NEUROPHARMACOLOGICAL STUDIES ON MEDICINAL PLANT *IXORA COCCINEA* L.


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ABSTRACT

Fresh leaves of *Ixora coccinea* L. were collected at Karachi and after removing the unwanted materials were dried at room temperature with ventilation. The dried leaves were first crushed into fine powder and then subjected to partition chromatography which provided four fractions i.e. *n*-hexane, methanol, *n*-butanol and aqueous. These four fractions yielded lupeol, α-amin, β-amin, β-sitosterol and kaempferol 3, 7-0-α-L-dirhamnoside.

Four fractions (*n*-hexane, methanol, *n*-butanol and aqueous) and above mentioned pure compounds were tested on central nervous system of albino rats and the changes in behavioural pattern were recorded. These different fractions and pure compounds were found to produce CNS depressive effects, when subjected to model experiments, on albino rats as compared to control. These findings suggested that this medicinal plant *Ixora coccinea* L. possessed a CNS depressant action.

INTRODUCTION

*Ixora coccinea* L. (Rubiaceae) is an evergreen ornamental shrub abundantly found in different places of Pakistan. Local name of this plant is "Bundukha" and English common name "Flame of Wood" (Ali & Nasir, 1989). The plant *Ixora coccinea* L. has great medicinal value in folklore, various morphological parts of this plant employed in different diseases such as diarrhoea, dysentery, leucorrhoea, fever, nausea, abdominal pain, scabies, sore throat and in eye troubles (Chopra et al., 1956). It also acts as astringent and antiseptic. The pharmacological activities of *Ixora coccinea* L. showed that the aerial parts exhibit CNS depressant activity (Nadkarni, 1976, Perry, 1980). For proving this activity different extracts and pure compounds of this plant were subjected to behavioral studies on albino rats using the methods described by Irwin (Irwin, 1962).
RESULTS AND DISCUSSION

The results of neuro-pharmacological studies suggested that the n-hexane and methanol extracts of the leaves of *Ixora coccinea* L. showed slight CNS depressant activities as compared to control (Table-1) and the n-butanol extract treated animals showed normal activity, indicating that n-butanol extract possessed no CNS depressant properties.

On the basis of the results of neuro-pharmacological studies the aqueous extracts of shoots of this plant is said to be the most potent CNS depressant agent as compare to other extracts (Table-1).

As far as aqueous extract of the leaves of the plant is concerned at low dose (10 mg/0.5 ml) extract produced the significant CNS depressant activities but at high dose (15 mg/0.5 ml) the same extract exhibited the reverse activity (Table-1).

In case of pure compound lupeol, α-amyrin and β-amyrin isolated from n-hexane extract showed more or less same behavioural changes like n-hexane extracts. But these changes are more significant as compared to n-hexane extract and β-sitosterol (isolated from n-hexane extract) showed no significant behavioural changes. This indicates that it is not a potent CNS depressant agent.

From the above-mentioned studies it is concluded that the plant *Ixora coccinea* L. has CNS depressant properties (Bataticha *et al*., 1995; Gouemo *et al*., 1951) but these are preliminary investigations. The detail studies require extensive experimentation and for elucidation of its mode of action a comparative study with different psychotic drugs is required, which is in progress.

EXPERIMENTS

The fresh plant material was collected from Karachi region. The dried plant material was chopped into small pieces, and percolated in n-hexane (15 days). Then a part of this extract (after evaporation of n-hexane) was mixed with a mixture of water-methanol (6:4) and extracted. This extract was first partitioned with chloroform and then with pre-saturated n-butanol. In this way various extracts (n-hexane methanol, n-btolan and aqueous) of the plant were obtained. The n-hexane and n-butanol extracts were subjected to silica gel column chromatography. As a result of which pure compounds such as lupeol, α-amyrin, β-amyrin, and β-sitosterol from n-hexane extract and kaempferol-3,7-dirhamnoside from n-butanolic extract were collected. The characterization and structure elucidation of these compounds were carried out by modern spectroscopic techniques i.e. UV, IR, Mass & NMR.
### Table 1

**Behavioral Studies of Different Extracts and Isolated Compounds of Exora Coccinea on Albino Rats**

| Extract/Compound | Dose (mg/ml) | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X |
| Hexane (leaves)  | 96 mg/0.4 ml | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | Slight | -ve | -ve | -ve | -ve | -ve | -ve |
| MeOH (leaves)    | 24 mg/0.4 ml | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
| BuOH (leaves)    | 8 mg/0.4 ml  | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve |
| Aqueous (leaves) | 10 mg/0.5 ml | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | Slight | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
|                 | 15 mg/0.5 ml | -ve | +ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
| Aqueous (shoots)| 340 mg/0.5 ml| -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
|                 | 510 mg/0.5 ml| -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
| Lupeol           | 5 mg/0.5 ml  | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
| α- and β-Amyrin | 5 mg/0.5 ml  | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
| β-Sitosterol     | 3 mg/0.5 ml  | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |
| Kaempferol-3,7'-Oα-L-rhamnoside | 5 mg/0.5 ml | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve | +ve | -ve | -ve | -ve | -ve | -ve | -ve | -ve |

* +ve = Increase or decrease in behavioral activity, -ve = No change in behavioral activity.

PREPARATION OF TEST MATERIALS

Dose of \( n \)-hexane extract was made by dissolving 96 mg in 0.4 ml \( n \)-hexane and introduced i.p. in animals. Similarly, the dose regime for methanol extract was made as 24mg /0.4 ml.

For \( n \)-butanol extract the dose preparation was made by dissolving 8 mg in 0.4 ml distilled water and introduced i.p. in animals. The dose of aqueous extract of the plant was prepared by dissolving 340 mg/0.4 ml and 510mg/ 0.4 ml in distilled water and introduced i.p. The dose regime for lupeol was made as 5 mg in 0.5 ml \( n \)-hexane and i.p. route was used. The dose of \( \beta \)-sitosterol was prepared by dissolving 3 mg in 0.5ml \( n \)-hexane and introduced i.p. in animals. Similarly the dose regime for \( \alpha \)- and \( \beta \)-amyrin were made by dissolving 5mg in 0.5ml \( n \)-hexane separately and introduced separately in animals (i.p.). 5mg of kaemperol-3,7-O-\( \alpha \)-L-dirhamnoside was dissolved in 0.5ml methanol and introduced i.p. in animals.

BEHAVIOURAL OBSERVATIONS

After introduction of dose, animals were kept under observation between 20-120 minutes. The behaviour was recorded according to a modified version of the procedure described by Irwin (Irwin, 1962). The following behavioural activities such as Grooming, vocalization, irritability, passiveness, catatonia, spontaneous activity, touch response, straub tail, tremor, twitches, convulsion, wrighting, staggering gait, righting reflex, body tone, grip strength salivaion, elevation, lacrimation, tail erection and aggressiveness.

The details of change in behaviour are given in a tabular form in Table-1.

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