

ANTINOCICEPTIVE ACTIVITY OF METHANOL EXTRACT OF TAMARIX INDICA

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ABSTRACT

The antinociceptive activity of the methanolic extract of the barks of *Tamarix indica* Roxb. was investigated using acetic acid-induced writhing model in swiss albino mice. The extract produced about 26.89% ($P < 0.01$) and 43.55% ($P < 0.001$) writhing inhibition at the dose of 250 and 500 mg/kg of body weight respectively, which was comparable to the standard drug diclofenac sodium where the inhibition was about 63.64% ($P < 0.001$) at the dose of 25 mg/kg of body weight. At the above doses, the extract exhibited significant and dose dependent antinociceptive activity in acetic acid-induced writhing model in swiss albino mice. Phytochemical investigation of the extract indicate the presence of reducing sugars, tannins, gums, flavonoids and saponin.

Key words: *Tamarix indica*, antinociceptive activity, acetic acid-induced writhing, phytochemical test.

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INTRODUCTION

Tamarix indica Roxb. (Family: Tamaricaceae), locally known as Nona Jhau, is a shrub or small tree, growing up gregariously on newly formed alluvial land along rivers and by the sea-coast and found throughout Coastal forests of Bengal, Madras, Assam, Burma, Malay Peninsula, Andaman's and Borneo. The barks are applied to reduce skin diseases, as a tonic, to reduce pain as folklore use in different areas around Sundarbans particularly in Bagerhat, Sathkhira, Sharankhola and Khulna. The leaves are analgesic, antipyretic, antivenous, carminative and diuretic². A literature survey of this plant did not retrieve any information regarding the nature of their chemical constituents and pharmacological activity. The aim of the present study was to investigate the antinociceptive activity of the crude methanolic extract of *Tamarix indica* (*T. indica*).

MATERIALS AND METHODS

Plant material and extraction:

The barks of *Tamarix indica* were collected from Karamjal, Sundarban, Bangladesh during the month of July 2003 and were identified by the expert of Bangladesh National Herbarium, Dhaka, Bangladesh. About 400 gm of dried powdered material was taken in a clean, flat-bottomed glass container and soaked in 1300 ml of 80%

methanol. 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 clean, white cotton material. Then it was filtered through filter paper. The filtrate (methanol extract) thus obtained was evaporated by using a suitable rotary evaporator to get a viscous mass. The viscous mass was then kept at room temperature under a ceiling fan to get a dried extract (about 10% yield). The extract thus obtained was used for antinociceptive activity.

PHYTOCHEMICAL TESTS

The crude methanolic extract was tested for its different chemical groups as alkaloids, flavonoids, gums, reducing sugars, saponins, steroids and tannins^{8,9}. In each test 10% (w/v) solution of the extract in methanol was taken unless otherwise mentioned in individual test.

Animals

Young Swiss-albino mice of either sex, weighing 20-25gm, purchased from the Animal Research Branch of the International Centre for Diarrhoeal Disease and Research, Bangladesh (ICDDR, B) were used for antinociceptive. The animals were kept at animal house for adaptation after their purchase under standard laboratory conditions (relative humidity 55- 65%, room temperature $25.0 \pm 2.0^\circ\text{C}$ and 12 hours light: dark cycle) and fed with standard diets (ICDDR, B formulated) and had free access to tap water.

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Antinociceptive activity study using acetic acid-induced writhing assay:

Antinociceptive activity of the methanolic extract of *T. indica* was tested using the model of acetic acid induced writhing in mice^{10,11}. The experimental animals were randomly divided into four groups, each consisting of eight animals. Group I was treated as 'control group' which received 1% (v/v) Tween-80 solution in water by p.o. route; 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 methanolic extracts of *T. indica* at the doses of 250 and 500 mg per kg of body weight respectively. 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 AND DISCUSSION

Phytochemical study on the methanolic extract of *T. indica* showed the presence of tannins, flavonoids, reducing sugars, saponins, and gums (Table-I).

At the dose of 250 and 500 mg/kg of body weight, the extract produced about 26.89% and 43.55% writhing inhibition, respectively in test animals (Table-II). The results were statistically significant ($P < 0.001$) and were comparable to that of the standard drug diclofenac sodium, which showed about 63.64% writhing inhibition at the dose of 25 mg/kg of body weight.

Since *T. indica* belongs to the coastal forests, part of the plant constituents may be polar in nature. Methanol was used which has a wide range of solubility in both polar and non-polar region. To avoid any solvent effect on the experimental animals, the solvent was evaporated completely to dryness. Antinociceptive activity of the methanolic extract of *T. indica* barks 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 [3]. Increased levels of PGE₂ and PGF_{2a} in the peritoneal fluid have been reported to be responsible for pain sensation caused by intraperitoneal administration of acetic acid [4]. On the basis of the result of acetic acid induced writhing test, it can be concluded that the methanolic extract of *T. indica* might possess an antinociceptive activity.

Table-I*Chemical constituents of T. indica.*

Plant Extract	Alkaloid	Reducing Sugars	Tannins	Gums	Flavonoids	Saponin	Steroid
Me. extract of <i>T. indica</i>	-	+	+	+	+	+	-

+: Positive result; - : Negative result; Me.: Methanolic

Table-II*Effect of T. indica on acetic acid induced writhing in mice.*

Animal Group/ Treatment	Number of writhes(% writhing)	Inhibition (%)
Control	18.6±0.466	—
1% tween-80 solution in water, p.o.	(100)	
Positive control	6.8±0.217**	63.64
Diclofenac sodium 25 mg/kg, p.o.	(36.36)	
Test group-1	13.6±1.380*	26.89
Me Extract 250mg/kg, p.o.	(73.11)	
Test group-II	10.5±0.810**	43.55
Me Extract 500 mg/kg, p.o.	(56.45)	

Values are expressed as mean ± S.E.M; **: $P < 0.001$; *: $P < 0.01$; vs. control; Me.: methanolic; %: percentage; p.o.: per oral.

CONCLUSION

In conclusion, it can be suggested that the crude methanolic extract of *Tamarix indica* may possess antinociceptive activity, which correlate well with the traditional use of the plant. Therefore, further pharmacological investigation of bioactivity guided phytochemical studies are required to find out the actual constituents responsible for antinociceptive action of the extract of *Tamarix indica* .

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