DEVELOPMENT OF RADIAL ARM MAZE APPARATUS USED IN MEMORY ENHANCING ACTIVITY

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Abstract- Memory is the power or process of recalling what has been learned and retained. It is capability of an individual to record sensory stimulant and retain them over long periods of time and recall the same at a later date when needed. Short and long term memory loss may result from declining cerebral mechanism due to different reasons having contact on quality of life. Memory enhancer can increase memory, thinking and alertness in people with Alzheimer diseases that affect the mind. Endemic drug are being constantly explored for this purpose. Mecobalamine (vit.B_{12}) is drug being examined for memory increasing activity. The RAM is used for determining the memory enhancing activity. The RAM is consist of eight equidistantly placed arms. Each about 35cm long and 5cm wide all diffusing from a small circular central platform. At the end of each arm there is a food site, the contents of which are not noticeable from the central platform. The mice is placed at the center platform and observe for 5min by counting the errors. Mecobalamine was standard drug used. It was administered in mice to evaluate memory enhancing activity using radial arm maze model. Mecobalamine act as a dose at a dose 0.9mg/kg produce a powerful increase in memory using RAM in connection with the control. Time require to reach the reward chamber each powerfully declined in treated groups in comparison to control group.

Key word- RAM (Radial arm maze apparatus), EPM (Elevated plus maze apparatus), Y-MAZE, T-MAZE

INTRODUCTION

Memory is one of the important functions of brain which basically involves multiple neuronal pathway and neurotransmetters[1]. Learning is the ability to alter the behavior on the basis of experience and the memory is the ability to recall past events at the conscious and unconscious level. This two are obviously closely related to each other and should be consider together[2].Spatial memory is highly relevant in biological because it is related with both individual and species survival .Between behavioral tests, one of the most appropriate devices for measuring memory and spatial learning is the Radial Arm Maze. The radial arm maze was used to measure spatial learning and memory in mice[3] and was designed by Olton and Samuelson in 1976.The authentic apparatus consists of eight equidistantly spaced arms. Each about 35cm long, and 5cm in width[4], all emerging from a small circular central platform. At the end of each arm there is a food site, the contents of which are not visible from the central platform.

Memory is of two types that are assessed during the performance in this task are reference memory and working memory. Reference memory is checked when the mice visit only the arms of the maze which contains the reward. The failure in this will result in reference memory error. Working memory is checked when the mice enter each arm a single time. Re-entry into the arms would concluded as working memory error[5].

The design of apparatus assure that, after checking for food at the end of each arm, the mice is always enforced to return to the central platform before making another choice. As a result, the mice always has eight possible choices. Elaborate controls are used to assure that the mice are not simply using their sense of smell, either to sense innominate food objects or to sense their own tracks.

Olton and Samuelson in 1976 found that mice have accomplished memories for visited and unvisited arms; they made, on average, of about 7.0 novel entries in their first 8 choices, and thus were 88% correct[3]. Chance execution with eight arms would be 5.3 novel entries in the first 8 choices (66% correct). Olton and Samuelson also found unvisited locations pathway through a trial, when they switched some already-visited arms into as yet that the mice tended to visit as-yet unvisited locations even when doing so meant running down arms that had already been traversed, and tended to avoid arms that had not yet been traversed but were now in previously visited locations[3]. It therefore looks that in recognizing locations on the radial arm maze, rats do not rely on local intra-maze cues, but rather on extra-maze cues.

Methodology

The development of RAM, the pieces of hard fiber wood are taken. Then from this the octagonal central base and 8 arms is get prepared by cutting the hard fiber wood in different length and height. Then the close box is get prepared by cutting the ply in various diameter then the 8 arms is get joint to central platform and 8 closed box is get fitted in 8 arms hence the RAM is get developed.

For Y-maze the triangular center platform and 3 arms get prepared by cutting hard fiber wood then the 3 closed box is get prepared by cutting the ply in various length. Then joint the different arms in the center platform and fitted the box in the arm.

For T Maze the center base and 3 arms get prepared by cutting the hard fiber wood then 3 closed box is get prepared by cutting the ply in various length then joint the different arms in the central platform and fitted the box in arm.

For Elevated Plus Maze apparatus the square central platform and four arm is get prepared by cutting hard fiber wood then closed box is get prepared. Then joint the different four arms to center base and fitted the box into the arm.

SPECIFICATIONS FOR FABRICATION

RADIAL ARM MAZE APPARATUS- The apparatus is a wooden elevated eight arm radial maze with the arm extending from the Central platform 26cm in diameter, each arms 35cm long and 5cm wide. And central platform is 50cm above the floor, each arms are closed with box which are 15cm long and 6cm wide.

ELEVATED PLUS MAZE APPARATUS- The apparatus is a wooden elevated four arm Elevated Maze with the arm extending from the Central platform 6cm in diameter, each arms 35cm long and 5cm wide. And central platform is 50cm above the floor, each arms are closed with box which are 15cm long and 6cm wide.

T MAZE APPARATUS- The apparatus is a wooden elevated three arm T Maze with the arm extending from the Central platform 6cm in diameter, each arms 35cm long and 5cm wide. And central platform is 50cm above the floor, each arms are closed with box which are 15cm long and 6cm wide.

Y MAZE APPARATUS- The apparatus is a wooden elevated three arm Y Maze with the arm extending from

the Central platform 26cm in diameter, each arms 35cm long and 5cm wide. And central platform is 50cm above the floor, each arms are closed with box which are 15cm long and 6cm wide.

QUOTATION

VJ INSTRUMENTS
166/I, Deoda Sdan, Main Road,
Nehru chowk, Karanja (lab),
Dist. Washim

table no. 1.1 quotation of v. j. instruments fabrication of apparatus

Sr. No.	Particulars	Rate in rupees	Quantity	Total
1.	Radial arm maze apparatus		1	
2.	Elevated plus maze apparatus	28,600rs	1	
3.	T Maze apparatus		1	85,500rs
4.	Y Maze apparatus	21,900rs	1	
		17,800rs		
		17,200rs		

table no. 1.2 quotation of our fabricated apparatus

Sr. No.	Particulars	Rate in rupees	Quantity	Total
1.	Radial arm maze apparatus	5000rs	1	
2.	Elevated plus maze apparatus(Base)	750	1	
3.	T maze apparatus (Base)	-	1	6000rs
4.	Y maze apparatus (Base)	250	1	

MATERIALS

1] Hard wood
2] Hard fiber board
3] Fabricated joints
4] Black paint

5] Screw
6] Food reward

Animals- 6 mice weighing 20-25gm were used in the present study. These mice were housed in a standard laboratory condition of temperature, relative humidity and under standard environmental conditions (12 h light and 12 h dark) with capable food and water accept for those, use for radial arm maze task performance. The mice were transferred to the laboratory at least 1hr before the start of the experiment[6].
Drug- Mecobalamine (micro gm)

EXPERIMENTAL PROTOCOL

Mice were divided into two groups each Consisting of a 3 mice for each experiments.
Group 1- Normal control group received only vehicle.
Group 2- Treated group received drug Mecobalamine
Steps:-
1. The platform should elevated 50cm above the floor.
2. Small black plastic cup can be mounted at the end of each as receptacles for reinforces.
3. The animal for the experiment should be preselected by conducting at least one daily trail training.
4. At the beginning of the trial, two food plate are placed in each receptacle.
5. Then the mice are keep on the central base, mice choose arms freely.
6. The trial is considered complete when the mice visit all eight arms are spends 10 minutes in the maze. Entry into an arm which the mice had not previously is visited is recorded as a correct responses and re-entry counted as a error is calculated as the index of radial performance.
7. A trial in which an animal made on error or only an error at the eight choice can be defined as a successful trial.
8. The percentage of successful mice is also an index which is highly sensitive to drug induce behavioral changes in the radial arm maze.
9. The total running time is divided by the total no. of choices to calculate the running time only animals which succeeded in trials for 6 consecutive days should be used.
10. Although this paradigm is tedious and time consuming, recent investigations have shown that working memory can be reliably assessed using a radial maze.
11. Mecobalamine significantly decreased both the no. of initial correct responses and the percentage of successful mice.
12. The running time of Mecobalamine treated mice was significantly lower than that of control mice. Several traditional medicines such as Chinese medicine, Shimotsu and peony and its constituents paeoniflorin, have been shown to same to improve working memory in an eight are radial maze task. However, the mechanism underlying working memory and the brain regions involved are poorly understood. Lesions of the anterodorsal caudate nucleus have been reported to impair the radial maze performance, suggesting the involvement of striatal function in the maintenance of the radial maze performance[7].

STATISTICAL ANALYSIS

fig. 2.1 effect of mecobalamine on error arm entries on 1st trial – 10th trials.

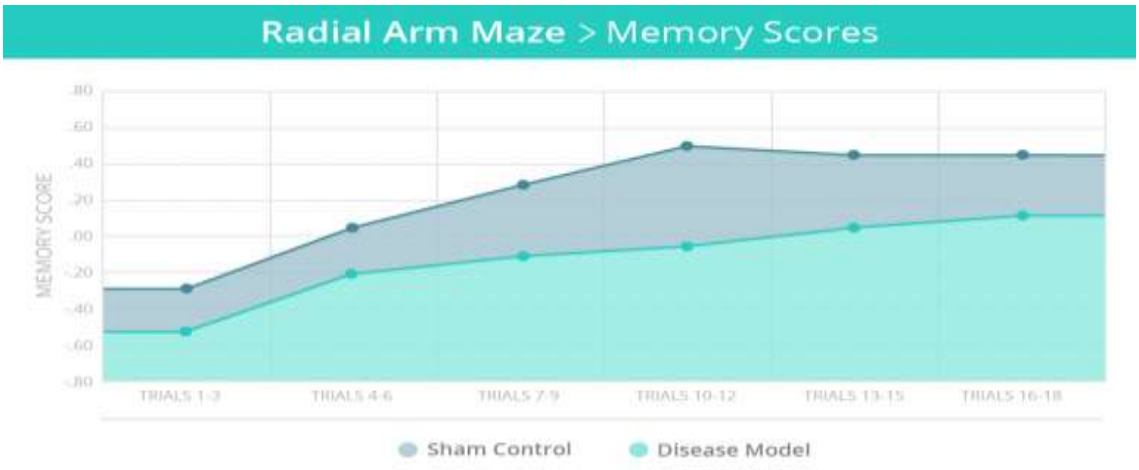

fig 2.2 effect of mecobalamine on memory score on 1-18 trials.

RESULT

table no 1.3 shown that effect of mecobalamine on memory enhancing activity in mice using ram.

SR No.	Groups	Treatment, (Drug)	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
			RME	WME	RME	WME	RME	WME	RME	WME	RME	WME	RME	WME
1	Control -1	Saline Water	8	5	7	5	8	4	7	4	5	3	4	3
2	Control-2	Saline Water	9	4	9	6	8	5	8	6	6	3	5	2
3	Control-3	Saline Water	7	5	8	6	7	7	5	4	7	4	5	3
4	Treated-1	Mecobalamin	4	7	4	6	3	5	3	5	2	4	2	3
5	Treated-2	Mecobalamin	4	8	3	6	3	5	3	6	2	4	2	4
6	Treated-3	Mecobalamin	5	6	6	5	2	4	3	5	3	5	2	3

DISCUSSION

Cognitive deficit are those conditions associated with memory impairment, characterized by loss of memory intellectual ability, poor learning abilities, lower retention of learn task and slow recall these initial symptoms is left untreated may result in and ominous threat like Alzheimer's Disease. A variety of Pharmacological agents ranging from cerebral vasodilators to notropics have been used. The notropics in the current Pharmacology are most widely used drugs which belongs to the class of psychotropic agents with

selective facilitator effect on performance, learning and memory. However, their side effects and associated drug interactions are major limitations. The extensive literature survey for traditional claims for its facilitator effect on learning and memory through it has not been documented so far. In the present study, administration of methylcobalmine in mice animal shows memory and learning enhancing activity using Radial Arm Maze apparatus.

CONCLUSION

Radial arm maze is a centralized pattern for the evaluation of memory. The most extended model used in this kind of experiments for evaluation of memory is the mice, Radial arm maze as also determined its validity across other animal species. Accordingly, animal models have also increased. Mice is a rodent that has been discovered as a valid experimental animal to test memory related impairment associated with dementia. In this sense, determining the performance of this recent model using radial arm maze results very useful to understand multiple cognitive and behavioral components of memory testing. Moreover, the validity determined with this pattern open numerous possibilities within the field of memory and learning studies, especially those regarding cognitive impairment, which in last term will conclude to a better knowledge of these processes.

ACKNOWLEDGEMENT

We owe a great debt of gratitude to our guide Dr. Nitin Indurwade principal, MIBP Gondia and Department of Pharmacology of Manoharbhai Patel Institute of Bachelor of Pharmacy, Kudwa Gondia, for providing the necessary facilities.

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