ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHYTOCHEMISTRY AND PHARMACOLOGY
Published by ScienzTech Publication Journal Home Page: www.scienztech.org/ijrpp

Investigating the relation between anti-oxidant activity and epileptic enzymes of formulation-40 capsules

Bhavani J*, S Ravichandran

PSV College of Pharmaceutical Science and Research, Krishnagiri-635108, Tamil Nadu, India

Article History:

Received on: 07 May 2019
Revised on: 11 Jun 2019
Accepted on: 24 Jun 2019
Published on: 05 Jul 2019

Volume: 4 Issue: 1

Keywords:

Formulation-40,
Anti-oxidant,
Anti-epileptic,
PTZ

ABSTRACT

Seizures and Epilepsy are those significant conditions that are common symptoms of many diseases that affect the human nervous system. It is one of the most chronic and most frequent neurological disorders that are prevalent in almost 5crore people around the world. Even though the drugs are effective and potent, there are various side effects, and adverse effects are associated with those drugs. General side effects include nausea and vomitings; many other specific side effects include altered mental consciousness, confusion anorexia and excessive aggression are also noted in many cases of drugs. In this research, herbal formulations were designed to fight back the free radicals that are generated in the brain, and those protective enzyme levels were analyzed to estimate the activity of the formulation in the brain tissue. In the research, the prepared formulation showed a dose-dependent activity in restoring the brain-protective enzymes and balancing them. The formulation contained herb powders that contain anti-oxidant chemical constituents which helped for the anti-epileptic formulation. The herbal capsules at dose 500mg/kg showed a better activity compared to the standard drug but without notable side effects and adverse effects.

*Corresponding Author

Name: Bhavani J
Phone: +91-9942645282
Email: tnbhavanisundaram@gmail.com

eISSN: 2231-010X

DOI: https://doi.org/10.26452/ijpib.v4i1.1212

Production and Hosted by

ScienzTech.org

INTRODUCTION

Seizures and Epilepsy are those extreme conditions that are common symptoms of many diseases that affect the human nervous system. It is one of the most chronic and most frequent of the neurological disorders that are prevalent in almost 5crore people around the world [1]. There are various types of symptoms like tonic-clonic seizures, grand and petit mal epilepsy and other types. The general issues in the Epilepsy are due to the generation of free radicals in the brain that causes convulsions [2]. There are also reports that oxygen free radicals are the major causes of the elevated enzyme activity in the brain during the process of convulsions and Epilepsy. Many drugs are available to treat Epilepsy efficiently such as Benzodiazepine derivatives, Barbiturate derivatives, GABA analogues, Hydantoins and sedatives etc. [3]. Even though the drugs are effective and potent, there are various side effects, and adverse effects are associated with those drugs. General side effects include nausea and vomitings; many other specific side effects include altered mental consciousness, confusion anorexia and excessive aggression are also noted in many cases of drugs [4].

Epilepsy and convulsions are the primary class of symptoms that are commonly seen in many neurological diseases. There are many types of epilepsies like general, clonic tonic, grand mal, petit mal etc. this may be considered as a disorder or a symptom of other disorders. Generally, Epilepsy causes an increase in the free radicals in the brain and thus damage the brain tissue and nerves. It is also

clear that the generated free radicals also cause an increase in seizures [5]. There are also reports and investigations that the oxidative reactions are primary aetiology for Epilepsy. With this hypothesis, the anti-oxidant activity of the drugs, they also fight the oxygen free radicals that lower the protective enzymes in the brain that will lead to recovery and regeneration of nervous tissue. These anti-oxidant enzymes will protect the brain, and with this idea, formulations have been designed for combating the Epilepsy using the anti-oxidant activity and restabilizing the brain enzymes.

In this research, herbal formulations were designed to fight back the free radicals that are generated in the brain, and those protective enzyme levels were analyzed to estimate the activity of the formulation in the brain tissue.

FORMULATION

The fresh plants were collected in the local area and were duly identified and authenticated. Herbarium sample is stored in the college library for future references. The plant parts were dried adequately under direct sunlight for two days, and the dried plants were powdered and then sieved. This powder was measured and then mixed using a baffled mixer in the proper proportions that are given in Table **??**.

Table 1: Formulation parametres of Formulation-40 capsules

S.No.	Ingredients	Quantity
1	Centella asiatica	50mg
2	Bacopa moneirii	50mg
3	Phyllanthus emblica	50mg
4	Acorus calamus	50mg
5	Terminalia chebula	50mg
6	Withania somnifera	50mg
7	Nardostachys jatamansi	50mg
8	Asparagus recemosus	50mg
9	Piper longum	25mg
10	Sida cordifolia	25mg
11	Tribulus terrestris	10mg

It was filled in the hard gelatin capsules at a dose of 500mg of whole powder and is weight balanced with additives. It was used in the animal experiments at an appropriate dose as prescribed.

Animal procedure

The animals that are used in the experiment are albino Wistar rats which are between 15-170 grams of weight. They are kept in the air-controlled room inside cages with one animal in each cage and allowed free to eat and drink water. It prevents coprophagy also. They were divided into five groups, with five animals in each group. The first group was treated as a healthy control group. From groups 2-5, they are administered with seizures induction. 2^{nd} group was considered a negative control group which received just the normal saline. 3^{rd} group received standard drug phenytoin, and 4^{th} and 5^{th} groups received formulation at two doses like 250mg/kg and 500mg/kg for animals.

Electricity Induced Convulsions Method

This method involves the use of the electric current to induce the convulsions. The animals received the current shock using an electric convulsiometer. When the animals were produced Epilepsy the current was stopped, and the animals were sacrificed. The brain tissue was isolated carefully and then stored for further experiments [6–8].

Pentylene Tetrazole induced Convulsions method.

This method uses PTZ as an induction agent of convulsions. It is administered at a dose of 90mg/ kg of the body weight. It was given in subcutaneous route, and the animals were seen to have convulsions after 30mins of administration of PTZ. The seizures were observed in the animals, and they were sacrificed, and the brain tissue was carefully isolated and stored. It was used to proceed for further experiments [9].

Estimation of enzymes

The isolated tissue of brain was homogenized using a blender, and this homogenate weighed to 100 mg and was mixed with 10 ml of Tris HCl solution of buffer at 4^0C. It was centrifuged at 3000rpm for 5mins. The supernatant liquid was collected, and the solid matter was discarded. This supernatant liquid was evaluated for the anti-oxidant enzymes like Glutathione peroxidases, Glutathione Reductases, Superoxide Dismutases, Catalases and Peroxidases using standard procedures [10].

DATA & DISCUSSION

In both methods, the results showed a potent activity of the formulation in restoring the brain-protective enzymes. The formulation at the dose of 500mg/kg showed better activity than at the dose of 250mg/kg. It normalized brain activity by increasing the brain enzymes that were lowered by electric shock. The results of the activity were tabulated in Tables 2 and 3.

The formulation was compared to the standard drug phenytoin and showed comparably significant and similar activity. SOD's are enzymes that protect the brain from oxidative free radicals that are generated

Table 2: Protective enzyme levels in EIC method

Group treatment	Catalase Units/mg	Lipid Peroxidation Nmol/mg	Superoxide Dismutase Units/mg	Glutathione Reductase Units/mg	Glutathione Peroxidase Units/mg
Normal group	25.23±0.06	3.39±0.72	14.78±0.23	28.17±0.83	27.48±1.02
Induced and saline group	20.37±0.42*	6.8±0.24*	8.44±0.91*	7.94±0.97*	19.9±0.61*
Phenytoin	24.64±0.0.7a	3.56±0.99a	14.8±0.58 a	24.45±0.82a	26.90±0.75 a
Formulation-40 250mg/kg	21.46±0.05	4.50±0.68	10.02±0.43	25.66±0.74	21.73±0.54
Formulation-40 500mg/kg	23.75±0.51a	2.03±0.44 a	13.93±0.67 a	24.81±0.99 a	24.54±0.86 a

Table 3: Protective enzyme levels in PTZ method

Group treatment	Catalase Units/mg	Lipid Peroxidation Nmol/mg	Superoxide Dismutase Units/mg	Glutathione Peroxidase Units/mg	Glutathione Reductase Units/mg
Normal group	24.69±0.12	3.83±0.46	15.54±0.67	27.48±0.35	34.72±0.81
Induced and saline group	16.86±0.7*	7.91±0.93*	10.93±0.78*	18.51±0.18*	23.10±0.56*
Formulation-40 250mg/kg	19.98±0.21	5.52±0.64	11.23±0.92	20.72±0.83	26.94±0.78
Formulation-40 500mg/kg	20.42±0.53a	4.75±0.95 a	12.4±0.86	22.64±0.29 a	29.25±0.42a
Phenytoin	22.13±0.38a	4.38±0.84a	15.36±0.51a	25.30±0.96 a	31.89±0.85 a

due to physiological stress and oxidation. Due to the induction of Epilepsy, their levels were lowered and caused Epilepsy in the animals $.

The PTZ is an antagonist of the GABA receptor and reduces GABA levels in the brain and also lowers the receptors in the brain [11]. EIC leads to the continual stimulation of the brain cells and results in the seizures in humans and also affects the enzyme levels [12]. In addition to this, herbal chemical constituents like Apigenin, Ellagic acid, Quercetin, Kaempferol, Piperine and terpineols have anticonvulsant activity in many models [13]. Brain enzymes like Glutathiones also help in the lowering of the free radicals that are produced by the stress or other chemicals in this case PTZ and electrical shock. The formulation had a positive impact on the enzyme levels in the brain and prevented oxidative damage in the brain [14].

Peroxidases level in the brain were elevated due to the induction of Epilepsy or convulsions. This elevation in the peroxidases that causes the lipid peroxidation, which results in the damage to the nervous tissue membrane and thereby causing breakage of nerve cells. Due to the presence of the anti-oxidant chemical constituents like flavonoids and polyphenols, the formulation could effectively balance the enzymes in the brain.

CONCLUSION

In the research, the prepared formulation showed a dose-dependent activity in restoring the brain-protective enzymes and balancing them. The formulation contained herb powders that contain anti-oxidant chemical constituents which helped for the anti-epileptic formulation. The herbal capsules at dose 500mg/kg showed a better activity compared to the standard drug but without notable side effects and adverse effects.

ACKNOWLEDGEMENTS

The authors are thankful to all who have extended their constant support for the completion of the work.

Funding Support

None

Conflict of Interest

Authors declared no conflict of interest.

REFERENCES

[1] Jefferys JGR. Advances in understanding basic mechanisms of epilepsy and seizures. Seizure. 2010;19(10):638–646. Available from: 10.1016/j.seizure.2010.10.026.

[2] Choi BH. Oxygen, anti-oxidants and brain dysfunction. Yonsei Med J. 1993;34(1).

[3] Goldenberg MM. Overview of drugs used for Epilepsy and seizures: Etiology, diagnosis, and treatment. P and T. 2010;35:392–415.

[4] Aneja S, Sharma S. Newer anti-epileptic drugs. Indian Pediatrics. 2013;50(11):1033–1040. Available from: 10.1007/s13312-013-0284-9.

[5] Rola R, Swiader M, Czuczwar SJ. Electroconvulsions elevate the levels of lipid peroxidation process in mice. Polish Journal of Pharmacology. 2002;54:521–524.

[6] Chrościńska-Krawczyk M, Jargiełło-Baszak M, Andres-Mach M, Łuszczki JJ, Czuczwar SJ. Influence of caffeine on the protective activity of gabapentin and topiramate in a mouse model of generalized tonic-clonic seizures. Pharmacological Reports. 2016;68(4):680–685. Available from: 10.1016/j.pharep.2016.03.011.

[7] Gupta Y, Joshi R, Reeta KH, Sharma S, Tripathi M. Pharmacodynamic and pharmacokinetic interaction of Panchagavya Ghrita with phenytoin and carbamazepine in maximal electroshock induced seizures in rats. AYU (An International Quarterly Journal of Research in Ayurveda). 2015;36(2):196–196. Available from: 10.4103/0974-8520.175538.

[8] Mishra A, Punia JK, Bladen C, Zamponi GW, Goel RK. Anticonvulsant mechanisms of piperine, a piperidine alkaloid. Channels. 2015;9(5):317–323. Available from: 10.1080/19336950.2015.1092836.

[9] Showraki A, Emamghoreishi M, Oftadegan S. Anticonvulsant effect of the aqueous extract and essential oil of Carum carvi L. Seeds in a Pentylenetetrazol model of seizure in mice. Iranian Journal of Medical Sciences. 2016;41:200–208.

[10] Paglia DE, Valentine WN. Studies on the quantitative and qualitative characterization of erythrocyte GP. Journal of Laboratory and Clinical Medicine. 1967;70:158–169.

[11] Psarropoulou C, Matsokis N, Angelatou F, Kostopoulos G. Pentylenetetrazol-Induced Seizures Decrease ?-Aminobutyric Acid-Mediated Recurrent Inhibition and Enhance Adenosine-Mediated Depression. Epilepsia. 1994;35(1):12–19. Available from: 10.1111/j.1528-1157.1994.tb02906.x.

[12] Huang RQ, Bell-Horner CL, Dibas MI, Covey DF, Drewe JA, Dillon GH. Pentylenetetrazole-induced inhibition of recombinant gamma-aminobutyric acid type A (GABA(A)) receptors: Mechanism and site of action. Journal of Pharmacology and Experimental Therapeutics. 2001;298:986–95.

[13] Zhu HL, Wan JB, Wang YT, Li BC, Xiang C, He J. Medicinal compounds with anti-epileptic/anticonvulsant activities. Epilepsia. 2014;55:3–16.

[14] Kumar A, Tejasri CKM, Kumar DS, Ramya M, Revathi K, Reddy AK, et al. A Review on Anti-oxidants Innovative Drug Discovery. 2012;1(2):98–114.

Cite this article: J Bhavani, Ravichandran S. **Investigating the relation between anti-oxidant activity and epileptic enzymes of formulation-40 capsules**. Int. J Res. Phy. Pharmacol. 2019; 4(1): 6-9.