Research Journal of Pharmaceutical, Biological and Chemical Sciences

Effect of *Tragia plukenetii* R-Smith Leaf Extracts on Learning, Memory and Reasoning Using Hebbs William Maze.

M Sathish Kumar* D Eswar Tony, and N Rama Rao

Chalapathi Institute of Pharmaceutical Sciences, Guntur, Andhra Pradesh, India.

ABSTRACT

Hebbs William maze is used for studying learning, memory and reasoning in animals. The clever the rat, the more quickly it is able to make use of past experience and therefore more quickly it learns its way out in the maze. In the present study, we evaluated the effects of *Tragia plukenetii* R.Smith leaf extracts on learning, memory and reasoning model using the Hebbs William maze in rats.
Keywords: Hebbs William maze, nootropic activity, learning, memory, reasoning.

**Corresponding author*

INTRODUCTION

It is easily understood that behavioral psychopharmacologies faced with the task of dealing with extremely complex behavioral disturbances. This holds true for both patient groups: young people with learning and memory problems and elderly patients with memory deficits. For the elderly, difficulties arise in designing appropriate animal models of human aging or the deficits occurring during human aging. One of the major problems for experimental behavioral pharmacology is whether or not old animals are the appropriate models [1]. Considerable evidence indicates that there are age-related changes in learning and memory [2]. For certain kinds of learning, there are specific developmental periods at which acquisition and retention is optimal; for example, imprinting in animals [3] and language acquisition in humans [4]. For other forms of learning and memory, acquisition and long-term retention in animals mature gradually with development [5].There is some evidence that aged organisms have impaired memory function. For example, in humans, performance on recent memory tasks appears to decay at shorter training-test intervals and is more susceptible to retroactive interference in elderly subjects than in young adult subjects [6]. Recent memory also appears to be deficient in aged non-human primates [7].

Hebbs William Maze Model

Hebbs William maze is one of the best known device for studying the learning, remembering (memory) and reasoning in animals [8, 9]. The clever the rat the more quickly it learn its way out in maze. Drugs may affect the time taken to traverse the maze. The Hebbs William Maze is designed in such a way to make the animal explore its way through a maze, which has obstructions arranged to give an identical look. The main entrance is initially obstructed by a ''L'' shaped wall that isolates rest of maze. The Rectangular Maze is divided into i) Chamber A, in which the rat is placed. It has a sliding door that is opened to allow the rat to enter the maze. ii) Chamber C the maze the animal has to explore. iii) Chamber B, at the other end of the maze in which the reward is kept. The time taken by the rat to traverse the maze is noted.

Experimental Animals

Wistar rats of either sex (200-300g) were maintained for 7 days in the animal house of Chalapathi Institute of Pharmaceutical Sciences, Guntur under standard conditions temperature (24 ± 10 C), relative humidity (45-55%) and 12:12 light: dark cycle. The animals were fed with standard rat pellet and water ad libitum. The animals were allowed to acclimatize to laboratory conditions 48 h before the start of the experiment. 5 rats/group were used in all sets of experiments. All the experiments were conducted after obtaining permission from the Institutional Animal Ethics Committee (IAEC) Chalapathi Institute of Pharmaceutical Sciences, Guntur.

Selection of Dose and Treatment Period

The learning, remembering (memory) and reasoning activity of the leaf extracts of *Tragia plukenetii* R. Smith was investigated using the Hebbs William Maze. The test animals were randomly chosen and divided into five groups having five rats in each as follows:

Group-1- Control group (0.9% Normal saline 5ml/kg i.p), Group-2 – Standard (Piracetam at a dose of 150mg/ kg i.p), Group-3 – Methanolic extract (100mg kg i.p), Group-4 - Benzene extract (100mg kg i.p), Group-5 – Chloroform extract (100mg kg i.p).

Statistical Analysis

The values are expressed as mean± SEM. The results were analyzed for statistical significance using student's t test.

RESULTS AND DISCUSSION

Memory and learning deficits, which severely alter the quality of life, appear with normal aging and are associated with numerous diseases, such as Alzheimer's Disease, brain damage, Huntington's Disease, Multiple Sclerosis, Parkinson's Disease and HIV among others. Studying learning   memory neurobiological mechanisms is therefore essential to find efficient therapeutic strategies. To do so, various behavioral tasks have been developed in laboratory rodents and are largely validated. These are commonly used to assess many aspects of learning and memory abilities in response to drug administration and to study their neurobiological mechanisms. In this regard the Hebbs William Maze is one of the very useful models for evaluation of Neurodegenerative Diseases related to Aging, Alzheimer's disease, Drug Screening and Phenotyping. In the present study the methanolic leaf extract of *Tragia plukenetii* R. Smith showed significant learning, remembering (memory) and reasoning enhancing activity when compared with the other treatment groups (Figure 1).
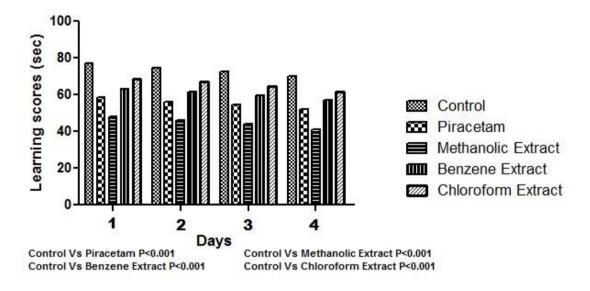

Control Vs Piracetam P<0.001
Control Vs Benzene Extract P<0.001
Control Vs Methanolic Extract P<0.001
Control Vs Chloroform Extract P<0.001

Figure 1: Learning, Memory and reasoning enhancement effect of various leaf extracts of Tragia *plukenetii* R. Smith.

CONCLUSION

The methanolic leaf *Tragia plukenetii* R. Smith showed significant learning, remembering (memory) and reasoning enhancing activity when compared with the other

treatment groups and therefore has the potential of being used in Neurodegenerative Diseases related to Aging and Alzheimer's diseases.

REFERENCES

[1]   H. Gerhard Vogel. Drug Discovery and Evaluation. Pharmacological Assays. Springer-Verlag Berlin Heidelberg New York. 2002, pp 595-596.
[2]   Gold PE, McGaugh JL. Changes in learning and memory during aging, Neurobiology of Aging, Plenum Press, NY, 1975, pp 145–158.
[3]   Hess EH. Scientific American 1972; 227:24–31.
[4]   Lennenberg E. The Biological Foundations of Language. Wiley & Sons, New York, NY. 1967.
[5]   Campbell BA, Spear NE. Psychol Rev 1972; 79:215–236
[6]   Craik FJM. Age differences in human memory. In: Birren JE, Schaie KW (eds) Handbook of the Psychobiology of Aging, Von Nostrand Reinhold Co., New York, NY, 1977, pp 384–420.
[7]   Bartus RT, Dean RL, Flicker C. Cholinergic psychopharmacology: an integration of human and animal research on memory. In: Meltzer HY (ed) Psychopharmacology: The Third Generation of Progress. Raven Press, New York, 1987, pp 219–232.
[8]   S Uma, S Kavimani, KV Raman. International Journal of Phytopharmacology, 2010; 1(1):15-19.
[9]   S Indumathy, S Kavimani, KV Raman. Int J Pharm Bio Sci 2010; 1(3): 1-6.