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Comparison of anti-epileptic property of various parts of Datura

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ABSTRACT

Epilepsy is the most common of the neurological conditions that are widely affecting most of the population around the world. It is a condition on its own and a symptom of other neurological conditions too. It affects almost one per cent of the human population. Many synthetic drugs are produced to treat epilepsy effectively in various mechanisms. Few of them are Barbiturates like phenobarbitone and barbital sodium, hydantoin derivatives like Phenytoin, Sedatives and azepam derivatives like Diazepam etc. Many drugs treat epilepsy but are not devoid of side effects as discussed. So herbs are supporting the system of medicine to treat epilepsy but don't have side effects and adverse effects. There are a lot of herbs that are used to treat the disease on among them is *Datura stromonium*. In this work, the comparison between the antiepileptic property of the different parts of Datura was investigated, which included Flowers, Leaves, Stems and Fruits. The activity was investigated in electrical shock method to induce epilepsy. The brain enzymes were used as estimating parameters. Overall, the flowers showed very less activity compared to stems followed by fruits, and leaves of the plant *Datura stramonium* showed the highest activity.

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INTRODUCTION

Epilepsy is the most common of the neurological conditions that are widely affecting most of the population around the world. It is a condition on its own and a symptom of other neurological conditions too. It affects almost one per cent of the human population [1]. Different mechanisms of the convulsions are reported and investigated a few of them include GABA disturbances and free radicals formation etc. [2]. There are various types of epilepsies they are grand mal epilepsy, tonic-clonic seizures, petit mal epilepsy etc. Other types of convulsions are just symptoms of the major neurological diseases like stroke or any mechanical insult to the brain. Based on the duration of epilepsy and etiology of the convulsions, they are classified accordingly.

Many synthetic drugs are produced to treat epilepsy effectively in various mechanisms. Few of them are Barbiturates like phenobarbitone and barbital sodium, hydantoin derivatives like Phenytoin, Sedatives and azepam derivatives like Diazepam etc. [3]. Even though the drugs are very potent and effective in treating epilepsy, there are also associated side effects with those drugs. The more potent the drugs are, the more toxic they become and more side effects and adverse effects they will have. Few of the side effects include nausea, vomiting, dizziness, ams, confusion, lack of hunger and other psychological symptoms like anger and rage are commonest of the symptoms [4].

The general assertion was that the free radicals that

are generated due to the physiological stress in the brain are the causative factors of the convulsions. They disrupt the nervous cells membrane and cause the disturbance in the impulse transmission. So the generation of free radicals is the basic underlying mechanism of the action to control epilepsy [5].

Many drugs treat epilepsy but are not devoid of side effects as discussed. So herbs are supporting the system of medicine to treat epilepsy but don't have side effects and adverse effects. There are a lot of herbs that are used to treat the disease on among them is *Datura stromonium* [6]. The fruits and leaves of the plant are used to treat epilepsy in the traditional systems and folklore. There were also claims for the leaves that proves the epileptic activity of the plant. Since the leaves are toxic even at minute doses, there is being a search for other parts of the plant for its antiepileptic profile. In this work, parts of the Datura like flowers, leaves, fruits and stems were investigated for the antiepileptic activity in MES method. The results were compared and discussed.

EXPERIMENTAL DESIGN

Fresh plants of Datura were identified in the local farm in March, and the parts were collected, and the herbarium samples were preserved. The plant authentified duly by a botanist, and the samples were submitted in the laboratory. All the parts of the plant were dried under sunlight directly for about two days, and after ensuring the drying of elements, they are collected and powdered using a blender.

The powder is used to extract using chloroform using a Soxhlet apparatus in the laboratory. Fifty grams of the powder was used for extraction and continued for extraction until the clear liquid was run. This was collected and filtered, and the extract was then evaporated to give a thick paste-like liquid. The extractive yields and the parameters of the extracts were given in Table 1.

Invivo studies

Albino Wistar rats were used to study the antiepileptic activity of the parts of the datura plant. The animals weighed between 140-160 grams and were procured from the experimental animal supplier from Tirupathi, India. They are acclimatized in the air-conditioned rooms in their plastic cages which were allowed for easy access to food and water. The animals did not exhibit any coprophagy. The animals were separated into seven groups, with four animals in each group. The first group was taken as a normal group wherein the rats in these groups were administered only with normal saline without induction of the convulsions.

Rest all the groups are induced with convulsions in the maximum electrical shock method. The second group was administered with normal saline only. The third group was administered with a standard drug that is Diazepam. Fourth, fifth, sixth and seventh group were administered with extracts that are obtained by extraction of various parts of Datura

Maximum Electric Shock Induced Epilepsy method

In this method, electric shocks are used to induce convulsions. The maximum electric shock method was used as per the standard procedure described [7–10]. The electric shock was induced with the help of an electro convulsion meter. The maximum electric shock was given to the rats, and signs were seen, and the animals were sacrificed graciously, and the brain was collected.

Enzyme Estimation Procedure

The brain that is isolated from the above procedure was a blender and minced. The homogenate was then mixed with tris buffer and left to react for 5mins in a refrigerator. The mixture was centrifuged at 4000rpm for 10 minutes, and the supernatant liquid was separated, and the solid matter was discarded. This liquid was estimated for protective brain enzymes using standard procedures [11].

RESULTS

The convulsions were induced successfully using the MES, and the brain enzymes levels were disturbed. There was a significant lowering in the protective enzymes in the brain. This was the evaluative parameter for the estimation of the extent of epilepsy. In MES method, the extracts showed a significant balance in the protective brain enzymes. All the parts of the plant showed an antiepileptic activity, but there were some differences in the balance of the enzymes [12].

The values and levels of brain enzymes and the activity of the parts of plant Datura in normalizing the enzyme levels. The GABA receptors in the brain were protected by proteins from the free radicals that are generated from the electric shock, and the shock significantly lowered their levels thereby causing the generation of free radicals and finally affecting the receptors [13].

During the shock, the nerve impulse stimulation was continuous, and therefore a continuous generation of radicals was induced, which are deteriorated the receptors and nerve impulse transmission. This leads to the convulsion activity in the rats [14]. (Fig-

Table 1: Plant extracts Parameters

S.No.	Ingredients	Moisture content	Colour	Extractive value
1	Flowers	5.2	Pale greenish-yellow	12.23
2	Fruits	10.9	Pale green	13.74
3	Stems	5.6	Greenish brown	18.46
4	Leaves	3.8	Dark Green	17.19

Table 2: Comparison of antiepileptic property of Datura parts

Group treatment	Superoxide Dismutase Units/mg	Catalase Units/mg	Lipid Peroxidation Nmol/mg	Glutathione Reductase Units/mg	Glutathione Peroxidase Units/mg
Control	14.72± 0.39	23.25± 0.7	2.16± 0.73	29.47± 0.92	26.41± 1.02
Negative control	8 43± 0.90*	20.39± 0.40*	5.08± 0.18*	7.88± 0.97*	18.12± 0.63*
Standard (Diazepam 50mg/kg)	10.05± 0.43	21.46± 0.05	3.52± 0.62	24.71± 0.56	22.64± 0.51
Stems extract	13.89± 0.64 a	23.74± 0.52a	2.99± 0.35a	23.92± 01.12a	24..57± 0.70a
Leaves extract	14.12± 0.72 a	24.58± 0.3a	4.45± 1.06a	23.48± 0.82	25.89± 0.84a
Flower extract	12.5± 0.93	20.41± 0.21a	4.83± 0.98 a	29.26± 0.06a	21.74± 0.25 a
Fruit extract	14.93± 0.58a	22.25± 0.07a	3.45± 0.84 a	28.56± 0.91a	25.39± 0.92a

ure 1, Tables 1 and 2).

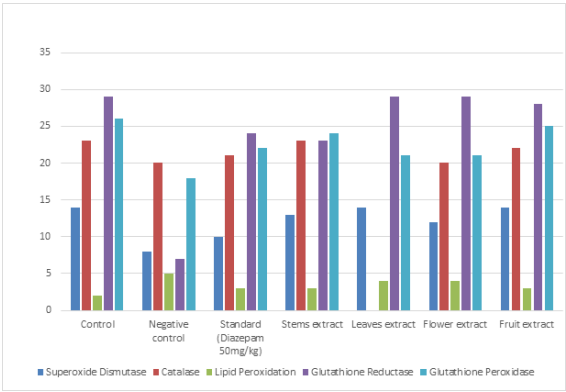

Figure 1: Comparison of antiepileptic property of Datura parts

The enzymes levels, especially peroxidases, have a different influence on the radicals which protect the cell membrane from getting damaged due to the peroxidase enzymes [15]. This was also effectively prevented by the plant extracts. Overall, the leaves showed the highest activity and flowers showed the least activity in normalizing the enzymes in the brain. This might be due to the antioxidant chemical constituents that are present in the leaves like flavonoids like kaempferol and Quercetin [16].

CONCLUSION

In this work, the comparison between the antiepileptic property of the different parts of Datura was investigated, which included Flowers, Leaves, Stems and Fruits. The activity was investigated in electrical shock method to induce epilepsy. The brain enzymes were used as estimating parameters. Overall, the flowers showed very less activity compared to stems followed by fruits, and the highest activity was shown by leaves of the plant Datura stramonium.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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