

## Comparison of short term memory status before and after applying memory improvement methods and its effect on Gender

Arshiya Zeba<sup>1\*</sup>, Khwaja Nawazuddin Sarwari<sup>2</sup>

<sup>1</sup>Tutor, ESICMC, Gulbarga, <sup>2</sup>Assistant Professor, Dept. of Physiology, GIMS, Gulbarga

**\*Corresponding Author:**

Email: dr\_nawaz786@yahoo.co.in

### Abstract

Learning is acquisition of information and memory is retention and storage of information. The process of learning is most essential to become academically more effective and memory status plays an important role. The present study is aimed to establish that different memory improvement techniques can help to enhance and retain a particular object for longer time and also to see its influence on gender.

**Materials and Method:** Two hundred young healthy medical males and females of age group 18-25 years were randomly selected for this study (100 males and 100 females). Short term status by visual tasks before and after application of memory improvement methods by using words and objects were analyzed. Student's paired 't' test was used to analyze the memory status before and application of memory improvement methods. 'Z' test was used to compare the memory status between the various tests.

**Results:** There was statistically significant decrease in short term memory status in higher trials of test. Short term memory status for object test was significantly greater than word test. Statistically significant gender difference was observed in object test in which female showed better short term memory. There was statistically significant improvement in memory status after application of memory improvement methods in all subjects and more so in females.

**Interpretation and Conclusion:** progressive decrease in memory status in higher trials of word test is due to increase in number of bits or items more than seven as an individual can hold 7+2 bits of information. Short term memory status for object test was significantly better than word test which may be due to good sight, one's relation with the world around. Females showed a significantly better object memory due to better attention, involvement in task and concentration.

**Keywords:** Short term memory, Visual task, Object test, Word test, Learning and metamemory.

### Introduction

The human brain has been called the most complex object in the known universe and in many ways it's the final frontier of science. A hundred billion neurons, close to a quadrillion connections between them, and we don't even understand a single cell.<sup>(1)</sup>

Memory function is generally divided into three categories; immediate, recent and remote much can be learned about memory as the patient tells his or her story during the interview specific memory functions are tested only when one has reasons to suspect memory deficit on the basis of patient's history and clinical condition.<sup>(2)</sup>

Metamemory, a type of metacognition, is both introspective knowledge of one's own memory, capabilities and strategies that can aid memory and process involved in memory self monitoring. This self-awareness of memory has important implications for how people learn and use memories.<sup>(3)</sup>

Overall, the mechanisms for memory are not well understood brain areas such as the hippocampus, the amygdala or the mammillary bodies are thought to be involved in certain kinds of memory for e.g.; the hippocampus is believed to be involved in spatial learning and declarative learning. Scientists who have investigated the nature of memory, namely Johan Carew Eccles, Weilder Penfeld and biologist Rupert Sheldrake, have suggested that memories are afield

phenomenon and are not stored in the brain at all, but rather accessed through neurological structures. A final possibility of explaining short term memory is synaptic potentiation, which can enhance synaptic conduction.<sup>(4,5)</sup>

### Materials and Method

The present study was conducted in department of Physiology Bidar Institute of Medical Science, Bidar.

Two hundred young healthy boys and girls of age group of 18- 25 years were volunteers for this study personal family and past history was recorded and the subjects were also clinically examined to rule out any neuropsychiatric disorders, mental disorders, head injury, drug history of any anti psychotics, anti-depressants, hypnotics and any other disorders which would short term memory by visual task.

1. **Words test:** Subjects were given 30 seconds to look at a list of 15 words which were used commonly in daily life, like eggs, apple, chair etc. Then the subjects were asked to recall all the words or whatever they remembered and ask them to write on a paper immediately. Results were expressed in percentage 36.
2. **Object test:** A tray containing 15 commonly used objects, like lock & key, flower, pen, pencil etc. was shown to the subjects for 30 seconds. The tray was covered with cloth and then the subjects were

asked to write the names of the objects on a paper.

Results were expressed in percentage 35. The subjects were given a rest of 15 minutes, and then the same short term memory tests were repeated with different sets of words and objects after asking them to apply some standard methods for improvement of short term memory. The improvement methods used in this study were

1. **Grouping method:** This method was used for improvement of words test. Here the subjects were asked to make a group of words (2 or 3) like a group of eatable products for example, eggs, banana, apple etc, group of parts of our body like brain, heart etc.
2. **Association method:** It is also called as linking method used for improvement of object test. Here the Subjects were asked to link the objects with each other and try to remember, for example the following are the objects-Soap, pot, school bag, tooth brush, table, chair, apple, Tiffin carrier, school bus etc how to link each other? Early morning a child wakes up, brushes his teeth, has bath with soap and takes water from a pot in to bucket, later sits on a chair and has an apple on the table, picks up the Tiffin carrier & school bag goes to school by school bus 10.

## Results

### Words Test

a. Memory status before application of memory improvement methods:

1. **In all the subjects:** The mean + SEM of memory status in all the subjects was 68.41+ 14.47%.

The memory status found to be less than object test, however this decreased memory status of words test was not significant statistically when compared to objects test.

2. **In males:** The mean + SEM of memory status was found to be 67.29 + 14.57%. Like in all the subjects, the memory status found to be less than object tests, however this decreased memory status of words test was not significant statistically when compared to objects test ( $p > 0.05$ ).
3. **In females:** The mean + SEM of memory status was found to be 69.52 + 14.18%. The results were same like in males, the memory status found to be less than object tests, however this decreased memory status of words test was not significant statistically when compared to objects test ( $p > 0.05$ ).

**Male Vs female:** The mean of memory status before application of memory improvement method was found to be numerically more in females than males which was not significant statistically ( $p > 0.05$ ).

b. Memory status after application of memory improvement methods:

1. **In all the subjects:** The mean + SD of memory status in all the subjects was 77.99 + 14.47%.

The memory status found to be increased and was statistically highly significant when compared to the memory status before application of memory improvement methods ( $p < 0.001$ ).

2. **In males:** The mean + SEM of memory status was 75.86 + 15.64%. The memory status found to be increased and was statistically highly significant when compared to the memory status before application of memory improvement methods ( $p < 0.001$ ).
3. **In females:** The mean + SEM of memory status was 80.09+ 12.88%. The memory status, like in males, was found to increase significantly ( $p < 0.001$ ) when compared to memory status before application of memory improvement methods.

**Male Vs female:** A statistically significant ( $p < 0.001$ ) improvement in memory status was observed in females than males.

Object Test

A. Memory status before application of memory improvement methods:

1. **In all the subjects:** The mean + SD of memory status in all the subjects was 82.121+ 12.28% when compared to words test, memory status was found to be more and was significant statistically ( $p < 0.001$ ).
2. **In males:** The mean + SD of memory status was found to be 79.41 + 12.60% when compared to words test, memory status was found to be more and was significant statistically ( $p < 0.001$ ).
3. **In females:** The mean + SD of memory status was found to be 84.79 + 11.35% when compared to words test memory status was found to be more and was significant statistically( $p < 0.001$ ).

**Male Vs female:** The mean of memory status before application of memory improvement method was found to be more in females than males which was significant method was found to be more in females than males which was significant statistically ( $p < 0.05$ ).

B. Memory status after application of memory improvement methods:

1. **In all the subjects:** The mean + SD of memory status in all the subjects was 88.47 + 12.0%. The memory status found to be increased and was statistically highly significant when compared to the memory status before application of memory improvement methods ( $p < 0.001$ ).
2. **In males:** The mean + SD of memory status was 86.12 + 12.24%. The memory status found to be increased and was statistically highly significant when compared to the memory status before application of memory improvement methods ( $p < 0.001$ ).
3. **In females:** The mean + SD of memory status was 90.79 + 11.18% status in females was found to be numerically better than males in 6th when

compared to memory status before application of memory improvement methods.

**Male Vs female:** A statistically significant ( $p < 0.001$ ) improvement in memory status was observed in the memory status, like in males, was found to increase significantly ( $p < 0.001$ ) females than males.

In a study entitled "Working memory in mild Alzheimer's disease and early Parkinson's disease" by Elizabeth A. Kensinger, Deirdre K Shearer and Joseph J Locascio, compared the performance of 22 patients with mild Alzheimer's disease, 22 patients with early Parkinson's disease without dementia and 112 control participants on tests of short term memory (digit span and word span), tests of working memory.

The result suggests that, although mild Alzheimer's disease and early Parkinson's disease both impaired working memory. The working memory deficits seen in patients with Alzheimer's disease may be secondary to deficit in other cognitive capacities, including semantic memory.<sup>(6)</sup>

Saher Ansari et al, showed that progressive decrease in memory status in higher trials of alphabetical test is due to increase in number of bits /items more than 7 as an individual can hold 7+2 bits of information .Due to effectiveness of memory improvement methods there is statistically significant improvement in memory status in all subjects, more so in females visual memory and working memory.<sup>(7)</sup>

**Table 1**

Age in years	Females no	Females %	Males no	Males %	Total no	Total %
18	53	53	41	41	90	47
19	24	24	37	37	61	30.5
20	14	14	13	13	27	13.5
21	4	4	5	5	9	4.5
22	4	4	3	3	7	3.5
23	4	1	1	1	2	1
Total	100	100	100	100	200	100

Mean age of males is 18.95+/-2.08

Mean age of females is 18.85+/-1.15

**Table 2**

	Before MEAN +/-SD	After memory improvement	't' test
Word test	68.41+/-14.47	77.99+/-14.47	T=10.7, p<0.0011 VHS
Object test	82.121+/-12.28	88.47+/-12.00	T=8.54, p<0.001 VHS

VHS= very highly significant

**Table 3: Comparison of memory status before and after application of memory improvement methods in word and object test**

	Before mean +/- SD	After mean +/-SD	Paired t test and p value
Word test	67.29+/-14.57	75.86+/-10.94	T=5.76 p<0.001 VHS
Object test	79.41+/-12.60	86.12+/-12.34	T=6.63 p<0.001 VHS

**Table 4: Comparison of short term memory status before and after application of memory improvement methods in word and object test among females**

	Before mean +/-SD	After mean +/-SD	T test and p value
Word test	69.52+/-14.18	80.99+/-12.88	T=9.32 p<0.001 VHS
Object test	84.79+/-11.35	90.79+/-11.18	T=6.46 p<0.001 VHS

**Table 5: Comparison of word and object test in males and females after application of memory improvement method**

	Males mean +/-SD	Females mean +/-SD	Z test and p value
Word test	75.86+/-15.64	80.09+/-12.88	Z=2.17, p>0.05 NS
Object test	86.12+/-12.34	90.79+/-11.18	Z=2.84, p<0.05 S

## Conclusion

The present study is to know the memory status of young individuals, and to find out methods to test short term memory and to see the changes in short term memory after applying some standard memory improvement methods and also to evaluate its influence on gender.

Hence this study showed that

1. There was statistically significant progressive decrease in short term memory in higher trials, which may be due to increased number of bits more than seven, as an individual can hold 7+2 bits of information in short term memory
2. Short term memory status for objects was better than words this may be due to good sight, ones relation with the object around.
3. Females showed better short term memory as compared to males which may be due to their better attention, involvement in task, intention, concentration and effort in this study
4. There was statistically significant improvement in memory status after application of memory improvement methods both in males and females
5. Short term memory test thus assessed can also be recommended to evaluate short term memory status in diseases affecting memory as bedside test.

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