

# Comparing working memory, verbal memory and keeping attention in the manic phase and depression in bipolar disorder

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## ABSTRACT

Bipolar disorder is a disease that its distinct cognitive symptoms include acceleration of thoughts, distractibility, and severe defects in judgment. Neuropsychology defects such as defects in memory, inability to pay attention and dysfunction in executive function also have been approved during mania. This study was conducted to determine the differences in working memory, verbal memory, and keeping the attention in manic and depressed patients, and compare them with healthy individuals. For this purpose, 105 subjects (35 depressed and 35 normal people) were selected using available samples of patients hospitalized in Razi Hospital of Tabriz and peer healthy people, and they were tested. To collect data, sub-tests of digit symbol, verbal memory, and working memory of Wechsler were used. Multivariate variance analysis showed that there were significant differences between the three groups in the variables of keeping the attention and verbal memory ( $p < 0.05$ ), but there was no significant difference between them in working memory. In addition, the performance of normal group was better than other two groups, and the performance of the manic group was better than the depressed group.

**Keywords:** Bipolar disorder, manic phase, depression phase, working memory, verbal memory, and keeping attention

## Introduction

Bipolar disorder is a disease characterized by periods of abnormal mood and depression. Neuropsychological deficits during these periods have been approved, for example, defects in the memory [1-3], inability in attention [2,4-8] and executive dysfunction [3,9-12]. Cognitive characteristic symptoms of this disorder include thought acceleration, distraction, and severe defects in judgment. Nowadays, the primary focus has been on the use of higher cognitive ability such as working memory, long-term memory, mental images or reinforcing learning, judgment and reasoning in cognitive neuroscience. In general, these abilities depend on the interaction between the prefrontal, dorsal cortical, posterior systems [4,12-16]. For example, working memory deficits in bipolar patients may lead to patient-like

behavior and lack of regulating the activities [5,16-19]. Although medical therapy is the main therapy for patients with bipolar disorder, the last 5 years' research has shown that other factors and adding other interventions can increase the effectiveness of the treatment. In addition, the assessment of recognition and cognitive processes can contribute to a better understanding of this disorder. Accordingly, the main question is whether the mood changes affect comorbidity cognitive processes.

## Method

### A) Participants of the study and research project:

The study population included people with bipolar disorder hospitalized in Tabriz Razi Hospital, among which, 35 manic, 35 depressed, and 35 healthy subjects were selected. They were matched with bipolar subjects in terms of demographic variables such as age, education level, and gender. The study was a causal-comparative study and fundamental considering its objectives.

### B) Measurement tools:

- **Digit Span:** Digit Span of subscale of the Wechsler test was used to measure working memory. Digit Span test was considered as short-term memory and attention test. In

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this test, subjects remembered and repeated the audio information in an appropriate order.

- **Treasury of words:** Treasury of words was used to measure verbal memory. This test indicated the language development, verbal general intelligence, knowledge of words, and dense verbal learning. It was the person's ability of facilitation and flexibility in a wide range of thoughts. Treasury of words has been noteworthy since it is the most reliable verbal sub-scale (test-retest reliability of WAIS-R was 0.96), and it has been strongly resistant as general information against nerve damage and mental disorders.
- **Digit symbol:** Wechsler's digit symbol indicated the talent to sustain the effort, focused attention, and mental efficiency. This subtest requires learning an unfamiliar task, the precision of eye-hand coordination, skill in paying attention and short-term memory (quoted by Groth, 1995 [6,20]).

### C) Method of data collection:

To implement the study on manic and depressed people, after the necessary coordination with the university and the hospital and referring to Tabriz Razi Hospital departments, people diagnosed with bipolar disorder who were not affected with other psychiatric patients were selected after initial interview. Healthy people were also selected among those who referred to the clinic. After obtaining informed consent, and providing explanation about the research and ensuring that the personal information will be kept confidential, each of the subjects was tested individually. Then, the subscales of Wechsler's digit symbol, Wechsler's Digit Span, and the treasury of words were taken from the participants.

### Findings

Information on descriptive findings is presented in Table 1. This Table shows the mean and the standard deviation for the three groups.

**Table 1: Results of descriptive statistics**

Group	Test	Mean	SD	N
Normal	Cryptography	39.8000	15.75511	35
Manic		26.7429	12.18809	35
Depressed		22.2286	13.00698	35
Total		29.5905	15.52646	105
Normal	words	38.5714	12.54705	35
Manic		25.8286	13.42624	35
Depressed		22.6857	11.66113	35
Total		29.0286	14.22988	105
Normal	Digit span	10.8286	2.78109	35
Manic		9.8571	2.51048	35
Depressed		9.8571	2.25105	35
Total		10.1810	2.54113	105

To determine the cognitive differences of emotion regulation in healthy, manic, and depressed groups, multivariate variance analysis was used, the data is shown in Table 2.

**Table 2: Results of Pillai's Multivariate test**

Effect	Value	F	Assumed df	Error of df	significance	Eta square	Chi-Observed power
Pillai's Multivariate	0.403	4.126	12.000	196.000	0.000	0.202	0.999

According to Table 2, it can be stated that the changes obtained from studied variables can be explained by the differences in three groups.

**Table 3: Results of multivariate variance analysis of variance**

Dependent variable	Sum of squares	df	Mean squares	F	Significance	ETA chi-square	Observed power
Digit span	22.019	2	11.010	1.729	0.183	0.033	0.356
Cryptography	5828.933	2	2914.467	15.449	0.000	0.232	0.999
Words	4953.829	2	2476.914	15.687	0.000	0.235	0.999

The above table shows, studied groups have significant differences in keeping attention and verbal memory, because calculated F was significant at the level of  $p < 0.05$ , while they were not different significantly in working memory at the level of  $p < 0.05$ .

### Discussion and Conclusion

This research studied phenomenological dimension of the cognitive dysfunction in bipolar disorder. The results obtained from the analysis of the data suggested that there was a significant difference between three groups in the ability to keep attention and verbal memory, and healthy people had better performance compared to the manic and depressed people. However, no significant differences were found between the three groups considering the working memory, and this result was not in line with the result of the study conducted by Glahn et al. (2006), but it was in line with the result of the study conducted by Sweeney et al. (2000) [1, 7,21]. The lack of the difference can be explained by the possibility that working memory was healthy in these patients, and attributing the poor performance of patients on replacement of objects and orderly counting of numbers to working memory defect was difficult. If this condition was true, in the patients' groups, it was expected that these people would be faced with problems in initial formulating of the problem-solving strategies and showing a pattern of randomized responses. However, people mostly showed preservative increase in these studies. It was likely that these people had the ability to choose the problem-solving approach in performing their tasks, but they were faced with a problem in changing strategies [8,22]. In addition, studies have shown that bipolar patients have poor performance in keeping attention in a completely correct way. Although elevated mood disrupted the performance of the tasks that require much attention, sharp drop

in mood disrupted the more efficiency<sup>[9,23]</sup>. It was likely that psychological nerves defected the memory and executive and verbal functioning, especially disorder in keeping the attention and verbal memory<sup>[10,24]</sup> led to disorder in using emotional regulation strategies in the entire stages of mania, depression and recovery period in patients with bipolar disorder. Neuro-structural imaging techniques have also shown that the Subcortical white object, basal nodes, amygdala, Hippocampus, frontal pieces, parietal pieces, and the cerebellum may be involved in bipolar disorder. The degradation of the verbal memory in other studies conducted on acute bipolar patients and in recovery mode has shown that verbal memory defect (especially in recovery) refers to frontal structural malfunction. However, encryption degradation was due to the middle temporal lobe malfunction. It was assumed that the cognitive process coordination depended on accurate function of prefrontal cortex<sup>[3,25]</sup>, and damage to the frontal lobe destructed the ability to plan and organize. In addition to the problems in storing and retrieving new information, it might limit the effects of the psychological interventions. These cognitive deficits in patients with bipolar disorder (verbal memory and executive function) may be helpful in explaining the daily performance degradation, even during recovery period. In this study, drug therapy on manic and depressed people could affect the performance of individuals.

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