Afr. J. Trad. CAM (2005) 2 (2): 122 - 128

Afr. J. Traditional,
Complementary and Alternative Medicines
www.africanethnomedicines.net

Research Paper

ISSN 0189-6016©2005

EVALUATION OF ANALGESIC, ANTICONVULSANT AND HYPNOTIC ACTIVITIES OF P*YRENACANTHIA STAUNDTII*

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Abstract

An Aqueous leaf extract of *Pyrenacanthia Staundtii* (AqPs) was studied for central nervous activities. The extract (100.0 – 400.0 mg/kg i. p). significantly ($p<0.05$) inhibited acetic-acid induced abdominal constriction, and both the early and or late phases of formalin-induced paw licking in mice. AqPs (100-400mg/kg i.p.) also demonstrated a protective effect against strychnine-induced convulsion. The extract potentiated the hypnotic effect of hexobarbitone following i.p. injection at the dose levels studied. The results suggested that AqPs possesses potential analgesic, anticonvulsive and hypnotic properties.

Keywords: *Pyrenacanthia staundtii,* Analgesic activity, Anticonvulsive, Hypnotic effects.

Introduction

Pyrenacanthia Staundtii (Engl) (Icacinacae) is used traditionally for blenorrhoea in Congo (Brazaville). The leaf is used as analgesic for instestinal pain and for hernia. The medication is partly by mouth and partly by topical dressing at the point of pain (Dalziel, 1948; Oliver-Bever, 1986). The leaf extract of the plant has been reported for its anti-inflammatory, anti-ulcer, anti-hypertensive and anti-schistosomiasis activities (Aguwa and Okunji, 1986). Information gathered from local people where the plant was collected revealed that the leaves of plant are useful to sedate or induce sleep in people with insomnia.

Here, we report the central nervous activities of aqueous leaf of *Pyrenacanthia Staundtii* using animal model.

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Materials and methods

Plant Material

P. Staundtii leaves were collected from a village near Ilesha in Southwest Nigeria. The plant sample was identified at the herbarium of the Federal Institute of Forest Research, Ibadan where voucher specimen was deposited with voucher No 106886.

Preparation of Extract

Air-dried and powered leaves (120g) were extracted by maceration in distilled water for 24h. This was evaporated under reduced pressure to give a yield of 17.2%. of the starting material.

Animals

Male Swiss mice (weighing 20 24 g) were used. The animals, bred and house under standard environment condition in the Department of Pharmacology and Therapeutics, College of Health Sciences, Ladoke Akintola University of Technology, were fed with standard diet (Ladokun Feeds Ltd., Ibadan) and water *ad libitum.*

Acetic-acid induced writhing in mice

The test was carried out using the method of Koster et al. (1959). Different concentrations of the extract (100.0, 200.0 and 400.0 mg/kg) were given intraperitoneally. Thirty minutes after treatment, the mice were injected intraperineally with 0.2 ml of 0.6% acetic acid solution to induce characteristic writhing. The number of writhings occurring between 5 and 15 min after injection were recorded. Indomethacin (5.0 mg/kg i.p) was used as a reference drug while animals in the control group received normal saline.

Formalin-induced paw licking in mice

The method of Hunskar and Hole (1987) was used. Twenty microlitres of 1% formalin was injected into the dorsal surface of the left paw of mice. Thirty minutes (30 min) after intraperitoneal administration of the extract (100.0, 200.0 and 400.0 mg/kg), indomethacin (5.0 mg/kg i.p.) or normal saline (10.0 ml/kg), the time spent licking the injected paw was recorded. Animals were observed for the first 5 min post-formalin (early phase) and for 10 min starting at 20 min post-formalin (late phase).

Picrotoxin-induced convulsion in mice

The method described by Elisha et al (1988) was used. Picrotoxin 10.0 mg/kg was injected i.p. Thirty minutes after i.p. injection of the extract (100.0 – 400.0 mg/kg) or normal saline (10 ml/kg), the animals were observed for tonic convulsion and 24h period to note lethality.

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Strychnine-induced convulsion in mice

The method used was as described by Elisha et al. (1988). Strychnine 3.0 mg/ kg was injected i.p. Thirty minutes after i.p injection of the extract (100.0 – 400.0 mg/kg) normal or saline 10 ml/kg, the animals were observed for tonic convulsion and 24 h period to note lethality.

Hexobarbitone-induced sleep in mice

The method described by Leite et al (1982) was used. Hexobarbitone 85.0 mg/kg was injected i.p. Thirty minutes after i.p injection of extract (100.0 – 400.0 mg/kg) or normal saline 10 ml/kg, loss of righting reflex was employed to detect the onset of hypnosis, while the return of this was used as index of awakening.

Statistic Analysis

Values are expressed as mean $\pm$ S.E.M. Statistical significance was determined using the student t-test. Values with ($p < 0.05$) were considered significant.

Results and Discussion

The aqueous leaf extract of *Pyrenacanthia Staundtii* (100.0 – 400.0 mg/kg, i.p). exhibited a significant and dose-dependent analgesic activity in the acetic-acid induced writhing activity in mice (Table 1). The possible effect of *P. staundtii* was evaluated by its effect on paw licking induced by formalin. The test possesses two distinct phases, reflecting different types of pain (Elisabetsky et al., 1995). The early phase reflects a direct effect of formalin on nociceptors (neurogenic pain) whereas the late phase reflects tissue injury or inflammatory pain (Hunskar and Hole 1987, Elisabetsky et al., 1995). The extract produced significant anti-nociceptive effect in both phases (Table 2). This probably suggests or indicates that the extract exerts its analgesic effect through both peripheral inhibitory actions on released prostagladins (inflammatory pain) and central activity relates to antagonistic action of the nociceptors (neurogenic pain). (Goodman and Gilman 1996)

The extract was further tested for anti-convulsant activity and potentiation of hexobarbitone induced sleep. Pretreatment of animals with 400 mg/kg of the extract and injection of strychnine (3 mg/kg i.p) showed 40% protection against strychnine-induced convulsion (Table 3). However, treatment with pictrotoxin (10 mg/kg i.p) did not afford any protection (Table 4). Strychnine has been shown to induce convulsion by modulation of action of glycine on inhibitory neurotransmitter (Zbinderg and Randall 1967, Curtis et al., 1971, Ryall 1975, Gnyther and Curtis 1986). However, the extract blocked the convulsion induced by strychnine indicating the involvement of glycinergic transmission. Picrotoxin is reported as GABA receptors antagonist (Costa et al., 1975; Macdonald and Maclean, 1982) inducing convulsion, but the extract failed to block the convulsion induced by this agent. This indicates that the extract is not facilitating the GABA-ergic transmission.

Treatment of animals with extract caused potentiation of hypnotic effect produced by hexobarbitone (Table 5). Sedation in animals with extract increases with the dose. Thus, on

Table 1: Effect of *P. staundtii* leaf aqueous extract on acetic-acid induced writhings in mice.

Treatment	Dose (mg/kg i.p.)	Total Number Writhings [a]	Inhibition (%)
Control (Saline 10ml/kg i.p)		10.8 ± 2.77	-
P. Staundtii	100	5.8 ± 6.8*	46.3
P. Staundtii	200	2.0 ± 2.7*	81.5
P. Staundtii	400	0.6 ± 0.8*	94.4
Indomethacin	5	3.30 ± 0.8*	70.3

[a] Values are mean + SEM (n = 6) * P < 0.05 Vs control. Student's t – test.

Table 2: Effect of *P. staundtii* leaf aqueous extract on formalin - induced paw licking in mice.

Treatment	Dose (mg/kg i.p.)	Licking time [(a)] (S)	
		Early Phase	Late Phase
Control (Saline 10ml/kg i.p)		67.2 ± 3.70	24 ± 2.23
P. Staundtii	100	24.6 ± 2.7*	17.2 ± 1.3*
P. Staundtii	200	16.0 ± 1.6*	7.0 ± 1.6*
P. Staundtii	400	4.8 ± 3.1*	0.8 ± 1.1*
Indomethacin	5	21.2 ± 2.0*	9.8 ± 2.0*

[a] Values are mean + SEM (n = 6) * P < 0.05 Vs control. Student's t – test.

Table 3: Effect of *P. staundtii* leaf aqueous extract on picrotoxin-induced convulsion in mice.

Treatment	Dose (mg/kg i.p.)	Latency of Tonic Convulsion (min) [a]	Latency of Death (min) [a]	% Protected	% Mortality
Control (Saline 10ml/kg i.p)	-	2.84 ± 0.8	4.6 ± 1.1	0.0	100.0
P. Staundtii	100	2.84 ± 0.8	4.40 ± 0.5	0.0	100.0
P. Staundtii	200	2.40 ± 1.1	4.40 ± 0.5	0.0	100.0
P. Staundtii	400	2.40 ± 1.1	4.0 ± 1.0	0.0	100.0

[a] Values are mean + SEM (n = 6) * P > 0.05 Vs control. Student's t – test.

Table 4: Effect of *P. staundtii* leaf aqueous extract on strychnine-induced convulsion in mice.

Treatment	Dose (mg/kg i.p.)	Latency of Tonic Convulsion (min) [a]	Latency of Death (min) [a]	% Protected	% Mortality
Control (Saline 10ml/kg i.p)	-	3.8 ± 0.8	3.0 ± 0.8	0.0	100.0
P. Staundtii	100	4.0 ± 1.6	5.8 ± 1.3*	0.0	100.0
P. Staundtii	200	7.6 ± 3.0*	10.8 ± 4.4*	20.0	80.0
P. Staundtii	400	13.8 ± 4.0*	18.8 ± 5.8*	40.0	60.0

[a] Values are mean + SEM (n = 6) * P < 0.05 Vs control. Student's t – test.

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Table 5: Effect of *P. staundtii* leaf aqueous extract on hexobarbitone–induced sleep

Treatment	Dose (mg/kg i.p.)	Duration of Sleep (min) [(a)]
Control (Saline 10ml/kg i.p)	-	4.0 ± 0.5
P. Staundtii	100	5.4 ± 0.4
P. Staundtii	200	15.6 ± 0.8*
P. Staundtii	400	28.4 ± 1.2*

[a] Values are mean + SEM (n = 6) *P < 0.05 Vs control. Student's t – test.

the basis of these findings, we can conclude that the aqueous leaf extract of *Pyrenancanthia staundtii* possesses promising analgesic properties. Studies are in progress to chemically characterize the active ingredients of *P. staundtii* and further define the potential therapeutic benefit of the plant.

Acknowledgement

The authors are grateful to Mr. Olasore for collecting the plant.

References

1. Aguwa, C. N. and Okunji, C. O. (1986). Preliminary Pharmacological study of some Nigerian Medicinal Plants, J. Ethnopharmacol. **8:** 1:53-63.
2. Costa, E.., Guido, A., Mao, C. C. and Suria, A. (1975). New concepts on mechanism of action of benzodiazepine. Life Sciences, **17:** 167-186.
3. Curtis, D.R.; Duggan, A.W.; Felix, D.; Johnston, G.A.R. and Mclennan, H. (1971). Antagonism between bicuculline and GABA in the cat brain. Brain Res. **33:** 57-73
4. Dalziel, J. M. (1948). The Useful Plants of West Tropical Africa. *London Crow Agents.*
5. Elisabetsky, E., Amdor, T. A., Albuquerque, R. R., Numes, D. S. and Carvolho, A. C. T. (1995). Analgesic Activity of *Psychotria colorata* (Wild ex R & S) Muell Arg. Alkaloids, J. Ethnopharmacol.. **48:** 77-83.
6. Elisha, E., Al-Maliki S. and Ibrahem, D. K. (1988). Effects of *Jasmium officinale* Flower on the Central Nervous System of the Mouse: Int. J. Crude Drugs Res. **26:** 221-227.
7. Gnyther, D. D. and Curtis, D. R. (1986). Pyridazinyl GABA derivatives as GABA and glycine antagonist in the spinal cord of the cat. Neuroscience letters **68:** 585-587.
8. Goodman, L. S. and Gilman, A. S. (1996). Opioid analgesic and antagonists: In: the Pharmacological Basic of Therapeutics 9th edition Pp. 529-537.
9. Hunskar, S. and Hole, K. (1987). The Formalin Test in Mice: Dissertation between Inflammatory and Non-Inflammatory Pain: Pain **30:** 113-114.

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10. Koster, R., Anderson, M. and Delkeer, E. I. (1959). Acetic-acid for Analgesic Screening, Federation Proceedings **18:** 412.
11. Leite, J. R., Carlini, E. A., Lander, N. and Mechaulam, R. (1982). Anticonvulsant Effects of the (-) and (+) Isomers of Cannabind and Dimethyheptyl Homologs. Pharmacology **24:** 141-146.
12. Macdonald, R. L. and Maclean, M. J. (1982). Cellular basis of barbiturate and phenytoin anti-convulsant drug action, Epilepsia 23 suppl 7-18.
13. Oliver-Bever, B. (1986). In: Medicinal Plants in Tropical West Africa. London Cambridge University Press, 161.
14. Ryall, R. W. (1975). Amino acid receptor in CNS, GABA, Glycine spinal cord: In Handbook of Psychopharmacology (Inverse S.D. and Synder S.H.L. Planum Press New York Vol. 4, 84-128.
15. Zbinden G Randall L O. (1967). Pharmacology of Benzodiazepine: Laboratory and Clinical Considerations: Advance Pharmacol. **5:** 213-291.