EFFECTS OF ENANTIA CHLORANTHA EXTRACTS IN LABORATORY INDUCED CONVULSION AND INFLAMMATION

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SUMMARY

Objective: It was decided to investigate the effect of boiled and evaporated extracts of *enantia chlorantha* in reversing bicucculine-induced convulsions and carrageenan-induced inflammation in rodents.

Methods: For the anticonvulsant study, intra-peritoneal doses of 130.0 – 550.0mg/kg of the herbal preparation, or 2 -6mg/kg of phenobarbitone, or distilled water were administered to groups of the animals (15 – 20g, n = 10) prior to the injection of 7.5mg/kg bicucculine 30minutes later. The latent period before the onset of convulsions in each group of animals was determined.

For the anti-inflammatory study, intra-peritoneal doses of either 50.0 – 250.0mg/kg of various extracts of the herbal preparation or 30 – 100mg/kg aspirin or distilled water was administered to groups of rats of either sex (200 – 250g, n = 10). Each of the groups of rats then received 0.1ml of 1% of carrageen into the plantar tissue of the right hand paw. The resultant inflammatory oedema was assessed by measuring the percentage increase in the paw diameter.

Results: While the evaporated aqueous herbal drug increased the latency of convulsion in all the treated animals, the aqueous extract did not, behaving rather similar to the control mice given distilled water. *E. chlorantha* did not compare well with phenobarbitone (2.0 – 6.0mg/kg) which protected all the animals from seizure.

On the other hand, a dose dependent anti-inflammatory action of evaporated extract of *E. Chlorantha* (50.0 – 250.0mg/kg) in carrageenan induced inflammation was obtained showing a better efficacy than the boiled aqueous preparation and compared favorably with aspirin. *E. chlorantha* showed statistically significant activity at doses of 100.0 and 250.0mg/kg, exhibiting 67% and 90% inhibition respectively post 6h induction of inflammation. No inhibition was observed in the control group.

Conclusion: *E. chlorantha*, especially the evaporated extract, exhibited significant anti-inflammatory effect on carrageenan-induced inflammatory oedema in rats. This effect is more gradual and more sustained than a similar effect of aspirin.

E. chlorantha also prolonged the latency of bicucculine-induced convulsions in rats.

Key Words: *Inflammation, Convulsion, Enantia-Chlorantha extract*

INTRODUCTION

E. chlorantha is a medicinal plant which is commonly found along the Western coast of Africa. The main local use of the herb is as an anti-malarial drug and users have claimed its efficacy in the treatment of *Plasmodium falciparum* malaria and that they are usually relieved from malaria symptoms within 48 hours of therapy[1]. While its anti-malarial, ani-pyretic and analgesic effects have already been scientifically elucidated and documented[2,3] other effects have not been so studied. For instance, the bark of *E.chlorantha* has also been used in treating hepatic disorders[4].

The present study aimed at investigating its potential in reversing laboratory induced convulsion and inflammation, subsequent to previous observations of its effects in laboratory investigations.

MATERIALS AND METHODS

The plant was obtained as previously described[2].

A measured quantity (500.0g) of the dried bark of the plant, *Enantia chlorantha,* was boiled in 2.5L of distilled water for 2h on a hot plate at 100±2°C. The resultant decoction was allowed to cool, decanted and filtered using Whatman filter

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paper (18.0cm). This constituted the aqueous extract.

A measured portion (350.0ml) of the latter decoction was thereafter evaporated to dryness in a Petri-dish, on a hot plate. The resultant dark-brown granules were weighed and 0.8g suspended in 5.0ml distilled water, stirred and then filtered to make a concentration of 160.0mg/ml. This was labeled as the evaporated extract.

Investigation of *E. chlorantha* effects on bicucculine induced convulsion

Preliminary investigation was conducted to determine the dose range of the herbal drug that would protect the animals from seizures as well as the latency, that is, the time interval between administration of bicucculine (British Drug House Ltd, London – England) and the onset of convulsion. Thereafter, groups of albino mice of either sex (15 – 20g, n = 10) were separately administered with 130.0 – 550.0mg/kg of *E. chlorantha* and 2.0 – 6.0mg/kg phenobarbitone respectively. Thirty minutes later, they were all challenged with 7.5mg/kg bicucculine. For control, a similar group of animals received the same quantity of bicucculine after pre treatment with distilled water.

Investigation of *E. chlorantha* effects on carrageenan induced inflammation

The test was based on the procedure described by earlier workers[5,6].

Groups of rats of both sexes (200 – 250g n = 10) received an intra-peritoneal injection of either 50.0 – 250.0mg/kg of the evaporated extract, or 85.0mg/kg of the aqueous extract, or 30.0 – 100.0 mg/kg aspirin or distilled water, 30 minutes before injection of a phlogistic agent (0.1ml 1% carrageenan) into the plantar tissue of the right hand paws. Percentage increases in paw diameter as well as inhibition were thereafter determined.

RESULTS

Animals pre-treated with 130.0 – 550.0mg/kg of the aqueous extract convulsed within 0.5 min. post-administration of 7.5mg/kg bicucculine. A similar response was observed in the controls. However, the evaporated extract of *E. chlorantha* prolonged the latent period between the injection of bicucculine and onset of convulsion in the animals pre-treated with it. The least dose of *E. chlorantha* employed in the study protected the animals for an average time of 1.5 minutes, whereas the highest dose, 550.0mg/kg could abolish convulsion for 3.2 minutes (table 1). Phenobarbitone gave a mean latency greater than 30 minutes.

Table 1
Mean Latency in Bicucculine-induced Convulsion in Animals Pre-treated with *Enantia chlorantha* and Phenobarbitone

Agent	Dose (mg/kg)	Mean Latency (Min)	% Inhibition
Distilled Water		1.03	
Aqueous *E. chlorantha*	350.0	1.01	0.72
Evaporated *E. Chlorantha*	130.0	1.50	21.0
Evaporated *E. Chlorantha*	270.0	1.70	29.0
Evaporated *E. Chlorantha*	412.0	1.90	35.5
Evaporated *E. Chlorantha*	451.0	2.06	45.0
Evaporated *E. Chlorantha*	550.0	3.20	100.0
Phenobarbitone	6.0	>30.00	

On the other hand, the inflammatory oedema induced by carrageenan in the control rat paws reached maximum size 4h post injection and thereafter, gradually reduced but could not return to the basal size even 24h post therapy. *E. chlorantha* was found to arrest the oedema thereby resulting in reduction of rat paw size.

Table 2
Mean Paw Size in Rats Pre- Treated with *E. chlorantha*

Rat Group	Dose	Mean Rat Paw Size cm± Standard Error of Mean over 24h period							
		0 h	1h	2h	3h	4h	5h	6h	24h
Control		2.4±0.09	2.9±0.14	3.3±0.12	3.7±0.1	3.8±0.09	3.7±0.08	3.5±0.08	3.0±0.09
Evaporated *E.chlorantha*	100.0mg/kg	2.3±0.05	2.6±0.04	2.9±0.12	3.2±0.04	3.25±0.23	3.2±0.02	2.7±0.04	2.4±0.02
Evaporated *E.chlorantha*	250.0mg/kg	2.9±0.04	3.22±0.05	3.4±0.04	3.37±0.02	3.22±0.03	3.1±0.12	3.0±0.02	2.9±0.03
Aqueous *E. chlorantha*	85.0mg/kg	2.3±0.06	2.6±0.08	2.8±0.02	3.2±0.04	3.25±0.05	3.1±0.12	2.7±0.14	2.5±0.09
Aspirin	60.0mg/kg	2.4±0.29	2.7±0.1	3.0±0.12	3.25±0.15	3.22±0.14	3.0±0.09	2.7±0.08	2.5±0.09
Aspirin	100.0mg/kg	2.8±0.07	3.1±0.03	3.32±0.05	3.3±0.4	3.25±0.07	3.2±0.04	3.0±0.02	2.9±0.05

Apart from the observed anti-inflammatory action of the herbal drug, it also returned the rat paw size to its original size 24h post treatment (table 2). The evaporated extract was found to be more potent than the aqueous preparation and was also observed to compare well with aspirin (tables 3 and 4).

Table 3
Mean Change in Hind Paw Oedema in *E. chlorantha* and Aspirin Pre-treated Rat

Agent	Dose	Mean Change (cm) in Hind Paw size over a 24h Period						
		1h	2h	3h	4h	5h	6h	24h
Control		0.52	0.95	1.3	1.42	1.53	1.1	0.68
Evaporated *E. chlorantha*	100mg/kg	0.27	0.65	0.87	0.92	0.07	0.37	0.1
Evaporated *E. chlorantha*	250.0mg/kg	0.3	0.5	0.45	0.32	0.28	0.1	0.05
Aqueous *E. chlorantha*	85.0mg/kg	0.32	0.57	0.9	0.9	0.8	0.55	0.15
Aspirin	60.0mgkg	0.3	0.6	0.82	0.8	0.5	0.35	0.07
Aspirin	100.0mg/kg	0.25	0.47	0.45	0.4	0.35	0.2	0.07

Table 4
Mean % Inhibition of Carrageenan-Induced Oedema in Rat Paw by *E. chlorantha*

Agent	Dose	Mean % Inhibition of Oedema over a 24h Period						
		1h	2h	3h	4h	5h	6h	24h
Evaporated *E. chlorantha*	100mg/kg	48	31	33	35	47	67*	85
Evaporated *E. chlorantha*	250mg/kg	42	47	65	77	78	90*	92
Aqueous *E. chlorantha*	85mg/kg	38	40	30	36	39	50	78
Aspirin	60mg/kg	42	36	37	43	62	68	88
Aspirin	100mg/kg	52	50	65	71	73	82	89

***p<0.05**

DISCUSSION

The result of the present investigations showed that *E. chlorantha* exhibited a significant anti-inflammatory property and it is also able to slightly prolong the latency in bicucculine induced convulsion. Although its effect on induced convulsion was less than that of phenobarbitone, this shortfall could probably be adduced to its crudity. It is envisaged that the activity of the herbal drug would be improved by purification. However, further investigation is required to confirm this.

The mechanism of prolongation in latency has not been elucidated. It is projected to act through the same mechanism as phenobarbitone

since it has been found to produce sedation in animals[2].

Concerning its anti-inflammatory property, *E. chlorantha* especially the evaporated preparation compared well with aspirin (60.0 and 100.0mg/kg, tables 2 – 4). The mechanism of its anti-inflammatory effect is yet to be elucidated but it is thought to act in a similar manner as the non-steroidal anti-inflammatory drugs, some of which, as exemplified by the salicylates, are also analgesics and anti-pyretics. Furthermore, the bark of the willow plant, which is the source of the salicylates, contains a glycoside which is responsible for the anti-inflammatory, analgesic and anti-pyretic action of salicylates[7]. *E. chlorantha* has also been found to contain glycosides[8].

Lastly, it was shown in table 4 that *E. chlorantha* (250.0mg/kg) exhibited 92% mean inhibition of carrageenan induced oedema in rats 24h post therapy whereas aspirin could only achieve 89%. This implies that *E. chlorantha* has a gradual and more sustained anti-inflammatory effect than aspirin.

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