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Research Article

COMPARATIVE STUDY OF PHENYTOIN SODIUM AND ETHANOLIC EXTRACT OF *NARDOSTACHYS JATAMANSI* AUGMENTED WITH PHENYTOIN SODIUM TO EVALUATE ANTI-EPILEPTIC ACTIVITY OF THE DRUG

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ABSTRACT

Epilepsy is a disorder of nervous system which leads to episodes of sensory interruption, loss of perception, or *seizures*, coupled with irregular electrical bustle in the brain. It is generally treated by drug therapy using anti-epileptic drugs. The core objective of this study is to comparatively study anti-epileptic activity of phenytoin sodium and ethanolic extract of jatamansi augmented with phenytoin sodium. Convulsions were induced in the mice by pentylenetetrazol (PTZ) *seizure* model and *maximal electroshock seizure (mes)* model. Jatamansi extract augmented with phenytoin sodium was the drug used for the comparative study the anti-epileptic activity of phenytoin sodium. And jatamansi extract augmented with phenytoin sodium gave better results.

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INTRODUCTION:

Epilepsy is defined as a brain disorder with episodic seizures coupled with irregular electrical bustle in the brain. Seizures are of two types, partial seizure and generalized seizure. Partial seizures usually start in one section of brain and affect the part of the body associated with that section of brain. It is further classified into:

1. **Simple Partial seizure:** This affects muscle activity leading to jerking of body parts like face, arm, etc.
2. **Complex Partial seizure:** Doesn't cause seizure but impair perception, i.e. the patient will not respond.

Generalized seizure occurs in entire brain and hence affects entire body. It is further classified into-

1. **Myoclonic seizure:** This is a short term seizure leading to muscle jerks which doesn't last for more than 3 seconds.
2. **Atonic seizure:** This leads to sudden muscle weakness causing patient to fall on head or face leading to injury. Last for maximum 16 secs.
3. **Tonic seizure:** This leads to sudden muscle stiffening usually occurs in sleep but may occur

while awake which lead to fall and cause major head injuries. Last for 20 seconds.

4. **Tonic clonic seizures:** This leads to stiffening of the muscle along with rhythmic jerking and twitching of the body. Patient makes noise due to the contraction of chest muscle leading to flushing of air from the vocal cord; it also leads to wetting and soiling due to contraction bladder and bowel respectively. Patient may also bite the tongue which causes bleeding. It lasts for 5 mins.
5. **Absence seizure:** This only cause's loss of consciousness and the patient don't have memory of it.

Other seizure types include infantile spasm and psychogenic non-epileptic seizure¹.

Causes of epilepsy are brain injury, structural deformity in the brain growth, genetic and may the combination of the same. Seizures are triggered by number of factors like stress, climatic conditions, lack of sleep, fever, menstrual cycle, alcohol etc.

Epidemiology: Epilepsy is mainly seen in underdeveloped countries and in villages compare to developed countries and cities.

Diagnosed by EEG, Blood Test, PET scan and Spinal Tap.

Epilepsy can be **treated** by taking medication, without medication or by complementary medications.

Models of Epilepsy are genetic animal model, chemically induced model (PTZ) and electrically induced animal model (MES)².

MATERIALS AND METHOD:

Pentylenetetrazole (PTZ)

It is also called pentamethylenetetrazole or metrazol. Chemical formula is $C_6H_{10}N_4$. It is used to induce seizures in the pre-clinical study of anti-epileptic drugs. It binds to the picrotoxin binding site of GABA-A receptor complex.

Phenytoin Sodium: It is diphenylhydantoin Sodium, having chemical formula $C_{15}H_{11}N_2NaO_2$. A hydantoin derivate and nonsedative antiepileptic agent with anticonvulsant activity. Phenytoin sodium promotes sodium efflux from neurons located in the motor cortex, thereby stabilizing the neuron and inhibiting synaptic transmission. This leads to a reduction in posttetanic potentiation at synapses, an inhibition of repetitive firing of action potentials and ultimately inhibits the spread of seizure activity³.

Jatamansi: Botanical name is *Nardostachys jatamansi*. Its dried rhizome and roots are the main medicinal part. Its medical use is in epilepsy, schizophrenia, stress and anxiety.

Extraction: Extract of *N. jatamansi* root was prepared by extracting 100 grams of jatamansi powder in 90 % ethanol (1L) at 50 °C to 60 °C in a Soxhlet extractor for 72 hours. The cooled liquid extract was concentrated by evaporating its liquid contents in rotary evaporator, with an approximate yield of 20 %. The dried ethanol extract was suspended in distilled water. The drug, *N. jatamansi* root extract (NJE) was administered⁴.

Electro Convulsometer: It is used in the application of maximal electro-shock using corneal electrodes. It is

used in the study of anti-convulsant activity using MES model. It includes Digital

Voltmeter, Analog Type Ammeter, Analog Timer, Multiplier and Three pair of corneal Electrodes⁵.

Animals: Male CD-1 mice is albino coat color mice ideal for different multitasking models, safety and efficacy testing, surgical model etc.

Allotment of groups: Three groups were formed one of control, one of test and other of standard. Each group consisted of 6 mice fed with usual diet (Atromin pellets) and water ad libitum. All the experiments were performed in accordance with the guidelines of the Institutional Animal Ethics Committee (IAEC) of SPARC. Animals surviving after completion of the study were sent for their disposal under the IAEC approved protocol.

Administration drug: All drugs were freshly prepared before administration. The control group was administered with sterile 0.9% saline i.v. The standard group was administered by phenytoin sodium i.v. The test group was administered by jatamansi extract and phenytoin sodium, dose 50mg/kg orally and 75mg/kg i.v respectively.

PTZ Test: Mice were administered 85 mg/kg dose of PTZ subcutaneously into a loose fold of skin of the neck, between two shoulder blades. Animals were observed over the course of 60 min for appearance of clonus and TE.

MES Test: A drop of saline solution (0.9% saline) was placed in each eye of mice. Convulsions were induced by placing the corneal electrode in the mice cornea. Readings were noted.

RESULT:

The comparative results of tonic, clonic and stupor of controlled, standard and test are given in the below table:

Table 1: Comparative results of tonic, clonic and stupor

Groups	Tonic	Clonic	Stupor	Dead or Alive
Control	110	120	140	Dead
Standard	86	90	100	Alive
Test	98	95	80	Alive

CONCLUSION: The test group showed positive and better result, proving jatamansi and phenytoin combination better than phenytoin sodium.

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