



Short Communication

Antinociceptive activity of the ethanolic extract of *Ficus racemosa* Lin. (Moraceae)

Muhshina Ferdous, Razina Rouf, Jamil Ahmad Shilpi and Shaikh Jamal Uddin*

Phytochemical and Pharmacological Research Laboratory, Pharmacy Discipline, Life Science School, Khulna University, Khulna-9208, Bangladesh

SUMMARY

The ethanolic extract of *Ficus racemosa* Lin. (Moraceae) bark and fruit were tested for its possible antinociceptive activity study on acetic acid induced writhing method in mice. Both the bark and fruit extracts at a dose of 500 mg/kg body weight showed significant antinociceptive activity on the experimental animals. The fruit extract showed most potent inhibition of acetic acid induced writhing in mice (61.38%, $P < 0.001$) where as the bark extract showed inhibition only 42.6% ($P < 0.001$) and all the result were statistically significant.

Key words: *Ficus racemosa*; Moraceae; Antinociceptive activity

INTRODUCTION

Ficus racemosa Lin. (Moraceae), locally known as 'Jogyadumur' a medium size tree, lactiferous and red-brown color. Fruit is round or globular and resemble figs with obovate in shape (Ghani, 1998). Commonly it is found all over the Bangladesh and also in Asia, Australia, Taiwan, Hainan and others. Traditionally the fruit extract is used in diabetes, leucoderma and menorrhagia. It is also used locally to relive inflammation of skin wounds, lymphadenitis. The ethanolic extract of the bark is hypoglycemic

and antiprotozoal activity. Decoction of the bark is used as wash for wounds, in asthma, piles and menorrhagia (Yusuf *et al.*, 1994; Ghani, 1998). The bark and leaf of *F. racemosa* were also reported to have significant antidiuretic activity, wound healing activity, antitussive activity, anti-pyretic activity, hypoglycemic activity, anti-bacterial activity, hepatoprotective activity and anti-diarrhoeal activity (Mukherjee *et al.*, 1998; Mandal *et al.*, 1999, 2000; Rao *et al.*, 2002; Bhaskara *et al.*, 2003; Ratnasooriya *et al.*, 2003). *Ficus racemosa* is a chemically rich plant and possess glycosides, beta-sitosterol, lupeol, dumurin, tiglic acid ester, taraxasterol and a new compound racemosic acid (Ghani, 1998; Li *et al.*, 2004).

Searching of plants having antinociceptive effect we are screening commonly available Bangladeshi medicinal plants (Shilpi *et al.*, 2004; Uddin *et al.*, 2005, 2006), we now report the antinociceptive effect of the extract of *F. racemosa*

*Correspondence: Shaikh Jamal Uddin, Phytochemical and Pharmacological Research Laboratory, Pharmacy Discipline, Life Science School, Khulna University, Khulna-9208, Bangladesh. (Present address) School of Pharmacy, Griffith University, Gold Coast Campus, G16 Building, Room no. 3.14, Queensland 9726, Australia. Tel: +610755529740; Fax: +61075558804; E-mail: uddinsj@yahoo.com

fruit and bark in mice using established acetic acid induced writhing method.

MATERIALS AND METHODS

Plant material and extraction

F. racemosa fruit and bark were collected from Pabna, Bangladesh in the month of March 2005 and was identified by the experts of Bangladesh National Herbarium, Dhaka, Bangladesh, where a voucher specimen was deposited. The dried fruit and bark were pulverized into coarse powder with the help of a suitable grinder (Capacitor start motor, Wuhu motor factory, China). The dried and powdered plant parts of *F. racemosa* (500 mg each) were subjected to maceration by 95% EtOH (650 ml each) at room temperature for 3 days. The resulting extract was filtered and solvent was evaporated using rotary evaporator and yielded approximately 5% w/w and 7% for fruit and bark respectively.

Animals

Swiss albino mice of either sex (20 - 25 g) were obtained from the Animal house, Pharmacy Discipline, Khulna University, Khulna. The animals were housed under standard laboratory conditions (relative humidity 55 - 65%, room temperature 23.0 ± 2.0°C and 12 h light: dark cycle). The animals were fed with standard diet and water *ad libitum*. The control vehicle and test substances were administered to the test animals at the dose of 10 ml/kg body weight using a feeding needle.

Antinociceptive activity study using acetic acid

induced writhing assay

The method of Uddin *et al.* (2006) was adopted with minor modification. The animals were orally fed with the extracts (vehicles for control group) at the specified doses (500 mg/kg body weight). Forty five minutes after administration of the extract and the vehicle, each animal was given 0.7% (v/v) solution of acetic acid (0.1 ml/10 g body weight) interperitoneally (i.p.) to induce abdominal contractions or writhing. Five minutes after the administration of acetic acid, the number of writhing for each animal was counted for 15 min. The number of writhings in the control was taken as 100% and percent inhibition was calculated as follows:

$$\% \text{ Inhibition of writhing} = 100 - (\text{treated mean} / \text{control mean}) \times 100\%$$

For comparison, the same experiment was carried out with a positive control group treated orally with diclofenac-Na (Square Pharmaceuticals Ltd., Bangladesh) at the dose of 25 mg/kg body weights.

Statistical analysis

All data were expressed as mean ± S.E.M. The Student's *t*-test was used to analyze data obtained from *in vivo* experiments.

RESULTS AND DISSUSSION

In the acetic acid induced writhing test all the extracts significantly suppressed the frequency of acetic acid induced writhing in mice. Among the

Table 1. Effect of *F. racemosa* extract on acetic acid induced writhing in mice

Treatment	Dose ^a (mg/kg, p.o.)	Writhings ^b	% Writhing inhibition
Control (1% Tween 80, 10 ml/kg, p.o.)	-	29.0 ± 1.66	100
Diclofenac-Na	25	7.2 ± 0.65*	75.17
<i>F. racemosa</i> fruit	500	11.2 ± 0.82*	61.38
<i>F. racemosa</i> bark	500	16.6 ± 1.10*	42.76

^aAdministered 45 min before 0.7% acetic acid administration (10 ml/kg, i.p.), ^bCounted for 15 min, starting 5 min after acetic acid administration. Values are mean ± S.E. (n = 5).

**P* < 0.001 vs. control, Student's *t*-test.

extracts, the ethanolic extract of the fruit showed the most potent antinociceptive activity (61.38% writhing inhibition, $P < 0.001$) whereas the bark extract showed the least (42.76% writhing inhibition, $P < 0.02$) (Table 1). Diclofenac-Na, used as the positive control exhibited a writhing inhibition of 75.17% as compared to control and the result was statistically significant ($P < 0.001$).

Acetic acid is a pain stimulus and i.p. administration of acetic acid (0.7%) causes localized inflammation, which causes contraction of the body in mice and referred to as 'writhing'. Such pain stimulus causes the release of free arachidonic acid from tissue phospholipid by the action of phospholipase A_2 and other acyl hydrolases.

There are three major pathways in the synthesis of the eicosanoids from arachidonic acid. All the eicosanoids with ring structures that is the prostaglandins, thromboxanes and prostacyclins are synthesized via the cyclooxygenase pathway. The leucotrienes, HETEs (hydroxyeicosatetraenoic acids), and HPETEs (hydroperoxyeicosatetraenoic acids) are hydroxylated derivatives of straight-chain fatty acid and are synthesized via the lipoxygenase pathway (Mary *et al.*, 1997).

The prostaglandins, mainly prostacyclin and prostaglandin-E have been reported to be responsible for pain sensation by exciting the A-fibres. Activities in the A δ -fibres cause a sensation of sharp well localized pain (Rang HP, 1993). Any agent that lowers the number of writhing will demonstrate analgesia preferably by inhibition of prostaglandin synthesis, a peripheral mechanism of pain inhibition.

In acetic acid induced writhing test all the extracts significantly suppressed the frequency of acetic acid induced writhing in mice. The extract *F. racemosa* possess racemosic acid, and it is well reported that racemosic acid is a potent inhibitory agent against COX-1 and 5-LOX. Racemosic acid also a good antioxidant and can scavenge free radicals (e.g. superoxide, hydroxyl radical, nitric oxide) and other reactive species (e.g. hydrogen peroxide, single oxygen, peroxynitrite, hypochlorous

acid) (Li *et al.*, 2004). Recent studies suggest that the inflammatory tissue damage is due to the liberation of reactive oxygen species from phagocytes invading the inflammation sites (Winrow *et al.*, 1993; Conner and Grisham, 1996; Parke and Sapota, 1996). Many natural and synthetic antioxidants are in use to prevent the lipid peroxidation. So it can be assumed that their COX-1 & 5-LOX inhibitory activity and antioxidant activity may reduce the production of free arachidonic acid from phospholipid or may inhibit the enzyme system, which is responsible for the synthesis of prostaglandins, and ultimately relieve pain-sensation.

The results obtained in the present study, it can be postulated that the antinociceptive activity of the extracts may be linked to their COX-1 inhibitory activity and free radical scavenging activity. However, further study could be carried out to find the actual mechanism of their antinociceptive activity and to isolate the active principle(s) responsible for such activity.

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