



## Phytochemical studies and pharmacological screening of *Sida rhombifolia* Linn.

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### Abstract

**Plan:** Anti-anxiety activity of *Sida rhombifolia* Linn.

**Prologue:** *Sida rhombifolia* commonly called Bala or Atibala is claimed by folklore for various ailments like rheumatism, seminal weakness, and diarrhea. Earlier studies on the ethanolic extract of the roots (SRE) revealed a significant, antioxidant, antimicrobial, anti-inflammatory, hepatoprotective and antibacterial activity. The present study was designed to evaluate anti-anxiety activity of powdered whole plant extracts of *Sida rhombifolia* Linn. viz petroleum ether and ethanol.

**Methodology:** Anti-anxiety activity of *Sida rhombifolia* Linn. were studied by using Elevated Plus Maze (EPM) model in albino mice.

**Outcome:** Albino mice were treated orally with dose 300 mg/kg of the extract and behavior was observed on the EPM. Diazepam (2mg/kg, P.O) was used as a positive control. Result showed that alcoholic extract was found to produce very significant result. Hence, this plant may be developed as a potentially useful anti anxiety agent

**Keywords:** *Sida rhombifolia* Linn., Anti-anxiety activity

### 1. Introduction

*Sida rhombifolia* commonly called Bala or Atibala is claimed by folklore for various ailments like rheumatism, seminal weakness, and diarrhea<sup>1</sup>. *Sida rhombifolia* belonging to family *Malvaceae* possess insecticidal and antimicrobial properties. *Malvaceae* is a cosmopolitan family of herbs, shrubs and trees. Modern research carried out on the *Malvaceae* plants revealed that most of the plants belonging to this family are medicinally important as they contain biologically active compounds<sup>2</sup>.

The plant is much used for treating ulcers, inflammation, swellings and antinociceptive.<sup>2-4</sup> Earlier studies on the ethanolic extract of the roots (SRE) revealed a significant, antioxidant, antimicrobial, anti-inflammatory, hepatoprotective and antibacterial activity<sup>5-8</sup>.



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## 2. Experimental

### 2.1 Preparation of extracts, and their phytochemical screening

In the phytochemical studies, the whole parts of *Sida rhombifolia* Linn were dried in shade and powdered. The powdered whole plant (300 g) was subjected to successive Soxhlet extraction by solvents in increasing order of polarity viz petroleum ether (60-80°C), chloroform, ethanol and water. Before each extraction the powdered material was dried in hot air-oven below 50°C. Each extract was concentrated by distilling off the solvent and then evaporating to dryness on the water-bath. Extracts were weighed and percentage was calculated in terms of the air-dried weight of the plant material. The yield of the extracts of petroleum ether (60-80°C), chloroform and ethanol and water was 1.5%, 1.0%, 1.83%, 2.0% w/w respectively.

The different extracts were analyzed for the presence of active constituents like alkaloids, steroids, carbohydrates, fixed oils, fats, tannins, phenolic compounds, proteins, amino acids, saponin, gums, mucilage, glycosides, terpenoids and flavonoids. Results obtained are presented in Table-2.

### 2.2 Animals:

The experimental animals [Swiss *albino* mice (20-25 gm) of either sex] were procured from animal house Swami Vivekanandha College, Tamilnadu. The animals were given standard laboratory feed and water *ad libitum*. The animals were fasted for 18 h before use. The approval from the Institutional Animal Ethical Committee (IAEC No. 889/PO/ac/05/CPCSEA) of Swami Vivekanandha College, Tamilnadu, was taken before carrying out pharmacological studies.

### 2.3 Evaluation of anti-anxiety Activity

#### *Preparation of doses:*

Animals were divided into four groups Group I was a negative control and was given vehicle, consisting of acacia (2%), in a dose of 1 ml/100gm. Group II was a positive control and was given standard drug, diazepam (2mg/kg, orally), suspended in the vehicle. Group III-IV was treated as test group and was given petroleum ether and ethanol extracts of *Sida rhombifolia* Linn. at dose of 300 mg/kg respectively. All the test solutions, standard drug and control were administered orally 45 min prior to elevated plus maze study.

### 2.4. Solvents:

Petroleum ether (60–80°C), chloroform (CHD, Mumbai) and ethanol (S. D. Fine Chemicals Pvt.), all of LR grade, distilled under normal atmospheric pressure were employed for extraction of the plant material.

### 2.5. Elevated plus maze model of anxiety:

The elevated plus-maze model is a well established animal model for testing anxiolytic drugs.

The elevated plus-maze apparatus consist of two open arms (16 x 5 cm for mice and 50 x 10 cm for rats), two closed arms (16 x 5 x 12 cm for mice and 50 x 10 x 40 cm for rats), and an open roof with the entire maze elevated (25 cm for mice and 50 cm for rats) from the floor. The animals were placed individually in the centre of the maze, head facing towards open arms and the stop watch was started and following parameters were noted for 5 min. a) First preference of mice to open and closed arm. b) Number of entries in open and closed arms (an arm entry defined as the entry of four paws into the arm) c) Average time each animal spends in each arm (average time = total duration in the arm/number of entries)<sup>9-12</sup>.

### 2.6 Statistics

The results have been expressed as mean  $\pm$  standard error of mean (SEM). The test dose were compared with diazepam and controlled by Dunnet's test using Graph pad instat prism.

## 3. Results and Discussion

The percentage yield of various extracts viz. petroleum ether (60-80°C), chloroform and ethanol and water was 1.5%, 1.0%, 1.83%, 2.0% w/w respectively. Table 1 showed results of phytochemical screening of various extracts. Phytochemical screening showed presence of alkaloids and flavonoids in ethanol extract of *Sida rhombifolia* Linn. Flavonoids have shown anti-anxiety activity in various studies. Further, the anxiolytic effect of flavonoids has been attributed to its effect on central nervous system. The mean time spent by the mice in open arms after oral administration of 300 mg/kg of the extracts of *Sida rhombifolia* Linn., diazepam (2 mg/kg) and the control (vehicle) has been shown in Table 2. Among the extracts tested, maximum anxiolytic activity was observed in the ethanol at the dose of 100 mg/kg, p.o. Results obtained are presented in Table 1.

## 4. Conclusion

It was concluded from the present study that ethanolic extract of *Sida rhombifolia* Linn exhibited good anti-anxiety activity at the dose of 300 mg/kg in mice using elevated plus maze model of anxiety.

Table 1: Anti-anxiety activity of *Sida rhombifolia* Linn.

| S. No. | Groups                            | Mean no. of entries in open arm (5 min) |
|--------|-----------------------------------|---|
| 1      | Control (2% acacia 1mg/100gm)     | 108.33 $\pm$ 6.83                       |
| 2      | Standard drug (Diazepam 2 mg/kg)  | 215.33 $\pm$ 15.63*                     |
| 3      | Ethanolic extract (300mg/kg)      | 265.33 $\pm$ 23.48**                    |
| 4      | Petroleum ether extract(300mg/kg) | 154.66 $\pm$ 9.15                       |

Values are expressed as mean  $\pm$  S.E.M; \*P<0.05-significant, \*\*P<0.01-very significant; Degree of freedom-5,30; F=6.395

Table-2: Results of phytochemical screening of *Sida rhombifolia* Linn

| S.No. | Test                           | Petroleum ether extract | Chloroform extract | Ethanol extract | Aqueous extract |
|-------|--------------------------------|-------------------------|--------------------|-----------------|-----------------|
| 1     | Carbohydrates                  |                         |                    |                 |                 |
|       | a) Molisch test                | -                       | -                  | +               | -               |
|       | b) Fehling's test              | -                       | -                  | +               | -               |
|       | c) Benedict's test             | -                       | -                  | +               | -               |
| 2.    | Alkaloids                      |                         |                    |                 |                 |
|       | a) Dragondroff's test          | -                       | -                  | +               | +               |
|       | b) Mayer's test                | -                       | -                  | +               | +               |
|       | c) Wagner's test               | -                       | -                  | +               | +               |
|       | d) Hager's test                | -                       | -                  | +               | +               |
| 3.    | Saponins                       | +                       | +                  | +               | -               |
| 4.    | Fixed oils and fats            | +                       | +                  | +               | +               |
| 5.    | Flavonoids                     | -                       | -                  | +               | +               |
| 6.    | Proteins                       | +                       | -                  | -               | +               |
| 7.    | Gum and mucilage               | +                       | +                  | +               | -               |
| 8.    | Phenolic compounds and tannins | +                       | -                  | -               | -               |
| 9.    | Terpenoids                     | -                       | -                  | +               | -               |
| 10.   | Glycosides                     | +                       | -                  | -               | -               |

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