PHARMACOLOGICAL INVESTIGATIONS ON AGLAIA ROXBURGHIANA (W. & A) MIQ. VAR. BEDDOMEI LEAVES

S. JANAKI, S. VIJAYASEKARAN* and R. BIMA RAO**
Department of pharmacology, sri ramachandra medical college & research institute (Deemed University), Porur, Chennai – 600 116, Tamil Nadu.
Institute of pharmacology, Chennai medical college, Chennai – 600 003*
Captain Srinivasa Murti drug research institute for Ayurveda, Arumbakkam, Chennai – 600 106**

Received: 4 May, 1998 Accepted: 7 June, 1998

ABSTRACT: Aglaia roxburghiana is a traditional remedy for a variety of diseases. The ethanolic extract of the leaves was screened for related activities upon it exhibited significant anti-inflammatory activity in rats in acute and chronic models. There was no acute toxicity in mice up to 2g/kg. The extract protected the mast cell deregulation by compound 48/80 and inhibited histamine induced contractions in guinea pig ileum. The data obtained in this study suggest that the extract may act by stabilizing mast cells and blocking histamine receptors.

INTRODUCTION

Aglaia roxburghiana (W. & A) Miq. Var. beddomei (Meliaceae) is a source drug for Priyangu, used in Ayurveda (1). The plant is considered as a remedy for dysentery, skin diseases, leprosy, inflammation, leucoderma and abdominal pain (2), (3). It is said to be cooling and useful in buring sensation of the body and painful maturation (4).

There is no detailed literature pertaining to biological studies on the leaves of this plant. Hence the ethanolic extract of the leaves, which was found to have alkaloids, steroids and triterpenoids (5), (6) has been considered for the present study to evaluate the specific activities, if any, before investigation the isolated compounds.

MATERIALS AND METHODS

The leaves of Aglaia roxburghiana were freshly collected from Tirupathi hills in Andhra Pradesh and authenticated by the botanist, Captain Srinivasa Murti Drug Research Institute for Ayurveda, where a voucher specimen has been deposited.

Shade dried and coarsely powdered leaves (2 kg) were extracted with 90% alcohol by cold percolation method. The solvent was removed by distillation over water bath and races under vacuum. This extract, designated as LF (yield 72.7g) was suspended in carboxymethyl cellulose (CMC) and used for animal experiments.

Swiss albino mice (0-25g) Wistar albino rats (150 – 200g), guinea pigs (400-500g) were used for various experiment.

Preliminary screening and acute toxicity testing

Mice were tested with different doses of LF extract (500-4000 mg / kg, S.C) and continuously observed for 6h. The changes in various autonomic and behavioral responses were noted. The animals were
kept under observation for a further period of 24h and mortality, if any, was noted, based on the results of preliminary screening (7) three doses (100, 200 & 400 mg/kg, s.c) were selected for further experiments.

**Analgesic activity**

This was investigated in mice using acetic acid induced writhing (8). Morphine sulphate (0.25 mg/kg, s.c) was used for comparison.

**Anti-inflammatory activity**

**A) Acute study**

(i) Carrageenin induced hind-paw oedema in rats (9). Different groups of rats were tested with these doses of LF extract. 0.1 ml of 1% carrageenin was injected into the right hind paw 30 min after LF extract administration. The paw volume was measured plethysmographically 5h after carrageenin injection.

**B) Chronic study** (10)

Sterile cotton- Pellets (10mg) were implanted s.c in arm – pits and groins in albino rats. The animals were treated with LF extract for 7 days.

All the animals were sacrificed on 8th day and cotton- pellets were removed, dried at 50°C for 24 h and weighed.

In the acute and chronic models of inflammation, the activity of LF extract was compared with Ibuprofen (100mg/kg, s.c) further 10 min. the percentage degranulation was calculated. The effect of LF extract per se was studied in separate mesenteric bits and percentage degranulation was calculated. Disodium cromoglycate (DSCG) 1µg/ml was included in the study for comparison.

**Gastric secretion and ulcer:**

**Shay rat ulcer**

Adult male albino rats (130-150g) were selected and ulcers were induced as described by say et al (12). The animals were treated with LF extract 30 min. prior to pyloric ligation. A separate group of animals received aspirin 100 mg/kg (p.o) 60 min prior to pyloric ligation.

The animals were sacrificed 18h later. The volume, free and total acidity of gastric contents were examined. The gastric ulcers were scored and subjected to histopathological examination.

**Intestinal smooth muscle (in vitro)**

Health adult guinea pig starved overnight was sacrificed, the terminal ileum was cut, washed, mounted. The contractions were recorded with histamine according to the method of ghosh (13). Following this the LF extract was added and contractions were recorded. The effect of LF extract on the spasmogenic effect of histamine was also investigated.

**Statistical analysis**

The results were analysed by analysis of variance followed by dunett’s test.

**RESULTS**

**Preliminary screening and acute toxicity**
There was no significant change in the various autonomic and behavioral responses after LF extract administration compared to the control animals. No mortality was recorded in 24h in the animals treated with LF extract upto a dose of 2.0 g/kg.

**Analgesic activity**

Treatment with LF extract did not alter the number of acetic acid induced writhings in mice compared to vehicle treated animals. But, morphine treatment significantly reduced the number of writhings in mice.

**Anti-inflammatory activity**

A) **Acute study:** In carrageenin induced paw oedema ibuprofen produced a significant reduction in paw oedema. Similarly, a dose dependent reduction was observed with different doses of LF extract (Table-1).

B) **Chronic study:** A dose dependent reduction in the weight of the cotton-pellets was observed after LF extract administration. The reduction was significant in all the doses tested (Table – 2) and comparable with Ibuprofen.

**Effect on mast cell**

Compound 48/80 per se produced extensive degranulation of mast cells. Pre treatment with LF extract reduced this degranulation significantly at 10& 100 µg/ ml (Table -3).

**Effect on gastric secretion and ulcer**

Treatment wit a potent histamine (H₂) antagonist, ranitidine significantly reduced the volume of gastric secretion, free acidity, total acidity and also the ulcer score compared to vehicle treatment in pyloric ligated rats. Treatment with LF extract reduced only the volume but there was not protection of ulcer by the different doses of the exact. Histopathological examination revealed extensive ulceration after LF extract treatment and confirmed the above results.

**Effect on isolated guinea pig ileum**

LF extract per se did not produce any significant effect on the intestinal smooth muscle. A dose dependent reduction in histamine response was observed after treatment with LF extract.

**Discussion**

The experiments designed in the present study were based on traditional claims. The results of the study supports the traditional claims of the use of Aglaia roxburghiana in inflammation.

A significant anti-inflammatory effect was observed in acute and chronic modes of inflammation as indicated by reduction in the paw oedema and cotton-pellet granuloma. But the extract did not reveal an analgesic activity.

The leaves contain alkaloids, triterpenes and steroids. The results of the present study supports the traditional claim of the plant in inflammation which suggests that one or a combination of the above said compounds present in the extract may be responsible for the above said activity.

The probable mode of action may be by stabilization of mast cells and blocking the histamine receptor action. However, other mediators involvement needs to be explored in future studies.
Table 1
Effect of *Aglaia roxburghiana* on acute inflammation

| Treatment (mg/kg) | Vol. of paw oedema (ml) |
|------------------|-------------------------|
| Vehicle          | 0.73 ± 0.04             |
| Ibuprofen 100    | 0.43 ± 0.04*            |
| LF extract 100   | 0.37 ± 0.06*            |
| 200              | 0.38 ± 0.06*            |
| 400              | 0.33 ± 0.04*            |

*p<0.05 (Dunett’s test)*
Each value represents the mean ± SEM of 6 observations

Table 2
Effect of *Aglaia roxburghiana* on Chronic inflammation

| Treatment (mg/kg; s.c) | Wt. of Cotton pellets (mg) |
|------------------------|----------------------------|
| Vehicle                | 48.73 ± 7.05               |
| Ibuprofen 100          | 23.25 ± 1.36*              |
| LF extract 100         | 37.40 ± 1.8*               |
| 200                    | 32.60 ± 1.0*               |
| 400                    | 22.65 ± 0.9*               |

*p<0.05 (Dunett’s test)*
Each value represents the mean ± SEM of 6 observations

Table 3
Effect of *Aglaia roxburghiana* on compound 48/80- induced degranulation of mast cells

| Pre-treatment (µg/ ml) | Treatment (µg/ ml) | % degranulation |
|------------------------|--------------------|-----------------|
| Vehicle                | Vehicle            | 21.8 ± 1.51     |
| Vehicle                | 48/80 -10          | 66.0 ± 1.15     |
| LF extract 1           | 48/80 -10          | 66.0 ± 1.7      |
| 1                      | 48/80 -10          | 55.0 ± 2.31*    |
| 10                     | 48/80 -10          | 43.6 ± 1.9*     |
| 100                    | 48/80 -10          | 20.0 ± 1.9*     |
| DSCG1                  | 48/80 -10          |                 |

*p<0.05 (Dunett’s test, Compared with vehicle + 48/80 treatment)*
Each value represents the mean ± SEM of 6 observations
Reference:

1. Chopra, R.N., Nayar S.L. and chopra I.C, Glossary of Indian medicinal plants, CSIR, New Delhi (1956).

2. Kirtikar K.R. and Basu B.D., Indian medicinal plants, International book distributors, Dehra Dun, India, Vol – I, p. 550 (1975).

3. Chunekar K.C., Bhavaprakasha nighantu, Indian material medica, choukhamba vidya bhavan, Varanasi. P.251 (1969).

4. Georg watt, dictionary of economic products of India, periodical experts vol.I, 42-D, vivek vihar, Delhi, p. 145 (1972).

5. Purushothaman K.K., Sarada A; Connolly J.D, Akinniji J.A, chem soc Perkin 1, 3171 (1979).

6. Balakrishna K, Kundu AB, Patra A. J. Nat. Products 53 (2), 523 (1990).

7. Miller L.C and Tainter M.L. Proc. Soc Exptl Bil Med. 57, 262, (1944).

8. Koster R.M, Anderson M., DeBeer E.J. Fed. Proc. 18, 412, (1959).

9. Winter C.A., Risley E.A., NUSS G.W., Proc. Soc. Exp. Biol. Med, 111, 544 (1959)

10. Winter C.A Risley E.A., NUSS G.W., Proc. Soc. Exp. Biol. Med, 141/369, (1963).

11. Kaley G and Weiner R, Annals of New York Academy of sciences (eda. Peter Ramwell & Jan, M Jane E. Shaw) A.C Press, New York, 180, 347 (1971).

12. Shay H, Homannov S.A., Fils SS, Morantzul D, Gruenstein M, siplet HH, Gastroenterology. 5, 43 (1945).

13. Ghosh M.N. Fundamentals of experimental pharmacology scientific Book agency, Calcutta (1984).