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ANTICONVULSANT ACTIVITY OF LEAVES EXTRACT OF *CASSIA AURICULATA* (LINN)

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ABSTRACT

Epilepsy or convulsion is a disorder of CNS characterized by paroxysmal cerebral dysrhythmia, manifesting as brief episodes of loss or disturbance of consciousness, with or without characteristic body movements know as convulsions. Variety of number of drugs are available in practice, however their effectiveness does not grip true with the entire population suffering from epilepsy. Adjuvent therphy for such disease are in popular for their primary health care need. Phytoconstituents have been the basis of treatment of human diseases including epilepsy. Herbal products are extensively used for the treatment of many diseases worldwide and where allopathic fails or has severe side effects. The present study was undertaken to evaluate anticonvulsant activity of *Cassia auriculata* Linn. of leaves extracts. Anticonvulsant activity was carried out using two models viz., Maximal Electroshock seizure MES induced seizure and Pentylenetetrazole (PTZ) induced seizure. The acute toxicity study was carried out and the doses of the extract selected were 250 and 500 mg/kg, b.w. The anticonvulsant effect of petroleum ether extract (CAP), chloroform extract (CAC), ethanolic extract (CAE), and aqueous extract (CAA) were evaluated in Swiss albino wistar rats by maximal electric shock method. The extracts showed presences of steroids, glycosides, flavonoids, carbohydrate, proteins and amino acid. The alcohol extract exhibited highly significant activity in MES and PTZ compared to control. In the study of combination therapy of alcohol extract and phenytoin in different dose against MES induced seizure using albino rats. Combination of alcohol extract (250mg/kg) and Phenytoin (12.5mg/kg) was showed significant anticonvulsant activity.

KEYWORDS: *Cassia auriculata* Linn, Phytochemicals, Anticonvulsant, Maximal Electroshock seizure, Pentylenetetrazole induced seizure, Phenytoin.

INTRODUCTION

Epilepsy is a serious neurological condition which is derived from Greek word meaning a condition of being overcame or attacked. Word wide up to 5% of the world population develops epilepsy in their lifetime and requires effective treatment without which death is possible.[1] The current therapy of epilepsy with modern antiepileptic drugs is associated with side effects, dose-related and chronic toxicity, as well as teratogenic effects. In spite of regular treatment, approximately 30% of the patients continue to have seizures with current antiepileptic drugs. Main root cause of epilepsy is damage or injury of nerves due to many factors, but 65% of cases have no known cause.[2]

The ideal anti-seizure drug would suppress all seizures without causing any unwanted effect. Unfortunately the drugs used currently not only fail to control seizure activity in some patients, but they frequently cause side effects.[3] In addition to safety, tolerability, efficiency, expenses especially in long term therapy, serum drug monitoring etc. are other limitations with synthetic antiepileptic drugs. Comparatively lesser side effects and interactions associated with these herbal remedies can make the anticonvulsant treatment more rationale and patient friendly.

The medicinal plants for the study were selected in such a way that their availability is maximized in many parts of the world.[4] Plants have been one of the important sources of medicines even since the dawn of human civilization. Approximately one -third of all pharmaceuticals are of plant origin, wherein fungi and bacteria are also included. Over 60% of all pharmaceutical are plant-based.

Cassia auriculata Linn (Family: Caesalpiniaceae) commonly known as Tanners Senna, is distributed throughout hot deciduous forests of India. It is found in wood lands wooded grasslands upto 600 m altitude. It

usually grows wild and dry regions with a minimum annual precipitation of 400mm but it also tolerates wet climates with a minimum precipitation of up to 4,300 mm. it grows well in areas with mean annual temperature range of 16-27°C *Cassia auriculata* needs full sun. It tolerates many soil types saline soils but prefers fairly rich well drained friable soils.[5] The plant has been reported to possess antipyretic, hepatoprotective antidiabetic, antiperoxidative, antihyperglyceamic and microbicidal, anticancer, antirheumatic, antiasthmatic activities etc.Use this plant for the treatment of skin diseases, asthma, conjunctivitis and renal disorders. In the folk medicine, tea prepared from the leaves is useful in chronic fever and fruits are used as anthelmintic *Cassia auriculata* has been used for a variety treatment like in case of leucorrhoea scorpion bite etc. The 50% ethanolic extract of flower and leaves is reported to have antiviral, antispasmodic, antilipidemic activity.[6,7]

Leaf extract has a protective action against alcohol induced oxidative stress to the cells as evidenced by the lowered tissue lipid peroxidation and elevated levels of the enzymatic and non-enzymatic antioxidants and experimentally induced alcohol related liver damage.[8] The ethanol and methanol extracts of the flowers of *Cassia auriculata* showed antioxidant activity using improved assay based on the decolorization of the radical monocation of 2,2-azinobis –(3-ethyl benzothiazoline-6-sulfonic acid) (ABTS) and 1,1-diphenyl-2-picryl hydrazyl (DPPH) radical scavenging method.[9] *C. auriculata* has been shown to antiviral activity and anti spasmodic activity.[10] The flower and leaf extract shown to anti pyretic activity.[11] The leaf extracts also shows emollient effect[12] and showed anthelmintic activity.[13] It has been reported in the literature that *Cassia auriculata* leaf extract showed significant activity against alcohol induced liver injury.[14]

There are no available reports on the comparison studies of anticonvulsant activity of *Cassia auriculata* leaves extracts. Therefore the present study was undertaken to determine the effect of comparison studies of *Cassia auriculata* leaves extracts on anticonvulsant properties in MES and PTZ induced rats.

MATERIALS AND METHODS

Phenytoin, Pentylenetetrazole, 1, 1-Diphenyl Picryl Hydrazyl (DPPH), Thiobarbitulic acid (TBA) were purchased from Sigma-aldrich, Mumbai, Tri-chloro acetic acid (TCA), 2-thiobarbituric acid, Hydrochloric acid from Himedia laboratories Pvt. Ltd, Mumbai, India, Hydrogen peroxide, Normal Saline from Rajat Pharmaceutical Industries Mumbai and Ethanol, Ethylene diamine tetra acetic acid (EDTA), L-ascorbic acid, Dimethylsulphoxide (DMSO) from S.D.Fine – Chem Ltd, Mumbai. All the chemicals used in the study were of analytical grade.

Experimental Animals

All the experiments were carried out with Male wistar rats, 250±20g, were supplied by Venkateshwara Enterprises Bangalore. They were housed in polypropylene cages (47cmx34mx20cm) lined with husk, renewed every 24hr under a 12:12 hlightdark cycle at around 22 C. The rats had free access to tap water and food. The rats were fed on a standard pellet diet (Pranav Agro Industries Ltd., Maharashtra, India).The experiment was carried out according to the guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), New Delhi, India and approved by the Animal Ethical Committee of SET's College of Pharmacy S. R. Nagar Dharwad Karnataka India (Approval No. SETCP/IAEC/2008-2009/02).

Plant Material

The leaves of *Cassia auriculata* Linn were collected from surrounding area of Dharwad in the month of June-August and authenticated. The collected material was washed with running water. The plant were chopped in to small pieces and dried under shade. Dried parts of plant were coarsely powdered and used for extraction.

METHODS

Preparation of the Extracts

The dried plant material was then crushed and continuous hot extraction method using Soxhlate apparatus extracted with benzene it removes chlorophyll. Residue was air dried. The air dried plant material successively extracted with petroleum ether, chloroform, ethanol (60^0C-80^0C), in a Soxhlet extractor. Filtered in hot condition and evaporated in a rotary flash evaporator (*Hahnvapor, Hahnshin Scifintic Korea)* to remove the solvents. The aqueous extract prepared by cold maceration process macerated with chloroform water I.P. The mixture was filtered through muslin cloth and concentrated in vacuum under reduced pressure using rotary flash evaporator. And then the extract was kept on water bath to obtain crude extract and finally residue was dried in a vacuum desiccator over calcium chloride, to petroleum ether extract [CAP] chloroform extract [CAC] ethanol extract [CAE] and aqueous extract [CAA] respectively.

Phytochemical Investigation

The phytochemical investigation was carried out on the alcoholic extract of *Tectona grandis*. The tests were carried out by following standard methods described in practical pharmacognosy by Dr. C. K. Kokate[15] and Dr. K. R. Khandelwal.[16]

1. Detection of Carbohydrates, Proteins and Amino acids, Lipids, Glycosides, Flavonol glycosides/ Flavonoids, Tannins and Phenolic compounds, Alkaloids.

PHARMACOLOGICAL EVALUATION

Toxicity Studies[17]

Acute oral toxicity – Acute toxic class method

The acute oral toxicity study was carried out as per the guidelines set by Organization for Economic Co-operation and Development (OECD), revised draft guidelines 423, received from Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Social Justice and empowerment, Govt. of India.

Principle of Test

It is the principle that based on a stepwise procedure with the use of a minimum number of animals per step. Sufficient information is obtained on the acute toxicity of the test substance to enable its classification. The substance is administered orally to a group of experimental animals at one of the defined doses. The substance is tested using a stepwise procedure, each step using three animals of single sex (normally females). Absence or presence of compound related mortality of the animals dosed at one step will determine the next step.

- No further testing is required
- Dosing of three additional animals with the same dose.
- Dosing of 3 animals at the next higher or the next lower dose level.

The method enables judgment with respect to classifying the test substances to one of the series of toxicity classics defined by fixed LD_{50} cut off values.

Description of the Method

It involves selection of animal species, housing and feeding condition of animals, preparation and administration of doses and number of animals and dose levels.

The procedure of dose selection and finalizing LD_{50} cut off values is shown in the Table No. 1. The following LD_{50} values were obtained for various extracts.

Table No. 1: LD50 values (Acute toxicity studies) of various extracts.

Sl. No	Name of Extract	LD_{50} Cut-Off mg/ kg, b.w	Vehicle
1	Petroleum ether extract	5000 mg	Tween 60
2	Chloroform extract	5000 mg	Tween 60
3	Alcohol extract	5000 mg	Tween 60
4	Aqueous extract	5000 mg	Tween 60

$1/10^{th}$ of this lethal dose was taken as effective dose (therapeutic dose) for subsequent anti-convulsant activity.

Observations

Animals were observed initially after dosing at least once during the first 30 minutes, periodically during the first 24 hours. In all cases death was observed within first 24 hours.

EVALUATION OF ANTI-CONVULSANT ACTIVITY[18-20]

Selection of animals

Healthy young albino wistar rats of either sex weighing between 150 to 220 gm (8 to 12 weeks old) were selected for the experiment. Totally, there were six groups, in these four groups received test extracts and remaining two groups were standard (Phenytoin) and control group.

1. Maximal Electroshock (MES) induced seizure

Albino wistar rats of either sex will be divided into ten groups (5 in each) as given in above table. Group I receive normal saline, Group-X receive Phenytoin a standard drug Group- II, III, IV, V, VI, VII, VIII and IX receive CAP, CAC,CAE and CAA respectively in lower and higher dose 1 h prior to induction of convulsion. Maximal electroshock of 150mA current for 0.2 seconds were administered through ear electrodes to induce convulsion in the control and drug treated animals. The severity of convulsion will be evaluated by measuring the (sec) duration of tonic flexion, tonic extensor, clonus, stupor and recovery phase for all grouped animals was shown in table no. 2.

Table No. 2: Work plan for Anticonvulsant activity by Maximal Electroshock (M.E.S) induced seizure in rats. (MES of 150mA current for 0.2 seconds)

Groups	Treatment *Dose in mg/kg body weight and route of administration*	Time of administration *Prior to induction of convulsions*
I	Normal1ml/rat p.o	30 min
II	*Cassia auriculata* petroleum ether extract **CAP** Lower dose 250mg/kg	60 min
III	*Cassia auriculata* petroleum ether extract **CAP** Higher dose500mg/kg	60 min
IV	*Cassia auriculata* chloroform extract **CAC** Lower dose 250mg/kg	60 min
V	*Cassia auriculata* chloroform extract	60 min

	CAC Higher dose500mg/kg	
VI	*Cassia auriculata* ethanol extract extract **CAE** Lower dose250mg/kg	60 min
VII	*Cassia auriculata* ethanol extract extract **CAE** Higher dose500mg/kg	60 min
VIII	*Cassia auriculata* aqueous extract **CAA** Lower dose250mg/kg	60 min
IX	*Cassia auriculata* aqueous extract **CAA** Higher dose500mg/kg)	60 min
X	Phenytoin p.o.25mg/kg	30 min

2. Pentylenetetrazole (PTZ) induced seizure.

Albino wistar rats of either sex will be divided into six groups (5 in each) as given in above table. Group I receive normal saline, Group-X receive Diazepam a standard drug Group- II, III, IV, V, VI, VII, VIII and IX receive CAP, CAC, CAE and CAA respectively in lower and higher dose. Pentelynetetrazole (80mg/kg) were administered intraperitoneally to induce convulsion to all grouped animals 1 h post treatment of saline (Vehicle), standard drug and different extracts. The anticonvulsant effect will be assessed by measure (sec) the ability of the test drug to delay the onset of action/protection against PTZ (chemoshock) induced convulsion shown in table no. 3.

Table No. 3: Work plan for Anticonvulsant activity by Pentylenetetrazole (PTZ) induced seizure in rats. (PTZ of 150mA current for 0.2 seconds).

Groups	**Treatment** ***Dose in mg/kg body weight and route of administration***	**Time of administration** ***Prior to induction of convulsions***
I	Normal1ml/rat p.o	30 min
II	*Cassia auriculata* petroleum ether extract **CAP** Lower dose 250mg/kg	60 min
III	*Cassia auriculata* petroleum ether extract **CAP** Higher dose500mg/kg	60 min
IV	*Cassia auriculata* chloroform extract **CAC** Lower dose 250mg/kg	60 min
V	*Cassia auriculata* chloroform extract **CAC** Higher dose500mg/kg	60 min
VI	*Cassia auriculata* ethanol extract **CAE** Lower dose250mg/kg	60 min
VII	*Cassia auriculata* ethanol extract **CAE** Higher dose500mg/kg	60 min
VIII	*Cassia auriculata* aqueous extract **CAA** Lower dose250mg/kg	60 min
IX	*Cassia auriculata* aqueous extract **CAA** Higher dose500mg/kg)	60 min
X	Diazepam 4mg/kg p.o. (standard drug)	30 min

***IN-VITRO* ANTIOXIDANT ACTIVITY**[21-22]

Free radical scavenging activity by 1, 1-Diphenyl picryl Hydrazyl (DPPH) Assay, Hydrogen peroxide Assay, Lipid peroxidation assay.

RESULTS

Cassia auriculata Linn. plant was identified and along with its leaflets and authenticated by experts. Excess amount of leaves were collected and drying in sunshade and powdered by using grinder and preparation of extract by continuous hot extraction method using Soxhlet apparatus. The yield and physical characteristics of extracts of leaflets of *Cassia auriculata* Linn are reported in the Table no. 4. Around 10 % yield was obtained for various solvents and the extract had characteristic odor with grayish brown color.

The extract was subjected for phytochemical investigation. The bark extract was also subjected for spectral analyses to find out possible chemical constituents in the extract. Preliminary phytochemical analysis of ethanolic extract of leaves of Cassia *auriculata* Linn are presented in the Table no. 5. The extract was identified for Carbohydrates, Glycosides, Flavonoids, Tannins & phenolic compounds Alkaloids, and Steroids. The results indicated that the extract showing positive tests for all constituents tested. Confirmation of the phytoconstituents was done by carrying out more than one test.

Table No. 4: Percentage yield and physical characteristics of leaves extracts of *Cassia auriculata* Linn.

Extracts	%Yield (gm)	Color	Odour	Consistency
Petroleum ether Extract **(CAP)**	11.56%	Greenish yellow	Characteristic	Waxy
Chloroform Extract **(CAC)**	10.68%	Greenish brown	Characteristic	Semi-solid
Ethanol Extract **(CAE)**	9.55%	Brown	Characteristic	Semi-solid
Aqueous Extract **(CAA)**	12.02%	Blackish brown	Characteristic	Crystalline

Table No. 5: Preliminary phytochemical analysis of leaves extracts of *Cassia auriculata* Linn.

Sl. No	Extracts	Phytoconstituents
1	**Petroleum ether extract CAP**	Lipids, Steroids, Flavonoids
2	**Chloroform extract CAC**	Carbohydrates, Anthraquinone, Glycosides, Tannins and Phenolic compounds, Flavonoids
3	**Ethanol Extract CAE**	Carbohydrates, Cardiac glycosides, Tannins and phenolic compounds, Flavonoids, Alkaloids, Saponin glycosides
4	**Aqueous extract CAA**	Carbohydrates, Tannins, Flavonoids, Proteins and amino acids

Acute Toxicity Studies

The guidelines described by OECD 423 (animals n=3) will be adopted for the determination of LD50 on Swiss albino female mice and 1/10th of LD_{50} will be taken as higher dose and $1/20^{th}$ of LD_{50} will be taken as lower dose for the study.[9]

A. Maximal Electroshock (MES) induced seizure

The leaves extracts of *Cassia auriculata* (250 and 500 mg/kg, P.O) exhibited significant anticonvulsant activity ($P<0.001$) in extension phase by protecting the onset and number of seizures without hind limb extension in rats as compared to others except CAA treated groups. The results were further comparable with normal group and standard drug Phenytoin (Table no. 6) The leaves extracts of *Cassia auriculata* exhibited dose depended significant anticonvulsant activity ($P<0.001$) in clonic phase by decreasing the clonic seizures in selected 250 and 500 mg/kg doses.

Table no. 6: Effect of *Cassia auriculata.* Linn on Anticonvulsant activity by MES induced seizure in rats Extension phase.

Groups	Treatment	Time (min)	1	2	3	4	5	6	mean ± SEM
I	Normal1ml/rat p.o	30	8	9	5	8	8	10	8.00 ± 1.67
II	CAP Lower dose 500mg/kg	60	6	5	2	6	4	1	4.00 ± 2.10**
III	CAP Higher dose 500mg/kg	60	5	4	1	2	1	2	2.50 ± 1.64***
IV	CAC Lower dose 250mg/kg	60	4	5	7	6	1	2	4.17 ± 2.32**
V	CAC Higher dose 500mg/kg	60	1	2	1	2	1	1	1.33 ± 0.52***
VI	CAE Lower dose 250mg/kg	60	1	1	2	0	1	0	0.83 ± 0.75***
VII	CAE Higher dose 500mg/kg	60	0	0	0	0	0	0	0.00 ± 0.00***
VIII	CAA Lower dose 250mg/kg	60	9	4	5	5	6	6	5.83 ± 1.72
IX	CAA Higher dose 500mg/kg)	60	9	4	4	6	7	6	6.00 ± 1.90
X	Phenytoinp.o.25mg/kg	30	0	0	0	0	0	0	0.00 ± 0.00***

Each value is expressed as mean ± SEM for 6 animals in each group. *P<0.05 **P<0.01 ***P<0.001. One-way ANOVA followed by Tukeys post test.

B. Pentylenetetrazole (PTZ) induced seizure

The leaves extracts of *Cassia auriculata* (250 and 500 mg/kg,p.o) prevented seizures against Pentylenetetrazole (PTZ) (3.5 mg/kg, S.C) induced convulsion, but exhibited dose dependent prolongation of both tonic and clonic seizures for the extracts compared with control mice. The results were comparable with standard drug Diazepam (10 mg/kg, I.P) (Table no. 7).

Table No. 7: Effect of *Cassia auriculata* on anticonvulsant activity by Pentylenetetrazole (PTZ) induced seizure in rats. (Min).

Groups	Treatment	Time	1	2	3	4	5	6	mean ± SEM
I	Normal1ml/rat p.o	30 min	20	19	21	15	22	17	19.00 ± 2.61
II	CAP Lower dose 500mg/kg	60 min	25	25	28	29	20	21	24.67 ± 3.61**
III	CAP Higher dose 500mg/kg	60 min	31	32	28	27	26	27	28.50 ± 2.43***
IV	CAC Lower dose 250mg/kg	60 min	22	21	21	21	19	19	20.50 ± 1.22
V	CAC Higher dose 500mg/kg	60 min	22	20	22	28	25	26	23.83 ± 2.99**
VI	CAE Lower dose 250mg/kg	60 min	21	23	24	26	20	18	22.00 ± 2.90**
VII	CAE Higher dose 500mg/kg	60 min	26	25	29	32	25	25	27.00 ± 2.90***
VIII	CAA Lower dose 250mg/kg	60 min	16	20	18	18	19	18	18.17 ± 1.33
IX	CAA Higher dose 500mg/kg)	60 min	21	20	21	24	25	25	22.67 ± 2.25**
X	DIAZEPAM p.o.25mg/kg	30 min	25	39	41	38	37	40	36.67 ± 5.89***

Each value is expressed as mean ± SEM for 5 animals in each group.
*P<0.05 **P<0.01 ***P<0.001. One-way ANOVA followed by Tukeys post test.

DISCUSSION

Through the reported literature on medicinal plants in particularly on *Cassia auriculata* showed as an anthelmintic, laxative, antipyretic, diseases of urinary system, constipation, rheumatism, skin diseases, leprosy, conjunctivitis, anthelmintic and anti-diabetic agent.[23,24]Hence, present work was under taken to study the possible antiepileptic activity using two different models. Preliminary phytochemical investigation studies of leaves extracts of *Cassia auriculata* revealed the presence of steroids, flavonoids, tannins and alkaloids as the major phytoconstituents.

The various extracts of *Cassia auriculata* did not revealed any abnormal behaviour or mortality up to 5000 mg/kg P.O, Hence 1/10th of the dose i.e 500 mg/kg and lower dose 250 mg/kg p.o were selected for the study. The ethanolic extracts (250 and 500 mg/kg,p.o) exhibited significant (P<0.001) effects against acute seizures induced by maximal electric shock (MES), chemical convulsant such as Pentylenetetrazole anticonvulsant effects as compared to alcoholic extract (P<0.05) at the same dose. On the other hand aqueous extract (250 and 500 mg/kg,p.o) did not exhibited any effect on the above parameters and showed onset of seizures and death after forelimb extension in maximal electric shock induced convulsions, along with frequent tonic and clonic seizures appeared in picrotoxine and strychnine induced convulsions.

Picrotoxine is a selective noncompetative antagonist of gamma amino butryic acid (GABA) at GABA A receptor, which has been widely implicated in epilepsy.[25] .GABA is the major inhibitory neurotransmitter in the brain and it's inhibitionis thought to be an underlying factor in epilepsy. It is therefore probable that anticonvulsant effect of the extracts might involve both gabaergic and glycinergic inhibitory mechanisms. On the other hand strychnine has been demonstrated to have a well defined mechanism of convulsant action by directly antagonizing the inhibitory effect of spinal cord and brain stem reflexes of glycine and thus increasing spinal reflexes.[26]

The models used to evaluate the effectiveness of various extracts were (1) Maximal Electroshock Seizure and (2) Pentylene tetrazole seizure. The MES model is generally used to evaluate the anticonvulsant drugs against generalized tonic-clonic seizure (grand mal) in rodents, which is related to intensity of current stimulus and the dose. MES produced various phases of convulsion i.e. Flexion, Extension, Clonus and Stupor. The duration of tonic extension of the hind limb was used as end point i.e. prevention or decrease in the duration of hind limb extension was considered as a protective action.

The various extracts were given orally with the help of stomach tube to rats. The results of all the extracts are compared with the result produced by control. The data resulted from anticonvulsant effect of different extracts showed that all extracts decrease the duration of hind limb extension, petroleum ether extract 4 and 2 min, chloroform extract 4 and 1min, alcohol extract 0 and 0.8 min, and aqueous extract 5 and 6 min respectively for lower and higher does which are most significant when compared to control. In other words the alcohol extract is able to decrease the duration of hind limb extension (extensor phase), clonus and also the duration of stupor phase, which indicate its potent anticonvulsant activity against generalized tonic-clonic seizure (grand mal).

CONCLUSION

Self medication using herbal product is an increasing day-by-day due to fact that these products are safe and without side effects, interactions between complementary alternative and conventional medicines are being described Many drugs that increase the brain content of GABA have exhibited anti-convulsant activity against seizure induced by MES, PTZ and lithium Pilocarpine. In the present study, MES and PTZ are used for assessment of anti-epileptic drugs in generalized tonic clonic seizures. The leaves extracts of*Cassia*

auriculata Linn (250 and 500 mg/kg, p.o) exhibited significant anticonvulsant activity as compared to standard drugs. The activity may be due to presence of phytoconstituents such as flavonoids, tannins and alkaloids in the plant extracts. Similarly ethanolic extracts of the plant exhibited relevant antioxidant activity in all the *in-vitro* models. Hence leaves extracts of the *Cassia auriculata* can be employed in the treatment of convulsive disorders as well as potential antioxidant in prevention of oxidative stress induced by the free radicals. However, possible mechanisms of action have to be further investigated with few more experimental evidences.

REFERENCES

1. Shih LIM, Epidemiology and etiology of seizures and epilepsy in the elderly in Asia; Neurology Asia, 2004; 9(1): 31-32.
2. Raymand A, Maurice V, Allan H., Rooper. Epilepsy and other seizure disorders, Chapter 16, "Principles of Neurology" 6th Edition McGraw-Hill Health Profession Division, 1997; 313-341.
3. www.epilepsyfoundation.org/answerplace. Accessed on 12-03.2015.
4. Tando PN, Jain S. Ayurvedic medicine & indian literature on epilepsy. Neurology Asia, 2004; 9: 57-58.
5. Kirtikar KR, Basu BD. Indian Medicinal Plants. Allahabad UP (India), 2nd Edn. IV, 1993; 867-868.
6. Veerachari U, Bopaiah AK. Phytochemical investigation of the ethanol, methanol and ethyl acetate leaf extracts of six *Cassia* species.J. Chem. Pharm. Res, 2011; 3(5): 574-583.
7. Lohar DR, Garg SP, Chawan DD. Phytochemical studies on Indian medicinal plants. J Indian Chem Soc, 1981; 58: 989-991.
8. Khalid S.Al-N, Hypocholesteremic & Antioxidant Effects of Garlic (*Allium sativum* L.) Extract in Rats Fed High Cholesterol Diet. Pakistan Journal of Nutrition, 2009; 8(2):161-166.
9. Kumaran A, Karunakaran RJ. Antioxidant activity of *Cassia auriculata* flowers. Fitoterpia, 2007; 78: 46-47.
10. Anandan A, Eswaran R, Doss A, Sangeetha G, Anand SP. Chemical Compounds Investigation of *Cassia auriculata* Leaves; A Potential Folklore Medicinal Plant;BEPLS, 2011;1 (1): 20-23.
11. Vedavathy S, Rao KN. Antipyretic activity of six indigenous medicinal plants of Tirumala hills. J Ethnopharmacol, 1991; 33: 193-196.
12. Nanba TS, Kadota K, Shimomura K, Iida K. Skin-Lightening cosmetic containing hyaluronidase and collangenase inhibiting *Cassia auriculata* extracts. Japan Kokai Tokyo Koho, 1994; 26: 960.
13. Kainsa S, Kumar P. Singh R. Investigation of *in vitro* anthelmintic activity of *Cassia auriculata* leavesJ. Nat. Prod. Plant Resour, 2012; 2(4): 460-464.
14. Rajagopal SP, Manickam N, Periyasamy V, Namasivayam L. Activity of *Cassia auriculata* leaf extract in rats with alcoholic liver injury. J Nut Biochem, 2003; 14: 452-458.
15. Kokate CK. Practical Pharmacognosy. 4th ed. New Delhi: Vallabh Prakashan; 1994, pp. 330- 6.
16. Khandelwal KR. Practical Pharmacognosy techniques and Experiments. 2nd ed. Pune: Nirali Prakashan, 2000; 26-9.
17. Ghosh MN. Fundamentals of Experimental Pharmacology. 2nd ed. Calcutta: Scientific Book Agency, 1984; 154-8.
18. Wolfgang.L, Christian.P. Fassbender and Bjron M. The role of technical, biological and pharmacological factors in the laboratory evaluation of anticonvulsant drug II. Maximal electroshock models. Epilepsy Res, 1991; 8: 79-94.
19. Vogel HW, Sholkens BA, Sandow J, Muller G, Vogel WF. Drug discovery and evaluation pharmacological assays. Germany, Springer, 2002; 2: 459-93.
20. Wolfgang L, Christian P, Fassbender and Bjron M. The role of technical, biological and pharmacological factors in the laboratory evaluation of anticonvulsant drug III. Pentylenetetrazole seizure models. Epilepsy Res, 1991; 8: 171-189.
21. Veerapur VP, Prabakar KR, Vipin KP, Machendar RK, Ramakrishna S, Mishra B. *Ficus racemosa* stem bark extract : A potent antioxidant and a probable natural radioprotector. Evidenc Comple Alter Med (e CAM), 2007; 1-8.
22. Wolfgang L, Christian P, Fassbender and Bjorn N. The role of technical, biological and pharmacological factors in the laboratory evaluation of anticonvulsant drugs. II. Maximal electroshock seizure models. Epilepsy Res, 1991; 8:79-94.
23. Suresh HM, Hatapakki B.C. *auriculata* Pods in Rats, J. Nat. Rem, 2007; 7: 150-154.
24. Malhotra,S. Misra K,Shivakumar SI, Hallikeri CS, Swamy BM, Chandur VK. Laxative activity of *Cassia* Anthra Quinone from *Cassia-Sophera* Heart Wood. Planta Medica, 2007; 46: 247-9.
25. Rao KCS. Mechanism of antiepileptic drugs J. Antibiotics, 2002; 55: 789-793.
26. Nakayama T. Mechanism of gabergic and glycynergic receptors. Biochemical Pharmacology, 1993; 45: 265-267.