WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.453
Volume 14, Issue 22, 21-29. Review Article ISSN 2277–7105

EVALUTION OF NOOTROPIC AND ANTICONVULSANT STUIES OF ETHANOLIC EXTRACT OF *CROTALARIA HEBECARPA* PLANT LEAVES

Ooviya P.*[1], Kavitha M.[2], K. L. Senthil Kumar[3]

[1]M. Pharm Final Year Student, Department of Pharmacology, Sri Vijay Vidyalaya College of Pharmacy, Nallampalli, Dharmapuri.

[2]Assistant Professor, Sri Vijay Vidyalaya College of Pharmacy, Nallampalli, Dharmapuri.

[3]Principal, Sri Vijay Vidyalaya College of Pharmacy, Nallampalli, Dharmapuri.

Article Received on 13 Oct. 2025,
Article Revised on 03 Nov. 2025,
Article Published on 16 Nov. 2025,

https://doi.org/10.5281/zenodo.17614543

***Corresponding Author**

Ooviya P.

M. Pharm Final Year Student, Department of Pharmacology, Sri Vijay Vidyalaya College of Pharmacy, Nallampalli, Dharmapuri.

How to cite this Article: Ooviya P.*, Kavitha M., K. L. Senthil Kumar. (2025) Evalution Of Nootropic And Anticonvulsant Stuies Of Ethanolic Extract Of Crotalaria Hebecarpa Plant Leaves. World Journal of Pharmaceutical Research, 14(22), 21–29.

ABSTRACT

Human learning may occur as part of education or personal development (http://en.wikipedia.org/wiki/Learning). In psychology, memory is an organism's mental ability to store, retain and recall past information. Traditional studies of memory began in the fields of philosophy, including techniques of artificially enhancing the memory. The late 19th and early 20th century put memory within the paradigms of cognitive psychology. The common cause of dementia is Alzheimer's disease, which is progressive neuro-degenerative disorder associated with loss of neurons in distinct areas of brain. The central cholinergic pathway plays a prominent role in learning and memory process. Since allopathic system of medicine is yet to provide a radical cure for dementia and it is worthwhile to look for new direction i.e. in ayurvedic system of medicine which was reported with many drugs to minimize the memory loss seen in elderly patients (Dhingra D *et al*., 2004). dementia in the elderly, about 5 million people in the United States are estimated to be afflicted by this disorder and the percentage approximately doubles with every 5 years of age with about 1% of 60 years old and about 30 % of 85 years olds having the disease (Guyton AC *et al*., 2006). Medicinal plants have served as sources of readily accessible, inexpensive, and effective medication since the earliest times known to man. Several ethnomedicinal plants have been found to possess neurobehavioral

profile and serve as alternative to modern medicine. The extract of showed significant dose dependent decrease ($p < 0.01$) in the symptoms of status epilepticus in rats. These were found to be similar to standard drug diazepam at dose of 10 mg/kg. That the relief from LT induced status epilepticus was observed from 45 min of administration in the Extract 200mg/kg group of extract. Then from 45 min to 150 min of observation shows a dose dependent decrease in convulsions. It is evident from the observations that the extract of *Crotalaria Hebecarpa* is potentially effective against the LT induced status epilepticus. The finding of this study which are evident from the observations, have shown that the ethanolic extract of *Crotalaria Hebecarpa* has potent anticonvulsant activity. This also justifies the use of vernacular and traditional medicines for the treatment of CNS related disorders such as epilepsy.

KEYWORDS: Dementia, Epilepsy, Nootropic, Diazepam.

INTRODUCTION

Dementia is a mental disorder characterized by loss of intellectual ability sufficiently severe that interfere with one's occupational or social activities. It is of several types and invariably involves impairment of memory. The common cause of dementia is Alzheimer's disease, which is progressive neuro-degenerative disorder associated with loss of neurons in distinct areas of brain. Nootropic means "acting on the mind", and nootropics are the substances found to have beneficial effects in the treatment of memory loss, age related memory decline and in lack of concentration. The substance piracetam (Nootropil®) was not only beneficial, but also found to have fewer side effects hence the biochemists described it "as safe as salt!"(http://www.smart-drugs).

Epilepsy is the most common neurological disorder after stroke, with 0.5 % prevalence, and a 2–3 % life time risk of being given a diagnosis of epilepsy. Recent studies both in the developing and in the developed world revealed that if properly treated up to 70 % of people with this condition could live productive and fulfilling lives, free from seizures.

MATERIALS AND METHODS

Ethanolic Extraction of Leaves

The plant leaves were washed thoroughly using tap water before drying it completely under shade for 11 days. The dried leaves were grinded using grinder machine to increase its surface area. About each 250g of leaves powder was packed in soxhlet extraction unit and exhaustively extracted using 2000ml of solvents such as ethanol. petroleum ether and water

respectively at 60ºC for 12 hours.

The extract was completely dried in water bath at 40ºC and subsequent stored at 4ºC (Sharmila N *et al*., 2011).

Priliminary Phytochemical Studies

The Leaves were subjected for extraction. The % yield was Ethanol extracts were found to be 2.5 % w/w respectively. The extracts obtained were subjected to varies phytochemical tests, to identify the active constituents, which showed the presence of alkaloids, carbohydrate, flavanoids and phenolic compounds, tannins and Terpenoids.

Table No. 1: Presence of phytoconstituents in leaves of *Crotalaria Hebecarpa*.

Phytoconstituents present in the extracts	Ethanolic extracts of Leaves of *Crotalaria Hebecarpa*
Alkaloids	+
Saponins	-
Glycosides	+
Tannins & Phenolic compound	+
Flavanoids	+
Steroids	+
Terpenoids	+
Carbohydrate	+

(+) Indicates Presence of chemical constituents; (-) Indicates Absence of chemical constituent

Evaluation of Anticonvulsant Activity

Scopolamine Induced Model of Dementia

Group I maintain as normal control was given with distilled water (10 ml/Kg, p.o.) only daily for 7 days after 90 min of the last treatment Transfer latency (TL) was record on elevated plus maze and retention (memory) of learned task was examined 24 h later. Group II was inject with scopolamine (0.3 mg/Kg, i.p.) alone on 1stday and after 45 min TL was recorded on Elevated Plus Maze and retention (memory) of learned task was examined 24 h later. Group III with Piracetam (50 mg/Kg, p.o.) and Groups IV,V, and Groups VI animals were treated with different doses of Extract (50, 100 and 200 mg/Kg, p.o.) On 7th day 90 min after administration of piracetam or EI, scopolamine was administered, after 45 min TL was recorded on elevated plus maze and retention (memory) of learned task was examined 24 h later. The inflexion ratio was calculated as described earlier.

And these the inflexion ratio (IR) was calculated using the formula: IR=(L_0-L_t)/ L_0. (Kola Venu et *al*., 2019).

Pentylenetetrazol Induced Convulsion

The animals were divided into six groups; each group comprised five rats. Different groups were treated with distilled water (10 mL/kg), diazepam (7.5 mg/kg), and Ethanolic *extract* at doses of 50, 100, and 200 mg/kg, BW. Thirty minutes later, convulsions were induced by the Subcutaneous administration of 85 mg/kg BW of PTZ. Following the administration of PTZ, rats were placed in separate transparent plexiglass cages (25 × 15 × 10 cm) and were observed for the occurrence of seizures over a 30 min time period. Latency of convulsions (the time prior to the onset of tonic convulsions), duration of tonic convulsions, and mortality protection (percentage of deaths in 24 h) were recorded (Soliman Gamal A *et al*., 2016).

Table No. 2: Effects of Ethanolic Extract of Leaves Induced Convulsion in Rats.

Sl. No. of Rats	Treatment	Latency of Tonic convulsion (s)	Duration of Tonic convulsions (s)	Mortality (% death)	% Protection
Control Group	Control	100.20±3.34	446.10±5.19	6/6(100)	0.0
Std Group	Diazepam (7.5mg/kg)	478.34±6.07**	126.69±1.93**	0/6(0.0)	100
Test group	Plant extract (50mg/kg)	141.43±1.98	216.29±1.23	4/6(66.66)	33.33
Test group	Plant extract (100mg/kg)	298.16±4.45*	189.19±1.72*	3/6(50.00)	50.0
Test group	Plant extract (200mg/kg)	416.42±6.14**	137.11±2.61**	0/6(0.0)	100

The data represents the mean S.D ± (n=6) *p<0.1, **p<0.001significantly different compared to normal control and diazepam.

Maximal Electro Shock Model

Table No. 3: Leaves Using Mes Induced Seizure In Rats.

Sl. No. of Rats	reatments	Duration Of Convulsions(Sec)			
		Flexion	Extension	Clonus	Stupor
Control group	Saline water 10 mL/kg	11.60 ± 0.27	15.02 ± 0.10	11.16 ± 0.52	9.88 ± 0.22
Standard group	Phenytoin 20 mg/kg i.p	2.98 ± 0.19**	4.00 ± 0.07**	3.58 ± 0.19**	3.10 ± 0.07**
Test group 1	CH-50 mg/kg p.o	9.52 ± 0.20**	12.96 ± 0.17**	9.14 ± 0.09**	8.08 ± 0.22**
Test group 2	CH-100 mg/kg p.o	6.06 ± 0.15**	7.34 ± 0.16**	5.34 ± 0.19**	4.72 ± 0.15**
Test group 3	CH-200 mg/kg p.o	3.4 ± 0.11**	5.56 ± 0.13**	3.72 ± 0.17**	3.52 ± 0.13**

Values are expressed as Mean ± S.E.M., *p < 0.05, **p < 0.01.

Table No. 4: *Crotalaria Hebecarpa* on inflexion ratio in Scopolamine-induced amnesic model in Rats.

Animal Groups	Normal Control (Group I) (10ml/Kg)			Toxicant (Group II) (Scopolamine 1 mg/Kg)			Standard (Group III) (Piracetam 200 mg/Kg)			Group (IV) CH 50 mg/Kg			Group (V) CH 100 mg/Kg			Group (VI) CH 200 mg/Kg		
	Transfer Latency (sec) after		IR= (L_0-L_t) L_0	Transfer Latency (sec) after		IR= (L_0-L_t) L_0	Transfer Latency (sec)after		IR= (L_0-L_t) L_0	Transfer Latency (sec)after		IR= (L_0-L_t) L_0	Transfer Latency (sec) After		IR= (L_0-L_t) L_0	Transfer Latency (sec) after		IR= (L_0-L_t) L_0
	45min (L_0)	24h (L_t)		45 min (L_0)	24 h (L_t)		45 min (L_0)	24 h (L_t)		45min (L_0)	24 h (L_t)		45 min (L_0)	24 h (L_t)			24 h (L_t)	
H (I)	48	33	0.312	48	38	0.208	53	13	0.754	44	29	0.340	81	37	0.543	43	16	0.627
B (II)	68	46	0.323	70	53	0.242	86	29	0.662	57	39	0.315	49	34	0.306	50	21	0.58
T(III)	31	9	0.709	46	40	0.130	76	13	0.828	76	44	0.421	76	32	0.578	46	13	0.717
HB (IV)	39	23	0.410	70	37	0.471	55	13	0.763	58	37	0.362	54	24	0.555	31	11	0.645
BT (V)	21	12	0.428	76	58	0.236	34	12	0.647	69	36	0.478	69	33	0.521	22	10	0.545
HT (VI)	64	47	0.265	66	47	0.287	39	15	0.615	48	29	0.395	49	22	0.551	28	13	0.535
Mean ± SEM	**45.1**	**28.1**	**0.407±0.046^{ns}**	**62.6**	**45.5**	**0.262±0.046**	**57.1**	**15.8**	**0.711 ±0.033****	**60**	**35.6**	**0.35 ±0.024^{ns}**	**63**	**30.5**	**0.509 ±0.041 ****	**36. 6**	**14**	**0.608 ±0.028 ****

n = 6, Significant at P < 0.05*, 0.01** and 0.001***, ns = not significant. EI -Ethanolic extract of Leaves

CONCLUSION

The leaves of *Crotalaria Hebecarpa* to family Fabaceae has been examined to gain an insight of its Phytochemical and pharmacological behaviors.

The preliminary phytochemical investigation of Ethanolic extract of leaves of the presence of Carbohydrate, Alkaloids, Phytosteroids, Flavonoids, Phenolic compounds and Tannins. Medicinal plants have served as sources of readily accessible, inexpensive, and effective medication since the earliest times known to man. Several ethnomedicinal plants have been found to possess neurobehavioral profile and serve as alternative to modern medicine. Biological evaluation and scientific validation of the ethnomedicinal plants are the need of the hour. The present study was proposed to assess nootropic and anticonvulsant effects of Ethanolic extract of leaves of an ethnomedicinal plant, In this study with the EPM model and Diazepam, Scopolamine induced amnesia models with medium and high doses of transfer latency is significantly reduced (increased IR).

The results of the present laboratory animal study indicate that Ethanolic extract of extract possesses anticonvulsant activity. The present study demonstrated the anticonvulsant effects of the Ethanolic extract of both chemically and electrically induced seizures in rats In conclusion, Ethanolic extract of nootropic and anticonvulsant effects and these findings collaborate with the ethnomedicinal uses of this plant. The isolation of active chemicals from this plant might serve as lead compounds for the synthesis of drugs which could be used in the management of these nervous disorders.

BIBLIOGRAPHY

1. Avanzini G & Franceschetti S. Cellular biology of epileptogenesis. The Lancet Neurology, 2003; 2: 33-42.
2. Barua CC, Talukdar A, Begum SA, Buragohain B, Roy JD, Borah RS, Lahkar M. Department of Pharmacology & Toxicology, Antidepressant-like effects of the methanol extract of achyranthes aspera linn.in animal models of depression., Pharmacology online, 2009; 2: 587-594.
3. Berg AT, Berkovic S.F, Brodie SF, Buchhalter J, Cross JH, Van Emde Boas W, Engel J, French J, Glauser TA, Mathern GW, Moshe SL, Nordli D, Plouin P, & Scheffer IE. Revisedterminology and concepts for organization of seizures and epilepsies: Report of the ILAE Commission on Classification and Terminology, 2005–2009. Epilepsia, 2010; 51: 676- 685.

4. Bennet PN, Brown MJ. Clinical pharmacology. 10th ed. Churchil Livingstone, New York, 2003; 406-408.
5. Browne TR & Holmes GL. Epilepsy. New England Journal of Medicine, 2001; 344: 1145-1151.
6. Buger G T, Miller C L. Animal care and facilities, in principles and methods of toxicology. 2th ed. Wallace Hayes A, Raven Press Ltd, NewYork, 1989; 527-31.
7. Christopher Kennard. Recent advances in Clinical Neurology. 1st ed. p 55.
8. Daniel H. Lowenstein. Seizures and Epilepsy. In: Fauci etal (Ed). Harrisons principles of Internal Medicine. 14th ed. United States of America. McGraw Hill Companies, 1998; 2320-2322.
9. David Vauzour, Katerina Vafeiadou, Ana Rodriguez-Mateos, Catarina Rendeiro, Jeremy PE. Spencer. The neuroprotective potential of flavonoids: a multiplicity of effects. Genes and Nutrition. Review, 2008; 3: 115–126.
10. De Boer HM, Mula M, & Sander JW. The global burden and stigma of epilepsy. Epilepsy Behavior, 2008; 12: 540-6.
11. Dhingra D, Parle M, Kulkarni SK. Memory enhancing activity of Glycyrrhizaglabra. Journal of Ethonopharmacology, 2004; 91(2-3): 361-364.
12. Elger CE & SchmidTD Modern management of epilepsy: A practical approach. Epilepsy Behav, 2008; 12: 501-539.
13. Elamathi R, Deepa T, Kavitha R, Kamalakannan P, Sridhar S, and Suresh Kumar J. Phytochemical screening and antimicrobial activity of leaf extracts of Crossandra infundibuliformis (L.) nees on common bacterial and fungal pathogens. international journal of current science, 2011; 1: 72-77.
14. Farooqui AA, Ong W, Horrocks LA. Inhibitors of brain phospholipase-A_2 activity: their neuropharmacological effects and therapeutic importance for the treatment of neurologic disorders. Pharmacol Rev., 2006; 58: 591-620.
15. Gilliam FG. Epilepsy--success in clinical practice: translating trials to practice. Eur J Neurol, 2005; 12(4): 22-9.
16. Guerrini R & Parneneggiani L. Topiramate and its clinical applications in epilepsy. Expert Opinion on Pharmacotherapy, 2006; 7: 811-823.
17. Guyton AC, Hall JE. Textbook of medical physiology. 11th ed. Elsevier division of Reed Elsevier India Private Ltd, New Delhi, 2006; 739-747.
18. Hampson RE, Deadwyler SA. Role of Cannabinoid receptors in memorystorage. Neurobiology of Dissease, 1998; 5: 474-482.

19. Harvey JA. Role of the Serotonin 5-HT_{2A} receptor in learning. Learning and Memory, 2003; 10: 355-362.
20. Hasselmo ME. The role of acetylcholine in learning and memory. Current Opinion in Pharmacology, 2006; 16: 710-715.
21. Kamal. S, Shaheen Sharif M, Rahman.MM, Rahman SMA, (2018), Potential Antimicrobial activity of Achyranthes bidentata methanol extract against both gram (+)ve and gram(-)ve bacteria. http://pharmacologyonline.silae.it ISSN: 1827-8620: Archives, 2018; 3: 223-228.
22. Karnaukh EV, Kalyuzhka VY, Markevych MA. The new nootropic mechanism of action of the modern antidepressant rolipram on cognitive functions. European journal of natural history, NO1, 2015.
23. Klitgaard H, Matagne A, Schachter SC, & White HS, 2008. Chapter 8 -Animal and Translational Models of the Epilepsies. In: Robert AM, Phd & Francoborsini, P. (eds.) Animal and Translational Models for CNS Drug Discovery. San Diego: Academic Press.
24. Kokate, CK. Evaluation of crude drug, Practical Pharmacognosy, 4th edn, 2000; 122-135.
25. Kola Venu, Prasenjit Mondal, Rajesh BRC, Arjun Goje, Gummadevelly Sandeep, Manish Kumar Thimmaraju, Shaik Chanbasha, Bhookya Padmaja, Evaluation of Nootropic activity of Ethanolic and Aqueous Root Extracts of Adhatoda vasica nees in Rodents. International Journal of Pharmaceutical Investigation, 2019; 9(4): 180-186.
26. Kulkarni SK. Handbook of experimental pharmacology. 3rd ed. Vallabh Prakashan, Delhi, 2005; 44-45.
27. Kumar G, Patil, Jaishree V, Poornachandra Tejaswi HN. Evaluation of Phenolic Content and Antioxidant Property of Crossandra infundibuliformis Leaves Extracts. American Journal of Plant Sciences, 2014; 5: 1133-1138.
28. Kwan P, Sills GJ. & Brodie MJ. The mechanisms of action of commonly used antiepileptic drugs. Pharmacology & Therapeutics, 2001; 90: 21-34.
29. Lateef Abiola Akinpelu, Theophilus Adekunle Adegbuyi1, Samuel Sunday Agboola1, Julius Kayode Olaonipekun, Idowu Julius Olawuni, Adesoji Mutiu Adegoke, Idris Ajayi Oyemitan, Gbola Olayiwola. Antidepressant Activity and Mechanism of Aqueous Extract of Vigna Unguiculata ssp. Dekindtiana (L.) Walp Dried Aerial Part in Mice., International Journal of Neuroscience and Behavioral Science, 2017; 5(1): 7-18.
30. Loscher W, Honack D & Taylor CP. Gabapentin increases aminooxyacetic acid-induced GABA accumulation in several regions of rat brain. Neuroscience Letters, 1991; 128: 150-154.

31. Loscher W. Valproate: a reappraisal of its pharmacodynamic properties and mechanism Of action. Progress in Neurobiology, 1999; 58: 31-59.
32. Lynch G. AMPA receptor modulators as cognitive enhancers. Current Opinion in Pharmacology, 2004; 4: 4-11.
33. Manjit Inder Singh Saggoo, Lovleen. Screening of Total Phenol and Flavonoid Content in different cytotypes of two species of achyranthes linn. from western himalaya, india,International Journal of Pharmacy and Pharmaceutical Sciences., 2017; 9(10).
34. Macdonald RL, & Kelly KM. Antiepileptic drug mechanisms of action.Epilepsia, 36 Suppl., 1995; 2: S2-12.
35. Martel G, Millard A, Jaffard R, Guillou JL. Stimulation of hippocampal adenylyl cyclase activity dissociates memory consolidation processes for response and place learning. Learning Memory, 2006; 13(3): 342-348.
36. Meldrum BS. Glutamate as a neurotransmitter in the brain: review of physiology and pathology. The Journal of Nutrition, 2000; 130: 1007S-15S.
37. Najm I, Ying Z & Janigro D. Mechanisms of epileptogenesis. Neurologic Clinics, 2001; 19: 237-250.
38. Nunez-Jaramillo L, Delint-Ramirez I, Bermúdez-Rattoni F. PKC blockade differentially affects aversive but not appetitive gustatory memories. Brain Research 2007; 1148: 177-182.
39. Parle M, Vasudevan M. Memory enhancing activity of Abana®: An Indian ayurvedic poly-herbal formulation. Journal of Health Science, 2007; 53(1): 43-52.
40. Pisani A, Bonsi P, Martella G, De Persis C, Costa C, pisani F,Bernardi G,& Calabresi P. Intracellular Calcium Increase in Epileptiform Activity: Modulation by Levetiracetam and Lamotrigine. Epilepsia, 2004; 45: 719-728.
41. Pulok K, Mukherjee. Quality control of Herbal drugs, 1st ed., 2002, Business Horzons, New Delhi, P.13-14,16,23,282-284,307-304,325-326,349-351,362-363,370-372,417-422.