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Mentalizing Deficits in Parents of Patients with Schizophrenia: A Cross Sectional Study

Şizofreni Hastalarının Ebeveynlerinde Mentalizasyon Problemleri: Çapraz Kesitsel Bir Çalışma

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Abstract
Objectives: Although, there is an increasing number of studies about cognitive and neuropsychological deficits in the parents of patients with schizophrenia, there are few studies on mentalizing in this population. The aims of this study are to determine the presence of mentalizing deficits as an endophenotype in parents of patients with schizophrenia, as well as in patients with schizophrenia.
Materials and Methods: Fifty parents of patients with schizophrenia were selected according to the DSM IV-TR criteria. For the comparison group, 50 parents of patients suffering from chronic physical diseases were also included in the study for a total of 100 participants. We used the Dokuz Eylül Theory of Mind Scale to assess the parents of patients with schizophrenia and the healthy comparisons.
Results: When compared with healthy comparisons, the parents of patients with schizophrenia showed lower performance in first degree wrong belief, metaphor, irony coupler, faux pas coupler, and empathic understanding tests with all components of mentalizing.
Conclusion: Our finding determining that mentalizing deficits in parents of patients with schizophrenia suggest that mentalizing deficits indicates a possible endophenotype of schizophrenia. However, many studies supporting these conclusion are needed.
Key words: Parents, endophenotype, mentalization, schizophrenia, mentalizing

Öz
Amaç: Bilişsel bozukluklar ve nöropsikoloji alanında, şizofreni hastalarının akrabaları ile yapılan çalışmaların sayısı gün geçtikçe artmakla beraber, bu örneklem üzerinde mentalizasyon üzerine çalışmalar nispeten az sayıdadır. Bu çalışmanın amacı şizofreni hastalarının ebeveynlerinde olası mentalizasyon sorunlarının varlığını bir endofenotip göstergesi olarak araştırmaktır.
Materyal ve Metot: DSM-IV-TR' ye göre şizofreni tanısı almış 50 hastanın herhangi bir ebeveyni risk grubunu oluştururken, kronik fiziksel hastalıkları olan 50 hastanın herhangi bir ebeveyni ise sağlıklı karşılaştırma grubu olarak seçildi. Çalışmada tüm katılımcılara Dokuz Eylül Zihin Teorisi Ölçeği uygulandı.
Bulgular: Sağlıklı karşılaştırma grubuna göre şizofreni hastalarının ebeveynlerinde birinci derece yanlış inanış, metafor, ironi kavrama, faux pas kavrama ve empatik anlayış testlerini içeren tüm mentalizasyon alt puanlarında daha düşük performans gözlendi.
Sonuç: Bulgularımız, şizofreni hastalarında gözlemlediğimiz mentalizayon sorunlarının şizofreni için bir endofenotip olarak dikkate alınabileceğine işaret etmektedir. Bununla beraber, bu değerlendirmeye varmadan önce daha fazla sayıda benzer çalışmalara ihtiyaç vardır.
Anahtar kelimeler: Ebeveyn, endofenotip, mentalizasyon, şizofreni, zihinselleştirme

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Introduction

The theory of mind (ToM) term was first used by the primatologist Premack and the psychologist Woodruff in 1978 in their study describing the skills of chimpanzees in

understanding the mental state of other individuals of the same species. Premack and Woodruff were searching for the answer as to whether chimpanzees mentally understand the wishes, beliefs, and attitudes of their comrades in a similar manner to humans and react accordingly in a social environment. [1-3] Since the publication of this study, many different definitions related to predicting the mental state of others have been made. Among these, various terms, such as mentalizing, mentalization, metarepresentation, mindreading, and other minds, have been used.[4,5]

The ToM can be explained as the ability to attribute mental conditions, such as beliefs, hopes, intentions, desires, emotions, pretending, knowledge, to oneself and others; it enables one to understand that mental conditions can be the induce of behavior and thus it can be used to explain and estimate behavior. [4-6] Initially described in common developmental disorders, Mtz disorders were later understood not to be limited to autism, and have thus been studied in schizophrenia and bipolar disorder.[4,5] In terms of ToM, delusional symptoms can be explained that patients with schizophrenia instead of taking beliefs as subjective representations of reality, equate their representations with reality and may therefore have difficulty distinguishing between subjectivity and objectivity and pursue false beliefs in the form of delusional thought.[7]

It is known that genetic factors play an important role in the etiology of schizophrenia, and approximately thirty schizophrenia-associated loci have been identified through a genome-wide association study.[8] While schizophrenia has a prevalence of 1% in society, its prevalence is 12% among children who have one parent with schizophrenia, 40% among children who have both parent with schizophrenia, 8% in non-twin siblings, 12% in dizygotic twins, and 47% in monozygotic twins.[9]

In psychotic disorders, it is proposed that the risk of the disease is due to the co-occurrence of many genes, each with a small effect, and that this clinical picture is based on the manifestation of these effects together, which develops once an assumed threshold of predisposition is passed.[10] In a family with a preponderance of genetic diseases that carries both the disease and the genes susceptible to the disease, it has been emphasized that broader approaches to studying the common characteristics of members who are not sick are necessary. Disease is related to genes; however, the characteristics that do not cause open clinical occurrences are called endophenotypes.[11]

To determine the endophenotypes of schizophrenia, some studies have examined the defects found in electrophysiological changes, soft neurological findings, and structural changes that were observed with neuroimaging methods and neuropsychological tests, and their findings present important data in this area. [12,13] The theory of mind is one of these findings. There are also studies that have brought Mtz defects to the agenda as a possible candidate endophenotype for schizophrenia. [14,15]

The aim of this study was to determine the presence of Mtz defects in parents of patients with schizophrenia.

Materials and Methods

The study began after permission was granted by the Non-Medication Local Ethics committee of our hospital, Yıldırım Beyazıt University Ankara Atatürk Training and Research Hospital.

Participants

All patients had been diagnosed with schizophrenia according to the DSM-IV-TR scale. Of all the parents of patients who were admitted to the psychiatry clinic or were attending the psychiatric clinic for check-ups, the parents who graduated from at least primary school, were between 35-65 years of age, and gave informed, written consent were allowed to participate in the study group.

The parents whose children regularly applied to any clinic for chronic (lasting more than 1 year) physical disease (these patients of parents in control group have had orthopedic impairments, vision problems, rheumatological disease or diabetes mellitus, require maintenance from time to time and did not have any psychiatric disorder), who graduated from at least primary school, were between 35-65 years of age, and gave informed, written consent were accepted for the control group in the study. This healthy control group of parents was matched with the study group in terms of age, gender, and educational level.

Any parents destined for the control group who had physical diseases affecting their mental and/or mental state, vision disorders or hearing loss, and/or a history of medication use that affects cognitive functions in the previous 6 months were excluded from the study.

Data collection tool

Socio-demographic data sheet: A sociodemographic form prepared by the researchers who were aware of the study aims was used for all cases. This form included questions designed to determine the sociodemographic characteristics of the parents.

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I): The SCID-I was developed by First et al. for use as a diagnostic tool for psychiatric disorders according to DSM-IV criteria, and takes a semi-structured interview form aiming to diagnose current or lifelong axis I disorders. It was translated into Turkish by Özkürkçügil et al., and its reliability and validity studies for our country have been completed. [16,17]

Dokuz Eylul Theory of Mind Index (DEToMI): The Dokuz Eylul Theory of Mind Scale (DEToMI) was completed by Değirmencioğlu with reliability and validity studies. In Degirmencioglu's study, the correlation between DEToMI and Empathic Skill Index (convergent validity) were found to be statistically significant in schizophrenia group ($r=0.42$ $p<0.01$). Also, DEToMI has an acceptable internal consistency (Cronbach's Alpha=0.67); inter rater reliability ($r=0.99$) and test-retest reliability ($r=0.80$).[18] Designed to measure the first degree false belief, second degree false belief, irony, metaphor, empathy, and faux pas (gaff) scales of ToM, the scale comprises a total of 18 questions, including 5 picture and 7 story questions. The points of the scale are given according to the answer key, with each answer accepted as correct given 1 point. With 1 point for each correct answer, the lowest score an individual can have is 0, while the highest is 18.

Procedure

The diagnosis of schizophrenia was confirmed by using SCID-I. The Dokuz Eylul Theory of Mind Scale (DEToMI) was used to investigate the cognitive abilities of the parents of patients with schizophrenia and the comparisons within the framework of ToM. This procedure was completed with 100 people: 50 parents of patients with schizophrenia and 50 control parents.

Statistical Analysis

Numerical variables are summarized as mean and standard deviations, while categorical variables are given as frequency and percentages. The limit of statistical significance was determined as "p<0.05". The Kolmogorov-Smirnov test was applied to identify the distribution of all variable groups for comparisons. Parametric or non-parametric statistical methods were used considering dispersion properties of variables. In a pilot study (10 Healthy comparison and 10 Parents of patients with schizophrenia), the required sample size was calculated as 80 (when alpha=0.05 and power=0.90). All statistical analyses were performed with SPSS software (version 16; IBM, Chicago, IL) and Gpower.

Results

The study is comprised of 100 individuals, 50 parents of schizophrenic patients and 50 parents of individuals with chronic physical disease. Of all participants, 45% (n=45) were male and 55% (n=55) were female. The sociodemographic characteristics of the parents of patients with schizophrenia and healthy comparisons included in the study are given in Table 1.

Table 1. Sociodemographic characteristics of the test and control groups

	PPS n (%)	**HC n (%)**	**χ^2 / t**	**p**
Age (year)*	55.62±6.14	52.70± 6.86	2.240 **	.027
Marital Status				
Married/ Widowed	44 (88)	47 (94)	1.118	0.290
Divorced	6 (12)	3 (6)		
Educational level				
Primary school	35 (70)	34 (68)	.331	0.847
High school	8 (16)	7 (14)		
Third level	7 (14)	9 (18)		
Occupation				
Housewife	24 (48)	18 (36)	3.218	0.200
Regular work	7 (14)	14 (28)		
Retired	19 (38)	18 (36)		
Place of residence				
City	45 (90)	45 (90)	0	1
Rural	5 (10)	5 (10)		
Monthly income ‡				
0-500	21 (42)	22 (44)	2.155	0.340
500-1000	26 (52)	21 (42)		
1000 and above	3 (6)	7 (14)		
Smoking Habit				
No	39 (78)	44 (88)	1.772	0.183
Yes	11(22)	6 (22)		

PPS: Parents of Patients with Schizophrenia, HC: Healthy Comparison,
*mean ± standart deviation, **t value, ‡ U.S.D.

When the DEToMI scores of the parents of patients with schizophrenia and DEToMI scores of the healthy comparisons were compared, we found that the total points and all subscale scores of the parents of schizophrenic patients were lower than those scored by the healthy comparisons. We also found higher rates of suicide and more family histories of psychiatric illness in relatives of patients with schizophrenia than we did among the control group. The DEToMI total and subscale scores as well as the suicide and psychiatric history in relatives of schizophrenic patients and the healthy comparisons are summarized in Table 2.

The effect size and power of the study for DEToMI total score (considering mean and standard deviation) respectively were 2.02 and 0.95.

Table 2. Comparison between the test and control groups in terms of clinical parameters

	Groups	Mean±SD	Percentiles			Z ǂ	p
			25 th	50 th	75 th		
DETMS total points	PPS	11.12±3.21	9	11	14	7.464	< 0.001
	HC	16.10±1.44	15	16	18		
First degree false belief points	PPS	2.98±1.36	2	4	4	4.814	< 0.001
	HC	3.94±0.23	4	4	4		
Second degree false belief points	PPS	1.08±0.75	1	1	2	7.481	< 0.001
	HC	2.50±0.54	2	3	3		
Metaphor concept points	PPS	1.04±0.78	0	1	2	4.138	< 0.001
	HC	1.66±0.55	1	2	2		
Empathic understanding points	PPS	4.38±0.98	4	5	5	3.579	< 0.001
	HC	4.90±0.36	5	5	5		
Irony concept points	PPS	1.32±1.09	0	1	2	3.579	< 0.001
	HC	2.36±0.69	2	2	3		
Faux pas concept points	PPS	0.32±0.47	2	2	2	4.763	< 0.001
	HC	0.76±0.43	3	3	3		
		RPS n (%)	RHC n (%)			χ^2	p
Suicide history in family	Yes	4 (8)	0 (0)			-	0.117**
	No	46 (92)	50 (100)				
Psychiatric history in family	Yes	2 (4)	20 (40)			17.336	< 0.001*
	No	48 (96)	30 (60)				

DETMS: Dokuz Eylül Theory of Mind Scale
PPS: Parents of Patients with Schizophrenia, HC: Healthy Comparisons
RPS: Relatives of Patients with Schizophrenia, RHC: Relatives of Healthy Comparisons

Discussion

In our study, we compared the parents of individuals with a diagnosis of schizophrenia to parents of patients with physical diseases. We identified a deficit in the Mtz functions in the parents of individuals with schizophrenia. Our findings are in accordance with the few previous studies in the literature that have researched Mtz disorders in relatives of schizophrenics.[19,20]

These sparse studies focusing on Mtz components have assessed the parents of individuals with schizophrenia. The first of these studies, conducted by Anselmetti et al., used the task of arranging pictures in order and in accordance with our results, found that the non-psychotic parents of patients with schizophrenia performed worse in terms of Mtz functioning compared to healthy comparisons. They also found that both the patients and their parents were significantly slower at ordering the pictures than the control group, and concluded that this slowness may be related to disrupted processing of the social interactions described in the story. [21] A recent study on the unaffected first-degree relatives of schizophrenic individuals identified a deficit in mentalizing, overlapping with those seen in schizophrenic individuals, after accounting for factors such as age, educational level, and general cognitive performance.[22]. In a study assessing Mtz disorders among schizophrenic individuals, their healthy relatives, and healthy comparisons, Janssen et al found that the relatives of schizophrenics performed at a level between the schizophrenic patients and the healthy comparisons in tests of understanding allusions. Moreover, this observed disorder was independent of IQ, education, age, and severity of psychopathology. Janssen et al. concluded that Mtz changes may be considered determinant of schizophrenia or its endophenotypes in particular.[19] However, some studies have shown contrary results. For example, a study by Kelemen et al. using the eyes test found no significant difference between first degree relatives of schizophrenic individuals and healthy comparisons.[23]. In two separate studies using first degree false belief stories, second degree false belief stories, and the eyes test, Pentaraki et al found no Mtz disorder in the parents of schizophrenics compared with healthy comparisons. Instead, they found that Mtz functions were affected by the intelligence levels of the individuals, and, as a result, they concluded that Mtz functioning should not be considered an endophenotype for schizophrenia. [24,25]

Regardless of the presence of a psychiatric disorder, some changes in psychological-cognitive processes have been shown, such as; decision-making and executive functions, and these changes were considered endophenotypes. [26] Similarly, the effects of genetic factors in the development of psychiatric disorders have been considered. Higher rates of psychiatric disorders are observed in relatives of affected individuals than among the general population. According to the multifactorial threshold model, each genetic factor alone has a small effect, yet the threshold is passed when enough genetic factors come together and clinical manifestations emerge [27]. Although our present study does not focus on this issue, our finding that the number of psychiatric disorders in the relatives of patients with schizophrenia is higher than in the healthy comparisons can be interpreted that Mtz creates susceptibility to other psychiatric disorders, but this inference must be supported by appropriate designed studies.

The relationship between mentalizing deficit and psychiatric disorder has been shown.[2] Therefore, to avoid bias, we have concluded a control group consisting of parents of patients with the physical disease for at least one year. But, we have not investigated the burden of caregivers effect on mentalizing deficit in control group. Although, mentalizing is a neurodevelopmental concept and in the absence of corruptive factors, mentalization maturation is completed at an early age, it can be said that biological or psychosocial (caregiver burden in our study) factors that make disruption in the regions of the brain responsible for processing mentalizing may cause an acquired mentalizing deficit.[28] This seems to be one of the limitations of our study.

The inconsistency of the results of studies researching Mtz performance in first degree relatives or parents of individuals with a schizophrenia diagnosis is noteworthy, and there are some reasons for this. First, different components of Mtz have been assessed by different tests. Some of the Mtz tests used in these studies involve stories read aloud, and others used caricature drawings. [29-32] Mtz is a skill with at least four components (first degree Mtz, second degree Mtz, the metaphor and irony concept, and the faux pas concept). Whenever studies compare the differences in these components between the study group and the healthy comparisons, they usually feature only one or two components. The various cognitive deficits such as reduced attention span, difficulties with memory, reasoning, judgement, problem solving and decision making are another confusing variables that may affect Mtz performance in schizophrenia patients. [33] All of these inconsistencies make both administering and evaluating Mtz tests difficult, and thus increase the inconsistency between the results of studies.

In the present study, we used 7 story and 5 picture questions to measure first degree Mtz. Then, we used metaphor and irony concepts, the faux pas concept, and empathic understanding skills to measure second degree Mtz. The DEToMI was inspired by all tasks in the literature, and is a scale that encompasses these tasks in a synthesis. The story topics prepared for the scale are taken from daily life, and care was taken to use clear and simple expressions. Moreover, the picture tasks were designed for people who have difficulty following the text. In short, our aim was to assess different Mtz components without too many tests or too many methods, which is a superior aspect of our study. Our findings show that there are significant differences between the groups in terms of all of the sub-scale of DEToMI. This case implies that there is a pause in the early stage of mentalizing development in parents of patients with schizophrenia as well as patient with schizophrenia.[7] A study with larger sample consisting of patients with schizophrenia having different clinical manifestations and their parents carried out for the sub-scale of DEToMI may produce remarkable results.

Although, the sample size of the survey may seem small, power analysis showed that this sample size was sufficiently powerful to allow conclusions about the absence of differences between the two groups. In our study, mean total score of DEToMI (11,1±3,2) is lower than mean total score of DEToMI in control group in original validity - reliability study (13,11±2,71) and this comparison is another indication that increases the power of the results and reducing bias. It shows that mentalizing may be an endophenotype for schizophrenia. However, there is need for more studies on the clinical significance of this endophenotype in unaffected individuals.

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