

The Effect of Theory of Mind Capacities of Mothers of Patients with Schizophrenia on the Severity of The Diseases

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SUMMARY

Objective: Studies conducted with patients with schizophrenia and first-degree relatives show that, the pathology in theory of mind may be related to the risk of psychosis. The theory of mind capacities of the mothers may be effective in the prognosis of schizophrenia. The purpose of this study is to examine the effects of theory of mind capacities of patient mothers on the severity of the disease.

Method: The study was conducted with 34 schizophrenic patients and their mothers, and 31 healthy mothers. Sociodemographic data was captures for all groups. In addition, PANSS was collected from patients and Reading the Mind in the Eyes Test was collected from the each patient mother.

Results: There was no statistically significant difference between the age and education levels of the groups. The mothers of patients with schizophrenia performed significantly worse in the Reading the Mind in the Eyes Test than the control group. There was an inverse correlation between theory of mind capacity and the medication dose, PANSS general condition and PANSS total score.

Discussion: The significant difference between the groups suggests that the impairment in the function of the theory of mind can be regarded as an endo-phenotype for schizophrenia. The low theory of mind capacities of the mothers of schizophrenia patients can cause the mothers to misunderstand the feelings of their patient which could lead to increase in disease severity and drugs use.

Keywords: Theory of mind, schizophrenia, endophenotype

INTRODUCTION

Although schizophrenia is accepted as an organic brain disease, the effects of environmental factors are undeniable (Berkun 1997). Identification of schizophrenia endo-phenotypes as a polygenic disease will not only decide on the direction of genetic studies, but also will serve as a guideline for better defining and classifying the disease (Birdal et al. 2015, Özer et al. 2004, Ulaş et al. 2008). Studies with schizophrenia patients and their first-degree relatives show that the theory of mind (ToM) pathologies may be associated with the risk of psychosis (Bora and Pantelis 2013). Therefore, it becomes more important to make a detailed study of the ToM as an endophenotype for schizophrenia.

Theory of mind (ToM) is defined as the capacity to draw inferences about the feelings, thoughts, and intensions to oneself or others. ToM was first introduced by Premack and Woodruff in 1978. Later, this term was used in studies with chimpanzees (Harrington et al. 2005). Furthermore, the ToM is also use in the field of developmental psychology within the framework of development of cognitive processes in children and has been subject to an evolutionary approach and discussed as an adaptive capacity that enables adaptation to the social environment (Brüne 2005).

ToM was first used in clinical settings to better understand children with autistic spectrum disorders (Baron-Cohen et al. 1985), followed by frontal lobe lesions and schizophrenia.

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Recently, studies on ToM have been broadened to cover diseases such as frontotemporal dementia, Alzheimers dementia, antisocial personality disorder, bipolar mood disorder (Brüne 2005), and obsessive compulsive disorders (Grisham et al. 2010, Sayin et al. 2010). Frith carried out the first studies that investigated the relationship between ToM and schizophrenia. They argued that the disorders in the area of social interaction were similar in nature in both autism and schizophrenia (Harrington et al. 2005).

After exploring whether the psychotic experiences (hallucinations or delusions) of schizophrenia patients are associated with the deficits in ToM, Frith argued that apathy and peculiar behaviors, disorders related to self-monitoring and impairments in observing other people's thoughts and intentions that are seen in schizophrenia can be better understood with the help of ToM (Brüne 2005, Harrington et al. 2005).

Mentalization is defined as a person's capacity to explain the concealed mental states of others and to predict their behaviors. Mentalization and ToM are approaching the same incidence from different perspectives; while ToM refers more to cognitive processes, mentalization involves also emotional aspects (Choi-Kain and Gunderson 2008). Mentalization is agreed to be one of the major components of parent sensitivity with an emphasis on the role of parents in shaping the mental representations of the child (Birdal et al. 2015). The ability of the mother as the first caregiver to do mentalization and convey this to her child is critical for the development of mentalization capacity of the child (Dunn et al. 1991, Ruffman et al. 2006). The results of the meta-analysis made by Romney showed that thought disorders were more common in the families of schizophrenia patients compared to controls (Romney 1990). The increasing number of studies made in recent years show that high level of expressed emotions and the presence of an excessively anxious, excessively protective, interfering, dominant and unconfident caregiver are associated with a poor clinical prognosis, frequent hospitalization, frequent relapses, depression and suicide in patients with schizophrenia (McDonnell et al. 2003, Tüzer et al. 2003).

The ToM capacities of the mothers of schizophrenia patients may help us understand the environmental factors affecting the prognosis of schizophrenia. It is possible that the ToM functions are different between mothers with schizophrenia children as compared to mother with healthy non-mental illness children. Furthermore the difference in ToM functions may also influence the variables related to the severity of the disease.

METHOD

Study Population and Sample

The study included 34 schizophrenia patients treated in the outpatient psychiatry clinics or as inpatients in the clinics of Celal Bayar University. Schizophrenia was diagnosed according to the diagnostic criteria of the Revised Fourth Edition of the Diagnostic and Statistical Manual of Mental Diseases

(DSM-IV) (American Psychiatric Association 1994). To be part of the study, all patients needed to be monitored for at least five years and had mothers with no psychiatric diagnosis as per DSM-IV. The control group in this study consists of 31 healthy mothers older than 25 years with no psychiatric diagnosis as per DSM-IV and had at least one child not diagnosed with psychotic disorder. Other inclusion criteria for the mothers was that they had to understand the study material. Thus the study was completed with 34 schizophrenia patients and their healthy mothers, and 31 mothers in the control group.

Clinical assessment instruments

Socio-demographic questionnaire

This questionnaire was developed by the investigators to capture the socio-demographic data needed for this study (education, age, number and ages of children, mental diseases, etc.). The questionnaire was completed by the investigator during the preliminary clinical interviews. After the preliminary interviews, the mothers that met the inclusion criteria were included in the study, and signed a consent forms

Reading the Mind in the Eyes Test

The Reading the Mind in the Eyes Test assesses the emotion recognition ability and consists of 36 pictures showing only the facial features of people (Baron-Cohen et al. 1997, Baron-Cohen et al. 2001). This study used an adapted version, which was tested for validity and reliability in Turkish by Yıldırım et al. (Yıldırım et al. 2011). The Turkish version of the test consists of 32 pictures. A total of 4 pictures were excluded. Two exclusions were based on the consistently incorrectly answered during the pilot study and another 2 items whose reliability coefficients were found low in the validity and reliability study of the test. The test was administered in a room complied with clinical interview conditions with only the interviewer and the subject present. After answering the "test" item as directed by the interviewer, the subject was given a short glossary including the meaning of the four items that described the mental state of the person in the pictures. Only one of the four items is correct. The subject has to choose one of the four items that he/she thought is best describing the picture he/she saw. The items of the test can also be grouped as easy and difficult according to the proportion of the correct answers given to the questions.

Positive and Negative Syndrome Scale (PANSS)

PANSS is a semi-structured interview scale consisting of 18 items adapted from the Brief Psychiatric Rating Scale (BPRS) and 12 items from the Psychopathological Rating Scale. (Kay et al. 1987). The PANSS as three subscales. The positive syndrome subscale and negative syndrome subscale with each 7 items and a general psychopathology subscale with the remaining 16 questions. The Turkish version of the scale was tested for validity and reliability by Kostakoğlu and associates (Kostakoğlu et al. 1999).

Administration

The socio-demographic questionnaire was completed for all the groups participating in the study. The patients completed the PANSS and all mothers completed the the Reading the Mind in the Eyes Test (Eyes Test). The data obtained from the reading the mind tests of patient mothers were matched with patient data on a one-to-one basis (Patient - His/Her Mother) and analyzed.

Statistical Analysis

The independent variables t-test was used for the variables showing a normal distribution and the Mann Whitney U-test for the variables not showing a normal distribution. In exploring the correlations of the continuous variables with each other, the Pearson correlation analysis was used for those showing a normal distribution and the Spearman correlation analysis for those not showing a normal distribution. When $p < 0.05$, it was considered significant.

RESULTS

The mean age and mean years of education between the mothers of schizophrenia patients and control group was not statistically significant (mean years: mothers of schizophrenia patients, 55.6 ± 7.4 ; Control group, 55.6 ± 7.5 ; $p = 0.96$; mean years of education: mothers of schizophrenia patients, 4.4 ± 2.5 ; Control group, 4.8 ± 2.3 ; $p = 0.18$).

Table 1 shows that the mothers of schizophrenia patients had a significantly worse performance in the Eyes Test than the control group. This poor performance became more obvious in the difficult questions subgroup of the Eyes Test.

Looking at the correlation of the ToM capacities of patient mothers with the severity of schizophrenia, a reverse correlation was found between the ToM capacity and medication use, PANSS general state and PANSS total scores. The correlation results are shown in Table 2.

Table 1. Comparison of Reading the Mind in the Eyes Test Performances of Schizophrenia Mothers and Control Group

	Patient mother	Healthy mother	P value
Eyes Test easy items	8.08 ± 3.49	9.58 ± 2.97	0.07
Eyes Test difficult items	6.08 ± 2.45	7.45 ± 2.54	0.03
Eyes test total score	14.17 ± 5.19	17.03 ± 4.86	0.02

Table 2. Correlation of social cognition levels with severity of schizophrenia

	Chlorpromazine medication dose	panss positive	panss negative	panss general state	panss total	Number of hospitalizations
Eyes Test easy items	-.222	.088	.203	.310	.278	-.023
Eyes Test difficult items	-.468**	.302	.073	-.372*	-.333*	-.190
Eyes test total score	-.371*	.203	.171	-.384*	-.345*	-.105

*. $P = 0.05$

**. $P = 0.01$

DISCUSSION

The Eyes Test performance of the mothers of schizophrenia patients was significantly worse than the control group. In a large majority of the studies on the subject where false belief tests were used, the ToM performances of the first-degree relatives were found lower than those of the control groups (Anselmetti et al. 2009, Yucel et al. 2009, de Achával et al. 2010, Riveros et al. 2010). The results of the meta-analysis made by Bora and Pantelis indicated that the unaffected first-degree relatives of schizophrenia patients exhibit a poorer performance in the ToM tests compared to the healthy controls (Bora and Pantelis 2013).

The number of studies conducted using the Eyes Test is limited and has conflicting results. While some of the studies conducted with schizophrenia patients and their first-degree relatives reported no significant difference (Kelemen et al. 2004, Pentaraki et al. 2008, Riveros et al. 2010), others have pointed out a statistically significant difference between the performances of patient relatives and healthy controls (Irani et al. 2006, de Achával et al. 2010). Considering the meta-analysis of Bora and Pantelis, it is understood that no significant difference has been found in the studies conducted with the first-degree relatives of schizophrenia patients using the Eyes Test, but further studies are needed to reach a sound conclusion (Bora and Pantelis 2013). The study of Pentaraki et al. reported the Eyes Test scores for mothers ($n = 17$) and fathers ($n = 18$) and did not find significant difference between the two groups. However, it should be noted that the study was conducted with a small study group (Pentaraki et al. 2008). To our knowledge there are only a small number of studies that evaluate the Eyes Test in mothers of schizophrenia patients.

The study by Ragsdale and Foley compared the Eyes Test performances of siblings with the same mother and father or with the same mother but different fathers or with the same father but different mothers. The study showed a better Eyes Test performance score in the mothers. (Ragsdale and Foley 2011). The significant difference found in our study between the Eyes Test performances of the mothers of schizophrenia patients and the control group suggests that the impairment in the theory of mind function can be dealt with as an endophenotype for schizophrenia. Additionally, the results obtained were similar to the literature on mentalization where the role of first caregiver in the development of the child's mentalization capacity has been highlighted. Whether or not the mentalization capacity of the mother, besides being an

endophenotype for schizophrenia patients, plays a role in the developmental process is not clear yet and needs further studies.

Interestingly, no significant differences were found between the mothers of schizophrenia patients and the control group when recognizing the easy emotions. However, the mothers of schizophrenia patients showed a poorer performance than the control group in recognizing the difficult emotions. We speculated that these results may indicate that the failure of schizophrenia patients to recognize emotions may be associated with the inability of the patient mothers to interpret emotions. However more studies are needed to confirm this.

The proportion of correct responses during the standardization works of the test was affected significantly by the education status. Therefore, finding no significant difference in the education levels of the patient mothers and the control group was important for the validity of the result obtained in the study (Yıldırım et al. 2011). Furthermore, finding no statistically significant difference in the ages of the two groups was also important for the validity of the data obtained in the study.

This study has limitations. First, the absence of a mood test can affect the results since it is known that ToM functions can be affected by the person's mood (Inoue et al. 2004, Wang et al. 2008, Zobel et al. 2010, Marshall et al. 2011). Assessing the mood scale of the groups will enable more accurate results in future studies. Second, the absence of intelligence test would affect the test results since intelligence level can play a role in the test results.

Although there are studies investigating the effect of the ToM capacities of schizophrenia patients on the severity of their disease, we have not encountered any study investigating the effect of the ToM capacities of patient mothers on the disease. Sergi et al. found a moderate correlation between ToM capacity and negative symptoms (Sergi et al. 2007). Another study showed that symptom severity and aggressive behavior decreased and social communication improved in patients that were administered a social cognition interaction therapy (Combs et al. 2007). Our study found a reverse correlation between the ToM capacities of the mothers and the dose of medication used, PANSS general state and PANSS total scores. According to the widely used hypothesis related to the 'schizophrenic mother' concept, which was introduced by Fromm-Reichmann, this attitude of parents causes damage in the personality functions of children who cannot differentiate between their own wishes and the directives of their mothers at an early age (Freeman and Grayson 1955). Based on our study data we believe that mothers with low ToM capacities fail to interpret the emotions and the needs of their schizophrenia children which leads to increases disease symptoms and drug use. Further studies with more complicated designs and other variables that may affect the disease severity are needed.

REFERENCES

- American Psychiatric Association (1994) DSM-IV - Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. American Psychiatric Association, Washington DC.
- Anselmetti S, Bechi M, Bosia M et al (2009) Theory of mind impairment in patients affected by schizophrenia and in their parents. *Schizophr Res* 115:278-85.
- Baron-Cohen S, Leslie AM, Frith U (1985) Does the autistic child have a "theory of mind"? *Cognition* 21:37-46.
- Baron-Cohen S, Jolliffe T, Mortimore C et al (1997) Another advanced test of theory of mind: Evidence from very high functioning adults with autism or Asperger syndrome. *J Child Psychol Psychiatry* 38:813-22.
- Baron-Cohen S, Wheelwright S, Hill J et al (2001) The "Reading the Mind in the Eyes" test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *J Child Psychol Psychiatry* 42:241-51.
- Berksun OE (1997) Psikososyal açıdan Şizofrenide Aile Faktörü: Tarihçe. *Psikiyatri Bülteni* 3:58-60.
- Birdal S, Yıldırım EA, Delice MA et al (2015) Şizofreni Annelerinin Gözler Testi Performanslarının Değerlendirilmesi. *Türk Psikiyatri Derg* 26:33-9
- Bora E, Pantelis C (2013) Theory of mind impairments in first-episode psychosis, individuals at ultra-high risk for psychosis and in first-degree relatives of schizophrenia: systematic review and meta-analysis. *Schizophr Res* 144:31-6.
- Brüne M (2005) 'Theory of mind' in schizophrenia: a review of the literature. *Schizophr Bull* 31:21-42.
- Choi-Kain LW, Gunderson JG (2008) Mentalization: ontogeny, assessment, and application in the treatment of borderline personality disorder. *Am J Psychiatry* 165:1127-35.
- Combs DR, Adams SD, Penn DL et al (2007) Social Cognition and Interaction Training (SCIT) for inpatients with schizophrenia spectrum disorders: preliminary findings. *Schizophr Res* 91:112-6.
- de Achával D, Costanzo EY, Villarreal M et al (2010) Emotion processing and theory of mind in schizophrenia patients and their unaffected first-degree relatives. *Neuropsychologia* 48:1209-15.
- Dunn J, Brown J, Beardsall L (1991) Family talk about feeling states and children's later understanding of others' emotions. *Dev Psychol* 27:448-55.
- Freeman RV, Grayson HM (1955) Maternal attitudes in schizophrenia. *J Abnorm Psychol* 50:45-52.
- Grisham JR, Henry JD, Williams AD et al (2010) Socioemotional deficits associated with obsessive-compulsive symptomatology. *Psychiatry Res* 175:256-9.
- Harrington L, Siegert R, McClure J (2005) Theory of mind in schizophrenia: a critical review. *Cogn neuropsychiatry* 10:249-86.
- Inoue Y, Tonooka Y, Yamada K et al (2004) Deficiency of theory of mind in patients with remitted mood disorder. *J Affect Disord* 82:403-9.
- Irani F, Platek SM, Panyavin IS et al (2006) Self-face recognition and theory of mind in patients with schizophrenia and first-degree relatives. *Schizophr Res* 88:151-60.
- Kay SR, Flszbein A, Opfer LA (1987) The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophr Bull* 13:261-76.
- Kelemen O, Kéri S, Must A et al (2004) No evidence for impaired 'theory of mind' in unaffected first-degree relatives of schizophrenia patients. *Acta Psychiatr Scand* 110:146-9.
- Kostakoğlu A, Batur S, Tiryaki A et al (1999) Pozitif ve negatif sendrom ölçeğinin (PANSS) Türkçe uyarlamasının geçerlilik ve güvenilirliği. *Türk J Psychol* 14:23-32.
- Marshall AD, Sippel LM, Belleau EL (2011) Negatively biased emotion perception in depression as a contributing factor to psychological aggression perpetration: a preliminary study. *J Physiol* 145:521-35.
- McDonnell MG, Short RA, Berry CM et al (2003) Burden in schizophrenia caregivers: impact of family psychoeducation and awareness of patient suicidality. *Fam process* 42: 91-103.

- Özer S, Ayhan Y, Uluşahin A (2004) Bipolar bozukluk ve şizofreni genetiğindeki sorunların giderilmesinde endofenotip yaklaşımların yeri. *Türk Psikiyatri Derg* 15:125-37.
- Pentarakı A, Touloupoulou T, Stefanis N et al (2008) Theory of mind as a potential endophenotype of schizophrenia: Understanding mental states from the eyes in families with schizophrenia. *Schizophr Res* 102:188.
- Ragsdale G, Foley RA (2011, ağustos 5) A maternal influence on Reading the mind in the Eyes mediated by executive function: differential parental influences on full and half-siblings. *PloS one* 6(8): e23236, doi: 10.1371/journal.pone.0023236, The article was downloaded from <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0023236> on January 1, 2017.
- Riveros R, Manes F, Hurtado E et al (2010) Context-sensitive social cognition is impaired in schizophrenic patients and their healthy relatives. *Schizophr Res* 116:297-8.
- Romney DM (1990) Thought Disorder in the Relatives of Schizophrenics A Meta-Analytic Review of Selected Published Studies. *J Nerv Ment Dis* 178:481-6.
- Ruffman T, Slade L, Devitt K et al (2006) What mothers say and what they do: The relation between parenting, theory of mind, language and conflict/cooperation. *Br J Dev Psychol* 24:105-24.
- Sayin A, Oral N, Utku C et al (2010) Theory of mind in obsessive-compulsive disorder: Comparison with healthy controls. *Eur Psychiatry* 25:116-22.
- Sergi MJ, Rassovsky Y, Widmark C et al (2007) Social cognition in schizophrenia: relationships with neurocognition and negative symptoms. *Schizophr Res* 90:316-24.
- Tüzer V, Zincir S, Başterzi AD et al (2003) Şizofreni hastalarında aile ortamı ve duygu dışavurumunun değerlendirilmesi. *Klin Psikiyatr Derg* 6:198-203.
- Ulaş H, Taşlıca S, Alptekin K (2008) Şizofrenide nörofizyolojik ve nörokognitif genetik belirleyicilerin (endofenotip) yeri. *Klin Psikiyatr Derg* 11:12-9.
- Wang Y, Wang Sl, Chen C et al (2008) Theory of mind disability in major depression with or without psychotic symptoms: a componential view. *Psychiatry Res* 161:153-61.
- Yıldırım EA, Kaşar M, Güdük M et al (2011) Gözlerden Zihin Okuma Testi'nin Türkçe güvenilirlik çalışması. *Türk Psikiyatri Derg* 22:177-86.
- Yucel M, Devrimci-Ozguven H, Ozel-Kizil E et al (2009) Theory of mind deficits in unaffected relatives of patients with schizophrenia and bipolar disorder. *Eur Neuropsychopharmacol* 19:322.
- Zobel I, Werden D, Linster H et al (2010) Theory of mind deficits in chronically depressed patients. *Depress Anxiety* 27: 821-8.