OPEM
www.opem.org

Oriental Pharmacy and Experimental Medicine 2007 **7(1)**, 100-102

KHUP

Short Communication

Antinociceptive activity of *Avicennia officinalis*

IZ Shahid, F Ahmed*, D Karmakar and SK Sadhu

Pharmacy Discipline, Khulna University, Khulna-9208, Bangladesh

SUMMARY

The crude ethanol extract of leaves of *Avicennia officinalis* Linn. (Family: Avicenniaceae) was screened for its antinociceptive activity. The extract produced significant writhing inhibition in acetic acid-induced writhing in mice at the oral dose of 250 and 500 mg/kg body weight ($P < 0.001$) comparable to the standard drug diclofenac sodium at the dose of 25 mg/kg of body weight. The result tends to suggest the antinociceptive activity of the extract.

Key words: Antinociceptive; *Avicennia officinalis*; Avicenniaceae

INTRODUCTION

Avicennia (A.) officinalis Linn. (family: Avicenniaceae) (synonym- *Avicennia tomentosa* Willd.), commonly known as Baen or Kala baen, is a long tree widely distributed in Coast forests of Bengal, Myanmar, mangrove forests of China and Japan. The roots possess aphrodisiac properties. The unripe seeds are used as poultice and for small pox. The bark is astringent (Kirtikar and Basu, 1987). Although a number of chemical investigations have been performed and some constituents have been reported as alkaloids, carotenoids, flavonoids, glycosides, lipids, triterpines, polyphenols, saponins, etc. (Ghosh *et al.*, 1985; Basak *et al.*, 1996; Sharma and Garg, 1996), no biological work has been reported on *Avicennia officinalis*. The objective of the present study was to investigate the antinociceptive activity of the crude ethanol extract of the leaves of *A. officinalis*.

*Correspondence: F Ahmed, Pharmacy Discipline, Khulna University, Khulna-9208, Bangladesh. E-mail: firoj72 @yahoo.com

MATERIALS AND METHODS

Plant material collection and extraction

The leaves of *A. officinalis* were collected from the Sundarbans' Mangrove Forests, Bangladesh in August 2004, and were taxonomically identified by experts at the Bangladesh National Herbarium (accession number: 30556). About 400 g of powdered leaves were taken in a clean, flat-bottomed glass container and soaked in 1,300 ml of 80% ethanol. The container with its contents was sealed and kept for a period of 7 days accompanying occasional shaking and stirring. The whole mixture then underwent a coarse filtration by a piece of cotton followed by a filtration through Whatmann filter paper and the filtrate thus obtained was concentrated using a rotary evaporator (Bibby RE200, Sterilin Ltd., U.K.) to get the crude extract.

Drugs

Diclofenac sodium (Opsonin Chemical Industries Ltd, Bangladesh)

Preliminary phytochemical analysis

The crude extracts were subjected to preliminary phytochemical screening for the detection of major chemical groups. In each test 10% (w/v) solution of the extract in ethanol was used unless otherwise mentioned in individual test (Evans, 1989; Ghani, 1998).

Animals

Young Swiss-albino mice of either sex, weighing 20 - 25 g, purchased from the Animal Research Branch of the International Centre for Diarrhoeal Disease and Research, Bangladesh (ICDDR, B) were used for the test. The animals were kept at animal house (Pharmacy Discipline, Khulna University) for adaptation after their purchase under standard laboratory conditions (relative humidity 55 - 65%, room temperature 25.0 ± 2.0°C and 12 h light-dark cycle) and fed with standard diets (ICDDR, B formulated) and had free access to tap water.

Antinociceptive activity

Antinociceptive activity of the crude extract was tested using the model of acetic acid-induced writhing in mice (Whittle, 1964; Ahmed *et al.*, 2004). The experimental animals were randomly divided into four groups, each consisting of ten animals. Group I was treated as 'control group' which received 1% (v/v) Tween-80 in water at the dose of 10 ml/kg of body weight; group II was treated as 'positive control' and was given the standard drug diclofenac sodium at dose of 25 mg/kg of body weight; group III and group IV were test groups and were treated with the extracts at dose of 250 and 500 mg/kg of body weight respectively. Control vehicle, standard drug and extracts were administered orally, 30 min prior to acetic acid (0.7%) injection. Then after an interval of 15 min, the number of writhes (squirms) was counted for 5 min.

Statistical analysis

Student's *t*-test was used to determine a significant difference between the control group and experimental groups.

RESULTS

Preliminary phytochemical analysis

Results of different chemical tests on the ethanol extract of *A. officinalis* showed the presence of steroids, tannins, saponins, gums and reducing sugar (Table 1).

Table 1. Results of different chemical group tests of *A. officinalis*

Test sample	Steroids	Alkaloids	Reducing sugars	Tannins	Gums	Flavonoids	Saponins
Ethanol extract	+	-	+	+	+	-	+

+, Positive result; -, negative result.

Table 2. Effect of *A. officinalis* on acetic acid-induced writhing in mice

Animal Group/Treatment	Number of writhes (% writhing)	Inhibition (%)
Group-I (Control)		
1% tween-80 10 ml/kg, p.o.	17.2 ± 0.680 (100)	-
Group-II (Positive control)		
Diclofenac sodium 25 mg/kg, p.o.	6.2 ± 0.389* (37.05)	62.95
Group-III		
Ethanol extract 250mg/kg, p.o.	10.2 ± 0.611* (59.31)	40.69
Group-IV		
Ethanol extract 500 mg/kg, p.o.	7.8 ± 0.389* (45.35)	54.65

Values are expressed as mean ± S.E.M. (number of animals, n = 10); *indicates $P < 0.001$, vs. control; p.o.: per oral.

Antinociceptive activity

Table 2 showed the effect of the ethanol extract of *A. officinalis* on acetic acid induced writhing in mice. At the dose of 250 and 500 mg/kg of body weight, the extract produced about 41 and 55% writhing inhibition in test animals, respectively. The results were statistically significant ($P < 0.001$) and were comparable to the standard drug diclofenac sodium, which showed 63% writhing inhibition at the dose of 25 mg/kg ($P < 0.001$).

DISCUSSION

Since *A. officinalis* belongs to the coastal forests, part of the plant constituents may be polar in nature. Ethanol was used which has a wide range of solubility in both polar and nonpolar region. To avoid any solvent effect on the experimental animals, the solvent was evaporated completely to dryness.

Antinociceptive activity of the ethanol extract of *A. officinalis* was tested by acetic acid-induced writhing model in mice. Acetic acid-induced writhing model represents pain sensation by triggering localized inflammatory response. Acetic acid, which is used to induce writhing, causes algesia by liberation of endogenous substances, which in turn excite the pain nerve endings (Taesotikul *et al.*, 2003). Increased levels of PGE_2 and $PGF_{2\alpha}$ in the peritoneal fluid have been reported to be responsible for pain sensation caused by intraperitoneal administration of acetic acid (Derardt *et al.*, 1980). The extract produced significant writhing inhibition comparable to the standard drug diclofenac sodium (Table 2). The polar compounds present in the plant extract may be responsible for the obtained antinociceptive activity.

Based on this result it can be concluded that the ethanol extract of *A. officinalis* might possess antinociceptive activity. However, further studies are necessary to find out the active principles responsible for this activity.

REFERENCES

Ahmed F, Selim MST, Das AK, Choudhuri MSK. (2004) Anti-inflammatory and antinociceptive activities of *Lippia nodiflora* Linn. *Pharmazi.* **59**, 329-330.

Balasooriya SJ, Sotheeswaran S, Balasubramanium S. (1982) Economically useful plants of Sri Lanka, Part IV. *J. Nat. Sci. Counc.* **10**, 213-219.

Basak UC, Das AB, Das P. (1996) Chlorophyll, carotenoids, proteins, and secondary metabolites in leaves of 14 species of mangroves. *Bull. Mar. Sci.* **58**, 654-659.

Derardt R, Jougney S, Delevalcee F, Falhout M. (1980) Release of prostaglandins E and F in an algogenic reaction and its inhibition. *Eur. J. Pharmacol.* **51**, 17-24.

Evans WC. (1989) *Trease and Evan's Textbook of Pharmacognosy.* 13th edition, p. 546, Cambridge University Press, London.

Ghani A. (1998) *Medicinal Plants of Bangladesh.* 1st edition, The Asiatic Society of Bangladesh, Dhaka, Bangladesh.

Ghosh A, Misra S, Dutta AK, Choudhury A. (1985) Pentacyclic triterpenoids and sterols from seven species of mangrove. *Phytochemistry* **24**, 1725-1727.

Kirtikar KR, Basu BD. (1987) Indian Medicinal Plants. 2nd ed. International Book Distributors, p. 1952-1953, India.

Sharma M, Garg HS. (1996) Iridoid glycosides from *Avicennia officinalis. Indian J. Chem.* **35**, 459-462.

Taesotikul T, Panthong A, Kanjanapothi D, Verpoorte R, Scheffer JJC. (2003) Anti-inflammatory, antipyretic and antinociceptive activities of *Tabernaemontana pandacaqui* Poir. *J. Ethnopharmacol.* **84**, 31-33.

Whittle BA. (1964) The use of changes in capillary permeability in mice to distinguish between narcotic and non-narcotic analgesics. *Br. J. Pharmacol. Chemother.* **22**, 246-253.