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**BEHAVIORAL TEST IN STUDYING LEARNING AND MEMORY AND  
SERUM BIOCHEMISTRY OF ALBINO RATS VIS A VIS EFFECT OF  
CELASTRUS PANICULATUS**

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**ABSTRACT**

*To study the effect of ethanolic extract of *Celastrus paniculatus* in learning and memory process as well as the serum biochemistry in albino rats. Male Wister albino rats of 12 months (Young control) old and 20 months (Age control and Age treated) old animals were trained on Y-maze. Each animal received a daily session of 10 trials for 5 days i.e. a maximum of 50 trials. Ethanolic extract of *Celastrus paniculatus* (2g/Kg body weight) was orally given 16 days before trials experiment. Increase in response of 5<sup>th</sup> session as compared to 1<sup>st</sup> session was taken as criteria of learning and memory. Serum biochemistry was done using thyrocare standard kits. There was a significant increase in the behavioral test on 5<sup>th</sup> session as compared to 1<sup>st</sup> session in the age treated group with respect to age control. Serum cholesterol, protein and urea also have significant values. Results of this study shows the *Celastrus paniculatus* preferentially affects learning and recall of memory and also regulate the serum biochemistry.*

*Key words: Learning, Memory, Serum, and Y-maze*

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## INTRODUCTION

Exercise increases neurogenesis in the dentate gyrus of the brain, which is important for memory function. New neurons are added continuously to certain area of the adult brain, such as hippocampus and olfactory bulb. (Ahmadiasl, *et al*, 2003). In mice neurogenesis in the dentate gyrus increases with exposure to an enriched environment, and it is associated with improve learning (Kempermann *et al* 1997). The effect of drugs in learning and memory can be tested by the various behavioral studies e.g. passive and active avoidance test, radial arm maze, water maze, Y and T maze etc. (He, *et al* 2000). Each of these methods has its own characteristics and thus using more than one method for the same animal usually broadens our knowledge of its effects. The oil extracted from the seed of *Celastrus paniculatus* is known to have effects on the central nervous system (Joglekar and Balwani, 1976), beneficial effects in psychiatric patients (Hakim, 1964), stimulatory effects of intellect (Nadkarni, 1976), improvement in I.Q. of mentally retarded children (Nalini *et al* 1986). The preliminary studies have shown that *Celastrus paniculatus* improves the memory process in rats (Karanth *et al* 1980). The present study was carried out to evaluate the effect of seed extract of *Celastrus paniculatus* on learning and memory process as well as on serum biochemistry. This study also attempts to correlate the serum biochemistry with cognitive functions.

## MATERIALS AND METHODS

Male Wister albino rats were procured from the Disease-Free Small Animal House of Haryana Agricultural University, Hisar. The animals were housed in the Animal House of the Department of Zoology, Kurukshetra University, Kurukshetra, in groups of three in polypropylene cages, each measuring 40 X 25 X 15 cm. The animals were provided standard rat feed and water *ad libitum*. Standard light and temperature conditions were maintained through the experiment. Before starting the experiment the animals were kept under these conditions for Two weeks to acclimatize them in laboratory environment. Prior to start the experiment animals were divided into control i.e. young control and age control and age treated groups. In each group three rats were kept. The institutional Ethics Committee on experimental animals approved the study.

### Drug Preparation: -

The seeds of *Celastrus paniculatus* were procured from and Ayurvedic medical practitioner at Kurukshetra (India) in a single lot and sent to the Ayurvedic Department, Kurukshetra (India) and Department of Botany, Kurukshetra University, Kurukshetra for their verification and

Botanical identification. The seed were crushed and extracted with ethyl alcohol in 1:3 (seeds: alcohol) for 30 days. The extract thus obtained was then distilled under vacuum to remove all the traces of the solvents. Thick brown oil was obtained in the trough. This was subsequently used for treatment of experimental rats.

#### Drug Schedule: -

Ethanollic extract of *Celastrus paniculatus* was given to experimental group orally at a dosage of 2g/kg body weight daily at 10 A.M. for 16 days and control animal was given same amount of the distilled water.

#### Spatial Learning: -

All group of animals were familiarized to Y maze apparatus in order to eliminate stress of exercise. Prior to spatial learning young control, age control and age treated groups were trained on a Y maze for one hour for five days (Dellu *et al* 1992). All animals completed successfully the training session.

#### Recognition Memory: -

Testing of cognitive functions was carried out using the Y maze evaluating spatial learning and recognition memory. The correct aversive behavior of young control, age control and age treated rats in the Y maze was tested with ten trial per day for five days. At the start of testing rat were placed in the start arm and allow exploring the food palletes. The amount time to trace the pallets is recorded by digital timer. (Conrad *et al* 1997).

#### Serum analysis: -

After completion of experiment animals were slightly anesthized with diethyl ether and blood was taken out to collect the serum after centrifugation. Analysis off serum was done using the Standard thyrocare kit of digital blood analyzer

#### Statistical analysis:

Mean values and standard deviation were calculated for the numbers of avoid responses. The significance of difference between the value of control and treated was determined by ANOVA (one-way) followed by Sokal and Rolf (1953).

#### Results:

The mean time in second (ten trial per day) required to trace the food pallets by young, age and age treated animals in Y-maze are shown in table 1.and serum biochemistry in table 2.

**Table 1** Performance of rats in Y-maze (mean  $\pm$  SD)

Category	Number	Days				
		1	2	3	4	5
Young Control	A	9.0 $\pm$ 0.4	6.7 $\pm$ 0.0	9.7 $\pm$ 0.2	7.5 $\pm$ 0.2	5.5 $\pm$ 0.9
	B	6.1 $\pm$ 1.2	5.7 $\pm$ 0.5	11.7 $\pm$ 0.9	6.2 $\pm$ 0.5	7.8 $\pm$ 0.4
	C	10.0 $\pm$ 0.9	7.7 $\pm$ 0.5	9.0 $\pm$ 0.6	7.8 $\pm$ 0.4	8.2 $\pm$ 0.6
Age Control	A	0	14 $\pm$ 0.0	17 $\pm$ 2.3	13 $\pm$ 0.0	0
	B	14 $\pm$ 1.4	0	8 $\pm$ 2.8	0	0
	C	10 $\pm$ 1.4	0	14 $\pm$ 0.5	0	0
Age Treated	A	9.0 $\pm$ 0.2	10.0 $\pm$ 0.5	14.5 $\pm$ 1.8	8.4 $\pm$ 0.5	6.5* $\pm$ 0.5
	B	9.2 $\pm$ 0.3	9.8 $\pm$ 0.4	11.0 $\pm$ 0.5	9.2 $\pm$ 0.1	10.0 $\pm$ 1.5
	C	10.0 $\pm$ 0.3	7.2* $\pm$ 1.0	8.4 $\pm$ 1.6	10.3 $\pm$ 0.5	5.7 $\pm$ 0.9

**\*P < 0.05**

Table 2- showing the serum analysis value

Category	Number	Urea (mg/dl)	Cholesterol (mg %)	Total Protein (gm %)
YC	A	30.6* $\pm$ 0.6	186* $\pm$ 0.9	4.8* $\pm$ 0.0
	B	33.3 $\pm$ 0.9	185 $\pm$ 0.3	4.9 $\pm$ 0.05
	C	31.3 $\pm$ 0.2	186 $\pm$ 0.9	4.8 $\pm$ 0.0
AC	A	37.2 $\pm$ 0.7	189 $\pm$ 0.8	5.2 $\pm$ 0.5
	B	34.3 $\pm$ 0.9	187 $\pm$ 0.3	5.6 $\pm$ 0.1
	C	36.4 $\pm$ 0.2	187 $\pm$ 0.3	5.2 $\pm$ 0.5
AT	A	36.2 $\pm$ 2.3	186 $\pm$ 0.1	5.0 $\pm$ 0.5
	B	29.3 $\pm$ 1.6	187 $\pm$ 0.4	4.9 $\pm$ 0.0
	C	30.8 $\pm$ 0.7	186 $\pm$ 0.1	5.0 $\pm$ 0.5

\*P &lt; 0.05

## DISCUSSION:

The result of present study revealed that there was a significant decline in learning and memory with age. Avoidance response has been suggested to reflect cognitive function (Reddy, 1997). The treatment of *Celastrus paniculatus* has significantly increased learning and memory in age treated group as compared to age control. The present study strongly support the earlier finding of Levin, 1999, who have reported memory deterioration and other dementia with advancing in age that performance of ordinary task become more difficult. The results of the present study are similar to Dass et al 2003 where in susceptibility to scopolamine treatment in rat has involved in the acquisition and consolidation of process of learned task. Substantial clinical evidences indicate that muscarinic receptor blockade results into disruptions of behavioral inhibition, working memory, retrieval from long term memory, attention, decisional processes, movement and strategy selection and alter sensory processing (Fibiger, 1990). There why suggested importance of central cholinergic neurons in the acquisition and post acquisition (consolidation) performance of variety of learned behaviors (Fibiger, 1990). No significant alteration was observed in Urea, cholesterol and protein profile in aged treated (*Celastrus paniculatus*) rats.

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Thus clearly suggested that the *Celastrus paniculatus* extract does not impair the blood biochemistry and physiology of experimental rats. As already documented by Chaudhary, 2001 that *Centella asiatica* extract does not affect the blood biochemistry. It is therefore suggested to use this plant for clinical trials.

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