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Short Communication

Antinociceptive and anti-inflammatory properties of *Vernonia pauciflora* Willd. (Asteraceae) Ethanol Extracts

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Analgesic and anti-inflammatory properties of *Vernonia pauciflora* crude ethanol extract were studied in order to verify the antinociceptive and anti-inflammatory effect. The preliminary phytochemical screening of the leaf extract revealed that it contained cyanogenetic glycosides, flavonoids, terpenes with no trace of alkaloids. The analgesic screening of the extract against acetic acid-induced writhing in mice showed that the plant have a significant dose-dependent antinociceptive effect, with inhibition of 78.9% at 100mg/kg compared to that of the standard drug ketoprofen at 10 mg/kg which have 83.3%. Anti-inflammatory evaluation on the other hand against carrageenan-induced paw oedema in Swiss albino male mice showed also a dose-dependent anti-inflammatory effect with inhibition of 68.31% when compared to the that of the standard drug ketoprofen at 10 mg/kg with 71.50%. The values obtained in both studies were not significantly different from that of the standard drug. The study showed that the *V. pauciflora* was effective in pain reduction (analgesia) and a good anti-inflammatory agent, and this supports the claim in traditional medicine.

Key words: *Vernonia pauciflora*, antinociceptive, anti-inflammatory, ketoprofen, Carrageenan, acetic acid-induced.

INTRODUCTION

Vernonia pauciflora Willd. (or *V. galamensis* Cas.), commonly called 'iron weed', is an erect leafy annual herb up to 90 cm high and reproduces by seed. It is hairy and woody at the base with thread-like lines that are parallel. The fruit is a black achene with hairy pappus (Keay, 1989 and Akubundu, 1998). It is a short-day plant because most of the plant receives 5 to 10 short days of 11 h light and 13 h dark light (Keay, 1989).The plant is a weed of the Guinea and Sudan savannah zones that is widespread in West Africa in grain legume fields and fallows (Akubundu, 1989), and are mostly distributed in Ethiopia, Somalia, Sudan, Kenya, Tanzania, Uganda, Cameroon, Benin, Gambia, Nigeria, Senegal, Mozambique and Malawi (Hutchison, 1963). The seeds contain an oil rich in epoxy fatty acids used in plastics and additives in polyvinyl chloride (PVC) resins and also reduces pollutants (Ayorinde et al., 1990). It was reported to contain tannins, anthracenes, flavonoids, steroid glycosides and saponins (Adown, 2004). It is locally used, for treating various ailments in Nigeria, such as

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Table 1. Effect of *V. pauciflora* ethanol extract and ketoprofen on acetic acid-induced writhing in mice.

Group	Treatment	Dose (mg/kg)	Mean no abd contr/10min ± SEM	Percentage inhibition (%)
1	Normal saline		22.75±5.76	-
2	Kt	10	3.8±0.34	83.3
3	VE	25	8.8±0.86	61.34
4	VE	50	7.2±0.37	68.4
5	VE	100	4.8±0.37	78.9

* kt (ketoprofen), VE (*V. pauciflora* extract), abd (abdominal), p <0.01.

pain, swelling, sores, heart burns, among other uses. Therefore, we evaluated the pain reducing potency and the anti-inflammatory properties of the whole plant in laboratory animals in order to certify the traditional use of the plant in folk medicine.

MATERIALS AND METHODS

Collection, identification, and extraction of plant material

The whole plant was collected from Ogurugu, South Eastern Nigeria. A *voucher number 373* was identified by Mr. Adamu of the herbarium unit of the department of biological sciences, Ahmadu Bello University, Zaria, where it was deposited. The air-dried plant of *V. pauciflora* (200 g) was extracted successively with 95% v/v ethanol for 24 h by cold maceration techniques, concentrated, weighed and stored in desiccators prior to use. The percentage yield was 10% (w/w) and prepared into solution for administering to the mice via intraperitoneal route (i.p).

Acetic acid-induced writhing in mice

The method described by Koster et al., (1959) was used. Twenty five Swiss albino male mice were each weighed and divided into 5 groups of 5 animals each. Animals from group one (negative control) were administered intraperitoneally (i.p) with saline, group two (positive control) were administered with ketoprofen 10 mg/kg (i.p), while groups 3, 4 and 5 were given (i.p) 25 mg//kg, 50 mg/kg and 100 mg/kg of the ethanol extract respectively. After 30 min, the animals were given (i.p) acetic acid 0.6% v/v, and observed for abdominal contraction by viewing the animals on the abdomen for contraction of abdominal muscle using hand lens for 10 min after a stimulation period of 5 min. Percentage inhibition of writhing was calculated using:

$$\% \text{ Inhibition} = \frac{\text{MnWc - MnWt}}{\text{MnWc}} \times 100$$

Where, MnWc = mean number of writhing negative control
MnWt = mean number of writhing treated

Carrageenan-induced Paw Oedema in Mice

Carrageenan was administered to the paw of the animals to manifest oedema, and followed by test drug which was given in the presence of the positive control (ketoprofen). The animals were also divided into 5 groups of 5 animals per group. Group one is the negative control (normal saline) and group 2 is the positive control (ketoprofen 10 mg/kg) given i.p. Groups 3, 4 and 5 were each given 25 mg/kg, 50 mg/kg and 100 mg/kg of the crude extract. Acute inflammation was produced by sub-planar administration of 0.1 ml 1% carrageenan in the right hind paw of the animals in all the groups. Paw volumes were then measured at 0, 1, 2, 3 and 4 h after carrageenan injection, using vernier callipers (Winter et al., 1962).

RESULTS AND DISCUSSION

Acetic acid - induced writhing test is commonly used as an experimental animal model for antinociception. This method is very sensitive, and able to detect anti-nociception at doses that may appear to be inactive in other analgesic screening procedures (Collier et al., 1968). The effect of *V. pauciflora* ethanol extract against writhing caused by acetic acid (Table 1) showed decreased production of irritant such as prostaglandins and blocking the pain sensitizing mechanism, induced by bradykinin, interleukin and other analgesic substances. The inhibition was obtained with dose 100 mg/kg (Table 1). Anti-nociceptive activity of *V. pauciflora* was in dose-dependent fashion. Carrageenan induced oedema is an experimental model for acute in-inflammation which is biphasic; the first phase is mediated by the release of histamine and serotonin in the early stage followed by kinine, and then prostaglandins (Castro et al., 2013). Clinical symptoms of inflammation have been recognized as swellings, redness, pains, as indicated by oedema (swelling) caused by Carrageenan injection. Anti-inflammatory agent must be able to reduce these pains to make them potent drug. Anti-inflammatory activities were highest at 100 mg/kg and lowest at 25 mg/kg doses, and it is dose-dependent (Table 2). The study showed that ethanol extract of *V. pauciflora* had anti-nociceptive and anti-inflammatory properties which were dose-dependent; that is , it can be used to reduce pains, swellings, redness e.t.c, thus provide a good source for new drug development.

CONCLUSION

The study showed that ethanol extract of *V. pauciflora* is

Table 2. Effect of *V. pauciflora* ethanol extract and ketoprofen in carrageenan-induced paw oedema in mice.

Group	Treatment	Dose (mg/kg)	Paw diameter ± SEM(mm)				% Inhibition
			1h	2h	3h	4h	
1	Normal saline	-	1.64±0.09	2.36±0.08	3.04±0.14	2.24±0.13	-
2	Kt	10	0.60±0.13	0.86±0.07	0.68±0.10	0.50±0.03	71.55
3	VE	25	0.80±.17	1.4±0.16	1.54±0.21	1.42±0.16	44.40
4	VE	50	0.68±0.15	0.92±0.19	0.94±0.10	0.76±0.15	64.40
5	VE	100	0.68±0.10	0.78±0.08	0.86±0.12	0.58±0.09	68.75

* kt = ketoprofen, VE = *V. pauciflora* extract, h (s) = h, p.<.0.01 (t-test).

used as an anti-nociceptive and anti-inflammatory drug in traditional medicine, and justifies its use in folk medicine. Conclusively, there is the need to determine the component that showed these properties using column chromatographic techniques or other advanced methods.

Conflict of Interest

The authors have not declared any conflict of interest.

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