

THE RELATIONSHIP BETWEEN COGNITIVE DEFICITS AND CLINICAL CHARACTERISTICS IN PATIENTS WITH SCHIZOPHRENIA

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Abstract

Introduction: Schizophrenia is an endogenous psychotic disorder with a chronic course, which is characterized by dysfunction in multiple domains: perceptions, thinking, emotions, and cognition.

Objective: The main aim of the study was to introduce the relationship between clinical characteristics and cognitive deficits in patients with schizophrenia.

Methods: The research involved 53 randomly selected male and female respondents from 18 to 60 years of age, who suffer from schizophrenia according to the diagnostic criteria of the International Classification of Diseases – ICD 10, acute schizophrenia treated in the Psychiatric Hospital Skopje - Skopje. We used the following measuring instruments: the Positive and Negative Syndrome Scale (PANSS) and the Schizophrenia Cognition Rating Scale (SCoRS).

Results: The results indicated that the acute schizophrenic patients had higher rating scores in the SCoRS assessment ($M=45.736$, $SD=8.908$) in the first week after psychosis onset. A high degree of positive and negative symptoms was a strong predictor of higher cognitive deficits in patients with schizophrenia. A positive relationship was observed between the PANSS-Positive and SCoRS level ($F(53) = 0.559$, $sig. = .001$, $p < .01$). At the same time, positive relationship was observed between the PANSS-Negative and SCoRS level ($F(53) = 0.283$, $sig. = .001$, $p < .01$).

Conclusions: In the course of our longitudinal prospective study, we found that clinical characteristics of schizophrenia had a great impact on the cognitive dysfunction, whereby this is evident in the acute stage of the disease.

Keyword: cognitive deficit, positive symptoms, negative symptoms, schizophrenia, treatment

Introduction

Schizophrenia as a paradigm of a mental disorder has always been a challenge, starting from the understanding of the definition itself, up to the method of treatment. Today it is interpreted as a spectrum of related conditions that differ in terms of their course, outcome, and intensity, therefore a large number of authors believe that it does not represent only one and single entity (Sánchez, et al., 2009). Today, clinicians working in the field of cognition share the opinion of Eugen Bleuler and Emil Kraepelin that cognitive deficit is the primary characteristic of schizophrenia. In recent years, the belief that the neurocognitive deficit is a functional component of schizophrenia, and not a result of symptoms or consequences of treatment, has been increasingly expressed. This deficit is usually associated with dysfunction of the prefrontal cortex, sensory and association cortex, motor cortex, and basal ganglia (Bonilha, et al., 2008; Lesh, et al., 2011).

Changes in cognitive functions are observable early, initially, it seems to be of a milder degree, but the intensity can increase with the progression of the disease. This cognitive deficit does not depend on positive symptoms; rather it is more frequently associated with the negative symptoms of the disease, just as it is also considered that the lack of insight into the disease is a result of cognitive dysfunction (Joseph, et al., 2015).

The possibility of cognitive function in schizophrenia is displayed through the speed of information processing, attention, memory, thinking, learning process, problem-solving, and social cognition. It is considered an important and fundamental characteristic in almost all patients with schizophrenia that occurs as early as in the first episode of schizophrenia (Bechard-Evans, et al., 2010), however, it is also observable in the premorbid stage (Bora & Murray, 2014), while in the advanced stage the cognitive deficit is constant and cannot be reduced to secondary deficit, it is rather characteristic of the disease. Cognitive dysfunction is present in almost all patients and it has a different intensity in different domains compared to the healthy population, however the most sensitive is the domain related to information processing speed, memory, attention, executive function, language, motor skills, and spatial abilities (Forbes, et al., 2009). Cognitive dysfunction is in essence a constant category with small changes in the manifestation of cognitive functions in different stages of development of the disease and duration of the disease, and there are no important correlations with age, education, or socioeconomic status. The influence of psychotic symptoms on cognitive function shows moderate correlations, with the possibility of affecting certain domains of cognition, such as the ability to solve problems, where the thought process has the main role through the impoverished expression in speech. However, we should emphasize that the independence and persistence of cognitive dysfunction are evident during the very time frame of the emergence of cognitive symptoms, that is, the cognitive deficit also persists in periods of clinical remission of the disease.

Neurocognitive tests show that only 30% of patients with schizophrenia have satisfactory cognitive functioning, therefore neuropsychological testing is a superior method for accurate determination of the cognitive function and cognitive deficit in schizophrenia in any stage of the disease (Targum & Keefe, 2008). With clinical psychological processing, primary emphasis is placed on the behavior of the individual, which, unlike the findings of the brain imaging, has direct implications for the daily functioning of patients with schizophrenia.

Method

The research involves 53 randomly selected male and female respondents from 18 to 60 years of age who suffer from schizophrenia according to the diagnostic criteria of the International Classification of Diseases - ICD 10 and have a first episode of the disease. The patients were treated at the PHI Psychiatric Hospital Skopje - Skopje, and PHI University Clinic of Psychiatry - Skopje. The patients were monitored for a period of 4 to 6 weeks after the hospitalization.

The criteria for inclusion of the respondents included: male and female gender, age from 18 to 60 years, schizophrenia (according to ICD 10), patients in the first episode of schizophrenia without previous antipsychotic therapy, while the criteria for exclusion of the respondents included: younger than 18 years of age, diagnosis of comorbid psychiatric disorder, voluntary withdrawal from the study by the patient despite previous obtained consent or for any other reason, use of more than one antipsychotic.

After receiving the institutional official consent to conduct the scientific research, it was conducted in patients with schizophrenia who were getting hospital treatment at the PHI Psychiatric Hospital Skopje - Skopje and the PHI University Clinic of Psychiatry - Skopje in 2021. In the first phase, a questionnaire was filled out regarding the sociodemographic data of the respondents and the clinical characteristics, and in the second phase, the instruments of the research were given. During the research, we were guided by the basic ethical principles of the Helsinki Declaration for scientific research with human subjects. The instruments and instructions are administered in the same order to all respondents and with the same solution time in an optimal period during the day and relatively optimal conditions. Previously, in

accordance with the ethical international codes for research with human subjects, and depending on the current mental state, informed consent was necessarily signed by the patients or their family members.

In the research, we used the Schizophrenia Cognition Rating Scale (SCoRS) which consists of 9 domains: memory, learning, attention, working memory, problem-solving, processing speed/motor activity, social cognition, language, and global functioning (Keefe, et al., 2006). Each item is ranked from 1 (absent deviation) to 4 (expressed deviation), whereby higher scores reflect a greater degree of the disorder. The total score on the scale ranges from 20 to 80 points. The Positive and Negative Schizophrenia Syndrome Scale (PANSS) is more rationally defined by mean scores for 3 domains: Positive Scale, Negative Scale, and General Psychopathology Scale (Kay, Fiszbein, & Opler, 1987). The maximum score for this scale is 49 points. Each scale and subscale had good statistical validity with Cronbach>0.7.

The statistical processing of the data was carried out by using the statistical program SPSS version 26, and we interpreted the results at a significance level of .01, that is, .05.

Results

Table 1 shows the sociodemographic characteristics of the respondents in terms of gender, age, level of education and marital status.

Table1. Sociodemographic characteristics of the studied population

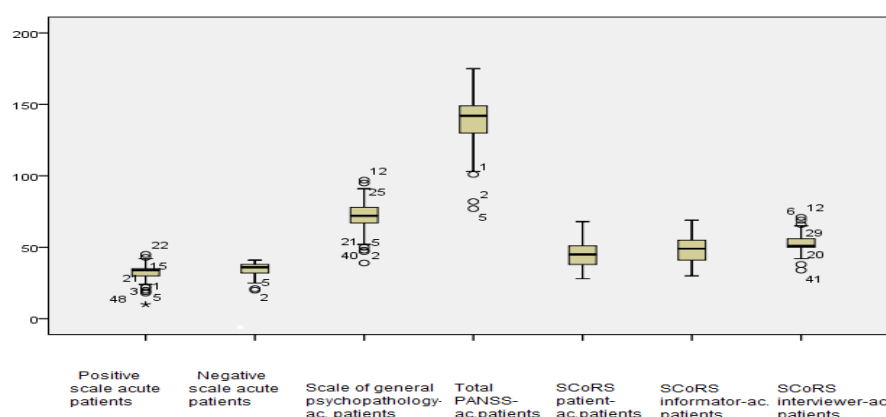
Patients with acute schizophrenia	
Gender	N
Male	30 (56.60%)
Female	23 (43.40%)
Age	N
20-29 yr.	31 (58.40%)
30-39 yr.	22 (21.60%)
40-49 yr.	0
50-59 yr.	0
60-69 yr.	0
Education	N
No education	0
Primary education	6 (11.30%)
High school	42 (79.20%)
Higher education	5 (9.50%)
Marital status	N
Single	21 (39.60%)
Married	13 (24.50%)
Extramarital union	16 (30.10%)
Divorced	3 (5.80%)
Widow	0

Table 2 shows that the mean value of the positive scale in patients with schizophrenia with a first episode of the disease is M=32.264 with minimum and maximum values from 10 to 45, on the negative scale it is M=34.547 with minimum and maximum values from 20 to 41, on the scale of general psychopathology it is M=71.736 with minimum and maximum values from 39 to 97, while the mean value of the total PANSS score is M=138.340 with minimum and maximum values from 77 to 175. On the other hand, the mean values from the Schizophrenia Cognition Rating Scale for Patients with Acute Schizophrenia - SCoRS are presented for the patient, the informant, and the interviewer. The mean value of the SCoRS for the patient is M=45.736, the mean value of the SCoRS for the informant is M=49.321, while the mean value for the interviewer is M=52.340.

Table2. Descriptive statistics of the examined clinical and psychological parameters in patients with acute schizophrenia

Acute patients	AS	SD	Va	Ku	Sk	Range	Min.	Max.
Positive scale	32.264	6.660	44.352	1.684	-0.960	35	10	45
Negative scale	34.547	4.742	22.483	1.376	-1.296	21	20	41
Scale of general psychopathology	71.736	11.556	133.544	0.901	-0.523	58	39	97
Total score of PANSS	138.340	18.989	360.575	2.256	-1.190	98	77	175
SCoRS patient	45.736	8.908	79.352	-0.440	0.376	40	28	68
SCoRS informant	49.321	9.380	87.991	-0.662	0.205	39	30	69
SCoRS interviewer	52.340	7.298	53.267	0.669	0.322	37	34	71

Graph 1 shows the distribution of the obtained results of the psychopathological subjects, i.e. the positive scale, the negative scale, and the general psychopathology in relation to the total score of the SCoRS scale obtained from the patient, the informant and the interviewer in patients with acute schizophrenia.



Graph1. Graphic representation of the distribution of the studied clinical and psychological parameters in subjects with acute schizophrenia

By means of the F-test, we found that in subjects with acute schizophrenia there is a significant correlation between the positive scale and the total score of cognitive functioning obtained from the patient $F(53)=0.559$, $sig.=.001$, $p<.01$; the positive scale and the total score of cognitive functioning obtained by the informant $F(53)=0.504$, $sig.=.001$, $p<.01$; however a negative correlation between the positive scale and the total score of cognitive functioning obtained from the interviewer $F(53)=0.833$, $sig.=.256$, $p>.01$. On the other hand, the negative scale related to the total score of cognitive functioning of the patient, the informant and the interviewer is at the $p<.01$ level. The scale of general psychopathology is not related to the total score of the cognitive functioning of the patient, the informant and the interviewer, that is, the level of statistical significance is $p>.01$ (Table3).

Table3. Influence of psychopathological symptoms on cognitive functioning in patients with acute schizophrenia

Acute schizophrenia	AS	Va	N	df	F test	Sig.
Positive scale	32.264	44.352	53	52	0.559	.001
Negative scale	34.547	22.483	53	52	0.283	.000
Scale of general psychopathology	71.736	133.544	53	52	1.683	.032
SCoRS patients	45.74	79.35	53	52		
	AS	Va	N	df	F	Sig.
Positive scale	32.264	44.352	53	52	0.504	.001
Negative scale	34.5472	22.4833	53	52	0.256	.000
Scale of general psychopathology	71.736	133.544	53	52	1.518	.068
SCoRS informant	49.321	87.991	53	52		
	AS	Va	N	df	F	Sig.
Positive scale	32.264	44.352	53	52	0.833	.256
Negative scale	34.547	22.483	53	52	0.422	.001
Scale of general psychopathology	71.736	133.544	53	52	2.507	.001
SCoRS interviewer	52.340	53.267	53	52		

Discussion

Schizophrenia is a mental disorder that is a consequence of changes in the neurotransmitter systems in the brain and that leads to the disruption of important mental functions and behavior, which affects the social, professional, and family functioning of the person (Lippi, 2016; McCutcheon, et al., 2020). The point of departure in neuropsychological theory is the assumption that schizophrenia, as a psychotic disorder, is the result of a psychological deficit caused by pathoanatomical and pathophysiological changes in the central nervous system. Numerous studies attempt to determine the specificity of the disorder or its relationship to psychopathological manifestation (Comer, et al., 2020). In schizophrenic patients with negative symptomatology, (poor speech, flattened affect, reduced volitional-impetus dynamisms), changes in the lateral ventricles and intellectual deterioration are more common. Based on the clinical practice so far and the available data from the literature, schizophrenia with productive clinical characteristics has a better prognosis than the type with non-productive characteristics, that is, with the dominance of negative and deficient symptomatology. It is known that patients who are dominated by productive symptoms (hallucinations, crazy thoughts, bizarre behavior, derealization, etc.) show a better therapeutic effect. Patients who manifest negative clinical characteristics (affective deficit, ambivalence...) have a worse therapeutic response and a weaker possibility of fitting into reality, and thus a worse prognosis.

One of the goals of our research was to determine whether there is a difference between the cognitive functioning of the individual and the psychopathological symptoms of schizophrenia as a psychotic disorder, that is, the positive and negative symptoms of the disease. Throughout the research, we found that in subjects with acute schizophrenia, there is a significant relationship between the positive scale and the total score of cognitive functioning obtained by the patient and the informant, which corresponds to the subjective cognitive deficit (Haddad, et al., 2021) and has a large significance in assessing cognitive dysfunction, regardless of the ability for an insight and criticality in patients with schizophrenia (Baliga, et al., 2020). However, there is a negative correlation between the positive scale and the total score of cognitive functioning obtained by the interviewer. The negative scale is related to the total score of cognitive functioning of the patient, the

informant, and the interviewer. Similar results were presented by Savilla and others (Savilla, et al., 2008). The General Psychopathology Scale is not correlated with the total score of the cognitive functioning of the patient, the informant, and the interviewer. We believe that this present difference in terms of positive and negative symptoms and cognitive deficit in patients with schizophrenia is the result of impaired cognitive processes from information processing to activity planning, which are more pronounced in the negative subtype of schizophrenia. A study by Kim and others (Kim, et al., 2008) confirms that clinical symptoms affect cognitive functioning and that treatment is associated with improvements in cognitive functioning, especially executive functioning. Moreover, the progression of schizophrenia, both in the early stage and in the chronic stage of the disorder itself, is characterized by an extensive and unpredictable profile of the expression of cognitive deficit, therefore in one paper, it is concluded that negative symptoms and general psychopathology in patients with schizophrenia can cause greater cognitive deficit (Okewole, et al., 2014). Deficits in learning/memory were observed even in patients with less pronounced clinical characteristics, while deficits in executive function and attention were more frequently found in patients with a chronic course of the disease, which affects their daily functioning. We hereby confirm that cognitive deficit is associated with clinical characteristics in schizophrenia patients.

Numerous studies attempt to explain the relationship between positive and negative symptoms, changes in the central nervous system, and cognitive deficits in patients with schizophrenia. The results show that the cognitive deficit is more pronounced in the negative symptomatology and not the paranoid form of the disease (Bucci, et al., 2018). All these findings confirm the complexity of the disease itself and its functional outcome, which largely depends on the cognitive abilities of the person.

Conclusion

Schizophrenia as a paradigm of a mental disease has been a challenge for study since ancient times, starting from its definition, to the method of treatment. Nowadays, it has been accepted as a neurobiological disorder with pronounced neurocognitive components. Modern neuropsychological research is based on determining the specificity of the neurocognitive models associated with schizophrenia, which contributes to an accurate explanation of the neuroanatomical and neuropsychological systems that represent the fundamental basis of the disease, however, at the same time affect the development of efficient rehabilitation measures and improvement of the quality of life of patients with schizophrenia. Neurocognitive deficit within the various cognitive domains is an integral part of the clinical characteristics of schizophrenia; therefore new researches are focused on understanding the causal relationship between cognitive dysfunction and certain psychopathological phenomena that are part of the positive and negative schizophrenia syndrome.

During the research, we proved our hypothesis that in patients with schizophrenia, there is a close connection between the clinical symptoms of the disease and the cognitive functioning of the examined subjects. Hence, the recommendations from our research include the following:

- First, cognitive deficits clearly precede the onset of psychosis and are relatively stable over the course of schizophrenia.
- Second, cognitive functioning is associated with the general functional outcome, which strongly suggests that detection should target the early stages of the disease which should be crucial in preventing the chronic course of the disorder.
- Third, we confirm the views presented so far, that cognitive functioning is a fundamental characteristic of the disease, and therefore the use of part of the standard

diagnostic procedures with appropriate unified and standardized cognitive tests is very important.

- Fourth, the consistency of antipsychotic medications may also have advantages for cognitive functioning.
- Fifth, future research will need to address the possibilities of confirming different views regarding these correlation relationships between clinical symptoms and cognitive functioning in schizophrenia.
- Sixth, one should not forget the significance of the development and improvement of cognitive treatment, the evaluation of cognitive functioning in schizophrenia as a basic component in mental health education and teaching.

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