

Full Length Research Paper

Anti-inflammatory and analgesic activity of water extract from *Ipomoea asarifolia* Desr (Convolvulaceae)

U. Lawal^{1*}, H. Ibrahim², A. Agunu² and Y. Abdulahi³

¹Department of Biology, Umaru Musa Yar'Adua University, Katsina, Nigeria.

²Department of Pharmacognosy and Drug Development, Ahmadu Bello University, Zaria, Kaduna state Nigeria.

³Department Pharmacology and Clinical Pharmacy, Ahmadu Bello University, Zaria, Kaduna state Nigeria.

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***Ipomoea asarifolia* (IA) (Desr) (family: Convolvulaceae) is an herb, with a hairless succulent perennial stem, trailing on the ground usually several meters long. The various parts of this plant are used locally in the alleviation of inflammation and painful conditions. This study was done to evaluate the anti-inflammatory and analgesic activities of the water extract of the plant in experimental animal models (anti-inflammatory action by carrageenan-induced rat paw edema, the analgesic activity by acetic acid-induced writhing response method. The water extract of *I. asarifolia* in doses of 37.5, 75 and 150 mg/kg showed 64.7, 70.5 and 73.6% inhibition of paw edema, respectively, at the end of 3 h and in acetic-induced writhing, the percentage protection was 45, 58.1, and 60.7%, respectively. These showed dose-dependent action in all the experimental models. The present study indicates that *I. asarifolia* has significant anti-inflammatory and analgesic properties.**

Key words: *Ipomoea asarifolia*, anti-inflammatory activity, rat paw oedema, antinociceptive activity, pain models.

INTRODUCTION

Over the years, medicinal plants have been found useful in the treatment and management of various health problems. Even with recent advances in modern medicine, traditional medicine practice is gaining more followership. This can be attributed to limited access to modern health facilities especially in rural settlements, where traditional medicine has carved a niche for itself and the fact that excellent modern medical practice is gradually getting out of the reach of the ordinary citizen especially in Africa and Asia where poverty is eating through the land. The situation thus requires an urgent elucidation of the scientific basis of action of most of these medicinal plants in a bid to verify the various claims asserted by local user. Traditional medicine has also increased in developed countries (Iyadi et al., 2005).

Ipomoea asarifolia (Desr) belongs to the family Convolvulaceae, a hairless succulent perennial, trailing on the ground usually several meters long. It reproduces from seeds and stem shoots. The stem is solid near the

base but hollow nearer the top of the plant. It has fine longitudinal lines, without hairs or only sparingly hairy. A common weed of hydromorphic soils, low-lying and inland valleys, streams and riverbanks (Okezie, 1998). The various parts of this plant are used locally in the alleviation of inflammation and painful conditions (personal communication).

This study is aimed at standard scientific evaluation of these traditional uses of the plant.

MATERIALS AND METHODS

Collection and identification of plant

The plant (*I. asarifolia*) material was collected in May 2006 from the Panhauya area of Zaria, Kaduna State, Nigeria. The voucher specimen's number 6958 is available at the Herbarium Unit, Department of Biological Sciences, Ahmadu Bello University, Zaria, Kaduna state, Nigeria.

Extraction of plant material

The plant (*I. asarifolia*) aerial part was air dried at room temperature

*Corresponding author. E-mail: ulawal@umyu.edu.ng.

for two weeks. The aerial part was powdered using pestle and mortar. The powdered plant material was then stored in plastic container, and kept in cool dry place until required for further use. 270 g of the powdered material was then extracted using water by maceration method. The extract was concentrated using water bath at a reduced temperature.

Animals

Wistar albino rats weighing 150 - 200 g and Swiss albino mice weighing 25 - 30 g of both sex were procured from the animal house, faculty of pharmaceutical sciences of the University. They were housed in standard polypropylene cages and kept under controlled room temperature ($24 \pm 20^\circ\text{C}$; relative humidity 60 - 70%) in a 12 h light-dark cycle. The rats were given a standard laboratory diet and water *ad libitum*.

Statement on the use of animals

The university ethics committee on the use of animals approved all experimental protocols.

Phytochemical tests

The water extract was subjected to phytochemical tests to detect the various types of chemical constituents present using standard procedures (Evans, 1996).

Acute toxicity

Studies was carried out intraperitoneal (IP), using the method described by Lorke (1983).

Writhing test

The Siegmund et al. (1957) technique modified by Koster et al. (1959) was adopted. Five groups were used for this experiment with five animals per group. After treatment with the (IA) water extract (37.5, 75 and 150 mg/kg i.p.) making groups 1 - 3, with a 4th group as positive control (Ketoprofen; 10 mg/kg i.p. body weight), another group (5th) served as the control in which normal saline was administered (negative control). After 30 min, each mouse was injected with 0.6% acetic acid, in a volume of 10 cm³/kg i.p. body weight. The number of writhing responses was recorded for each animal during a subsequent 10 min period after 5 min latency period using a tally counter. The percentage inhibition was calculated using the formula:

$$\text{Inhibition (\%)} = \frac{\text{Mean number of writhing (control)} - \text{Mean number of writhing (test)}}{\text{Mean number of writhing (control)}} \times 100$$

ANTI-INFLAMMATORY STUDIES

Carrageenan-induced paw oedema

The test was conducted according to the method described by Winter et al. (1962). The rats were pre-treated with the (*I. asarifolia*) water extract (37.5, 75 and 150 mg/kg i.p. body weight) making groups 1 - 3, positive control as 4th group (Ketoprofen; 10 mg/kg i.p. body weight), another group (5th) serves as negative control. 30 min

later, 0.1 cm³ of freshly prepared carrageenan suspension (1% w/v in 0.9% normal saline) was injected into the sub plantar region of the left hind paw of each rat. The paw diameter was measured with the aid of vernier caliper at 0, 1, 2, 3, 4 and 5 h after injection of carrageenan. Five groups were used for this experiment with five animals per group.

Statistical analysis

The data were presented as mean \pm standard deviation or standard error of mean. Significance between control and treated groups was tested by ANOVA.

RESULTS

Phytochemical tests

Phytochemical tests showed the presence of carbohydrates and saponins mainly with small quantity of flavonoids and tannins.

Acute toxicity study

The intraperitoneal (IP) LD50 values of the water extract of *I. asarifolia* in mice was found to be 774.6 mg/kg body weight.

Anti-inflammatory activity of the aerial part of *I. asarifolia*

In the acute inflammatory model, the plant extract was able to reduce the paw oedema significantly ($P < 0.05$) by (37.5, 75 and 150 mg/kg i.p.) and showed maximum inhibition of oedema by 57.1, 61.9 and 76% at the end of 3 h. The extract also showed a dose dependent inhibitory effect on the paw oedema (Table 1).

Analgesic activities of water extract *I. asarifolia*:

The water extract of *I. asarifolia* (37.5, 75 and 150 mg/kg i.p.) showed a significant ($P < 0.05$) antinociceptive effect in the treated mice (Table 2). The anti-nociceptive effect was dose dependent having a dose-pain reduction effect of 62.7, 66.7 and 73.3% for 35, 75 and 150 mg/kg i.p. of the extract, respectively.

DISCUSSION

In this study, we attempted to use scientific methods to elucidate the antinociceptive and anti-inflammatory properties of *I. asarifolia* to justify its use in folk medicine. The data obtained clearly indicated that the plant extract has anti-inflammatory activity by significant responses it showed on inhibiting the formation of edema after

Table 1. Effect of water extract of *I. asarifolia* on carrageenan induced rat paw oedema.

Group (n = 5)	Dose (mg/kg)	Mean oedema volume (M) and percentage inhibition (H%)									
		1 h		2 h		3 h		4 h		5 h	
		M	%H	M	H%	M	%H	M	%H	M	%H
Normal saline	-ve control	0.16 ± 0.01		0.20 ± 0.03		0.21 ± 0.01		0.20 ± 0.01		0.18 ± 0.02	
Ketoprofen (10 mg/ml)	+ve control	0.12 ± 0.01	25*	0.13 ± 0.01	35*	0.11 ± 0.01	48*	0.10 ± 0.02	50*	0.11 ± 0.01	39
Aqueous extract	150	0.11 ± 0.01	31.2	0.07 ± 0.01	60*	0.06 ± 0.01	71*	0.06 ± 0.02	70*	0.06 ± 0.01	66.7*
	75	0.14 ± 0.04	12	0.09 ± 0.03	55*	0.07 ± 0.01	66.7*	0.07 ± 0.01	65*	0.08 ± 0.01	55.5*
	37.5	0.11 ± 0.01	31	0.09 ± 0.01	55*	0.08 ± 0.01	61.7*	0.07 ± 0.01	65*	0.09 ± 0.01	50*

One way ANOVA* P < 0.05 P < 0.001 P < 0.01 when compare to normal saline, F = 30, F = 20, F = 10 and F = 9.0. Each value is the mean ± SEM of 5 rats.

Table 2. Effect of water extract of *I. asarifolia* on acetic acid induces writhes in mice (n = 5).

Drugs/treatment	Dose (mg/kg)	Writhing (mean ± S.E.M)	Inhibition (%)
Control		15 ± 1.97	-----
Kitoprofen	10	4.0 ± 0.39*	76
Aqueous extract	150	4.0 ± 0.39*	73.3
Aqueous extract	75	5 ± 0.63*	66.7
Aqueous extract	37.5	5.6 ± 0.77*	62.7

*Significant (P < 0.05) reduction of writhes.

carrageenan subplantar injection. A dose dependent anti-inflammatory effect against acute inflammation. The activities of the extract against acute inflammation suggest a possible anti-phlogestic effect. Acute inflammation may last for relatively shorter duration, ranging from few minutes to few days. Exudation of fluid and plasma proteins, emigration of leukocytes and predominantly neutrophils are characteristic changes (Amico-Roxas et al., 1985).

The acetic acid induced writhing reflex was used to elucidate central peripheral antinociceptive effects. Acetic acid causes inflammatory pain by inducing capillary permeability (Raj, 1996) and liberating endogenous substances that excite pain nerve endings (Fields, 1987). Nonsteroidal anti-

inflammatory drugs (NSAIDs) can inhibit cyclooxygenase (COX) in peripheral tissues and therefore, interfere with the mechanism of transduction of primary afferent nociceptors. The mechanism of analgesic effect of *I. asarifolia* could probably be due to blockade of the effect or the release of endogenous substances that excite pain nerve endings similar to that of indomethacin and other NSAIDs. The extract shows a dose dependent significant antinociceptive effect, which was peripheral. The result obtained indicates that the extract has some degree of anti-nociceptive and anti-inflammatory activity just like most non-steroid anti-inflammatory agents (NSAIA). Some drugs are known to have clinically effective analgesic and anti-inflammatory properties. This is

well documented for various non-steroidal anti-inflammatory drugs (NSAIDs) especially with salicylates and their congeners (Reuse, 1978; Famaey, 1983). This thus justifies the traditional indication of the plant for inflammation and pains such as sprains, bursae, wounds, spasmodic colic's, rheumatic arthritis.

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