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Analgesic Effects of *Erythrina variegata* L. Leaves and Soft Stems in Mice

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Abstract

Methanolic extract of leaves and soft stems of *Erythrina variegata* (EVLSS) was investigated for analgesic activity at the doses of 50, 100, 200 and 400 mg/kg body weight orally. All the doses of EVLSS significantly attenuated the writhing responses induced by intraperitoneal injection of acetic acid in mice.

Keywords: Erythrina variegata, acetic acid, analgesic activity, gastric writhing.

Introduction

Erythrina variegata L. (Fabaceae), commonly known as Mandar, Tiger's Claw, Indian Coral Tree and Sunshine Tree grows commonly in different parts of Bangladesh [1]. The tree is well adapted to the humid tropics and subtropics and even can tolerate a wide variety of climates within this zone [2]. This plant is well known in folklore medicine of Bangladesh, where both leaves and stems are used in combination. Its leaves are believed to have analgesic, anthelmintic, laxative and diuretic properties; its barks are used in treating leprosy and fever and also used as febrifuge, and astringent [3]. Local folk medicinal practitioners often use paste of soft stem and leaves for the treatment of joint pain. A scientific evaluation of the analgesic activity of only leaf extract of this plant has been carried out [4]. The present study was therefore designed to evaluate the analgesic activity of methanolic extract of both leaf and soft stems of *E. variegata* and compare with the analgesic effect showed by leaf only as reported by Haque *et al*. [4].

Materials and Methods

Collection of plant material

The leaves and soft stems of *E. variegata* were collected during June 2009 from Savar, Dhaka, Bangladesh. The leaves and stems were identified at the Bangladesh National Herbarium where a sample specimen was also deposited.

Preparation of the test samples

The dried leaves and soft stems (sun-dried for 5 days) of *E. variegata* were pulverized into a fine powder and were mixed with methanol at a ratio of 1:5 (100g leaves and stems in 500 ml methanol). After 24 hours, the mixtures were filtered; filtrate was collected and the residue was again mixed with methanol at a ratio of 1:3 (100g leaves and stems in 300 ml methanol) for 24 hours. After filtration, filtrates were combined and evaporated to dryness using a rotary evaporator.

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Animals

Swiss albino mice (20 - 25 g) of either sex were obtained from the animal house of International Center for Diarrhoeal Disease and Research, Bangladesh (ICDDR, B). The animals were given standard feed developed by ICDDR, B and water *ad libitum* and kept in the laboratory environment (relative humidity 55-65%, room temperature 25.0 ± 2^0C, and 12 hours light/dark cycle) for seven days for acclimatization. Animals were kept under fasting for overnight and weighed before the experiment. The study was approved by the Institutional Animal Ethical Committee of University of Development Alternative, Dhaka, Bangladesh.

Studied activity

Analgesic activity of EVLSS was tested using the acetic acid-induced writhing method as described by Mani *et al.* with minor modifications [7]. In brief, albino mice were divided into six groups having six animals in each group. The animals were pre-treated with the extract (50, 100, 200 and 400 mg/kg, p.o.) or aspirin (200 mg/kg, p.o) used as standard drug, 1 hour prior to intraperitoneal injection of 1% (v/v) acetic acid (0.1 ml/10g). Five minutes after the intraperitoneal injection of acetic acid, the number of writhing during the following 10 minutes was counted. Control mice were administered vehicle (0.5% carboxymethylcellulose sodium; 10 ml/kg).

Statistical Analysis

The results are expressed as mean ± S.E.M. Statistical difference was tested by using Student's *t*-test. $P < 0.05$ was considered as statistically significant.

Result

The oral treatment of mice with EVLSS (50, 100, 200 and 400 mg/kg) produced a significant ($P < 0.01$) and dose dependent inhibition in abdominal writhing produced by acetic acid. The inhibition by EVLSS (200 mg/kg, p.o.) was nearly similar to that produced by aspirin (200 mg/kg, p.o.). EVLSS at 400/kg dose showed 60.01% inhibition, which was higher than that obtained with the standard drug, aspirin (55.96%, Table 1). Any toxic effects were not noticed in mice up to extract dose of 400 mg/kg body weight.

Table 1: Analgesic activity of EVLSS in acetic acid-induced writhing test

Groups	Dose (mg/kg)	Number of writhing (mean ±SEM)	Inhibition (%)
Control	0.5	33.33 ± 3.95	
Aspirin	200	14.67 ± 3.41	55.96*
Extract of *E. variegata*	50	17.33 ± 4.19	48.01*
Extract of *E. variegata*	100	15.33 ± 1.23	54.01*
Extract of *E. variegata*	200	14.33 ± 3.32	57.01*
Extract of *E. variegata*	400	13.33 ± 2.23	60.01*

The writhing in control was considered as 100%. Data presented here as Mean ± S.E.M (n=6). *$P < 0.01$ as compared to control group.

Discussion

The mouse writhing assay is a simple and reliable method for rapid evaluation of peripheral type of analgesic action. In this method the abdominal constriction response is induced by acetic acid. Acetic acid causes algesia by liberating endogenous substances including serotonin, histamine, prostaglandins, bradykinin and substance P, which stimulate pain nerve endings [8]. The results obtained from this study indicate that EVLSS increased the writhing inhibiting capacity than leaves alone as reported by Haque *et al*. [4]. With EVLSS, the maximum analgesic activity (60.01%) of *E. variegata* in acetic acid-induced writhing mice was observed at 400 mg/kg dose, while only leaves at 500 mg/kg dose has been reported by Haque *et al*. [4] to demonstrate about 50% inhibition. These results suggest that some analgesic principles are present in leaves as well as in soft stem and together they possibly exhibit a synergistic analgesic activity. Whether such synergistic activity of leaves and stems is actually the case is currently under investigation. A further exploration of the bioactive molecules exactly responsible for this activity is also currently under investigation.

The obtained results provide a pharmacological evidence for use of both leaves and soft stems of this plant as an analgesic agent.

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