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Original Research Article

Antiepileptic Activity of Centella Asiatica Leaf Extract in Mice

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Abstract:

Background: Drug resistance persists in certain patients with epilepsy, despite the fact that it has long been regarded as one of the most common nervous system disorders. Centella asiatica has been used to treat epilepsy in traditional medicine. The antiepileptic efficacy of Centella asiatica was studied in a pentylenetetrazole (PTZ)-induced epilepsy model in order to develop an antiepileptic medication with minimal side effects.

Methods: For the purpose of eliminating the gender component, 48 lab-bred female mice were divided into 6 equal groups for this experimental study. The experimental groups included control, standard, and four treatment groups that received the extract 30 minutes prior to PTZ injection at doses of 50, 100, 150, and 200 mg/kg (intraperitoneally). The frequency of epileptic symptoms and their contributing factors were also examined.

Result: The mice in the 50 mg/kg dosing group showed the highest incidence of epileptic attacks, according to the results of utilising various doses of the extract. Myoclonic twitches were more common in samples that received the extract at doses of 50 and 200 mg/kg, respectively. The group that received a dose of 200 mg/kg experienced an increase in epileptic symptoms, a decrease in epilepsy frequency, and a drop in the death rate ($p<0.05$).

Conclusion: Based on the results, a 200 mg/kg dose of Centella asiatica extract may be suggested as a medication that effectively prevents epilepsy in the animal model.

Keyword: Centella asiatica, PTZ, Antiepileptic, Myoclonic twitches.

Introduction

Centella asiatica, also referred to as gotu kola (family: Apiaceae), is a traditional Ayurvedic herb used to improve nerve function, lower anxiety, and improve memory. According to phytochemical study [1], it contains triterpenoids, flavonoids, and saponins, all of which have antioxidant and neuroprotective properties [2].

Through the use of chemical components found in plants or by combining various plant parts, traditional medicine aims to develop appropriate substitutes for synthetic medications.

Put another way, the goal of traditional medicine is to enhance a system's performance in relation to other systems; as a result, herbal remedies have a wider spectrum of effects than currently available synthetic ones in pharmacotherapy. Hepatic toxicity and a reduction in white blood cells are only two of the many side effects that can result from using antiepileptic medications [3,4]. Additionally, using these medications during pregnancy may result in foetal abnormalities and teratogenic consequences. Consequently, herbal remedies that have less side effects might be a great substitute for treating this illness.

An irregular and sporadic attack is the hallmark of epilepsy, a chronic and primarily progressing illness caused by aberrant brain neurone discharge [5,6]. In light of the fact that no research has yet been done on the antiepileptic impact of Centella asiatica in the PTZ model, the current study was planned and carried out to investigate the antiepileptic effect of Centella asiatica in an animal model in order to make a modest advancement in

the treatment of epilepsy and alleviate human pain, suffering, and anxieties.

Materials & Methods

In 2018, Vaageswari College of Pharmacy in Karimnagar, Telangana state, India, carried out an experimental study. We employed little mice in this study that weighed 20–25 grammes. For a week, the adult mice in the study were housed in a lab setting to acclimatise to the surroundings. The animals were housed in a room with typical lighting, a temperature range of 28-30°C, and unrestricted access to food and water.

The 36 lab mice used in this investigation were divided into six groups of eight at random, and each group was housed in a different cage. We used a Soxhlet equipment to grind the provided leaves into tiny pieces in order to create the Centella asiatica extract.

The concentration of Centella asiatica in the solution was measured, and injectable normal saline was used to dilute the necessary doses. The experimental groups received intraperitoneal injections of the extract in the manner described below 0.5 ml of injectable normal saline was administered intraperitoneally to the control group [7,8].

The standard group was given an injection of diazepam at a dose of 2 mg/kg. Doses of 50, 100, 150, and 200 mg/kg were administered to the test group [9,10,11]. The factors influencing the frequency of epileptic symptoms were then examined.

In order to closely analyse and measure the type of movements, the mice in this study were monitored for an hour following the extract and PTZ injection, and all movements that were observed were captured on camera.

Results

The most common development of body stretching was seen in the control and C groups. The standard and D groups experienced the fewest body stretching attacks (p0.05).

With a function comparable to that seen in the B group, the 200 mg/kg dose might be proposed as the optimal dosage. The F group showed the greatest decrease in the mean frequency of myoclonic twitches.

After Diazepam, the 200 mg/kg dose had the biggest impact on lowering the mean frequency of general tonic-clonic seizures.

Table & Graph. Talk about Analysing the results from this investigation showed that injecting Centella asiatica extract intraperitoneally had a positive impact on the mice's epileptic behaviour parameters and validated the plant's antiepileptic properties.

Determining the right dosage with the fewest side effects is crucial when utilising herbal remedies, therefore in this study, we examined the effects of 50, 100, 150, and 200 mg/kg doses of Centella asiatica extract on treating epilepsy brought on by PTZ injection.

The detrimental effects of PTZ on the neuronal membrane have been thoroughly established. PTZ releases the intracellular calcium ion repertoires and alters potassium and calcium channels. Furthermore, PTZ reduces the chloride conductance brought on by neurotransmitters [12].

Table 1: **Comparison of effect of Centella asiatica extract against Pentylenetetrazole-induced seizure in mice**

Groups	Parameters				
	The number of attacks (stretching)	The number of myoclonic contractions	The absence of attacks	Frequency of myoclonic contractions	Frequency of generalized tonic-clonic seizures
Control	5.60±0.40	5.76±0.56	5.56±0.53	4.20±0.53	4.20±0.10
Standard	5.79±0.21	4.01±0.23	5.32±0.21	3.68±0.15	4.03±0.49
Test 50mg/kg	5.69±0.39	5.80±0.72	5.71±0.20	3.52±0.23	5.39±0.23
Test 100mg/kg	4.62±0.32	4.35±0.19	4.11±0.88	3.20±0.10	5.50±0.12
Test 150mg/kg	4.37±0.11	4.60±0.31	4.28±0.59	3.16±0.50	4.46±0.61
Test 200mg/kg	5.35±0.66	4.47±0.90	4.06±0.76	2.36±0.30	3.12±0.18

Mean±SD significant at p<0.05

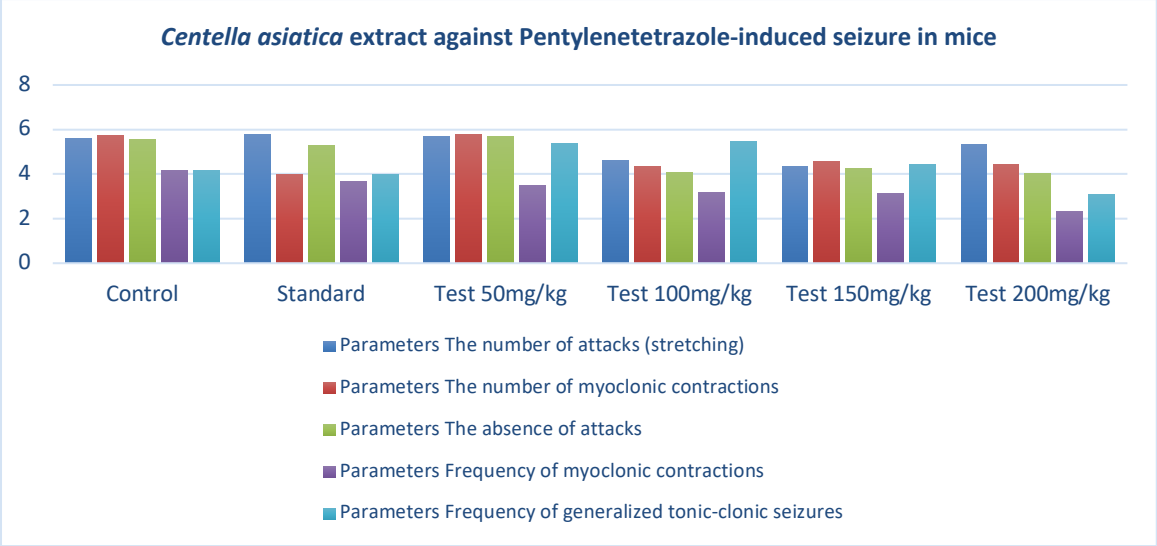

Figure 1: *Centella asiatica* extract against Pentylenetetrazole-induced seizure in mice

Clinically, the medications that work for PTZ-induced epilepsies are particularly helpful in managing absence or mild epilepsy [13,14]. As a result, Centella asiatica leaf extract has also shown promising results in preventing PTZ-induced epilepsies and may be useful in the treatment of absence seizures [15]. Namvaran et al. investigated the effect of Salvia officinalis hydroalcoholic extract on PTZ-induced seizure threshold in Vincristine injected mice. J Shahrekord Univ Med Sci 2012; 13(6): 47-55. The findings showed that the amount of GABA in the brain had increased.

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The findings showed that the amount of GABA in the brain had increased [16]. Terpenes were the primary components found in Centella asiatica essential oil, according to analysis. The principal terpenes were linalool (44.18%), cineole (13.65%), eugenol (8.59%), isocaryophyllene (3.10%), and methyl cinnamate (4.26%) [14]. Since linalool is one of Centella asiatica's primary constituents, the mechanism underlying its action on GABAergic system regulation has been discussed [17]. Because of the higher cerebral GABA content, Centella asiatica extract is therefore anticipated to have an antiepileptic effect in the PTZ-induced seizure model as well. The juniper, formally known as Aeollanthus from the Labiatae family, is one of many plants that contain linalool and are utilised as antiepileptic medicines in traditional medicine.

Conclusion:

Based on the findings, Centella asiatica at a dose of 200 mg/kg has a greater influence on the development of myoclonic twitches than the extract at other levels, and this dose is recommended as the best, with a function comparable to that observed in the standard group. As a result, because the effect is dose-dependent, the most important aspect of utilising this herbal medicine is to choose the right amount based on the requirement. This should be examined further in related works.

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