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The comparison of Cognitive Functions in Schizophrenia and Schizoaffective Disorder

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ABSTRACT

The comparison of cognitive functions in schizophrenia and schizoaffective disorder

Objective: The aim of this study was to investigate cognitive function in individuals with schizophrenia and schizoaffective disorder.

Method: Research participants included 48 outpatients with a diagnosis of schizophrenia, 35 outpatients with schizoaffective disorder, and 48 non-patients from the community. Scale for Assessment of Positive Symptoms (SAPS), Scale for Assessment of Negative Symptoms (SANS), and Brief Psychiatric Rating Scale (BPRS) were applied to the patients. Neuropsychological evaluation included Wisconsin Card Sorting Test (WCST) for executive functions, Verbal Memory Processes Test (VMPT) for verbal memory and Stroop Test (ST) for attention tasks.

Results: There were significant differences among the groups in the number of categories completed, number of perseverative error, percentage of perseverative error, number of conceptual level responses and percentage of conceptual level responses in WCST; time diffrence in Stroop test; score of learning, score of maximum learning and long term memory-recall in VMPT. A post hoc analysis (Turkey) was performed. It was determined that there was no difference between schizoaffective and schizophrenia patients on neuropsyhological tasks. However, schizoaffective and schizophrenia patients had significantly poorer performance than control group on neuropsychological tests.

Conclusion: Our study show that cognitive functions in patients with schizoaffective disorder and schizophrenia are similar and that they are both impaired compared with healthy controls.

Key words: Schizophrenia, schizoaffective disorder, executive function, attention, verbal memory

ÖZET

Şizofreni ve şizoaffektif bozuklukta bilişsel işlevlerin karşılaştırılması

Amaç: Bu çalışmada, şizofreni ve şizoaffektif bozukluğu olan hastalarda bilişsel işlevlerin araştırılması amaçlanmıştır.

Yöntem: Çalışmaya, remisyon dönemindeki 48 şizofreni hastası, 35 şizoaffektif bozukluğu olan hasta ve 48 sağlıklı kontrol alındı. Hastalara, Pozitif Semptomları Değerlendirme Ölçeği (SAPS), Negatif Semptomları Değerlendirme Ölçeği (SANS) ve Kısa Psikiyatrik Değerlendirme Ölçeği (BPRS) uygulandı. Nöropsikolojik değerlendirmede, Wisconsin Kart Eşleme Testi (WKET), Stroop Testi, Sözel Bellek Süreçleri Testleri (SBST) kullanıldı.

Bulgular: Gruplar arasında, WKET'de kategori oluşturma, perseveratif hata sayısı, perseveratif hata yüzdesi, kavramsal düzey tepki sayı ve yüzdesi; Stroop testi süre farkı; SBST öğrenme puanı, en yüksek öğrenme puanı, uzun süreli bellek kendiliğinden hatırlama puanları yönünden anlamlı farklılık bulundu. Yapılan post hoc analizlerde; şizofreni ve şizoaffektif bozukluğu bulunan hastaların nöropsikolojik test puanları arasında farklılık olmadığı, her iki hasta grubunun kontrol grubuna göre daha düşük performans gösterdiği tespit edildi.

Sonuç: Bu çalışmada, şizoaffektif bozukluk ve şizofreni hastalarının bilişsel işlev düzeylerinin benzer özellik gösterdiği ve sağlıklı kontrol grubuna göre daha düşük olduğu tespit edilmiştir.

Anahtar kelimeler: Şizofreni, şizoaffektif bozukluk, yürütücü işlevler, dikkat, sözel bellek

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INTRODUCTION

Emil Kraepelin defined the disease which is seen in younger people, not curable and causes destruction as schizophrenia and distinguished it from the disease which we currently define as bipolar disorder (1). He also observed that there are patients who do not fit with the diagnosis of both schizophrenia and bipolar disorder. Bleuer described patients showing psychotic symptoms as schizophrenia even they have affective components (1). George Kirby and August Hoch described patients showing mixed schizophrenia and

affective symptoms more clearly (1). Kasanin first used the term schizoaffective psychosis in 1933 to describe these kinds of patients (1). Schizoaffective disorder is a disease with which diagnostic confusion still continues even though the description of the disease is made several years ago and this decription has been used in clinical practice since then. Research about the accuracy, reliability and continuity of this diagnosis and its similarity and differences with schizophrenia and affective disorders from different aspects are still continuing (2). Kendler et al. (3) analyzed the clinical presentation, termination and familial psychopathology of schizoaffective disorder and investigated diagnostic validity of it according to DSM-III (Diagnostic and Statistical Manual of Mental Disorders). In this study, it was concluded that schizoaffective disorder shows a different course and is a distinct diagnosis from both schizophrenia and affective disorder due to presence of psychotic symptoms and consequences of the disease. Schizoaffective disorder was defined as a separate disease in psychotic disorders section of DSM-IV. Diagnosis is made by meeting diagnostic criteria of both schizophrenia (hallucinations, delusions, bizarre behavior, negative symptoms) and affective disorder (depressive or manic episode). Affective symptoms should be present in a substantial amount of time during total disease duration and psychotic symptoms should be present when there are no affective symptoms (4).

Cognitive disorders are widely seen in schizophrenic patients. Studies showed that there is impairment in several cognitive functions such as executive functions, attention, working memory, verbal memory, visual memory, learning and process speed (5-7). Difficulties in diagnosis and classification of schizoaffective disorder influenced studies evaluating cognitive functions as well. Studies done in this field generally compared schizoaffective disorder with schizophrenia and affective disorders. Szoke et al. (8) compared these three group of patients from the executive functions point of view. Cognitive impairment was mostly observed in schizophrenia but schizoaffective group was quite similar to schizophrenia group. Goldstein et al. (9) reported that patients with schizoaffective disorder are similar to paranoid sub-type of schizophrenia patients when cognitive functions are considered, number of neuropsychologically normal patients is high in both groups and a group of schizoaffective patients are not different from non-psychotic affective disorders.

Assessment of cognitive functions is important because it gives clues about how the patients will behave when encountered with problems of daily life and his/her functional performance (10). It is generally accepted that prognosis and social and occupational functionality of patients with schizoaffective disorder are better than patients with schizophrenia (11). In this context, cognitive functions of patients with schizoaffective disorder are expected to be better than patients with schizophrenia. In this study, we aimed to compare basic cognitive functions such as executive functions, attention and memory of patients with schizoaffective disorder to patients with schizophrenia and healthy controls.

METHODS

Sample

Patients who were followed-up at psychosis outpatient clinic of Pamukkale University Medical School between 2007 and 2009 diagnosed as schizophrenia and schizoaffective disorder and in remission according to DSM-IV criteria. Patients in acute psychotic episode and with mental retardation were excluded from the study. Study was approved by Pamukkale University Medical School Ethics Committee. Patients and their relatives were informed about the study and volunteered patients were recruited with informed consent document. Neuropsychological tests were administered following clinical evaluation by a trained and experienced psychologist.

Clinical Evaluation: Socio-demographic characteristics and clinical data of patients were collected from their files. Scale for the Assessment of Positive Symptoms (SAPS), Scale for the Assessment of Negative Symptoms (SANS) and Brief Psychiatric Rating Scale (BPRS) were used for the assessment of symptoms.

Scale for the Assessment of Positive Symptoms (SAPS): This scale was developed to assess the level, distributions and change of severity of positive symptoms of schizophrenia (12). Validity and reliability study of the Turkish version was published (13). It contains a total of 4 sub-scales and 34 items. Scores between 0 and 5 are given for each item.

Scale for the Assessment of Negative Symptoms (SANS): This scale was developed to assess the level, distributions and change of severity of negative symptoms of schizophrenia (12). Validity and reliability study of the Turkish version was published (14). It contains a total of 5 sub-scales and 25 items. Scores between 0 and 5 are given for each item.

Brief Psychiatric Rating Scale (BPRS): This scale was developed by Overall and Gorham (15). It is a scale assessing the severity and change of psychotic and some depressive symptoms in schizophrenia and other psychotic disorders. Validity and reliability study of the Turkish version was published (16). It contains 18 items and each item is scored between 0 and 6.

Neuropsychological assessment: Executive functions were assessed by Wisconsin Card Sorting test (WCST), attention was assessed by Stroop test and memory was assessed by Verbal Memory Processes test. Evaluation was started by first step of Verbal Memory Processes test and Stroop and WCST were administered consecutively. Evaluation was finished after 45 minutes by administering long-term memory recognition and recall steps of Verbal Memory Processes test.

Wisconsin Card Sorting test (WCST): This test was developed by Heaton et al. (17). Success in Wisconsin Card Sorting test is related to understanding the matching principle. WCST performance contains finding classification principle from feedback about the accuracy of behavior, attention to a specific part of stimulus selectively, using this principle during its valid duration, abandon the principle when leads to wrong behavior, i.e., changing the set-up of the behavior. This test evaluates frontal lobe functions and assesses working memory, executive functions and attention performance. Basic criterion to evaluate success in WCST is tendency to perseverate. Perseveration is insisting on conduct towards previous principles although conduct principle has already changed. Standardization study was done by Karakaş et al. (18) in Turkey.

Stroop Test: This test assesses perceptive set-up, changing skills of it towards changing demands and an impairing influence, suppressing a usual behavioral concept and performing an unusual behavior and attention process (19). In this test, scores such as error and reaction time are calculated and impaired performance is shown as not reacting a usual (or automatic) stimulus and increasing duration of saying the color or saying a wrong color (18).

Verbal Memory Processes Test (VMPT): This is vocabulary list learning test developed by Rey (20). VMPT can distinguish several parameters related to memory. First one is instant memory, second is learning or acquisition process of information and third is retrieving and recall processes. After the first and second steps a 45 min. pause is given and third step (long-term memory) is administered. Recall is evaluated in two ways; delayed spontaneous recall and delayed recognition recall. Test consists of 15 unrelated words. These 15 words are read to the subject in one second intervals and then required to say the ones they can recall. This gives information about the instant memory and continuing attention of the subject. Number of correct responses is recorded as instant memory score. Same list is read to the subject 9 times after the first trial and he/she is required to say all the words he/she can recall. This gives information about the learning skills of the subject (21). Turkish validity and reliability study of WCST was done by Öktem (22).

Statistical Analyses

Data were analyzed by SPSS 10.0 for Windows software. Besides descriptive statistical analyses, independent groups t-test and one-way analysis of variance were performed to compare the groups. For statistically significant data from one-way analysis of variance, post-hoc Turkey analysis was performed to determine the group that caused the difference. $p<0.05$ was accepted for statistical significance.

Table 1: Clinical characteristics and scale scores of patients

Clinical Data	Schizophrenia (Mean±S.D.)	Schizoaffective Disorder (Mean±S.D.)	t*
Age	38.19±12.55	39.00±11.08	1.399
Years of education	9.93±3.56	10.47±3.64	0.044
Disease duration (years)	13.14±9.53	14.10±9.52	0.418
Number of hospitalizations	2.71±3.14	2.68±2.63	0.035
BPRS scores	27.00±15.02	21.82±13.02	1.330
SAPS scores	33.72±26.27	24.03±14.83	1.735
SANS scores	46.62±25.40	40.39±25.67	0.991

BPRS: Brief Psychiatric Rating Scale, SAPS: Scale for Assessment of Positive Symptoms,
SANS: Scale for Assessment of Negative Symptoms, *t: Independent groups t test, at all assessments p>0.05, S.D.: Standard Deviation

Table 2: Comparison of neuropsychological tests

Neuropsychological test scores	Schizophrenia (Mean±S.D.)	Schizoaffective Disorder (Mean±S.D.)	Control (Mean±S.D.)	F*
WCST				
Category completion	1.95±2.10	2.33±2.00	4.20±1.97	14.784
Number of perseverative responses	55.28±39.64	50.06±38.37	17.86±16.67	15.990
Number of perseverative errors	43.26±28.51	42.03±30.78	16.02±14.49	15.480
Percent of perseverative errors	38.64±27.26	35.90±27.68	12.97±11.38	13.024
Number of conceptual level responses	31.53±25.37	34.63±20.72	52.76±19.63	11.014
Stroop Test				
Duration difference	68.97±43.12	70.77±45.11	41.30±15.43	8.236
VMPT				
Learning score	80.36±25.73	74.09±21.60	120.26±21.46	40.954
Highest learning score	10.81±3.07	9.95±3.02	14.78±2.06	31.775
Remote memory recall	8.89±3.20	7.85±3.18	12.36±1.80	23.795

WCST: Wisconsin Card Sorting Test, VMPT: Verbal Memory Processes Test, *F: One-way analysis of variance, p<0.05 at all assessments, S.D.: Standard Deviation

RESULTS

Thirty-five patients with schizoaffective disorder, 48 patients with schizophrenia and 48 healthy controls were included in the study. There were no differences between groups regarding duration of education and age (one-way analysis of variance, F=0.265, F=1.204, consecutively; p>0.05 for both). Mean age of control group was 35.17±9.92 years, mean duration of education was 10.07±3.85 years. There were no differences regarding disease duration, number of hospitalizations, scores of BPRS, SANS and SAPS between schizophrenia and schizoaffective disorder patients (p>0.05) (Table 1).

Statistically significant differences were found between the groups regarding WCST category forming, number of perseverative errors, percent of perseverative errors, number and percent of conceptual level reaction, duration difference in Stroop test, learning scores, highest learning scores and remote memory recall scores of VMPT (Table 2). In post-hoc Tukey analyses, it was found that there were no differences between cognitive test scores of schizophrenia and schizoaffective disorder patients, inter-group differences were due to control group and control group showed better performance compared to both schizophrenia and schizoaffective patients.

DISCUSSION

Our study groups mainly consisted of middle age adults who were primary school graduates, having 13-14 years of disease duration and mean 2 hospitalizations. Durations of disease and education, number of hospitalizations and scale scores were similar between schizophrenia and schizoaffective patients. No statistically significant difference was found between two disease groups regarding executive functions, attention and verbal memory performances. However, it was found that number of completed categories in

WCST was found to be low and perseveration scores were found to be high, duration difference at Stroop test was increased and learning and recall scores at Verbal Memory test were found to be low in patients with schizophrenia and schizoaffective disorder compared to healthy controls. These findings point out that domains such as planning, changing strategies according to new stimuli and completing tasks started, focusing and continuing attention, learning and recalling new information were impaired in patients with schizophrenia and schizoaffective disorder.

It is already known that executive functions are impaired, inhibition at WCST could not be done and perseverative responses are increased in patients with schizophrenia (23,24). Gooding and Tallent (25) compared WCST performances of 34 patients with schizophrenia and 23 patients with schizoaffective disorder to healthy controls. Similar to our findings, similar performances were achieved especially at category naming and perseverative error scores in both diseases and executive functions were impaired compared to healthy controls. In another study, it was reported that neuropsychological test profile of schizoaffective disorder is heterogeneous like schizophrenia, a group of patients are not different from affective disorder patients without psychotic symptoms and cognitive performance of another group of patients are similar to paranoid type schizophrenia patients (9). Evans et al. (26) compared psychopathological scale scores and basic neuropsychological test performances of patients with schizophrenia, schizoaffective disorder and affective disorder without psychotic symptoms. Patients with schizoaffective disorder and schizophrenia have more severe dyskinesias, less family history of affective disorders, more hospitalizations due to psychiatric causes, more use of antipsychotics and anticholinergics and less depressive symptoms. Neuropsychological test performances of schizophrenia and schizoaffective disorder groups were found to be lower than healthy controls and it was determined that schizoaffective disorder is closer to schizophrenia than affective disorders with regards to clinical symptomatology and cognitive dysfunction. Similarly, our findings also showed that basic cognitive functions are impaired in schizophrenia and schizoaffective disorder but severity of impairment do not differ between these two diseases.

On the other hand, Reichenberg et al. (27) reported that cognitive dysfunction is more prominent in patients with schizophrenia and number of patients in normal test performance interval was found to be low. Heinrichs et al. (28) tested the distinguishing ability of schizophrenia from schizoaffective disorder with regard to neuropsychological test performance. In this study, patients with schizophrenia performed lower than patients with schizoaffective disorder and healthy controls. However, it was concluded that none of these tests were characteristic to distinguish these two diseases. It was mentioned that patients with schizophrenia are more symptomatic than patients with schizoaffective disorder and need more social support. In another study, verbal memory was found to be impaired in both schizophrenia and schizoaffective disorder, however, impairment recall component of verbal memory were found to be more severe (29). In a study done at our center, metabolite levels measured by magnetic resonance spectroscopy (MRS) and cognitive skills were compared between bipolar disorder, schizophrenia, schizoaffective disorder and healthy control groups each consisting of 15 subjects. In this study, it was found that patients with schizoaffective disorder are similar to schizophrenia group regarding executive functions and similar to bipolar disorder regarding MRS findings. It was concluded that schizophrenia and affective disorder make up two extremes of a continuous spectrum, schizoaffective disorder has an intermediary position in this spectrum and longitudinal studies with larger samples are needed (30).

Low number of studies evaluating cognitive functions of schizoaffective patients and observing characteristics similar to schizophrenia in some studies and to bipolar disorder in others make this issue difficult to be clearly understood. Likewise, there are studies which different cognitive tests were administered to distinguish schizophrenia from schizoaffective disorder in terms of cognitive functions. In a study, these two diseases were compared by a neuropsychological test battery containing visual-motor tasks (Cambridge Neuropsychological Test Automated Battery, CANTAB) and it was found that visual-spatial and visual-motor coordination were found

better in the schizoaffective group (31). Fizsdon et al. (32) compared patients with schizophrenia and schizoaffective disorder regarding executive functions, verbal and non-verbal memory, process speed and social cognition. Social cognition was defined as how an individual thinks of him/herself, others, social status and relationships. No difference was found between groups regarding basic cognitive tests, however, schizoaffective group performed better in social cognition domain. These findings were interpreted as social cognition can be used to distinguish these two diseases.

Patients with schizophrenia and schizoaffective disorder in our study were using psychotropic drugs, mostly atypical antipsychotics. Not excluding possible effects of drug use is a limitation of our study. Cross-sectional nature of our study is another limitation and might have influenced our findings. In a study done in Turkey, chronicity of bipolar disorder, schizophrenia and schizoaffective disorder diagnoses were investigated retrospectively. Diagnostic stability was found to be higher in schizophrenia and bipolar disorder (96% and 92.5%, consecutively), however, this rate was found lower (45.5%) in schizoaffective disorder (33). Lake and Hurwitz (34) published an interesting study in this area. These authors examined 29,700 studies about schizoaffective disorder between 1965 and 2007, and searched evidence about validity of this diagnosis. In this study, it was found that there are no specific diagnostic criteria and inter-rater reliability was found to be low. In epidemiological, clinical, basic, hereditary and molecular genetic studies, it was said that conclusions such as schizoaffective disorder is either a "sub-type of schizophrenia" or "bipolar disorder" or "another disease between these two" causes suspicion about existence of such a diagnosis. It was proposed that schizoaffective disorder combines schizophrenia and bipolar disorder by filling the gaps between these two diseases so it is not a separate disease and patients diagnosed as schizoaffective disorder possibly have a psychotic affective disorder. It should be kept in mind that diagnostic reliability of schizoaffective disorder is low and patients currently diagnosed as schizoaffective disorder may be diagnostically transformed in the future when our findings are evaluated. These findings suggest that there is a need of further research about schizoaffective disorder. Long term follow-up studies may give more detailed information about diagnosis, clinical characteristics and cognitive functions of these patients.

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