Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

Der Pharmacia Lettre, 2010, 2(5): 358-362
(http://scholarsresearchlibrary.com/archive.html)

Der Pharmacia Lettre
Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

Analgesic activity of stem bark extract of *Morinda Citrifolia linn. (Noni)*

Mahesh Prasad[1*], Abhishek Suman[1], Antesh Jha[1], Pankaj Verma[1], Surender Singh[2], Vijender Singh[3]

[1] Anand College of pharmacy, Keetham, Agra (UP.)
[2] Dept. of Pharmacology, AIIMS, New Delhi
[3] R B Northland Institute of Pharmacy, Ghaziabad (U.P.)

ABSTRACT

Morinda citrifolia Linn (Rubiaceae) is commonly known as Noni and grows widely throughout the Pacific. It has been reported to have a broad range of therapeutic and nutritional value. The presently available drugs provide only symptomatic relief and are not free from side effects. Main objectives of this research work were to evaluate the analgesic effect of the stem bark of Morinda citrifolia in various animal models. The methanolic extract of stem bark has reduced pain in tail flick, tail clip and tail immersion analgesic models. The extract has also reduced number of writhings in acetic acid induced writhing model. The study revealed that the methanolic extract of stem bark at the dose level of 50, 100, and 200 mg/kg body weight significantly produced antinociceptive, effect which may be due to blockade or release of endogenous substances that stimulate pain nerve endings similar to aspirin and other NSAIDs.

Key Words: *Morinda citrifolia*, Tail flick, Tail clip and Tail immersion analgesic models.

INTRODUCTION

Morinda citrifolia Linn (Rubiaceae) is commonly known as Noni and grows widely throughout the Pacific. It has been reported to have a broad range of therapeutic and nutritional value **[1]**. Noni is one of the most significant sources of traditional medicine **[2]**. The fruit juice is used in the treatment of muscle aches and pains, arthritis, gastric ulcers and diabetes. A number of important constituents have been identified. Antitumor activity expressed in enhanced survival of

tumor-bearing mice has been demonstrated after treating with juice extracts. The present study was carried out to assess the analgesic activity of stem bark extract of *Morinda citrifolia Linn*.

MATERIAL AND METHODS

Preparation of Methanolic extract

The stem bark of the plant was collected from Shikohabad (Uttar Pradesh) and authenticated by Dr. R. M. S. Sengar, Associate Professor& Taxonomist, Department of Botany, Agra College, Agra, India. The stem bark was dried and powdered. The powdered plant material was taken in a 500 ml conical flask, soaked with different solvent of increasing order of polarity (hexane, benzene, chloroform, ethyl acetate, acetone and methanol) at room temperature for successive soxhlet extraction. The methanolic extract was concentrated by vacuum distillation.

Animals

Wistar strain of albino rats of both sex weighing between 120-200g and albino mice weighing between 30-35g were procured from National Jalma Institute for Leprosy and other Mycobacterial Diseases, Agra (ICMR). (Protocol serial number-5, DT: 18/12/2007)
The animals were acclimatized for one week and kept at room temperature in polyethylene cages with 12 hrs of light and dark cycle with free access to standard food pellets and water *ad libitum*. The animals were provided only water *ad libitum* before 24 hour prior to the study **[3]**.

Acute toxicity study in mice: The plant extract lethality in mice was tested using three doses (0.5, 1 and 3g/kg, orally). In addition, the general behaviour of animals manifested as various parameters such as locomotor activity, bizarre reactions, sensitivity to sound, social interaction, tail posture, aggressive behaviour, ataxia, paralysis, convulsions, tremors, prostration, exophthalmos, pupil size, defaecation, salivation, urination, pattern of respiration, nasal discharge, cyanosis and piloerection was observed over a period of 24 h. These parameters were selected in our laboratory as potential signs of toxicological effects.

Screening of Analgesic Activity

(i) Tail Flick Method

The animals were divided into five groups of six animals each. Group I served as vehicle control. Group III to V received the different doses 50, 100 and 200 mg/kg p.o. of the methanolic extract of *Morinda citrifolia* stem bark orally and group II received the standard drug Indomethacin (10mg/kg) p.o. Wistar strain of albino rats of either sex weighing 100-150g were selected and divided into five groups of six animals each. For each dose of the drug, separate animals were used. The tail of the rat was placed on the michrome wire of an analgesiometer (Techno, Lucknow, India.) and the time taken by the animal to withdraw (flick) its tail from the hot wire was taken as the reaction time. Extract of *Morinda citrifolia* plant parts and standard drug (indomethacin) (10mg/kg) were given orally. Distilled water served as control. An analgesic activity was measured at 30, 60, and 120 minutes after the administration of test and standard drugs. Extract of *Morinda citrifolia* plant parts and standard drug (indomethacin) (10mg/kg) were given orally. Distilled water served as control. An analgesic activity was measured at 30, 60, and 120 minutes after the administration of test and standard drugs. The analgesic activity was classified as positive if the rat failed to withdraw its tail within ten seconds of exposure.

(ii) Tail Clip Method

The animals were divided into five groups of six animals each and drug treatment was given as Tail Flick Method. Swiss strain of albino mice of either sex weighing between 20-25g was used. All the mice were screened by applying a metal artery clip to the base of the tail (having its jaw sheathed with thin rubber tubing). The pressure exerted by the clip were so adjusted that it was just sufficient to make all control mice respond. The animals that did not attempt to dislodge the clip within 10 seconds were not used for the experiment. The tail clip was applied 30, 60 &120 min. after the p.o administration of extract of *Morinda citrifolia* plant parts and indomethacin (10mg/kg), distilled water was used as control. A positive analgesic response was indicated if there was no attempt to dislodge the clip within 10 seconds in any of the four consecutive trails after a time period of two min and mean value was taken **[4]**.

(iii) Tail Immersion Method

The animals were divided into five groups of six animals each and drug treatment was given as Tail Clip Method. Distilled water (control), extract of *Morinda citrifolia* plant parts and indomethacin (10mg/kg) were administered orally. The tail (upto 5 cm) was then dipped in a pot of water maintained at temperature $55^0 \pm 0.5^0$ C. The time in seconds to withdraw the tail clearly out of the water was taken as the reaction time. The first reading (zero min.) was taken immediately after administration of the test drugs and the reading were taken at 60, 90,120, 150, 180 & 210 min. later. Analgesia tail flick latency difference (TFLD) was calculated as follows.

Analgesia TFLD = signifies past-drug tail flick latency pre- drug tail flick latency.

(iv) Acetic acid Induced Writhing Test in mice

The animals were divided into five groups of six animals each and drug treatment was given as Tail Clip Method **[5]**. Distilled water (control), extract of *Morinda citrifolia* plant parts and indomethacin (10 mg/kg) were administered orally sixty minutes before i.p injection of 0.6%v/v acetic acid solution in water at a dose of 10ml/kg. Immediately after administering acetic acid, the number of writhing or stretches were counted for 15 minutes. A reduction in the number of writhing as compared to control group was considered as evidence for the presence of analgesia which was expressed as percent inhibition of writhing. Data were calculated according to following formula:

$$\%\, Inhibition = \frac{Mean\ no.of\ writhes - Mean\ no.of\ wriths\ in\ control\ groups}{Mean\ no.of\ writhes\ in\ control\ group} 100$$

Statistical Analysis:

All values are expressed as mean ± SEM. One way ANOVA was followed by Dunnet t-Test. Statistically significant results with values of $p < 0.05$ were considered.

RESULTS & DISCUSSION

Table 1&2 show the effect of extract produced a dose-dependent analgesic activity in this model. The effects produced by methanolic extract at 50 mg/kg were not so significant but the effects

produced by 100 mg/kg and 200 mg/kg, p.o of the extract were significant when compared to that produced by indomethacin, the standard agent.

Table 3 shows the analgesic activity was expressed as "mean increase in latency after drug administration ±SEM" relative to controls ±SEM" in terms of ml and percentage inhibition in paw volume by different doses of the extract. *Morinda citrifolia* exhibited potent analgesic activity at the dose levels of 50, 100 and 200 mg/kg. The results indicate that methanolic extract of *Morinda citrifolia* produced significant analgesic activity. As far as the analgesic effects are concerned our results supports the claims about this plant in folk medicine.

Table 4 shows the methanol extract of *Morinda citrifolia* at 100 and 200 mg/kg doses significantly ($P < 0.05$) decreased the number of writhes when compared to the control. The extract at 50 mg/kg exhibited the lowest analgesic effect (46.2 %), followed by indomethacin (76.9 %). A dose-dependent decrease in writhings by rats injected with acetic acid signifies the analgesic effect of the plant extract. Not any toxicity was observed upto the level of dose 3mg/kg body weight of the stem bark extract.

Table 1: Effect of methanolic extract of *Morinda citrifolia* on pain (Tail flick method)

Group	Dose (mg/kg)	Min after treatment		
		30	60	120
control	Saline	4.01 ± 0.45	3.96 ± 0.04	3.96 ± 0.04
Indomethacin	10	7.46 ± 0.17*	8.06 ± 0.15*	7.61 ± 0.14*
Extract	50	4.32 ± 0.06	4.91 ± 0.07	4.76 ± 0.11
Extract	100	4.70 ± 0.09*	5.45 ± 0.08*	5.2 ± 0.06*
Extract	200	5.32 ± 0.07*	6.12 ± 0.08*	5.75 ± 0.14*

Data in mean ± SEM., n = 6.
*Data are significantly different from control (P<0.05)

Table 2: Effect of methanolic extract of *Morinda citrifolia* on pain (Tail clip method)

Group	Dose (mg/kg)	Min after treatment		
		30	60	120
Control	Saline	4.16 ± 0.3	4.30 ± 0.3	4.10 ± 0.5
Indomethacin	10	9.33 ± 0.3*	9.30 ± 0.4*	8.00 ± 0.9*
Extract	50	7.90 ± 0.9*	7.10 ± 0.7*	7.50 ± 0.8*
Extract	100	8.0 ± 0.7*	8.00 ± 0.7*	8.80 ± 0.8*
Extract	200	9.83 ± 0.2*	9.10 ± 0.5*	9.00 ± 0.6*

Data in mean ± SD., n = 6.
*Data are significantly different from control (P<0.05)

Table 3: Effect of methanolic extract of Morinda citrifolia on pain (Tail immersion method)

Treatment (min)	Dose/kg orally	Mean increase in latency after drug administration ± SEM (s)					
		+60	+90	+120	+150	+180	+210
Control	Saline	0.06±0.17	0.38±0.31	0.33±0.29	0.50±0.21	0.36±0.27	0.46±0.32
Indomethacin	10 mg	0.60±0.15*	1.22±0.19*	1.31±0.14*	1.48±0.14*	1.84±0.20*	2.14±0.23*
Morinda citrifolia	50 mg	0.60±0.18*	0.81±0.2*	0.99±0.29*	1.13±3.99*	1.45±0.22*	1.60±0.28*
	100 mg	0.82±0.06*	0.91±0.38*	1.16±0.30*	1.32±0.18*	1.72±0.16*	1.95±0.28*
	200 mg	1.03±0.31*	1.33±0.34*	1.59±0.64*	1.73±0.80*	2.36±1.47*	4.7±2.02*

Table 4: Analgesic effect of methanolic extract of *Morinda citriffolia* on acetic acid induced writhing test in mice

Group	Dose (mg/kg)	Number of writhing In 15 min	Inhibition (%)
Control	Saline	6.5 ± 4.4	-
Indomethacin	10	3.5 ± 1.3*	76.9
Extract	50	3.0 ± 1.6	46.2
Extract	100	1.8 ± 0.5*	53.8
Extract	200	1.5 ± 0.9*	72.3

Data in mean ± SD., n = 6.
*Data are significantly different from control (P<0.05)

CONCLUSION

The methanolic stem bark extract has reduced pain in tail flick, tail clip and tail immersion analgesic models. The extract has also reduced number of writhings in acetic acid induced writhing model. It is observable by the results that the methanolic extracts of stem bark of *Morinda citrifolia* have demonstrated significant analgesic activity without any noticeable toxicity and appear to be a good prospect of plant product for commercial exploitation. However, further studies are required for the same.

REFERENCES

[1] Y Singh., T Ikahihifo., M Panuve., C Slatter. *J Ethnopharm.* **1984**, 12, 305-25.
[2] WA Whistler. *J Ethnopharm.* **1985**, 13, 239-80.
[3] MN Ghosh. In: Fundamentals of Experimental Pharmacology, 2nd ed., Scientific Book Agency, Culcutta. **1984**., pp. 153.
[4] C Bianchi., G Franceschini. *British Journal of Pharmacology*. **1954**, 9, 3, 280-284.
[5] R Koster., M Anderson. EJ Beer. *Fed. Proc.* **1959**, 18, 418-420.