Profesional paper

# THE IMPACT OF COGNITIVE FUNCTIONING ON THE QUALITY OF LIFE IN PATIENTS WITH SCHIZOPHRENIA

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## ABSTRACT

Introduction: Schizophrenia is an endogenous psychotic disorder with a chronic course. The clinical features of schizophrenia are dominated by positive, negative symptoms, as well as cognitive dysfunction, which affects the quality of life.

Objective: To determine the relationship between cognitive dysfunction and quality of life in patients with first-episode schizophrenia and a chronic course of the disease.

Method: The research involved 37 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. The respondents are divided into two groups. The first group consists of 21 patients with schizophrenia in an acute period of the disease, while the second group consists of 16 patients with chronic schizophrenia treated in the PHI Psychiatric Hospital Skopje-Skopje, the PHI Clinical Hospital Stip and the PHI University Clinic of Psychiatry-Skopje. We used the following measuring instruments: the Positive and Negative Syndrome Scale (PANSS), the Schizophrenia Cognition Rating Scale (SCoRS) and the World Health Organization Quality of Life (WHOQOL)-BREF scale. For the statistical data processing we used the statistical package SPSS version 26 (Statistical Package for the Social Science).

Results: By applying ANOVA we found that the quality of life in acute patients is linearly related with at least one predictor, i.e. $F(21) = 3.570$, sig. $= .036$, $p < .05$. In the regression analysis by means of the t-test we found that there is a significant relationship between the quality of life and the total score of the cognitive functioning obtained by the informer $t(21) = -2.582$, sig.$= 0.019$, $p < .05$; while there is no statistically valid relationship between the quality of life and the total score of cognitive functioning obtained by the patient $t(21) = 1.158$, sig.$= 0.263$, $p > .01$ and between the quality of life and the total score of cognitive functioning obtained by the interviewer $t(21) = 0.096$, sig.$= 0.925$, $p > .01$. Also by using ANOVA, we found that the quality of life in chronic patients is not linearly related to any predictor, i.e. $F(16) = 0.840$, sig. $= .498$, $p > .05$. In the regression analysis by means of the t-test we also found that there is no relationship between the quality of life and the predictors.

Conclusion: In the course of our longitudinal prospective study, we found that cognitive dysfunction in schizophrenia affects a person's quality of life, whereby this is evident in the acute phase of the disease. Rehabilitation is focused on building the required skills for everyday life and work in the community, and is based on the principles of recovery and empowerment, it encourages the patient's autonomy by fostering the ability to work and by reducing incapacity –it improves self-confidence, social functioning and quality of life.

## INTRODUCTION

Schizophrenia is an endogenous psychotic disorder with a chronic course which is characterized by dysfunction in multiple domains such as: perceptions, thinking, emotions and cognition. The scientific and clinical public is focused on early detection, treatment and rehabilitation, with a special focus on treatment in the community, however in the last 20 years with the advancement of science, schizophrenia has been studied in the direction of a neurodevelopmental and a neurodegenerative process [1, 2]. In the acute phase, a schizophrenic disorder is manifested by subtle changes in behavior, changes in the neuromotor and cognitive spheres. Due to the heterogeneity of the manifestation of the symptomatology in the early stage of schizophrenia, along with the dominance of positive and negative symptoms, cognitive deficit is also observed, hence early detection and treatment play a major role in reducing difficulties in the person's functioning, therefore the chronic stage of the disease is dominated by negative symptoms and cognitive dysfunction, which of course leaves sequels from a personal and behavioral aspect of the schizophrenic person [3].

Cognitive dysfunction is a basic characteristic of schizophrenia. Deficits are moderate to severe in several domains, including attention, working memory, verbal learning, memory and executive functions. These deficits occur at the beginning of psychosis, however they remain stable throughout the course of the disease in most patients. Studies have shown that cognitive deficits present with variability in severity, persistence of disorders and absence of a cognitive deficit in certain groups of patients up to 25 percent, in whom a neuropsychological deficit has not been identified. A number of studies in the early 1990s found that a cognitive deficit is the best predictor of the functional status in a number of domains of schizophrenia, as well as patient's characteristics, which suggests that the neuropsychological disorder in schizophrenia is stable but over time leads to more severe cognitive impairment [4, 5]. Over the past decade, the focus of cognitive deficit in schizophrenic patients has increased dramatically with the realization that simultaneously it is a predictor of the outcome and the treatment, from both pharmacological and behavioral aspect.

Cognitive dysfunction is present in almost all patients, with varying intensity in different domains, compared to the healthy population, however the most sensitive domain is the one related to information processing speed, memory, attention, executive function, language, motor and spatial abilities. Cognitive dysfunction is basically a constant category with small changes in the manifestation of cognitive functions at different stages of development of the disease and duration of the disease, and there are no important correlations with age, education, socioeconomic status [6, 7]. However, on the other hand, the latest research results suggest that the cognitive functioning of a schizophrenic person affects the person's quality of life [8, 9].

At the same time, on the basis of the research findings, the clinical experiences and the realization that subjective and objective factors are different and sometimes overlap, the subjective quality of life in correlation with objective needs largely affects the outcome in the improvement of the quality of life according to the individual's personality traits, therefore the need of self-assessment in regard to the quality of life of patients with schizophrenia arises [10]. The quality of life in schizophrenic patients has been studied in terms of the severity of the disease, the psychopathology and the prognosis in terms of the available needs and opportunities. Therefore, some authors believe that the quality of life is very subjective and refers to the subjective abilities of the patient that are correlated with the schizoaffective disorder.

A number of studies present the connection between the symptoms of the disease and cognitive dysfunction and the abilities of the functional capacities that are also a product of interaction between environmental factors, social relationships, problem-solving ability, insight, and motivation. At the same time, certain studies have shown that when assessing the quality of life in schizophrenic patients, the highest ranked aspect is social integration, i.e. the contacts and the acceptance of individuals from the narrow and wider social environment.

## AIM OF STUDY

- To determine the level of cognitive functioning and the quality of life in patients with schizophrenia;
- To determine the relationship between cognitive dysfunction and quality of life in the first episode of schizophrenia;
- To determine the relationship between cognitive dysfunction and quality of life in patients with chronic schizophrenia.

## MATERIAL AND METHODS

The research involves 37 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. The respondents are divided into two groups. The first group consists of 21 patients with schizophrenia in an acute period of the disease, while the second group consists of 16 patients with chronic schizophrenia treated in the Psychiatric Hospital Skopje-Skopje, the Psychiatric department in the Clinical Hospital Stip and the University Clinic of Psychiatry-Skopje diagnosed with schizophrenia according to the diagnostic criteria of the ICD-10 classification. Before the very inclusion in the research, each respondent was informed about the objective of the research, the procedures during the research were explained to the respondent, as well as the advantages and disadvantages of the respondent's participation in the research. The criteria for inclusion of the respondents included: patients (male/female) diagnosed with schizophrenia according to the criteria of ICD-10; patients diagnosed with schizophrenia from 18 to 60 years of age, patients in the acute stage of schizophrenia without prior antipsychotic therapy, and patients with chronic schizophrenia. The criteria for exclusion of the respondents included: patients diagnosed with schizophrenia under the age of 18 and patients diagnosed with schizophrenia and a comorbid psychiatric disorder.

During the research we used the following measuring instruments:

The Positive and Negative Syndrome Scale – PANSS for schizophrenia assessment consists of three subscales [11]. The positive scale contains 7 items (madness, cognitive disorganization, hallucinatory behavior, anxiety, grandness, suspicion and hostility), which same as all the other items in this scale, are scored from 1 (absent) to 7 (extreme). The negative scale also contains 7 items (flat affect, emotional withdrawal, impairment of emotional reasoning, social withdrawal, difficulty in abstract thinking, lack of spontaneity, stereotypical thinking). The maximum score on this scale is 49 points. The General Psychopathology Scale contains 16 items and presents the structure of the clinical presentation. The Cronbach's alpha for 28 of 30 items was .756, which represents a good correlation between items.

The Schizophrenia Cognition Rating Scale - ScoRS is a scale for assessing the cognitive impairment and the extent of its effect on the everyday functioning in patients with schizophrenia [12]. The scale itself consists of 20 items that cover the following cognitive domains: memory (4 items), learning (2 items), attention (3 items), working memory (2 items), reasoning and problem solving (3 items), motor skills (2 items), language (1 item) and social skills (3 items). Each item is ranked from 1 (absent deviation) to 4 (expressed deviation), whereby higher scores reflect a greater degree of disorder. The time frame for the cognitive deficit should not be shorter than two weeks, with retesting performed 3-4 weeks after the commencement of the drug treatment. The statistical validity of the scales expressed with Cronbach is within the range from 0.743 to 0.782.

The WHOQOL - BREF (World Health Organization Quality of Life-BREF) questionnaires a short version of WHOQOL-100 [13]. Namely, 24 questions are selected from the original questionnaire that assesses the quality of life as a whole and the general health, hence the questionnaire basically contains 26 questions. Based on these questions, the quality of life is assessed in 4 domains: physical health, psychological health, social relations and living conditions. The answer to each question is according to the Likert's type from 1 to 5, where 1 means the lowest level of agreement, while 5 means the highest level of agreement with the question. The total score for the quality of life as a whole and the general health is 2-10, for the physical health it is 7-35, for the psychological health it is 6-30, for the social relations it is 3-15 and for the living conditions it is 8-40. The statistical validity of the scale is expressed by Cronbach which was .784.

## RESULTS

On the basis of the data from Table 1 it is observable that in patients with an acute course of the disease, the average value of the physical health is M=22.90 with minimum and maximum values from 13 to 34, of the mental health it is M=19.14 with minimum and maximum values from 14 to 27, of the social relations it is M=8.28 with minimum and maximum values from 4 to 12, and of the living conditions it is M=22.90 with minimum and maximum values from 17 to 29. The mean value of ScoRS for a patient is M=47.95, of ScoRS for an informer it is M=50.47 and of ScoRS for an interviewer it is M=53.66.

Table 1. Descriptive statistics of the domains of the quality of life and the total score on the ScoRS scale obtained from a patient, an informer and an interviewer in subjects with an acute course of the disease

| Variables | N | Minimum | Maximum | Mean | Std. Deviation | Variance |
|---|---|---|---|---|---|---|
| Physical health | 21 | 13.00 | 34.00 | 22.9048 | 4.91838 | 24,190. |
| Mental health | 21 | 14.00 | 27.00 | 19.1429 | 3.66450 | 13.429 |
| Social relations | 21 | 4,00 | 12.00 | 8.2857 | 1.92725 | 3.714 |
| Living conditions | 21 | 17.00 | 29.00 | 22.9048 | 3.60423. | 12.990 |
| SCoRS_patient | 21 | 32.00 | 68.00 | 47.9524 | 10.63239 | 113.048 |
| SCoRS_ informer | 21 | 30.00 | 69.00 | 50.4762 | 12.07319 | 145.762 |
| SCoRS_ interviewer | 21 | 38.00 | 71.00 | 53.6667 | 8.34466 | 69.633 |

In order to determine exactly which of the predictors affects the quality of life and its domains in the subjects with acute schizophrenia, we applied linear regression. By means of the corrected R2 (squared coefficient of multiple correlation) we found that the examined variables, i.e. the predictors have an effect on the quality of life of 27.8% in the examined sample (Table 2).

Table 2. Squared coefficient of multiple correlation

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,622a | 0,387 | 0,278 | 8,88422 |

a. Predictors: (Constant), SCoRS_interviewer, SCoRS_patient, SCoRS_informer

b. Dependent Variable: Quality of Life

By applying ANOVA we found that the quality of life in acute patients is linearly related to at least one predictor, i.e. F (21) =3.570, sig. =.036, p<.05.

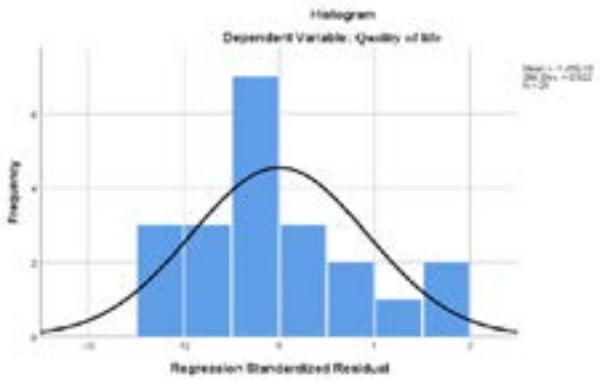
In the regression analysis by means of the t-test we found that there is a significant relationship between quality of life and the total score of cognitive functioning obtained by the informer t(21) = -2.582, sig.=0.019, p<.05; while there is no statistically valid relationship between quality of life and the total score of cognitive functioning obtained by the patient t(21)=1.158, sig.=0.263, p>.01 and between quality of life and the total score of cognitive functioning obtained by the interviewer t(21)=0.096, sig.=0.925, p>.01 (Table 3).

Table 3. Correlation between quality of life and the total score on the ScoRS scale obtained by a patient, an informer and an interviewer

| Model B | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | Std. Error | Beta | | | |
| 1 | (Constant) | 93.181 | 13.028 | | 7.152 | 0.000 |
| | SCoRS_patient | 0.411 | 0.354 | 0.417 | 1.158 | 0.263 |
| | SCoRS_informer | -0.819 | 0.317 | -0.945 | -2.582 | 0.019 |
| | SCoRS_ interviewer | 0.030 | 0.317 | 0.024 | 0.096 | 0.925 |

a. Dependent Variable: Quality of Life

Graph 1. Shows a histogram of the quality of life in patients with a first episode of schizophrenia.




Graph 1. Histogram of the quality of life in patients with acute schizophrenia.

On the basis of the data from Table 4, it can be seen that in patients with a chronic course of the disease, the mean value of physical health is M=22.81 with minimum and maximum values from 16 to 30, of mental health it is M=18.62 with minimum and maximum values from 13 to 24, of social relations it is M=8.20 with minimum and maximum values from 4 to 11 and of living conditions it is M=22.87 with minimum and maximum values from 10 to 29. The mean value of ScoRS for a patient is M=48.56, of ScoRS for an informer it is M=45.37 and of ScoRS for an interviewer it is M=46.93.

Table 4. Descriptive statistics of the examined clinical and psychological parameters in subjects with chronic schizophrenia

| Variables | N | Min | Max | Mean | Std. Deviation | Variance |
|---|---|---|---|---|---|---|
| Physical health | 16 | 16.00 | 30.00 | 22.8125 | 3.29077 | 10.829 |
| Mental health | 16 | 13.00 | 24.00 | 18.6250 | 2.75379 | 7.583 |
| Social relations | 16 | 4.00 | 11.00 | 8.0000 | 1.96638 | 3.867 |
| Living conditions | 16 | 10.00 | 29.00 | 22.8750 | 5.25198 | 27.583 |
| SCoRS_patient | 16 | 36.00 | 58.00 | 48.5625 | 6.73269 | 45.329 |
| SCoRS_informer | 16 | 10.00 | 63.00 | 45.3750 | 12.92994 | 167.183 |
| SCoRS_interviewer | 16 | 12.00 | 65.00 | 46.9375 | 12.90203 | 166.463 |

In order to determine exactly which of the predictors affects the quality of life and its domains in the subjects with chronic schizophrenia, we applied linear regression. By means of the corrected R2 (squared coefficient of multiple correlation) we found that the examined variables, i.e. the predictors affect 23.3% on the quality of life in the examined sample (Table 5).

Table 5. Squared coefficient of multiple correlation

Model Summaryb

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,417a | 0,174 | 0,233 | 9,01238 |

a. Predictors: (Constant), SCoRS_interviewer, SCoRS_patient, SCoRS_informer

b. Dependent Variable: Quality of Life

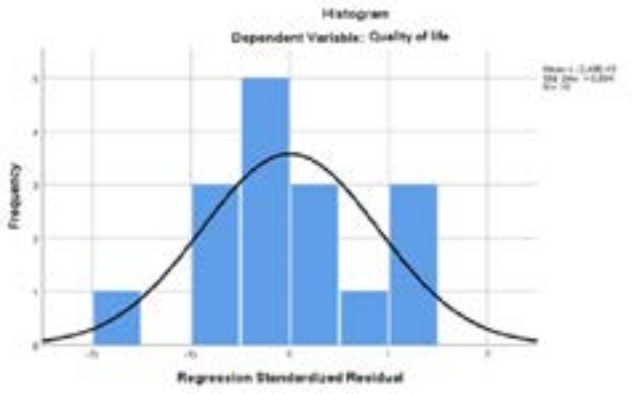
By applying ANOVA we found that the quality of life in chronic patients is not linearly related to any predictor, that is F (16) =0.840, sig. =.498, p>.05. In the regression analysis by means of the t-test we also found that there is no correlation between quality of life and the predictors (Table 6).

Table 6. Correlation between quality of life and the total score on the ScoRS scale obtained by a patient, an informer and an interviewer

| Model B | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | Std. Error | Beta | | | |
| (Constant) | 82.318 | 17.483 | | 4.709 | 0.001 |
| SCoRS_patient | -0.439 | 0.389 | -0.333 | -1.130 | 0.281 |
| SCoRS_informer | 0.999 | 1.228 | 1.457 | 0.814 | 0.432 |
| SCoRS_interviewer | -0.725 | 1.217 | -1.054 | -0.595 | 0.563 |

a. Dependent Variable: Quality of Life

Graph 2. Shows a histogram of the quality of life in patients with chronic schizophrenia.




Graph 2. Histogram of the quality of life in patients with chronic schizophrenia

## DISCUSSION

The quality of life in schizophrenic patients has been studied in terms of the severity of the disease, the psychopathology and the prognosis in relation to the available needs and opportunities. It is assumed that the ability of cognitive functioning of the schizophrenic subjects affects their quality of life, hence our objective during this study was to see if cognitive functioning is a predictor of the quality of life in patients with first-episode schizophrenia and a chronic course of the disease [14, 15].

Cognitive deficit in schizophrenia is increasingly accepted as a basic characteristic of the mental disorder and it is an important factor in explaining the dysfunction or

the duration and deficits during clinical remission, but also a risk factor that hinders the processes leading to functional recovery of patients with schizophrenia. Cognitive deficit is considered a basic characteristic of schizophrenia primarily because it is present before the onset of psychosis, i.e. patients with schizophrenia suffer from a wide range of cognitive deficits, which usually occur in a certain period of time, before and after the onset of the disorder, which determines the outcome of the mental condition [16]. In addition, this deficit is usually present during the symptomatic remissions and is relatively stable over time in both patients and persons at high risk for schizophrenia.

Cognitive deficit includes changes in memory, attention, learning, executive function, abstract thinking, and language. It should be noted that 75% of patients with schizophrenia suffer from cognitive symptoms as a result of the disease [17, 18]. The general functionality of schizophrenia is ascribed to cognitive symptoms, even when performing the simplest everyday tasks, the person's ability to cope with certain problems or to perform tasks in an appropriate way is reduced, there are changes in associations, logical comprehension, adequate thinking and acting, problems in using information, decision making and difficulty paying attention, which are reflected in the thought process.

Our hypothesis, that there is a significant relationship between cognitive functioning and quality of life in schizophrenic subjects, is fully confirmed. Thereby cognitive dysfunction affects the quality of life in subjects in the acute phase of the disease compared to chronic subjects. The obtained results support the hypothesis that impaired cognitive functioning leads to social withdrawal, isolation, reduced motivation and ability to perform daily functions in schizophrenic subjects. This coincides with certain studies that suggest that cognitive functioning is an indicator of a more severe and unfavorable course of the disease and poor functioning of the person in the community, i.e. a change in the person's quality of life [19, 20].

Therefore, patients with schizophrenia need to start with antipsychotic therapy and psychosocial therapeutic interventions in time in order to be able to affect the natural course of the disease. Along with the longer period of time that is required to achieve a satisfactory improvement of the patient's mental state, each subsequent deterioration of the psychological condition is continued. At the same time, patients who show a poor response to antipsychotic therapy have residual psychotic symptoms that reduce the person's functional capacity. Therefore, it is believed that timely application of therapy (psychopharmacological, psychosocial and psychotherapeutic interventions) can reduce psychotic symptoms, it can reduce the regressive course of schizophrenia and prevent the development of therapeutic resistance.

## CONCLUSION

Modern psychiatry today seeks to integrate the different psychiatric theories and concepts with contemporary neurophysiological findings. All attempts and tendencies to integrate different psychotherapeutic and pharmacotherapeutic interventions rest on this assertion.

It is known that the internal representation of the personal space can be modified with experience. Experience is modified not only through mental experiences, but also through brain functioning and brain architecture. All of this, together with the unique genetic material, establishes the biological basis of the person [21]. The biological basis generates our emotions, experiences and behavior, but also the experience of current brain activities reforms them in the brain structure. Unlike the findings in the past, according to the latest findings it is considered that the brain structures are variable and flexible, and our mind is a complex, biological, historical, cultural and social phenomenon.

Schizophrenia is a chronic mental illness, a clinical syndrome with the presence of specific psychological symptoms, individual variations in terms of the clinical features, the response to therapy and the course of the disease, as well as reduced functional capacities of the person from all aspects - personal, family, work and social. Therefore, our results may be important for the prevention, detection and treatment of schizophrenia. These results can also be applied as an auxiliary means of assistance in the treatment of schizophrenia, in order to prevent or overcome the already negative side effects. With adequate psychiatric and psychological help, in the form of counseling and psychotherapy work, patients can be provided help to more easily accept and overcome the disease. Of course, these results can help the families of patients, but also professionals who deal with the treatment of schizophrenia, through counseling and psychotherapy in the adaptation of the disease, in creating a new way of life, as well as regular use of antipsychotic therapy.

Based on the theoretical analysis and the empirical data we can say that although we have achieved the set goals, this research still leaves space for practical application of the results, but also provides an incentive for further new researches that will provide a better understanding of this complex problem.

**REFERENCES**


1. Addington, J., Addington, D. Social and cognitive functioning in psychosis. Schizophrenia Research 2008; 99:176-181.
2. Fett, A.K.J., Viechtbauer, W., Dominguez, M.G. The relationship between neurocognition and social cognition with functional outcomes in schizophrenia: a meta-analysis. Neuroscience Biobehavioral Review 2011; 35(3):573–88.
3. Lincoln, T.M., Mehl, S., Kesting, M.L., Rief, W. Negative symptoms and social cognition: identifying targets for psychological interventions. Schizophrenia Bulletin 2011; 37(2):23–32.
4. Kim, J.H., Lee, S,. Han, A.Y., Kim, K., Lee, J. Relationship between cognitive insight and subjective quality of life in outpatients with schizophrenia. Neuropsychiatry Disease Treatment 2015; 11:2041–2048.
5. Priebe, S. Social outcomes in schizophrenia. British Journal of Psychiatry 2007;91(50):15-20.
6. Sharma, T., Antonova, L. Cognitive function in schizophrenia: Deficits, functional consequences and future treatment. Journal of Clinical Psychiatry 2003; 26:25-40.
7. Green, M.F. Cognitive impairment and functional outcome in schizophrenia and bipolar disorder. Journal of Clinical Psychiatry 2006; 67: e12.
8. Caron, Y., Lecomte, Y., Stip, E., Renaud, S. Predictors of quality of life in schizophrenia. Community Mental Health Journal 2005; 41:399-417.
9. Dickerson, F.B., Ringel, N.B., Parente, F. Subjective quality of life in outpatients with schizophrenia: clinical and utilization correlates. Acta Psychiatrica Scandinavica 1998; 98:124-127.
10. Bowie, C.R., Twamley, E.W., Anderson, H., Halpem B., Patterson, T.L., Harvey, P.D. Self-assessment of functional status in schizophrenia. Journal of Psychiatry Research 2007; 41: 1012–1018.
11. Kay, S.R., Fiszbein, A., Opler, L. Positive and Negative Syndrome Scale (PANSS): Rating Manual Social and Behavioral Sciences Documents.San Rafael: CA, 1987.
12. Keefe, R.S., Poe, M., Walker, T.M., Kang, J.W. The Schizophrenia Cognition Rating Scale: an interview-based assessment and its relationship to cognition, real-world functioning, and functional capacity. American Journal of Psychiatry 2006; 163:426-432.
13. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th edition 2013; Washington DC: American Psychiatric Press.
14. Green, M.F., Horan, W.P., Lee, J. Cognitive dysfunction and quality of life in schizophrenia. World Psychiatry2019; 18: 146 61.
15. Savilla, K., Kettler, L., Galletly, C. Relationship between cognitive deficits, symptoms and quality of life in schizophrenia. Australian and New Zealand Journal of Psychiatry 2008; 42:496-504.
16. Heslegrave, R.J., Awad, A.G., Voruganti, L.N.P. The influence of neurocognitive deficits and symptoms on quality of life in schizophrenia. Journal of Psychiatry Neuroscience 2007; 22: 235–243.
17. Matsui, M., Sumiyoshi, T., Arai, H., Higuchi, Y., Kurachi, M. Cognitive function related to quality of life in schizophrenia. Progress in Neuro-Psychopharmacology & Biological Psychiatry 2008; 2:280-287.
18. Perlick, D.A., Rosenheck, R.A., Kaczynski, R., Bingham, S., Collins, J. Association of symptomatology and cognitive deficits to functional capacity in schizophrenia. Schizophrenia Research 2008; 99:192-199.
19. Narvaez, J.N., Twamley, E.W., McKibbin, C.L., Heaton, R.K., Patterson, T.L. Subjective and objective quality of life in schizophrenia. Schizophrenia Research 2008; 98:201-218.
20. Riley, E.M., McGovern, D., Mockler, D. Neuropsychological functioning in first-episode psychosis: evidence of specific deficits. Schizophrenia Research 2000; 43: 47-55.
21. Takeda, T., Nakataki, M., Ohta, M., Hamatani, S., Matsuura, K., Yoshida, R., Kameoka, N., Tominaga, T. Negative and positive self-thoughts predict subjective quality of life in people with schizophrenia. Neuropsychiatry Disease Treatment2019; 15:293-301.