



ANTICONVULSANT ACTIVITY OF *ABUTILON INDICUM* LEAF

DHARMESH K. GOLWALA<sup>1\*</sup>, LAXMAN D. PATEL<sup>2</sup>, SANTOSH K. VAIDYA<sup>1</sup>, SUNIL B. BOTHARA<sup>1</sup>,  
MUNESH MANI<sup>3</sup>, PIYUSH PATEL<sup>4</sup>

<sup>1</sup>C.U. Shah College of Pharmacy and Research, Wadhwan, Gujarat, India

<sup>2</sup>Faculty of Pharmacy, Dharamsinh Desai University, Nadiad, Gujarat, India

<sup>3</sup>IFTM, Department of Pharmacy, Muradabad, Uttar Pradesh, India

<sup>4</sup>B.M. Shah College of Pharmaceutical Education and Research, Modasa, Gujarat, India

E- mail: golwala@hotmail.com

ABSTRACT

The present studies reveal that the anticonvulsant activity by PTZ and MES induced convulsions in wistar rats using *Abutilon indicum* leaf ethanolic (AIE) and aqueous (AIA) extracts extracted successively. The presence of alkaloids, glycosides, carbohydrates, steroids, tannins, phenolic compounds, proteins, amino acids, saponins, flavonoids, terpenoids, gums and mucilages in both the extracts. 100 mg/kg and 400 mg/kg of AIE and AIA were given orally. The latency of seizures, death time and % of mortality were observed. AIE gave significant protection against the PTZ (pentylene tetrazole) and MES (maximal electro shock) induced convulsions. The p value in PTZ is p < 0.01 and MES, p < 0.01 and p < 0.001.

**Key words:** *Abutilon indicum*, Anticonvulsant, PTZ, MES.

INTRODUCTION

*Abutilon indicum* species has been widely used as medicine in Ayurvedic system of medicine. *Abutilon indicum* (Malvaceae), commonly known as "Thuthi" is distributed throughout the hotter parts of India. *Abutilon indicum* is known as Atibala in Sanskrit<sup>1</sup>.

Phytoconstituents like  $\beta$ -Sitosterol (0.2 %) <sup>2,3</sup>, tocopherol oil (0.3%)<sup>3</sup> were isolated. *Abutilon indicum* is rich of fatty acids like linoleic acid, oleic acid, palmitic acid, stearic acid and capric acid along with vanillin, p-coumaric acid, p-hydroxybenzoic acid, caffeic acid and fumaric acid. p- $\beta$ -D-glucosycoxybenzoic acid, gluco-vanilloyl glucose, fructose, galactase, glucose, leucine, histidine, threonine, serine, glutamic acid and aspartic acid<sup>2,4</sup>. Two sesquiterpene lactones Alantolactone, isoalanto-lactone<sup>5</sup>. Gallic acid<sup>6</sup>, it also contains flavonoids like luteolin, chrysoferiol, luteolin-7-O- $\beta$  gluco pyranoside, chrysoferiol 7-O- $\beta$  gluco pyranoside, apigenin 7-O- $\beta$ -gluco pyranoside, Quercetin 3-O- $\beta$ -gluco pyranoside, Quercetin 3-O- $\alpha$  rhamnopyranosyl,  $\beta$ -gluco pyranoside<sup>7</sup>. The phytochemical studies on *Abutilon indicum* revealed the presence of

steroids, saponins, carbohydrates, coumarins and flavonoids<sup>8</sup>.

Leaf decoction is used as eyewash, mouthwash in toothache and tender gums; gonorrhoea and inflammation of the bladder. The whole plant is used for anti-inflammatory, immuno stimulating effect and in piles. Flower paste is applied to boils and ulcers. Seeds are considered laxative in piles, aphrodisiac, in treatment of urinary disorders, gonorrhoea and chronic cystitis<sup>9</sup>. It has been reputed in the siddha system of medicine as a remedy for jaundice, piles, ulcer and leprosy<sup>10</sup>.

In some places, juice from the leaves of the plant is used in combination with the liquid extract of *Allium cepa* to treat jaundice and hepatoprotective studies on experimental animals confirmed the above activity<sup>11,12</sup>. The plant is reported to have analgesic<sup>13,14</sup>, hepatoprotective<sup>15</sup>, hypoglycemic activity<sup>16</sup>, wound healing activity<sup>17</sup>, antidiabetic<sup>18</sup>, and anti-diarrhoeal<sup>19</sup>. Acute oral toxicity studies were reported 4000 mg/kg<sup>12,16</sup>. However, there are no reports on the anticonvulsant activity of *Abutilon indicum* Linn., the present study is an attempt to validate it.

## **MATERIALS AND METHODS**

### **Plant material**

*Abutilon indicum* leaves were collected during the month of January 2009, from Muradabad, Uttar Pradesh, India and authenticated by Dr. P. Jayraman, Chennai. The fresh leaves were separated and kept for shade drying. Dried leaf material was powdered using mechanical grinder and passed through 60 mesh sieve to get the powder of desired coarseness. Powdered material was preserved in an air tight container.

### **Preparation of extracts**

Dried *Abutilon indicum* leaf powder was subjected to successive extraction in a soxhlet extractor using ethanol and water<sup>20</sup>. The extracts were filtered and the filtrates were concentrated under reduced pressure to obtain the extracts as solid residues<sup>21</sup>.

### **Preliminary Phytochemical studies**

Preliminary phytochemical test of *Abutilon indicum* ethanolic and aqueous extracts were performed for phytochemical analysis of alkaloids, glycosides, carbohydrates, steroids, tannins, phenolic compounds, proteins, amino acids, saponins, flavonoids, terpenoids, gums and mucilages<sup>21,22</sup>.

### **Animals**

Male wistar rats weighing 200-300 gm of either sex were procured from Cadila Health Care Ltd., Dholka, and Ahmedabad. All the animals were kept in standard polypropylene cages and maintained under standard conditions: temperature ( $24 \pm 1^{\circ}$  C), relative humidity (45-55 %) and 12:12 light:dark cycle. The animals were fed with standard rat pallet and water *ad libitum*. The animals were allowed to acclimatize to laboratory conditions 48 hrs before the start of the experiment. Groups of 6 rats (200-300 gm.) were used in all sets of experiments. All the

experiments were conducted after obtaining permission from the Institutional Animal Ethics Committee (IAEC).

### **PTZ to study the anticonvulsant activity**

Animals in Group I served as control were, treated with vehicle (4 % acacia) orally. Group II served as standard received diazepam (2 mg/kg p.o.). Group III and Group IV received AIE at the dose levels of 100 mg/kg and 400 mg/kg p.o., respectively. Group V and Group VI received AIA at the dose levels of 100 mg/kg and 400 mg/kg p.o., respectively.

One hour after administration of vehicle, standard drug, AIE and AIA to the respective groups, the animals were treated with PTZ (Pentylene tetrazole 80 mg/kg) subcutaneously<sup>23</sup>. Each animal was placed in to individual polypropylene cage and were observed initially for 30 min and later up to 24 hrs. The following parameters were recorded during test session of initial 30 min and up to 24 hrs: Latency (onset of clonus), Onset of tonic convulsions, Status of animal after 30 min, Status of animal after 24 hrs and Percentage protection<sup>24</sup>.

### **MES induced convulsions**

MES seizures were induced by Electroconvulsimeter. Maximal seizures were elicited by 60 Hz alternating current of 150 mA intensity for 0.2 sec using corneal electrodes. A drop of electrolyte solution 0.9% sodium chloride with lignocaine was applied to the corneal electrodes, which ensures better contact and the mortality rate to zero<sup>25,26</sup>.

This current intensity elicited complete tonic extension of the hind limbs in control rats. For recording various

**Table 1: Effect of AIE and AIA on PTZ-induced convulsions model**

Group	Treatment	Latency (onset of Clonic convulsions) (Sec/30min)	Onset of Tonic convulsions (min/30min)	Status of animal (after 30 min)		Status of animal (after 24 hrs)	
				No. of animals alive	% Protection	No. of animals alive	% Protection
Group I	Control (4 % Acacia)	49.33±0.88	750±88.54	0	0	0	0
Group II	Diazepam (5 mg/kg)	No clonus	No Tonic**	All	100	All	100
Group III	AIE (100 mg/kg)	230±18.43*	570±30	4	(67 %)	3	50
Group IV	AIE (400 mg/kg)	240±37.94*	560±40	5	84 %)	4	67
Group V	AIA (100 mg/kg)	145.00±45.49	630±90	2	34%)	1	17
Group VI	AIA (400 mg/kg)	190±39.24	620±87.17	4	67%)	2	34

Values expressed are mean SEM from 6 rats.  $p < 0.01^{**}$  as compared to control group

parameters, rats were placed in a clear rectangular polypropylene cage with an open top, permitting full view of the animal motor responses to seizure the pilot study of various phases of convulsions, like tonic flexion, extension, stupor and mortality due to convulsions were observed. Here phenytoin 25 mg/kg was used as standard instead of diazepam<sup>27</sup>.

#### Statistical analysis

Values were expressed as mean  $\pm$  SEM from 6 animals. Statistical differences in mean were calculated using one way

ANOVA followed by Dunnett's test.  $p < 0.05$  were  $p < 0.05$  were considered statistical.

## RESULTS

### Preliminary Phytochemical studies

The preliminary phytochemical screening of ethanolic and aqueous extract shows the presence of alkaloids, glycosides, carbohydrates, tannins, phenolic compounds, proteins, amino acids, saponins, flavonoids, terpenoids, gums and mucilages.

### PTZ (Pentylene tetrazole) induced convulsions

100 mg/kg and 400 mg/kg of AIE exhibited a significant anti-convulsant effect by increasing latency, onset of clonic convulsion and decreases onset of tonic seizures. After 30 min of interval 67 % and 84 % of animals survived. In AIA, after 30 min 34 % and 67 % animals survived at a dose of 100 mg/kg and 400mg/kg. 50 % and 67 % animals survived in AIE 400mg/kg after 24 hrs. While 17 % and 34 % survived in 100 mg/kg 400 mg/kg in AIA survived as shown in Table 1.

### MES (Maximal Electro Shock) induced convulsions

Treatment with AIE at doses of 100 mg/kg and 400 mg/kg exhibited 50 % and 67 % protection after 24 hrs. While in AIA, 17 % and 34 % protection after 24 hrs was observed at doses of 100 mg/kg and 400 mg/kg as represented in Table 2. AIA and AIE showed anticonvulsant effect by increasing the onset of clonic extension time and decreases the time of tonic extension. There were no flexion and stupor observed.

**Table 2 : Effect of AIA and AIE on MES Induced convulsion**

Group	Treatment	Duration of Tonic flexion (Sec/30min)	Duration of Tonic extension (Sec/30min)	Latency onset of Clonic extension (Sec/30min)	% Protection (24 hrs)
Group I	Control (4 % Acacia)	No tonic flexion	15.66±1.145	3±0.57	17
Group II	Phenytoin (25 mg/kg)	6.16±1.07***	No tonic extension	15.17±0.94***	100
Group III	AIE (100 mg/kg)	No tonic flexion	6.17±0.47***	10.17±0.98**	50
Group IV	AIE (400 mg/kg)	No tonic flexion	5.17±0.94***	11±1.46**	67
Group V	AIA (100 mg/kg)	No tonic flexion	7.34±0.67***	9.67±1.05**	17
Group VI	AIA (400 mg/kg)	No tonic flexion	6.67±0.88***	9.67±2.02**	34

Values expressed are mean SEM from 6 rats.  $p < 0.01^{**}$  and  $p < 0.001^{***}$  as compared to control group.

### DISCUSSION

In Pentylene tetrazole induced seizure test parameters like latency, onset of tonic convulsions, clonic convulsions and percent protection were observed in the test groups ( $p < 0.01$ ), showing

strong antiepileptic effect. The death rate was 100% in Group I. 5 mg/kg of Diazepam, prevents tonic and clonic convulsions and offered 100% protection. 100 mg/kg and 400 mg/kg of AIE and AIA exhibited a significant

anti convulsant effect by increasing onset of clonic convulsion and by decreasing onset of tonic seizures. After 30 min of interval 67 % and 84 % of animals survived with a dose of 100 mg/kg and 400 mg/kg of AIE. While 34 % survived with the dose of 100 mg/kg and 67 % survived with 400 mg/kg of AIA.

After 24 hrs, the % protection of animals was, 50 % and 67 % for 100 mg/kg and 400 mg/kg of AIE respectively. 17 % and 34 % protection after 24 hrs in 100 mg/kg 400 mg/kg in AIA survived ( $p$  value is  $p < 0.01$  as compared to control). Here, AIE shows potent anticonvulsant activity compare to AIA. These results further indicates the strong protective effect of test drug against a known epileptic agent

In Maximum Electro Shock induced seizure test, shown anticonvulsant effect by increasing the onset of clonic convulsion time and by decreasing the time of extensor of test groups reduced to significant level as compared to

control group ( $p < 0.01$  and  $p < 0.001$  as compared to control). There were no flexion and stupors observed. 100 mg/kg and 400mg/kg of AIE showed 50 % and 67 % of protection after 24 hrs. While in case of 100 mg/kg and 400mg/kg of AIA has shown 17 % and 34 % protection after 24 hrs.

These results indicate the strong protective effect of 100 mg/kg and 400 mg/kg of AIE against known epileptic agents. There are some evidences about anticonvulsant effect of this fatty acids<sup>28,29</sup> and some flavonoids<sup>30-32</sup>. Therefore it seems that antiseizure effect of *Abutilon indicum* may be due to part of linoleic acid and/or flavonoid compounds present in the extracts. Thus the results of both doses of AIE, demonstrates a very striking and potent antiepileptic activity, it may be useful in both types of epileptic conditions like Grand mal and Petit mal epilepsy. It demonstrated specific nature of pharmacological effect of *Abutilon indicum* Linn Leaf.

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