



Comparison of the Theory of Mind and False Beliefs in Patients with Major Depression Disorder, Bipolar Disorder I, II and Healthy Individuals

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ABSTRACT

Aims People usually experience the different ranges of mood states, and the combination of their emotional pretention is great in the same rate. The aim of this study was to compare the theory of mind and false beliefs in patients with major depression disorder, bipolar disorder I, II and healthy individuals.

Instruments & Methods In this descriptive comparative study, 90 patients bedridden in Ostad Moharari Hospital, Shiraz, Iran, in 2013-2014, including 30 patients with major depression disorder, 30 patients with bipolar disorder I, and 30 patients with bipolar disorder II were selected by purposive sampling method. Thirty healthy individuals were also selected as a control group. "Reading the Mind in the Eyes" test and "Unexpected transfer task" test were used and the data were analyzed, by SPSS 21 software, using MANOVA and Bonferroni post-hoc test.

Findings The theory of mind in the studied groups was significantly different ($P=0.001$, $F(6, 230)=7.1$) in a way that it was significantly different between the major depression group and bipolar disorder I, II with the healthy group ($p=0.001$), But there was no significant difference among other three groups ($p>0.05$). The false belief showed no specific difference among 4 groups ($p>0.05$).

Conclusion The score of theory of mind in the healthy group is higher than the major depression group and bipolar disorder I, II groups. However, there is no difference in the theory of mind among other three groups. Also, there is no difference in false belief among 4 groups.

Keywords Theory of Mind; False Beliefs; Major Depression; Bipolar Disorder

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Introduction

People usually experience the different ranges of mood states, and the combination of their emotional pretention is great in the same rate. Furthermore, they feel that they can be dominant over their mood and emotional conditions. Mood disorders are a group of clinical disorders characterized by the lost authority and great suffering [1].

The recent global burden of disease study has estimated that the unipolar major depression is the fourth largest contributor to the global burden of disease. By 2020, the unipolar major depression will be the second largest contributor to the global burden of disease, following heart diseases [2].

The World Health Organization (WHO) studies in 26 countries indicate the mood disorders in a row after anxiety disorders (Prevalence of mood disorders at 12 months has been obtained to be in the range of 8.0%-6.9%) [3].

People suffering from mood disorders show inadaptability behavior that can affect their interactions with others and may lead to negative social relationships [4]. This can be progressed and increased in depression symptoms [4, 5].

A concept used to understand the damaged social action is the theory of mind [6]. The term "theory of mind" was first presented in 1978 in the study of chimpanzees' behaviors [7].

People experiencing the defect of the theory of mind have difficulty in explaining the intentions of others; however, they are not able to understand how their behavior affects others. Besides, they have problems with social interaction [8]. The theory of mind is used to know the mental states (goals, attention, and beliefs) of others [9].

Depression symptoms have a relationship with the defect of the theory of mind, including delay in the psychomotor and the depressed mood. This defect of motivation for paying attention to the mental states of others possibly leads to weak performance [10].

Simply, people with a history of major depression in the past were compared with those who do not have a defect in the theory of mind [11]. They showed inability in the theory of mind tests [12, 13]. In addition, major depression disorder has a relationship with the impairment of the ability to discover the mental states of others [10, 14, 15].

A research study suggested that the depressed people show the pattern of the dysfunctional of interpersonal interactions [15]. Patients with depression have a poor perception of social situations [16]. Therefore, some research studies have been conducted regarding the theory of mind abilities in bipolar disorder I and II by Schenkel *et al.*, [17], Van Rheenen and Rossell [18], and Javier *et al.* [19], while the results of their studies show that the theory of mind in people with bipolar disorder has been damaged.

Moreover, the beliefs reflect the method existing in the world or the one we want it to be. Hence, if we realize that a belief is wrong, we will try to change it according to the external objects, reality [20]. The perception of false belief is the most important key component of the theory of mind. False belief means that the person for prediction of and reasoning about others' behaviors only relies on his/her interests and does not regard others' beliefs. These people are usually unsuccessful in the false belief tasks, while people reacting successfully in these tasks possibly show skillful understanding of coordination of belief and desire [8].

In the theory of mind, more emphasis is placed on the emotional aspects of the person, but the false belief puts greater emphasis on the cognitive aspects of the individual. Several studies have been conducted on the false belief in children. But, no research has been carried out in adults, especially in patients with mood disorders. Despite the defect in the theory of mind and the false belief in this group of patients, psychiatrists and psychologists should focus more on patients' social cognition and use cognitive therapy and social support for their interpersonal skills. The results of this research can be used to treat mood disorders through education and to reinforce the theory of mind and false belief. The literature review shows that few studies in the field of the theory of mind ability and the false belief in patients with major depression and bipolar have been done. Regarding the theory of mind as a new subject and its role in psychopathology and the limited number of articles examining the ability of theory of mind and false belief in patients with major depression disorder and bipolar disorder, the aim of this study was to compare the theory of mind and false beliefs

in patients with major depression disorder, bipolar disorder I, bipolar disorder II, and healthy individuals.

Instrument and Methods

The present research is a retrospective descriptive comparative study. The research population included patients with major depression disorder and bipolar disorder I and II bedridden in Ostad Moharrey Hospital, Shiraz, Iran, in 2013-2014, and the healthy individuals were the staff of this hospital. The samples were selected by purposive sampling method; they comprised of 30 patients with major depression disorder, 30 patients with bipolar disorder I, and 30 patients with bipolar disorder II. Thirty healthy individuals were selected as the control group, matching the experimental group with the same gender, marital status, age, level of education, and social status. The patients were selected by a psychiatrist based on the semi-structured clinical interview and the criteria of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), as well as the diagnosis of major depression disorder and bipolar disorder I, II. Individuals with any background of neurological disease, drug addiction, and severe trauma to the head followed by consciousness loss were excluded from this study. People between 20 and 50 years, and having the minimum education for reading and writing were taken into consideration in this research.

Reading the Mind in the Eyes Test (RMET):

This is a psychological test presented by Baron-Cohen, Wheelwright, Hill, Raste, and Plumb [21], containing images from actors and famous foreigner players, whose part of the eyes images has been cut into 36 different mental states like quiet, despondent, frightened, etc. For each image, the mental states of emotional capacity with similar feature have been presented. Each item comes with 4 of the above-mentioned mental states. Only by using the visual information, the respondents were asked to choose the best thought or feeling of eyes. The maximum score acceptable for the term selection in this test was selected as 36 and the lowest as 0.

The Baron-Cohen test scoring is based on the respondent's correct reply and the total scores of answers make his/her final score.

The scores between 22 and 30 indicate a moderate theory of mind; scores below 22 represent a low theory of mind, and scores more than 30 imply that the theory of mind is high. Fakhari *et al.* [22] obtained the Cronbach's alpha coefficient as 0.73 through reading the mind in the eyes test. In addition, Nejati *et al.* [23] calculated the Cronbach's alpha coefficient for this test as 0.72. Also, Mahmoodaliloo *et al.* [24] determined the Cronbach's alpha coefficient as 0.73 for of reliability. In this research, the validity of this test was obtained as 0.68.

Unexpected transfer task: The unexpected transfer task has been used to investigate the theory of mind by 2 Australian psychologists in order to assess the "False Belief" [25]. Nessesaeian *et al.* [25] changed the name of this task's dolls to Persian names, Ali and Maryam. The story is as below: *One day, Ali entered the room and began to play with his ball. After a while, he got tired and put the ball in the closet and left the room. After a few minutes, Maryam came into the room and went to the closet, picked up the ball and started to play with the ball. After a while, she got tired and she did not put it in the first place. She put it in the bucket and left the room. Then, Ali returned to the room to play with his ball again.*

After reading this story, the individuals were requested to answer the following questions:

- Does Ali know where his ball is? (*The reality question*)
- Where does Ali look for his ball? (*The question of prediction of belief*)
- Where did Ali put his ball first? (*The memory question*)

The scoring method in this test is in a way that each of the questions scores "0" or "1" based on true or false answering. Finally, those who have correctly answered all questions are considered as successful persons, and those who have not answered any of the questions and others with having wrong answers get zero and are regarded as unsuccessful persons.

The data were analyzed by SPSS 21. Descriptive statistics such as mean and standard deviation were used to compare the performance of 4 mental states through reading the mind in the eyes test, and the false

belief task with multivariate analysis of variance, and Bonferroni post-hoc test.

Findings

The mean age of the participants was 33.8 ± 5.2 years in the depression disorder group, 36.8 ± 4.6 years in the bipolar disorder I group, 33.3 ± 4.1 years for the bipolar disorder II group, and 34.6 ± 5.7 years in the healthy group.

The theory of mind in the studied groups (major depression disorder, bipolar disorder I, II, and healthy group) was significantly different ($P=0.001$, $F_{(6, 230)}=7.1$; Table 1).

Table 1) The mean and standard deviation of theory of mind and false belief in the four under study groups (n=30 in per group)

Variable	Mean±SD
Theory of mind	
Major depression disorder	14.26±5.20
Bipolar disorder I	13.03±3.40
Bipolar disorder II	13.63±4.65
Healthy group	20.06±4.63
False belief	
Major depression disorder	0.48±0.33
Bipolar disorder I	0.49±0.40
Bipolar disorder II	0.49±0.36
Healthy group	0.53±0.50

The theory of mind was significantly different between the major depression group and bipolar disorder I, II with the healthy group ($p=0.001$). But, there was no significant difference in the theory of mind between the major depression group and the bipolar disorder I ($p=1.00$), major depression and bipolar II ($p=1.00$), as well as bipolar disorders I and II ($p=1.00$). In addition, the healthy group had the highest score in the theory of mind compared to others, i.e. the major depression disorder, bipolar disorder II, and bipolar disorder I groups. The false belief showed no specific difference among 4 groups ($p>0.05$).

Discussion

The aim of this study was to compare the theory of mind and the false belief in patients with major depression disorder, and bipolar disorder I and II, as well as in healthy people. The findings of this study showed a significant difference in the theory of mind among the major depressive disorder, bipolar disorder I, bipolar disorder II groups, and the healthy

group. This finding is consistent with the results of Inoue *et al.* [12], who found a significant differences in the theory of mind tasks between patients with mood disorders (unipolar and bipolar mood disorder) and the control group.

There is a different result about the theory of mind defect in patients with major depression disorder. The results of this study confirmed the findings of Fakhari *et al.* [22], Zeraatkar *et al.* [26], Nejati *et al.* [23], Fakhari *et al.* [27], and Nejati *et al.* [28], suggesting that the theory of mind and mind reading ability have been lost and damaged in people with the major depression compared with the general population. In addition, the research conducted by Cusi *et al.* [29], Zobel *et al.* [30], Werden *et al.* [31], Wang *et al.* [15], and Inoue *et al.* [13] were similar with this result, indicating that major depression is significantly associated with failure to identify the mental states of others. But, this result is not in line with the results reported by Wolkenstein *et al.* [32], Kettle *et al.* [33], and Doody *et al.* [34]. The findings of these studies have shown that patients with major depression compared with the control group do not show a defect in the theory of mind. These different results may be due to the diagnosis of the depression subgroups that plays an important role in clarifying the inconsistent results associated with the theory of mind, false belief, and depression.

Moreover, regarding the differences of the theory of mind and false belief between the two groups, i.e. bipolar disorder I and the healthy group, almost all previous studies have found similar results. The results coordinate with the findings of Nejati *et al.* [28], Schenkel *et al.* [17], Purcell *et al.* [35], Javier *et al.* [19], McKinnon *et al.* [36], and Kerr *et al.* [37]. The results of this research indicated that bipolar disorder I was significantly associated with a defect in the theory of mind, and people with bipolar disorder I had failure in recognizing mental states of others. In addition, this result is in line with the results of Lahera *et al.* [38], who have shown that the bipolar disorder with or without the psychotic symptoms in both groups compared to control group had lower performance in the theory of mind's test. Also, according to the results of these researchers, the theory of mind performance reduction in these patients has a relationship

with the longer duration of illness and the symptoms' intensity enhancement.

Moreover, there are conflicting findings in the differences of the theory of mind and false belief between bipolar disorder II and healthy groups that are in accordance with the results of Van Rheenen and Rossell [18], Purcell *et al.* [35], Javier *et al.* [19], and Kerr *et al.* [37]. These researchers have shown that the theory of mind in people with bipolar disorder II is damaged. But, this result does not coordinate with the results of Schenkel *et al.* [17] and Barrera *et al.* [39]. They have found that the theory of mind in people with bipolar disorder II is not considerably different from that in healthy people. These conflicting results may be due to the differences in culture, the type of test, and the patient hospitalized. Considering the biological aspects to explain this finding, it can be argued that the damage to the right precursor region leads to damage to the theory of mind and social behaviors, and the 4 main brain regions, the fistula, the hippocampus, the precipitous cortex and the anterior cingulate, are involved in bipolar disorders. Common areas of the brain, the anterior cingulate and the prefrontal cortex, interfere with both the theory of mind and bipolar disorders. The common areas of mood disorders can also be viewed from the psychological and physiological perspectives. In general, the results showed is no difference in terms of performance and cognitive theory of mind and mental states of others in three groups of patients with mood disorders (major depressive disorder, bipolar I, and bipolar II). But, the theory of mind was different between 3 patient groups compared to the healthy group. The people suffering from mood disorders have difficulty with understanding social cognition and emotional states of others, and the theory of mind training can be used as a treatment. Difficulty in understanding the others' mental states is the basis of the theory of mind, which is very important for social interaction. The theory of mind and false belief is considered as a cognitive ability and emotional understanding of the social environment.

However, patients with major depression have problems in functions and social interactions, which could be related to the theory of mind. Since this is the first study about false belief in patients with mood

disorders, there is a need for further studies in order to make it possible to generalize the results of the research on the false belief.

The limitations of this study are confounding factors, such as duration of disease and drug type, while the amount of overlap disease is uncontrolled; so, it is better to control the confounding factors. It is also recommended that the study be repeated in other clinical samples.

Conclusion

The theory of mind is different in the major depression group and bipolar disorder I, II compared to the healthy group. However, there is no difference in the theory of mind among other three groups. Also, there is no difference in false belief among 4 groups.

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