for preclinical screening of putative antidepressant agents (Cryan et al, 2002 and 2005).

In the present study *R. damascena* in the doses of 20 mg and 40 mg/kg significantly decreased the immobility time compared to the control than standard, thereby proving that it has antidepressant activity. The dose of 40 mg/kg body wt showed anti-depressant activity almost similar to the standard drug imipramine (10 mg/kg).

Our study is supported by Dolati et al which showed antidepressant activity of *R. damascena* in mice using forced swimming test.<sup>17</sup> The active principle involved in showing antidepressant activity is reuptake inhibition of monoamine neurotransmitters. Selvi et al showed antidepressant activity of *R. damascena* in rats using forced swimming test. They proposed that increase in serotonin levels and inhibition of reuptake of serotonin levels in brain might be the responsible for antidepressant activity.<sup>19</sup> The antidepressant activity of *R. damascena* is probably by increase in monoamino-neurotransmitters in brain.

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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