Screening for cognitive impairment in schizophrenia: A comparison between the Mini-Mental State Examination and the Montreal Cognitive Assessment Test

Şizofrenide bilişsel bozulma taraması: Kısa Kognitif Muayene ve Montreal Bilişsel Değerlendirme Ölçeğinin karşılaştırılması

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SUMMARY

Objective: Cognitive impairment is a core feature affecting social and occupational functionality in schizophrenia. The aim of this study is to compare the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA) in screening for cognitive impairment in individuals diagnosed with schizophrenia and to examine the relationship between neurocognitive functions and clinical symptoms. **Method:** The study included 135 individuals with schizophrenia followed in Ankara Dışkapı Community Mental Health Centre. Sociodemographic Data Form, Brief Psychiatric Rating Scale (BPRS), The Scale for The Assessment of Positive Symptoms (SAPS), Negative Symptoms Assessment Scale (SANS), MMSE and MoCA were administered. **Results:** The mean MMSE score was 25.64 ± 2.72, and the mean MoCA score was 17.91 ± 3.83. There was a high positive correlation between the MMSE and MoCA scores (r=0.667). The MMSE and MoCA tests showed a substantial difference in the assessment of cognitive functions; and MoCA was found more sensitive than the MMSE in determining cognitive impairment. Moreover, the MMSE and MoCA scores showed a negative correlation with the BPRS, SANS, and SAPS scores. **Discussion:** These findings indicate that MoCA may be used as a more useful screening test for cognitive impairment in people with schizophrenia.

Key Words: Schizophrenia, cognitive tests, MoCA, MMSE, psychopathology

ÖZET

Amaç: Bilişsel bozulma, şizofrenide sosyal ve mesleki işlevselliği etkileyen temel bir özelliktir. Bu çalışmanın amacı, şizofreni tanısı olan bireylerde bilişsel bozulma taramasında Kısa Kognitif Muayene (KKM) ile Montreal Bilişsel Değerlendirme Ölçeği'ni (MOBID) karşılaştırmak ve nörobilişsel işlevler ile klinik belirtiler arasındaki ilişkiyi incelemektir. **Yöntem:** Çalışmaya Ankara Dışkapı Toplum Ruh Sağlığı Merkezinde takip edilen 135 şizofreni tanısı olan birey dahil edildi. Sosyodemografik Veri Formu, Kısa Psikiyatrik Derecelendirme Ölçeği (KPDÖ), Pozitif Belirtileri Değerlendirme Ölçeği (SAPS), Negatif Belirtileri Değerlendirme Ölçeği (SANS), KKM ve MOBID uygulandı. **Bulgular:** Ortalama KKM puanı 25.64 ± 2.72 ve ortalama MOBID puanı 17.91 ± 3.83 idi. KKM ve MOBID skorları arasında yüksek pozitif korelasyon vardı (r=0,667). KKM ve MOBID testleri, bilişsel işlevlerin değerlendirilmesinde önemli bir farklılık gösterdi ve MOBID'in bilişsel bozulmayı belirlemede KKM'den daha duyarlı olduğu bulundu. Ayrıca, KKM ve MOBID puanları, BPRS, SANS ve SAPS puanları ile negatif korelasyon göstermiştir. **Sonuç:** Bu bulgular, MOBID'in şizofreni tanısı olan bireylerde bilişsel bozulma için daha yararlı bir tarama testi olarak kullanılabileceğini göstermektedir.

Anahtar Sözcükler: Şizofreni, bilişsel testler, KKM, MOBID, psikopatoloji

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INTRODUCTION

Cognitive impairment is one of the prominent clinical features of individuals with schizophrenia and it has negative effects on the functionality of individuals (1). Although not included in the diagnostic criteria of schizophrenia, cognitive impairment is common in individuals with schizophrenia. It is estimated that 61–78% of patients with schizophrenia have cognitive problems (2). The cognitive impairment in schizophrenia is especially marked in executive functions, attention, and memory areas (3,4). Cognitive impairment is highly associated with poor functionality in schizophrenia. Especially, impairment in information processing speed, working memory and cognitive flexibility are strongly associated with lower daily functioning. Deficits in those cognitive areas make it difficult for individuals to follow task-oriented jobs and maintain their social relationships (2). Although cognitive impairment has negative effects on patients, it has been largely ignored in the treatment of schizophrenia.

Previous studies have shown improvement in cognitive functions through cognitive rehabilitation programs in patients with schizophrenia (5-7). Screening cognitive impairment in patients with schizophrenia and addressing the impaired cognitive domain in the rehabilitation program can provide better outcomes (8). Thus, it is important to assess the cognitive functions of patients with schizophrenia for applying for a proper rehabilitation program and increasing participation in daily living. There are various instruments for evaluating the cognitive functions of individuals with schizophrenia. There is not any standard, easily administered test battery in the assessment of cognitive impairment in patients with schizophrenia. Many paper-pencil tests and individual neuropsychological tests or batteries were developed for patients with schizophrenia, such as the MATRICS Consensus Cognitive Battery (MCCB), and Brief Assessment of Cognition in Schizophrenia (BACS) (8,9). The MATRICS battery is a valid and reliable cognitive assessment tool for schizophrenia and it includes 10 tests to measure a wide range of cognitive domains. However, it takes almost 60- 90 minutes for administration. The BACS was developed to evaluate the most damaged cognitive areas and assesses five different domains of cognitive functions through six tests (9). Administration of the BACS takes about 30–35 minutes in patients with schizophrenia. These comprehensive neuropsychological batteries have many benefits and provide detailed information; however, administration of the batteries requires trained testers and a longer time to administer (10).

A shorter cognitive test may be preferred for ease of completion and tolerability by patients in busy clinical settings (9). The MMSE and MoCA scales were used to assess cognitive dysfunction in patients with schizophrenia in some previous studies (11,12,13). Both the MMSE and the MoCA were developed to make a differential diagnosis between mild cognitive impairment and dementia and to detect dementia at an early stage. Although they are not specialized tests for cognitive impairment in schizophrenia, both tests are easy and practical to implement in daily practice. Some studies compared those tests and MoCA was found to be better at earlier detection of cognitive impairment in patients with schizophrenia (14). It will be important to assess the cognitive functions more frequently to achieve rehabilitation goals and to determine proper scales for screening cognitive impairment in schizophrenia.

There is not a certain relationship between the severity of clinical symptoms and the level of cognitive impairment in schizophrenia (15,16,17). Many studies demonstrated a significant but modest association between the severity of negative symptoms and cognitive impairment level, despite that, there was no association between cognitive impairment level and severity of positive symptoms in most of the studies (16,17,18,19). The severity of positive symptoms was associated with more cognitive impairment, especially in memory and attention areas in a previous study (20). In another study, schizophrenia patients with severe psychotic symptoms showed a greater cognitive impairment across multiple tests compared with the patients with mild or moderate clinical symptoms (21). There is not a simple and linear relationship between the severity of clinical symptoms and cognitive impairment level in schizophrenia. Therefore, future studies are needed to assess the relationship more clearly (18,19).

In summary, there is no study comparing the MMSE and MoCA tests for cognitive impairment in schizophrenia in Turkey. Also, there is a paucity of research regarding the administration of the MMSE and MoCA tests in outpatients with severe mental illness. Screening for cognitive impairment and referring for a further neuropsychological assessment will help detect cognitive deterioration in patients with schizophrenia. From this point of view, it was aimed to compare the MMSE and MoCA tests for screening cognitive impairment in schizophrenia and to assess the relationship between cognitive functions and clinical symptoms in this study.

METHOD

Participants

The present study was carried out in a Community Mental Health Center (CMHC) of the University Hospital in March 2020-June 2020 in Turkey. A total of 135 patients who were followed up with the diagnosis of schizophrenia in CMHC were included in the study. The inclusion criteria were having at least five years of education, being aged 18-59 years old, and not being hospitalized in the last six months. The participants were excluded if they had a comorbid diagnosis of intellectual disability, organic brain disease, or alcohol/substance abuse.

All subjects received information about the content of this study and signed a written consent form before participating. All procedures complied with the Declaration of Helsinki and were approved by the Clinical Research Ethics Committee of the University Hospital (Ethics Committee Decision Date-Number: 17.02.2020-82/10).

Instruments

Sociodemographic Data Form: Sociodemographic data included age, gender, marital status, education, employment status and duration of illness.

Mini-Mental State Examination (MMSE): The MMSE is developed by Folstein et al. (22). MMSE is scored on a 30-point scale, with items assessing orientation (temporal and spatial: 10 points), memory (registration and recall: 6 points), attention/concentration (5 points), language (verbal and written: 8 points) and visuospatial function (1 point). MMSE lasts about 5-10 minutes. Turkish validity and reliability study of the MMSE was done by Gurgen et al. (23). It was found that MMSE is valid and reliable in the diagnosis of mild dementia in Turkish society. A score of 24 on the MMSE is defined as the cut-off score in the Turkish population.

Montreal Cognitive Assessment (MoCA): The MoCA is used as a screening test to detect Mild Cognitive Impairment (MCI). MoCA is scored on a 30-point scale, with items assessing delayed word recall (5 points), visuospatial/executive function (7 points; includes clock drawing), language (6 points), attention/concentration (6 points) and orientation (6 points). MoCA lasts approximately 10-15 minutes and is a valid and reliable scale in the diagnosis of mild-stage dementia and MCI (24). Turkish validity and reliability study of the MoCA was performed by Selekler et al. (25). A score of 21 on the MoCA is defined as a cut-off score in the Turkish population.

Brief Psychiatric Rating Scale (BPRS): The BPRS is a scale aiming to assess the severity of clinical symptoms, such as depressive, psychotic, and negative symptoms (26). The BPRS consists of 18 items and each item is scored between 0 (none) and 6 (very severe) points. The minimum score that can be obtained from the scale is 0 and the maximum score is 108. The Turkish validity and reliability study of the scale was done by Soykan (27).

The Scale For The Assessment of Positive Symptoms (SAPS): The Scale for the Assessment of Positive Symptoms was developed by Andreasen (28) to measure the severity of positive symptoms. It is a clinician-administered questionnaire and includes 34 items. Each item is rated between 0 (absent) and 5 (severe) and the test includes four subscales (hallucinations, delusions, bizarre behaviour and formal thought disorder). A reliability study of the Turkish form was done by Erkoç et al. (29).

The Scale for the Assessment of Negative Symptoms

(SANS): The Scale for the Assessment of Negative Symptoms was developed by Andreasen (30) to measure the severity of the negative symptoms of schizophrenia. The SANS consists of 25 items representing 5 scales: Affective flattening or blunting, alogia, avolition-apathy, anhedonia-asociality and inattention. Each item is individually graded between 0 and 5. A reliability study of the Turkish form was done by Erkoç et al. (31)

Procedure

Sociodemographic Data Form, Brief Psychiatric Rating Scale (BPRS), Scale for The Assessment of Positive Symptoms (SAPS), Scale for the Assessment of Negative Symptoms (SANS), Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment Scale (MoCA) were administered to the individuals. The MMSE and MoCA were conducted by a psychologist (first author) who had training in neuropsychological testing and who has a clinical experience in the psychosocial rehabilitation of people with schizophrenia. The clinical assessments were conducted by a psychiatrist (second author). The tests were administered and scored as instructed by the relevant instruments.

Statistical analysis

Data analyses were conducted using SPSS version 22 (SPSS Inc., Chicago, USA). First, the skewness kurtosis tests and histogram were used to check normal distribution. Continuous variables were expressed as mean ±standart deviation and categorical variables were expressed as frequencies. Collected data was analyzed via independent samples t-test, chi-square test, and Pearson correlation analysis. The level of significance was accepted at 0.05.

RESULTS

135 patients completed the MMSE and MoCA tests in our study. The mean age of participants was 39.43±9.07. Most of the participants were men (66.7%) and single (50.4%). There was a high rate of unemployment (79.3%) while 44.4% of the patients graduated from high school. The duration of the disorder was 14.66±6.90 years. Table 1 summarizes the sociodemographic and clinical variables of the patients.

Table 1 Sociodemographic and clinical characteristics of the patients

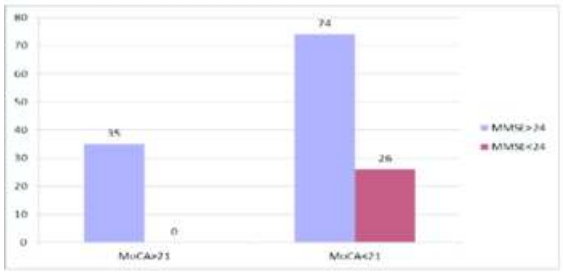
Characteristics		Total Sample (n=135)
Age (Mean–SD)		39.43–9.07
Duration of illness (Mean±SD)		14.66–6.90
Gender (n,%)	Female	45 (33. 3%)
	Male	90 (66.7%)
Marital status (n,%)	Married	68 (50.4%)
	Single	55 (40.7%)
	Divorced	12 (8.9%)
Education (n,%)	Primary	23 (17%)
	Secondary	29(21.5%)
	High school	60 (44.4%)
	University	23 (17%)
Employment (n,%)	Employed	28 (20.7%)
	Unemployed	107 (79.3%)
Mean SANS score		33.96–13.43
Mean SAPS score		22.53–11.85
Mean BPRS score		13.46–6.43
Mean MMSE score		25.63–2.71
Mean MOCA score		17.91–3.82
MMSE ≥24		109 (80.7%)
≤ 23		26 (19%)
MOCA ≥ 21		35 (25.9%)
≤ 20		100 (74.1%)

Standardized Mini Mental Test (MMSE); Montreal Cognitive Assessment Scale (MoCA); Brief Psychiatric Rating Scale (BPRS); Scale for The Assessment of Positive Symptoms (SAPS); Scale for the Assessment of Negative Symptoms (SANS)

There was a positive correlation between the MMSE and MoCA scores ($r=0.667$, $p<0.01$). The mean score of the MoCA scale was 17.91±3.82 (range 8 to 27) while the mean score of the MMSE scale was 25.63±2.71 (range 18 to 30) (Table 1). In addition, 80.7% (n =109) of the patients had 24 points (normal range) or higher on the MMSE scale. All of the patients who had a score of 21 or higher in the MoCA got 24 points or higher in the MMSE test, indicating the sensitivity of MoCA as 100% according to the MMSE test. However, 35 patients who had a score of 24 or higher in the MMSE got 21 points or higher in the MoCA test, and thus, the sensitivity of MMSE was 25.9% according to the MoCA test (Figure 1). The comparison of MMSE and MoCA tests according to cut-off values showed a statistically significant difference in the chi-square independence test ($x^2=11.271$, $p<0.01$).

The subdimension scores of the scales were given in Table 2. The patients had the highest score at the orientation subdimension in both tests. The mean orientation score was 5.79±0.58 (range 0 to 6)in the MoCA and 9.61±0.75 in the MMSE tests.

Figure 1 Comparison of the MMSE and MoCA tests



Data; number of cases, Standardized Mini Mental Test (MMSE), and Montreal Cognitive Assessment Scale (MoCA)

Attention-concentration subtest scores were 3.68±1.53 (range 0 to 6) in the MoCA and 3.06±1.64 (range 0 to 5) in the MMSE tests. The mean language score was 3.30±1.00, out of 6 points while it was 7.68±0.63 out of 8 points in the MMSE. There was only one item for visuospatial function in the MMSE and more than half of the patients (52.5were was not successful in drawing the geometrical shape. The MoCA had a combined visuospatial-executive dimension and the mean score was 3.60±1.66 out of 7 points. The patients had the lowest scores in the memory-delayed word recall domain (1.54±1.16, range 0 to 5) in the MOCA test whereas it was 4.82±0.95 out of 6 points in the MMSE.

The relationship between sociodemographic variables, clinical symptoms, and cognitive functions was assessed in the study. The results were reported in the correlation matrix in Table 3. Both MMSE and MoCA scores were not correlated with age (p>0.05). Despite that, the duration of the disorder showed a negative correlation with both the MMSE and MoCA scores (r=-.272, p=.001; r=-0.237, p=.006). Gender and education level showed a significant association with the MMSE score (x^2=4.02 p<0.05; x^2= 12.99, p<0.05, respectively). Increased education level was associated with higher MMSE scores while male patients had a higher MMSE score compared to females. However, the MMSE score was not associated with marital status and employment status (p>0.05). The mean MoCA score did not show a significant difference according to gender, marital status or employment status (p>0.05). Despite that, increased education level was associated with higher MoCA scores (x^2=20.97; p<0.05). The mean MMSE score was negatively correlated with mean BPRS, SANS, and SAPS scores (r=-.368, p<0.01, r=-.257, p<0.01, and r=-.199, p<0.05, respectively). In addition, the mean MoCA score also showed a moderate negative correlation between the BPRS, SANS, and SAPS scores (r=-.466, p<0.01, r=-.501, p<0.01, and r=-.401, p<0.01, respectively).

Table 2 Descriptive statistics of subtests of MoCA and MMSE

MoCA items/maximum score (n=135)	Minimum	Maximum	Mean±SD
Visuospatial-executive function/7	1	7	3.60–1.66
Language/6	1	6	3.30–1.00
Attention-concentration/6	0	6	3.68–1.53
Orientation/6	3	6	5.79–0.58
Memory (delayed word recall)/5	0	5	1.54–1.16
Total/30	8	27	17.91–3.83
MMSE items/maximum score (n=135)	Minimum	Maximum	Mean±SD
Visuospatial function/1	0	1	0.47–0.50
Language/8	6	8	7.68–0.63
Attention-concentration/5	0	5	3.06–1.64
Orientation/10	7	10	9.61–0.75
Memory/6	2	6	4.82–0.95
Total/30	18	30	25.63–2.71

tandardized Mini Mental Test (MMSE); Montreal Cognitive Assessment Scale (MoCA)

DISCUSSION

Most patients with schizophrenia have a significant cognitive impairment, and cognitive impairment negatively affects their daily life and treatment adherence. Although cognitive impairment is related to poor functionality, it has been largely neglected in the treatment of schizophrenia (32). However, cognitive difficulties severely affect the social and occupational lives of the patients, and therefore, cognitive impairment also should be assessed in addition to the treatment of clinical symptoms in schizophrenia. Comprehensive neuropsychological batteries take too much time during clinical evaluation and it is difficult for individuals with schizophrenia to finish a prolonged clinical battery. Shorter, less time-consuming and

Table 3 Correlations between scores of age, duration of illness, MMSE, MoCA, BPRS, SANS, SAPS

Variable	Age	Duration of illness	MMSE	MoCA	BPRS	SANS	SAPS
Age	1	.853**	-.159	-.094	-.120	-.121	-.154
Duration of illness		1	-.272**	-.237**	.140	.102	.080
MMSE			1	.667**	-.368**	.257**	-.199*
MoCA				1	-.466**	-.501**	-.401**
BPRS					1	.679**	.651**
SANS						1	.567**
SAPS							1

Standardized Mini Mental Test (MMSE); Montreal Cognitive Assessment Scale (MoCA); Brief Psychiatric Rating Scale (BPRS); Scale for The Assessment of Positive Symptoms (SAPS); Scale for the Assessment of Negative Symptoms (SANS)

more effective assessments are needed for screening cognitive deficits in patients with schizophrenia. From this point of view, it was aimed to compare the MMSE and MoCA tests for screening cognitive impairment in schizophrenia and to assess the relationship between cognitive functions and clinical symptoms in this study.

The mean MoCA score was lower than the cut-off level in the current study, despite that, the mean MMSE score was higher than the cut-off level. The mean MMSE score of the patients indicates no cognitive impairment whereas the mean MoCA score of the patients indicated moderate cognitive impairment. Furthermore, eighty per cent of the patients showed no cognitive impairment according to the MMSE scale while only one-fourth of the patients did not demonstrate a cognitive impairment according to the MoCA. Using the cut-off scores of the tests, 74.1% of the sample displayed a cognitive impairment in the MoCA while it was 19% in the MMSE test. According to our findings, cognitive impairment was shown in four domains of the MoCA test, while only one domain showed a clear impairment in the MMSE test. Therefore, MoCA was more sensitive in detecting cognitive impairment compared to the MMSE in the current study. Our findings were consistent with previous literature as the MoCA test showed a high sensitivity for the detection of cognitive impairment in long-term psychosis patients (33,34,35). Fiskevoic et al. (11) examined the clinical usability of MoCA in 30 patients with schizophrenia and compared the degree of sensitivity of the MoCA and MMSE. In that study, the sensitivity of MMSE was 41.7% compared to the MoCA test. Although the sensitivity of the MMSE according to the MoCA was higher in that study compared to our study, the sensitivity of the MMSE was also low for detecting cognitive impairment (11,34,36). Previous studies also demonstrated the superiority of the MoCA over the MMSE in the screening of cognitive functions in schizophrenia (11,12,35). On the other hand, the mean MoCA score of the participants in our study (17.9±3.8) was slightly lower than the mean MoCA scores of other studies. Participants had a mean MoCA score was 22.5±3.9 in the study of Rademeyer and Joubert (12). In addition, the MoCA mean score was 19.9±5.1 in the study of Fiskevoic et al. (11). Rodríguez-Bores et al. (37) stated that the mean MoCA score was 23.0±3.9. Lower mean scores in our study might be related to different sociodemographic and clinical variables of the patients and the duration of the disorder.

In the current study, the participants had the highest score at the orientation subdimension in both MMSE and MoCA tests. In other words, the orientation subtest was correctly answered by nearly all participants in both tests. Previous studies showed that participants had higher scores on the orientation subtest (33,35,38). Similarly, it is reported that orientation is not mostly impaired in schizophrenia (39). The items of the language subtest in the MMSE test were correctly answered by nearly all participants in the current study, contrarily, the patients showed impairment in the language area in the MoCA. The items of short memory and naming are more difficult in the MOCA rather than the MMSE, and that difference might be the reason for the better screening in those areas. In addition, the language (naming) and orientation subtests form 60% of the MMSE scale. There is no specific assessment for executive functions in the MMSE and there is only one item for visuospatial function in the MMSE. That is a big failure of the MMSE in the cognitive assessment of patients with schizophrenia (38). The participants had the lowest score at the visuospatial-executive subdimension in the MoCA test, one of the core cognitive impairment areas in schizophrenia. The MoCA contains specific subtests addressing abstraction and problem-solving which are core cognitive impairments in schizophrenia (40). As a result, the cognitive impairment of the patients can be assessed better with the MoCA compared with the MMSE and it can be suggested that the major difference among these instruments lies in the assessment of executive functions. Therefore, the MMSE does not seem appropriate for the cognitive assessment of patients with schizophrenia, and more patients who would benefit from psychosocial interventions can be determined with the MoCA test.

Another aim of the current study was to examine the relationship between sociodemographic variables, clinical symptoms, and cognitive impairment. Although age did not show a significant correlation with the mean MMSE and MoCA scores, the duration of the disorder showed a mild negative corre-

lation with the MMSE and MoCA scores. That result was shown in previous studies and it was revealed that cognitive impairment occurs gradually in schizophrenia. Considering that, screening cognitive functions during the course of the disorder and administering psychosocial and cognitive rehabilitation when needed is a substantial issue for the patients. The mean MMSE and MoCA scores were correlated with higher education levels. Some studies did not find a significant relationship between MoCA scores and education level while some others found a significant correlation between total MoCA scores and education level (13,33,34,35). Education level is a factor affecting the scores on cognitive scales, however, it showed a partial impact on the clinical scores in the present study. There is no definite cut-off point according to education level, and follow-up of cognitive functions during the disorder will be better at detecting cognitive impairment. Male patients had a higher MMSE score compared to females in the study, however, there was no significant difference between male and female patients in the MoCA. The reason for these different results might be due to the different clinical populations involved in those studies and there is still no definite relationship between gender and cognitive scores in the current literature (13,33). In literature, the relationship between sociodemographic variables (i.e., age, marital status, education level) and cognitive scales are incongruent, and our study also did not show a significant association between marital status, employment, and MMSE/MoCA scores.

Both the MMSE and MoCA scores showed a negative correlation with the BPRS, SAPS, and SANS scores. Current findings showed that the higher the scores on the BPRS, SAPS and SANS, the lower the score in the cognitive scales, indicating that the severity of clinical symptoms was related to more severe cognitive impairment. There was a moderate correlation between the severity of clinical symptoms and the MMSE while the MOCA score showed a high negative correlation with the clinical symptoms. MoCA was found to show a stronger relationship with the severity of psychotic symptoms compared to the MMSE in the current study. Wu et al. (35) examined the relationship between the MoCA and PANNS scales in 121 patients with schizophrenia and schizoaffective disorder. The authors found that the MoCA score was related to PANNS negative subscale score, but not to the positive or general subscale scores. Current study findings demonstrated that the severity of negative symptoms was associated with MMSE and MoCA scores, consistent with previous studies. Severe negative symptoms were related to cognitive slowing, worse verbal memory, visual memory, and attention and processing speed in previous studies (19,41). Therefore, psychosocial rehabilitation should be applied earlier to patients with resistant negative and cognitive symptoms. A negative relationship was found between the severity of positive symptoms and MMSE and MoCA scores in the current study and the evidence of that relationship was conflicting in the current literature (21). Davidson et al. (42) found that there was not a significant correlation between the severity of positive symptoms and the MMSE score. On the other hand, Talreja et al. (20) demonstrated that the severity of positive symptoms was associated with more cognitive impairment, especially in memory and attention areas. In addition, the lowest score was found in the visuospatial-executive area in the MoCA test, similar to previous studies. In another study, schizophrenia patients with severe psychotic symptoms showed a greater cognitive decline in the memory domain compared to the patients with mild or moderate symptoms (21). Therefore, although the relationship between positive symptoms and cognitive functions is controversial, our study findings suggest that treatment adherence and treatment follow-up will contribute positively to cognitive skills in individuals with schizophrenia.

Our study has some limitations. First, the sample size was modest, and we could not use a comprehensive neuropsychological battery to compare with the MMSE/MoCA. There was a disproportionate number of male patients (66.7%). There was not any control group. On the other hand, assessing the relationships between clinical symptoms and cognitive impairment is a strength of our study as clinical symptoms affect cognitive functions. To the best of our knowledge, this was the first study to compare the scores of the MMSE and MoCA scales in patients with schizophrenia in the Turkish population. The present study contributes to the literature in terms of testing the cognitive functions of patients with schizophrenia in a diffe-

rent culture and language. In particular, cognitive impairment in schizophrenia is one of the factors that hinder participation in daily life. On the other hand, cognitive impairment may be ignored because of focusing on psychiatric symptoms. In addition, comprehensive neuropsychological batteries are very time-consuming and challenging for people with schizophrenia during clinical assessments. Early cognitive assessment is quite important for rehabilitation planning and the social participation of individuals. Therefore, shorter, less time-consuming and more effective assessments are needed to screen for cognitive difficulties in patients with schizophrenia. The aim and findings of our study provide valuable contributions to the literature due to the limited number of studies in this respect. In addition, including outpatients with schizophrenia followed at a community mental health centre regularly and assessing the relationship between cognitive functions and clinical symptoms are the differences of the study.

CONCLUSION

MoCA was more sensitive in detecting cognitive impairment compared to the MMSE in that study, consistent with previous literature. Considering its ease of use, short administration time, and relevance to clinical practice, clinicians may consider using the MoCA in screening cognitive impairment in schizophrenia in daily practice. Incorporating MoCA as a brief screening tool in follow-up examinations of individuals with schizophrenia may improve the detection of cognitive impairments and may facilitate treatment and rehabilitation planning. It will be important to compare the MoCA with a comprehensive neuropsychological battery in future studies.

Conflicts of interest: The authors declare that they have no conflict of interest.

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