

Evaluation of effect of alcoholic extract of
Tinospora cardifolia on learning and memory in
alprazolam induced amnesia in albino mice

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INTRODUCTION:

- ▶ Learning is defined as the acquisition of information and skills, and subsequent retention of that information is called memory.
- ▶ Learning and memory can be a psychological process as well as a change in synaptic neural connectivity.
- ▶ Dementia is defined as an acquired deterioration in cognitive abilities that impairs the successful performance of daily activities. Memory is the most common cognitive ability lost with dementia.

- ▶ Approximately 10% of all persons over the age of 70 have significant memory loss and is more than half the cause is Alzheimer's disease.
- ▶ Alzheimer's disease tend to follow a characteristic pattern, beginning with memory impairment and spreading to language and visuospatial deficits.
- ▶ Pathological changes include atrophy distributed throughout the medial temporal lobes, as well as lateral and medial parietal lobes and lateral frontal cortex.

Study drug- Tinospora cardifolia (Tc)

- ▶ Indian medicinal plant and has been used in Ayurvedic preparations for the treatment of various ailments throughout the centuries.
- ▶ It has been used to treat general weakness, fever, dyspepsia, dysentery, gonorrhoea, secondary syphilis, urinary diseases, impotency, gout, viral hepatitis, skin diseases, and anemia.
- ▶ Ayurvedic literature recommends a rejuvenating recipe where *Tinospora cordifolia* being an important constituent to enhance the memory.



Properties of Tinospora cardifolia:

▶ **Phytochemical constituents:**

Alkaloids, diterpenoid lactones, glycosides, sesquiterpenoid, aliphatic compounds, phenolics, polysaccharides, steroids like tinosporine, tinosporaside, cordifolide, cordifol, heptacosanol, furanolactone tinosporidine, columbin and β -sitosterol. Leaves of the plant are rich in protein, and calcium and phosphorus.

➤ **Properties of Tc:**

Analgesic, Anticancer, Antioxidant, Anti-stress, Anti-ulcer, Antidiabetic, Immunostimulatory, Memory enhancing & Hepatoprotective.

OBJECTIVE:

- ▶ To evaluate the effect of *Tinospora cardifolia* on learning and memory in alprazolam induced amnesia in albino mice.

MATERIALS & METHODS

Alcoholic extract of *Tinospora cardifolia*:

- ▶ The whole plant was shade dried for one month and then coarse powder were powdered using a mechanical grinder. Coarse powder of 300 g was successively extracted with 1.5 L of Alcohol, in a soxhlet apparatus at 70–78°C each for 10–12 h consecutively.
- ▶ Alcohol was removed from the extract under vacuum and a semisolid mass was obtained. The yield of Alcoholic extract was weighed and used for experiment.

Animals:

- ▶ Albino mice of either sex, weighing around 25-30g were employed in the present study. They were exposed to alternate light and dark cycle of 12h and had a free access to food and water.
- ▶ They were procured from animal house of J.J.M.Medical College, Davangere.



INCLUSION CRITERIA:

- ▶ Healthy Albino mice weighing 25-30g with normal behaviour and activity.
- ▶ The mice previously unused for any experiment.

EXCLUSION CRITERIA:

- ▶ Pregnant and diseased animals are not included in the study.

Duration of study: 2 months

Drugs used:

Piracetam

Alprazolam

Source of test drug: collected from natural habitat in Davangere city, Karnataka.

PROCEDURE:

- ▶ Study would be conducted for 16 days. Animals would be administered the drug for 15 days. Experiments would be carried out during the 15th and 16th day between 9.00 am and 3.00 pm.
- ▶ Animals would be divided into four groups of 6 mice each. Animals would be administered the drug every day morning for 15 days.

Group 1- Treated with Alprazolam 2mg/kg alone p.o [Control group]

Group 2- Alprazolam (2mg/kg alone, p.o) + Piracetam 400mg/kg p.o [Standard group]

Group 3- Alprazolam (2mg/kg alone, p.o) + Alcoholic extract of Tc 100 mg/kg, p.o. [Test group 1]

Group 4- Alprazolam (2mg/kg alone, p.o) + Alcoholic extract of Tc 200 mg/kg, p.o. [Test group 2]

- ▶ On 15th day, 90min after the administration of the last dose of drugs in the respective groups, mice would be exposed to elevated plus maze and passive avoidance task for acquisition [learning] and retention [memory] would be recorded 24hrs later on the 16th day.

- ▶ Laboratory models for testing learning and memory enhancing activity:
 1. Elevated plus maze
 2. Step-down type passive avoidance test

Step-down type passive avoidance test:

- ▶ Apparatus
- ▶ Principle
- ▶ Parameter – step down latency (SDL)



Elevated plus maze:

- ▶ Apparatus
- ▶ Principle
- ▶ Parameter -Transfer latency (TL)



STATISTICAL ANALYSIS:

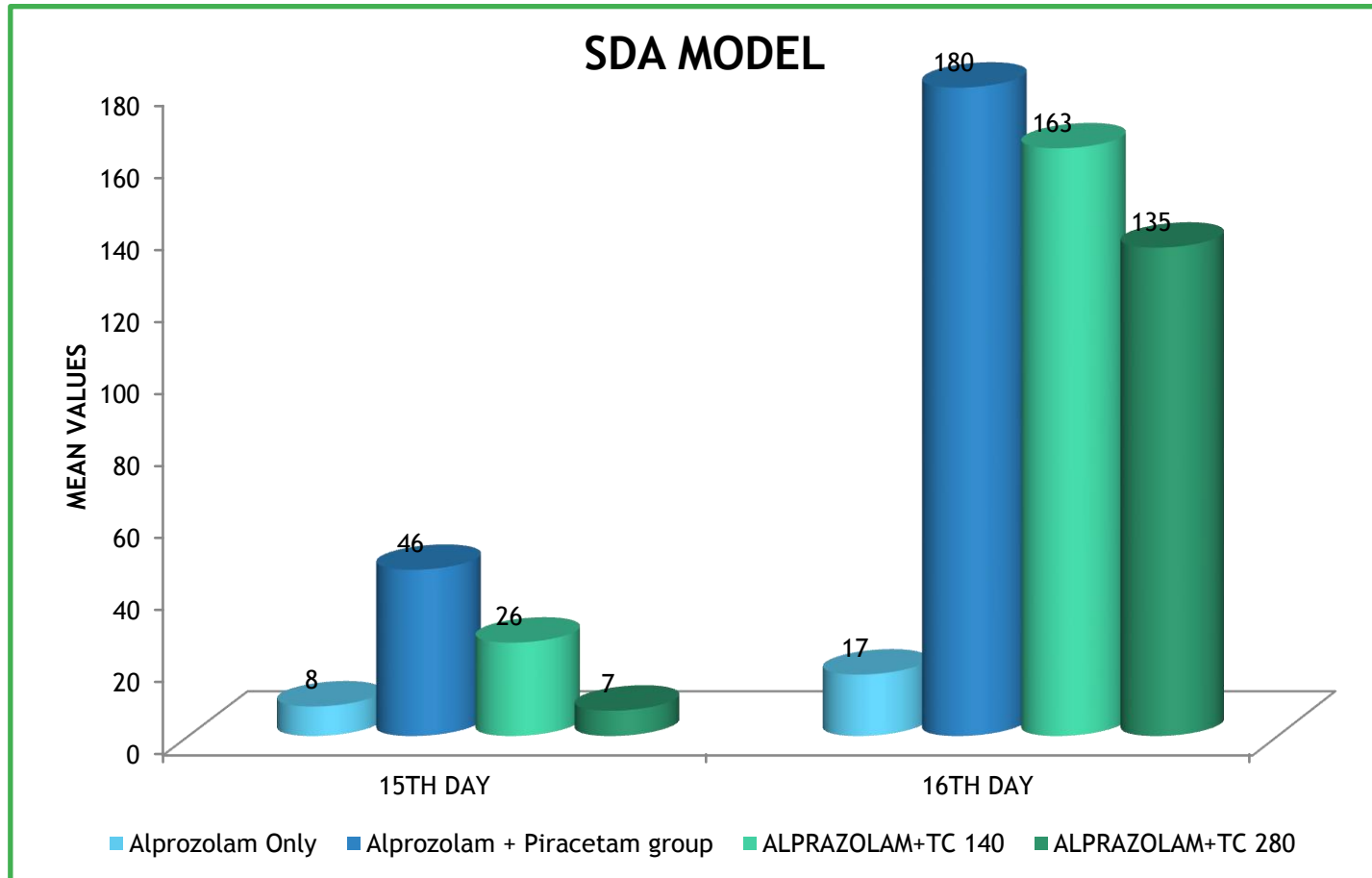
- ▶ The results were analyzed by calculating the mean values, standard deviation

and one way analysis of variance [ANOVA] is done.

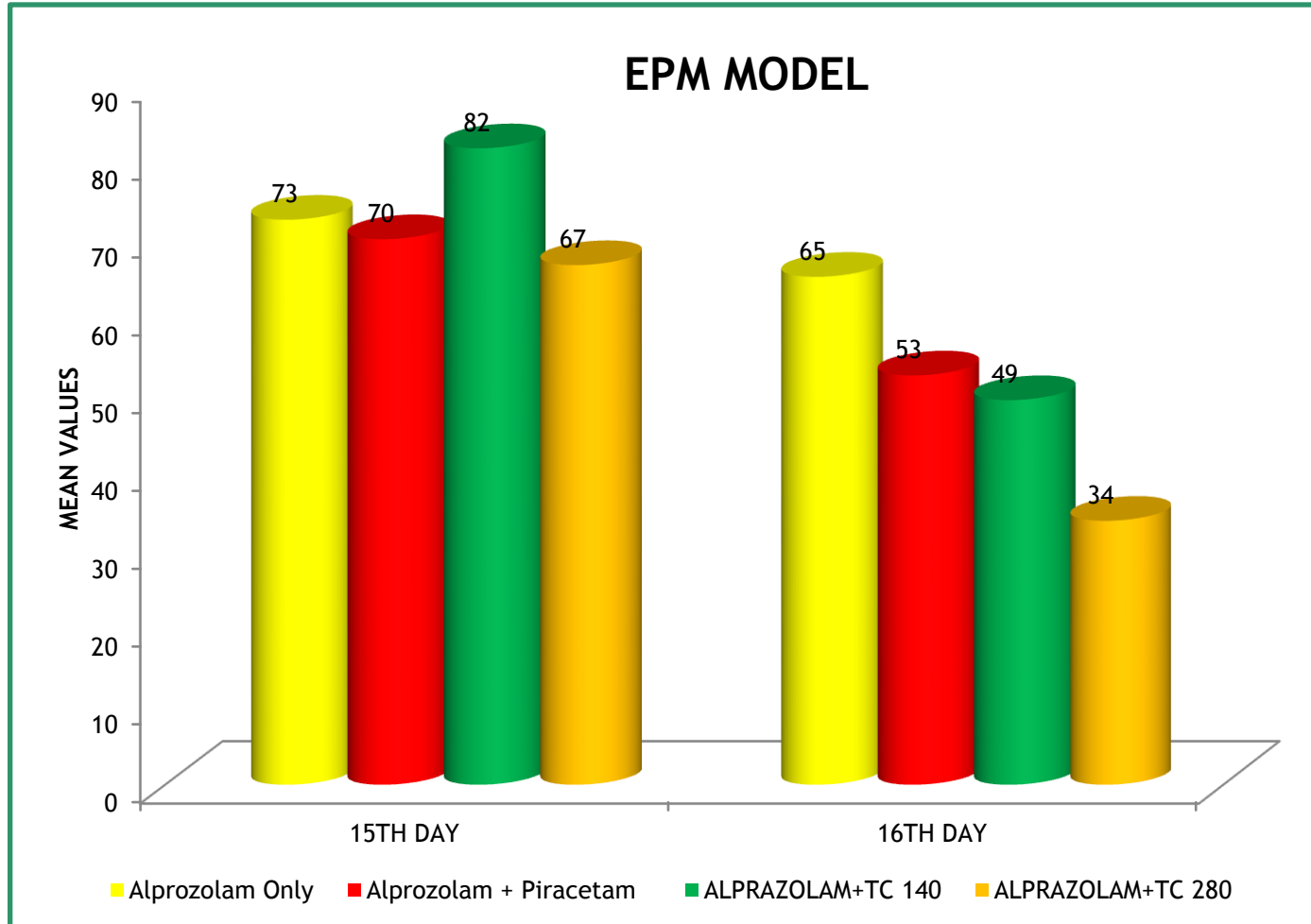
As results are significant post-hoc Tukey's test is done.

- ▶ $P < 0.05$ would be considered as significant.

RESULTS:



Groups	p value
A Vs B	<0.05
A Vs C	<0.05
A Vs D	<0.05
B Vs C	<0.02
B Vs D	<0.03



Groups			p value
A	Vs	B	>0.05
A	Vs	C	<0.000
A	Vs	D	<0.000
B	Vs	C	<0.02
B	Vs	D	<0.01

DISCUSSION:

- ❖ In our study both Elevated plus maze & Step-down type passive avoidance test models showed significant results when compared with standard.
- ❖ A study by Ashutosh Agarwal et al, Effect of *Tinospora cordifolia* on learning and memory in normal and memory deficit rats.
- ❖ Another study conducted by K. Laxminarayana Bairy et al, Efficacy of *Tinospora cordifolia* on Learning and Memory in Healthy Volunteers: A Double-Blind, Randomized, Placebo Controlled Study .

- ❖ The probable mechanism of cognitive enhancement by Tc could be by immunostimulation and increasing the synthesis of acetylcholine which is an important neurotransmitter in learning and memory process.
- ❖ This central action could be due to supplementation of choline which is an important active constituent of Tc. There are reports that supplementation of choline enhances the cognitive function in animals.

CONCLUSION:

- ▶ *Tinospora cardifolia* an Indian medicinal plant, is known to be beneficial for the treatment of disorders like Diabetes, Rheumatoid arthritis, Gout, Viral hepatitis, Gonorrhoea, Syphilis and Anemia can also be a useful alternative for treating Dementia and associated diseases like Alzheimer's disease.
- ▶ Further studies are required to support these observations. In future Tc can be an alternative and inexpensive drug for defective learning and memory.

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Thank you

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. These shapes are primarily located on the right side of the frame, creating a modern, layered effect against the white background.