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ANTI- CONVULSANT PROFILE OF AQUEOUS EXTRACT OF *SAPINDUS LAURIFOLIA* IN EXPERIMENTAL ANIMALS

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ABSTRACT:

Objective: The aim of the present study was to evaluate the anti convulsant property of aqueous extract of *Sapindus laurifolia* in Pentylenetetrazole (PTZ) and MES induced convulsions in experimental models. **Materials & Methods**: The purpose of this study is to explore the anticonvulsant activity of ethanolic extract of *Momordica tuberosa* using Pentylenetetrazole and maximal electric shock induced convulsions in rats. **MES Model:** rats were divided into 4 groups of 6 rats each. GROUP-I (NC) received 2% GA 2ml, GROUP-II (STD) received Phenytoin 25mg/kg, GROUP-III, IV received low dose (300 mg/kg) & high dose (600 mg/kg) of *Sapindus laurifolia* respectively orally Convulsions were produced in all groups by giving maximal electric shock of 150 mA for 0.2sec after 1 hour of giving test and standard drugs orally. Tonic clonic seizures were produced after giving electric shock. Recovery time was noted. The percentage of inhibition of convulsions by drugs was measured and compared between the control, standard and test. **PTZ model:** Rats were divided and test drugs were given same as above model but standard drug was Sodium valproate (50mg/Kg). Convulsions were induced by giving the Pentylenetetrazole IP 1 hr after giving test and standard drugs intraperitoneally (IP). The onset of convulsions, duration of action, and type of seizures were noted and compared between standard and test groups. **Results:** In MES Model, ethanolic extract of *Sapindus laurifolia* significantly ($p<0.001$) decreased the duration of tonic clonic seizures and recovery time. The percentage of inhibition was 66%. In PTZ Model the onset of seizures was delayed ($p<0.002$) with low and high doses and the duration of convulsions was reduced effectively ($p<0.001$). Type of seizure was controlled in initial phase and number of seizures was also reduced. **Conclusion:** *Sapindus laurifolia* was shown anticonvulsant property in both MES and PTZ animal models.

INTRODUCTION: Epilepsy is a chronic brain disorder characterized by recurrent derangement of the nervous system due to sudden excessive uncontrolled discharge from the cerebral neurons. It is the second most common neurological disorder with an annual incidence of 50 cases /100,000 per year [1].

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Herbal remedies have been recommended in various medicinal treatises for the cure of different diseases. *Sapindus Laurifolia (Sapindus)* is a genus of about five to twelve species of shrubs and small trees in the Lychee family, Sapindaceae, native to warm temperate to tropical regions in both the Old World and New World.

The genus includes both deciduous and evergreen species. Members of the genus are commonly known as soapberries [2] or soap nuts because the fruit pulp is used to make soap. The generic name is derived from the Latin words *saponis*, meaning "soap", and *indicus*, meaning "India" [3].

The drupes (soap nuts) contain saponins which are a natural surfactant. They have been used for washing for thousands of years by native peoples in Asia as well as Americans.

Soap nuts are being considered and used for commercial use in cosmetics and detergents as well as many other products. Soap nuts have historically been used in folk remedies as a mucolytic agent, emetic, contraceptive, and for treatment of excessive salivation, ***epilepsy*** [4] and to treat chlorosis. While they do exhibit anti-inflammatory and anti-microbial properties, the effectiveness of some of these folk-remedy treatments has not been subject to extensive scientific scrutiny. However, modern scientific medical research has investigated the use of soap nuts in treating migraines [5, 6]. No research work has not been conducted on this plant to evaluate its anti-epileptic property. So, the present study was selected.

MATERIALS AND METHODS:

Plant material: Fresh roots of *Sapindus laurifolia* popularly known as Soap nut tree were obtained in sufficient quantity from tribal area of Srikakulam district, A.P August 2013. They were carefully washed to remove dust particles and other foreign materials and dried in shaded area. The completely dried roots was powdered with electric grinder and stored in well closed bottles.

Preparation of aqueous extract: The dried fine powder of the *Sapindus laurifolia* was weighed on balance 30g and taken into the sac like cloth material and placed in the Soxhlet basket. 300ml of water was taken as solvent into the Soxhlet flask [7]. Cold tap water must flow through the inlet and outlet of the condenser.

The Soxhlet apparatus kept running for 24hours for proper extraction. The extract laden solvent falling from the Soxhlet basket is dark in color and it becomes clearer, that indicates the extraction process is finished. At the end of the extraction process the solvent is then evaporated and the remaining mass is measured.

TABLE 1: THE PERCENTAGE YIELDS ARE CALCULATED AS MG PER GM DRIED POWDER.

Solvent	Weight in gm		Percentage Yields
	Sapindus laurifolia	Extract	
Water	30gm.	3.2gm.	10.6%

The yield of the ethyl alcohol extract is 10.6%.The extract was suspended in 2ml of 2% Gum acacia and used for the oral administration in rats.

Experimental animals: The animals were supplied from Sainath Agencies, Hyderabad, AP, and India. They were randomly distributed into groups and housed in cages (6/cage) and maintained under standard conditions at 26 ± 2°C and relative humidity 44-56% and 10 hours light: 14 hrs dark cycles each day for 1 week before and during the experiments. All animals were fed the standard rodent pellet diet and water. So this study was cleared by institutional animal ethical committee.

Experiment design: The animals were divided into four groups with each group consisting of six animals. Group-I received gum acacia (2%) served as control, Group-III and IV were administered two graded doses of test drug (extract) i.e. 300, 600mg/kg, orally in MES and IP in PTZ experimental models. Group-II received diphenylhydantoin (25 mg/kg, orally) [(8)] and Valproic acid (50 mg/kg, i.p) [(9)] as standards in MES method and PTZ induced seizures method respectively orally. In MES model, Convulsions were produced in all groups by giving maximal electric shock of 150 mA for 0.2sec after 1 hour of giving test and standard drugs orally. Tonic clonic seizures were produced after giving electric shock. Recovery time and percentage of inhibition of seizures were noted. In PTZ model, Convulsions were induced by giving the Pentylenetetrazole (25mg/Kg) [8] IP 1 hr after giving test and standard drugs intraperitoneally (IP). The onset of convulsions, duration of action, and type of seizures were noted and compared between standard and test groups.

Statistical analysis: statistical analysis was done by one way Analysis of Variance (ANOVA). Results were expressed as Means ± SEM from 6 rats in each group. P values <0.001 were considered significant.

RESULTS: *Sapindus laurifolia* extract was subjected for anti convulsant effect using MES induced convulsant models in rats. The extract exhibited significant anti convulsant activity with high dose (600mg/kg) by reducing the recovery time (126.3±6.01) and p <0.001 and increasing the Percentage of inhibition (65.11%).

TABLE 2: ANTI CONVULSANT EFFECT OF *SAPINDUS LAURIFOLIA* EXTRACT IN MES MODEL

Groups	Treatment	Dose	Time in seconds of recovery from convulsions (Mean±SEM)	% of inhibition of convulsions
1	**Control-2% GA**	2% gum acacia (2ml/100g)	213.3±9.42	0
2	**Standard-Phenytoin**	Phenytoin (25mg/kg)	78.33±11.86**	97
3	**Test-T_1-extract**	Low dose- 300mg/kg	145.0±4.68*	52
4	**Test-T_2-extract**	High dose- 600mg/kg	126.3±6.01**	65.11

*P<0.05, **P<0.01, ***P<0.001 compared to Control.

In PTZ induced model, the ethanolic extract of *Sapindus Laurifolia* was shown significant anti convulsant effect with high and low dose by increasing onset of action and reducing the duration of action of convulsions. Recovery/death was observed in all groups.

TABLE 3: ANTI CONVULSANT EFFECT OF *SAPINDUS LAURIFOLIA* EXTRACT IN PTZ MODEL

Groups	Treatment	Dose	Onset of action (time in sec) (Mean±SEM)	Duration of action (sec) (Mean±SEM)	Recovery/death
1	**Control-2% GA**	2% gum acacia (2ml/100g)	551.3±120.4	890.8±85.21	Death
2	**Standard-Sodium valproate**	Sodium valproate (50mg/kg)	83.50±31.84***	17±5.03**	Recovered
3	**Test-T_1-extract**	Low dose-300mg/kg	596.1±112.3*	420.5±156.3*	Death/recovered
4	**Test-T_2-extract**	High dose-600mg/kg	623.3±119.7*	79±29.93***	Recovered

*P<0.05, **P<0.01, ***P<0.001 compared to Control.

DISCUSSION: In spite of tremendous development in the field of synthetic drugs during recent era, they are found to have some or other side effects, whereas plant products or homeo drugs still hold their own unique place by the way of having no side effects. Therefore a systemic approach should be made to find out the efficacy of plant products against epilepsy so as to exploit them as herbal anti-epileptic agents. Epilepsy is a chronic common neurological disorder that affects people of all ages. Around 50 million people worldwide have epilepsy. Nearly 90% of the people with epilepsy are found in developing regions [10].

The prevalence is 5-10/1000 persons with higher incidence in infants [11]. Epilepsy is often progressive disorder characterized by the periodic and unpredictable occurrence of epileptic seizures which are caused by an abnormal discharge of cerebral neurons. The definition of epilepsy requires occurrence of at least one epileptic seizure [12]. Many different types of seizures can be identified on the basis of their clinical phenomena [13]. Seizures are broadly categorized into two types: partial and generalized seizures [14]. Partial (focal, local) seizures are those in which clinical or electrographic evidence exists to suggest that the attacks have a localized onset in the brain, usually in a portion of one hemisphere, while generalized seizures are those in which evidence for a localized onset is lacking. Partial seizures are further subdivided into simple partial, complex partial and partial seizures evolving to secondarily generalized seizures, while generalized seizures are categorized into absence (non-convulsive), myoclonic, clonic, tonic, tonic-clonic and atonic seizures.

In addition to classifying the seizures that occur in patients with epilepsy, patients are classified into appropriate types of epilepsy or epileptic syndromes characterized by different seizure types, etiologies, ages of onset and electroencephalo-graphic (EEG) features. However, despite several anti-epileptic drugs both old and novel, many patients have intractable epilepsy or epilepsy with intolerable side effects. Better understanding of processes leading to epilepsy is required to create therapies aimed at prevention of epilepsy in patients at risk. Further there is need to develop disease modifying therapies which could halt the progression of epilepsy [15]. The discovery of novel antiepileptic drugs (AEDs) relies upon the preclinical employment of animal models to establish efficacy and safety prior to the

introduction of the AEDs in human volunteers. Clearly, the more predictive the animal model for any given seizure type or syndrome, the greater the likelihood that an investigational AED will demonstrate efficacy in human clinical trials [16]. Thus, many plants were known for their anticonvulsant activity. Various physiochemical and pharmacological studies have been carried out on these anticonvulsant plants [17, 18].

Currently available anticonvulsant drugs are able to efficiently control epileptic seizures in about 50% of the patients; another 25% may show improvement where as the remainder does not benefit significantly [19]. Furthermore, undesirable side effects from the drugs used clinically often render treatment difficult, so, a demand for new types of anticonvulsants exists. One of the approaches to search for new antiepileptic drugs is the investigation of naturally occurring compound, which may belong to new classes. In the present study the antiepileptic action of *Sapindus Laurifolia* extract was evaluated in Swiss albino rats.

According to literature, *Sapindus Laurifolia* having number of medicinal properties like anti-epileptic, act as mucolytic agent, emetic, contraceptive, and for treatment of excessive salivation, epilepsy,[4] and to treat chlorosis. While they do exhibit anti-inflammatory and anti-microbial properties, the present study antiepileptic property of this plant was selected to evaluate its action in epileptic seizures of experimental animals. In our study, aqueous root extract of *Sapindus laurifolia* has shown protection against Maximum Electroshock Seizures and PTZ induced seizures.

In MES induced seizures **(Table 2),** the extract of *Sapindus Laurifolia* inhibits the type of seizures and shortens the recovery time effectively with high dose and less action with the low dose when compared with control group. High dose (600mg/Kg) more active than low dose (300mg/Kg) (52% inhibition) but less active than standard drug (Phenytoin) (97% inhibition) Percentage of inhibition of seizures with high dose extract is 65.11%.

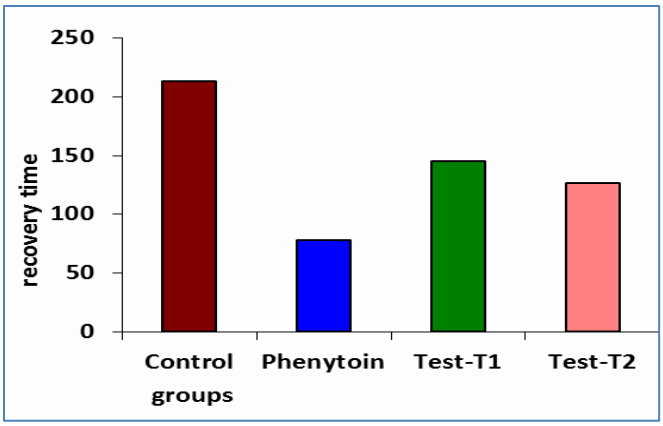

FIG. 1: EFFECT OF *SAPINDUS LAURIFOLIA* ON *RECOVERY TIME* IN MES INDUCED CONVULSIONS

In PTZ induced seizures (Table no.3), the extract of *Sapindus Laurifolia* was shown to act to reduce number of seizures, increase the onset of action and shorten the duration of action of seizures when compared with control group. High dose (600mg/Kg) more active than low dose (300mg/Kg) but less active than standard drug (Sodium valproate).

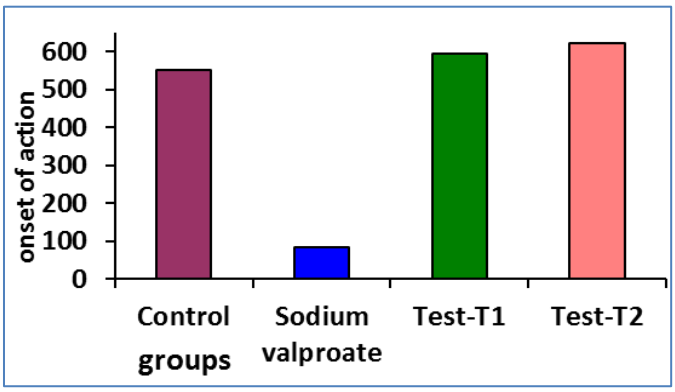

FIG. 2: EFFECT OF *SAPINDUS LAURIFOLIA* ON ONSET OF ACTION IN PENTYLENETETRAZOLE INDUCED CONVULSIONS

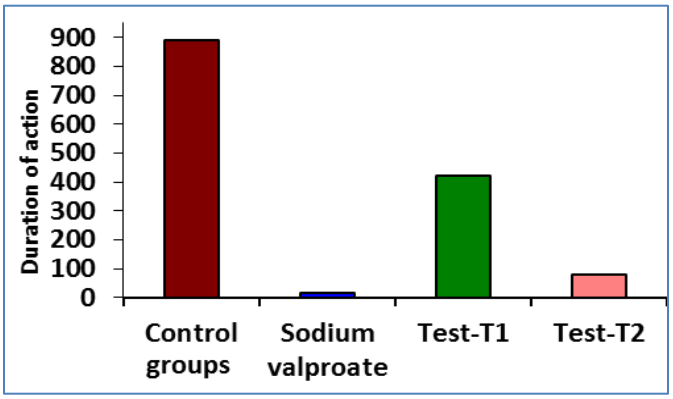

FIG: 3. EFFECT OF *SAPINDUS LAURIFOLIA* ON DURATIONOFACTION IN PENTYLENETETRAZOLE INDUCED CONVULSIONS

CONCLUSION: The present study indicates that the plant *Sapindus laurifolia* has potential anti-convulsant activity against MES induced and Chemical (PTZ) induced convulsions in experimental animals. So this activity of plant probably due to the compounds present such as Saponins and Flavonoids. So the plant *Sapindus laurifolia* uses for both Ayurvedic and Modern drug development areas because of its phyto-medicinal uses.

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