The Relationship Between Violence and the Clinical Features, Insight and Cognitive Functions of Patients with Schizophrenia

Ferdi KÖŞGER[1], Altan EŞSİZOĞLU[2], İpek SÖNMEZ[3], Gülcan GÜLEÇ[4], Müge GENEK[5], Özlem AKARSU[6]

SUMMARY

Objective: We aimed to investigate factors associated with violent behavior in schizophrenia and to clarify the relationship between violent behavior and insight and cognitive functions.

Method: 68 patients diagnosed with schizophrenia were separated into two groups that included patients with a history of violent behavior (n = 30) and those patients without prior history of violent actions (n = 38). The Positive and Negative Syndrome Scale (PANSS), Buss-Perry Aggression Questionnaire, Schedule for Assessing the Three Components of Insight, California Verbal Learning Test (CVLT), Trail Making Test, Wisconsin Card Sorting Test, and Stroop Test were administered to patients in each group.

Results: Male gender, the number of hospitalizations, noncompliance with the treatment, alcohol and substance abuse, the number of suicide attempts, PANSS positive score, PANSS general psychopathology score and PANSS total score were significantly higher in patients with schizophrenia with a history of violent behavior, relative to the non-violent patients. The mean score for the delayed response sub-section of the CVLT was lower among patients with a history of violent behavior. Noncompliance with treatment (OR:5.927, p=0.041), alcohol and substance abuse (OR:21.089, p=0.000), and total PANSS score (OR:1.053, p=0.011) were identified as significant predictive factors for violent behavior in patients with schizophrenia.

Conclusion: The absence of insight and executive function impairment are core symptoms of schizophrenia and do not appear to be associated with violent behavior. Memory impairment may be associated with violent behavior in patients with schizophrenia. Noncompliance with medical treatment, alcohol and substance abuse, and the severity of positive symptoms are the most significant factors for predicting violence behavior in patients with schizophrenia.

Keywords: Schizophrenia, violence, insight, cognitive function

INTRODUCTION

The relationship between mental disorders and violent behavior has always been challenging for clinicians. Monahan (1992) reported that violent behaviors among schizophrenic individuals are comparable to the general population after adjusting for known sociodemographic risk factors. However other studies have demonstrated that violent behavior is more common among schizophrenic individuals compared to the general population (Swanson et al. 1990, Hodgins 1992, Torrey 1994, Hodgins et al. 1996). Violent behavior in schizophrenia is often a realistic response to an unrealistic perception. Violent behaviors, which are the result of the delusional sense of being harmed, can be seen as psychotic forms of self defense (Umut et al. 2012). Male gender, age, alcohol addiction, substance abuse, non-adherence to treatment, antisocial personality disorder, paranoid subtype, presence of suicidal ideation, history of suicide attempts and frequent hospitalizations have all been

Received: 22.03.2015 - **Accepted:** 20.07.2015

[1]Assist. Prof., [2, 4]Assoc. Prof., [5]MD, [6]Psychologist, Eskisehir Osmangazi University, Faculty of Medicine, Department of Psychiatry, Eskisehir, Turkey., [3]Assist. Prof., Near East University, Department of Psychiatry, Nicosia, TRNC.

e-mail : *ferdikosger@mynet.com*

doi: 10.5080/u13575

associated with increased risk of violent behavior (Swanson et al. 1990, Walsh et al. 2004, Belli et al. 2011).

Insight in schizophrenia is a multidimensional term that includes psychological, psychopathological, neurocognitive mechanisms and interpersonal relations (Dankı et al. 2007). Approximately 50-80% of schizophrenic patients have poor insight, a factor that negatively influences treatment efficacy (Cuesta and Peralta 1994, Dankı et al. 2007). While some studies have demonstrated an association between insight and violent behavior in schizophrenia (Ekinci and Ekinci 2013, Arango et al. 1999, Buckley et al. 2004) other studies have found no evidence of an association (Lincoln and Hodgins 2008, Yen et al. 2002).

Among individuals who exhibit violent behavior, cognitive dysfunction, a critical component of behavioral control, is common (Yeudall et al. 1982, Morgan and Lilienfeld 2000, Brower et al. 2001, Cohen et al. 2003). Electroencephalography abnormalities, soft neurological signs, and cognitive dysfunction have been demonstrated in schizophrenic patients exhibiting violent behavior (Barber et al. 1988, Krakowski et al. 1989), however other studies have failed to support these findings (Lafayette et al. 2003, Chung et al. 2010). Barkataki et al. (2005) reported that there is no significant difference in intelligence, memory, attention and executive functions between schizophrenia patients with and without violent behavior, however limited differences can be observed using the Stroop Test and the Wisconsin Card Sorting Test (WCST). However, both groups displayed lower cognitive function relative to a control group, suggesting that cognitive dysfunctions are not related to violent behavior. In a review of 17 studies concerning schizophrenia patients with and without violent behavior, Naudts and Hodgins (2006) stated that schizophrenia diagnosed patients who have exhibited violent behavior since childhood showed better performance in tests evaluating executive functions and poor performance in tests of orbitofrontal functions. Together, the current literature regarding the potential association between schizophrenia and violent behavior is confusing and, at times, contradictory.

The prediction of the tendency towards violent behavior is important for determining the method of treatment as well as for the protection of the patient's relatives and medical staff. The aim of this study is to examine the factors associated with violent behavior in schizophrenia. We hypothesize that that cognitive dysfunction, lack of insight as a component of neurocognitive function, adherence to treatment, and clinical features are predictive of violent behavior.

METHOD

Consecutive patients admitted to the psychiatry polyclinic between November 2013 and February 2015 were included in this study. 68 patients who were diagnosed with schizophrenia after being evaluated using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) were separated into two groups: patients exhibiting violent behavior with the intention to physically harm others including injury, grievous bodily harm, and murder (n=30), patients with legal problems resulting from their violent behavior (n=9) or patients whose relatives confirmed the history of violent behavior (n=21) and 2) patients with no history of violent behavior and patients whose relatives confirmed the that no violent behavior had occurred (n=38). Regular drug utilization, as confirmed by the patients' relatives during the prior 6 months, was defined as adherence to treatment. A sociodemographic data form, Positive and Negative Syndrome Scale (PANSS), Buss-Perry Aggression Questionnaire (BPAQ) and The Schedule For Assessment of Three Components of Insight (SAI) were applied by a blinded researcher (M.G) to both groups of patients. Again, the California Verbal Learning Test (CVLT), Trail-Making Test (TMT), Wisconsin Card Sorting Test (WCST) and Stroop Test were applied to both groups of patients by a different researcher (Ö.A.) to evaluate verbal memory and executive functions. Inclusion criteria consisted of basic literacy and age at presentation of 18-65 years old. Patients diagnosed with other mental disorders, with diseases affecting the central nervous system, patients with a history of alcohol and/or substance abuse during the previous 6 months, and color blind individuals were excluded from the study. All participants gave written informed consent prior to inclusion in the study. The study was approved by the Local Ethics Committee.

MATERIALS

Socio-demographic data form: This form was developed to gather research data and includes questions about the patient's socio-demographic (age, sex, education and marital status, alcohol and/or substance abuse history) and disease characteristics.

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I): This is a diagnostic schedule developed by First et al. (1997). SCID-I was translated to Turkish and the Turkish version validity and reliability was confirmed (Ozkurkcugil et al., 1999).

Positive and Negative Syndrome Scale (PANSS): This scale was developed by Kay et al. (1987). This semi-structured interview contains 30 questions with 7 scores. Kostakoğlu et al. conducted reliability and validity studies of the Turkish form in 1999.

Buss-Perry Aggression Questionnaire (BPAQ): This questionnaire was developed by Buss and Perry in 1992 and consists of four basic components. Later, this form was re-evaluated by Buss and Warren (2000) and an indirect aggression component was added. The validity and reliability of the

Turkish version was measured by Can (2002). The scale consists of five subcomponents: physical aggression, verbal aggression, anger, hostility and indirect aggression.

Schedule for Assessment of Three Components of Insight (SAI): David (1990) developed the Schedule for Assessing the Three Components of Insight (SAI), which is administered by a clinician and assesses insight quantitatively starting from three components 1) adherence to treatment, 2) awareness of illness and 3) correct identification of psychotic symptoms. The SAI is a semi-structured scale consisting of eight items and administered by a clinician. Higher scores indicate higher levels of insight. The validity and reliability of this scale was confirmed for the Turkish language by Aslan et al. (2000).

California Verbal Learning Test (CVLT): This test was developed by Delis et al. (1987) to evaluate verbal learning and memory. Unlike other verbal tests, CVLT allows for the evaluation of numerous cognitive verbal memory elements. The test contains 16 common words, each of which shown in a shopping list format and belongs to one of four categories: for example, there are four fruits, four herbs and spices, four clothing, four tools. In addition to the 16 word shopping list, the test also contains a 44 word list that is read by the subject to facilitate short and long delay free retention and recalling by category clues. The subject is then asked to repeat the first list containing 16 words after reading the 44-word list. This phase is repeated 5 times. The total score is recorded on a scale of 1-5. Then the score obtained at this phase is recorded as the short delayed free recall score. Finally the subject is asked to recall the first list after a 20 minutes break. The score obtained during this phase is recorded as the long delay free recall score (Delis et al. 1987). The CVLT form was translated into Turkish for adults and validated in Turkish by Tükel et al. (2012).

Wisconsin Card Sorting Test (WCST): This test was developed by Heaton (1993). Among tests used to measure frontal lobe function, the Wisconsin Card Sorting Test is widely accepted as the standard for measuring dorsolateral prefrontal cortex functions (Weinberger et al, 1986). The test is administered with two decks of cards including 4 stimulus cards and 64 reactions cards. There is no time limitation. The adaptation of the WCST into Turkish was conducted by Karakaş et al. (1998). Categories achieved, perseverative reaction and perseverative errors scores were used in the present study.

Trail-Making Test (TMT): The TMT was administered in the present study to evaluate executive functions (Reitan 1958). This test is widely used and easily administered test assessing frontal lobe functions without the psychomotor speed and talent factors (Jarvis 1986). This test necessitates solid visual tracking and attention functions. It consists of two parts; Part-A and Part-B. Errors made in Part A and Part B are recorded. The validity and reliability of the Turkish version was established by Cangöz et al. (2007).

Stroop Test: The Stroop test was developed to assess the capacity of resistance to interference by reading the names of colors that are printed in colors different than that which they denote (Golden, 1978). In order to do the test, only one visual characteristic is marked as a selector and the others should be blocked. It consists of 4 parts: reading the names of colors written in black, reading the color of the colored squares or dots, reading the names of colors which are printed in colors different than that which they denote, and not reading colored color names and just naming the printed colors. A Turkish adaptation study was conducted by Karakas et al. (1998).

Statistical Analysis

The Kolmogorov-Simirnov test was applied to evaluate the variation present in the dataset relative to the normal distribution. Normally distributed variables were compared between groups using the Student's t-test, while the Mann Witney U Test was used to evaluate differences in variables that did not conform to the normal distribution. The chi square test was applied to evaluate differences in categorical variables. Variables that differed significantly between groups were included in the multiple regression analysis. The Hosmer-Lemeshow test was applied to verify model compliance. Differences were considered statistically significant when the P-value was < 0.05.

RESULTS

There was no significant difference in age (p=0.706), employment status (p=0.058), duration of education (p=0.361), duration of illness (p=0.941), age of illness onset (p=0.543), type of anti-psychotic medication (p=0.080) or marital status (p=0.587) between schizophrenia patients with a history of violent behavior and those with no prior history of violence (Table 1).

In total, 8 patients with a history of violent behavior (26.7%) were female and 22 (73.3%) were male; 20 patients without a history of violent behavior (47.4%) were female and 18 (52.6%) were male. There was a significantly higher number of male patients with a history of violent behavior compared to the patients without a history violent behavior (χ^2=4.666, p=0.031). The average number of hospitalization was significantly higher among those with a history of violent behavior (4.00±4.89) compared to those without a history of violent behavior (2.11±2.89) (z=-2.576, p=0.010). The rate of non-adherence to treatment in those with a history of violent behavior (36.7%) was significantly higher than those without a history of violent behavior (7.9%) (χ^2=8.488, p=0.004). Alcohol or substance abuse was significantly higher among

Table 1. Demographic characteristics of patients with schizophrenia with a history of violent behavior and without a prior history of violent behavior

	Violence n (%)	Non-violence n (%)	Statistical Analysis
Gender			χ^2 =4.666, p=0.031
Female	8 (26.7)	20 (47.4)	
Male	22 (73.3)	18 (52.6)	
Marital Status			χ^2 =0.295, p=0.587
Married	13 (43.3)	14 (36.8)	
Single/Divorced	17 (56.7)	24 (63.2)	
Employment status			χ^2 =5.688, p=0.058
Employee	7 (23.3)	9 (23.7)	
Unemployed	10 (33.3)	22 (57.9)	
Retired	13 (43.3)	7 (18.4)	
Age years (Mean±SD)	41.70±10.64	42.71±11.11	t=-0.379, p=0.706
Education (Mean±SD)	7.71±3.22	9.50±4.18	z=-0.914, p=0.361
Duration of illness	13.87±9.53	13.95±10.20	z=-0.074, p=0.941
Age of illness onset	27.33±7.95	28.55±8.43	z=0.613, p=0.543
Hospitalization	4.00±4.89	2.11±2.89	z=-2.576, p=0.010
Antipsychotic medication			χ^2 =6.758, p=0.080
2. generation AP	7 (23.3)	17 (44.7)	
1. generation AP	2 (6.7)	1 (2.6)	
1.+2. generation AP	3 (10.0)	0 (0.0)	
2.+2. generation AP	18 (60.0)	20 (52.6)	
Adherence to treatment			χ^2 =8.488, p=0.004
Positive	19 (63.3)	35 (92.1)	
Negative	11 (36.7)	3 (7.9)	
Alcohol or substance abuse			χ^2 =17.192, p=0.000
Positive	16 (53.3)	3 (7.9)	
Negative	14 (46.7)	35 (92.1)	
Suicide attempts			χ^2 =6.276, p=0.012
Positive	15 (50.0)	8 (21.1)	
Negative	15 (50.0)	30 (78.9)	

SD: Standard deviation, AP: Antipsychotic.

Table 2. Scale scores of the patients with schizophrenia with a history of violent behavior and without a prior history of violent behavior

	Violence (Mean±SD)	Non-violence (Mean±SD)	Statistical Analysis
PANNS			
Positive	17.60±5.99	13.13±5.86	t=3.092, p=0.003
Negative	24.23±6.00	21.63±5.92	t=1.788, p=0.078
General psychopathology	35.83±8.98	31.08±7.38	t=2.397, p=0.019
Total	77.33±18.02	66.08±15.38	t=2.777, p=0.007
BPAQ			
Physical	17.07±11.18	14.65±7.41	t=1.060, p=0.293
Verbal	9.50±4.46	9.78±3.38	t=-0.296, p=0.768
Anger	16.27±8.48	17.54±5.57	t=-0.739, p=0.463
Hostility	15.13±9.31	15.27±8.16	t=-0.064, p=0.949
Indirect aggression	10.70±5.87	9.89±4.05	z=-0.303, p=0.762
SAI	9.23±4.42	10.95±3.40	z=1.379, p=0.168

SD: Standard deviation, PANSS: Positive and Negative Syndrome Scale, BPAQ: Buss-Perry Aggression Questionnaire, SAI: Schedule For Assessment of Three Components of Insight.

those with a history of violent behavior (53.3%) compared to those without a history of violent behavior (7.9%) (χ^2 =17.192, p=0.000). The incidence of suicide attempts was significantly higher in those with a history of violent behavior (50.0%) compared to those without a history of violent behavior (21.1%) (χ^2 =6.276, p=0.012) (Table 1).

No significant difference in the mean PANSS negative scale scores was observed among the patients diagnosed with schizophrenia with and without a history of violent behavior (t=1.788, p=0.078). The PANSS positive scale, PANSS general psychopathology scale and PANSS total scores were significantly higher among patients with a history of violent behavior (t=3.092, p=0.003; t=2.397, p=0.019; t=2.777, p=0.007, respectively). There was no significant difference in BPAQ sub scale average scores and SAI average scores among the patients diagnosed with schizophrenia with a history of violent behavior compared to those with no prior episodes of violence (Table 2).

Table 3. Comparation of the cognitive functions of the patients with schizophrenia with a history of violent behavior and without a prior history of violent behavior

	Violence (Mean±SD)	Non-violence (Mean±SD)	Statistical Analysis
CVLT			
Total 1-5	39.37±9.83	43.11±9.20	t=-1.615, p=0.111
Short delayed	8.43±2.78	9.39±2.47	z=1.513, p=0.130
Long delayed	8.10±2.80	9.76±2.42	t=-2.627, p=0.011
Discriminability	86.04±11.36	89.45±11.33	z=1.270, p=0.204
WCST			
Categories achieved	2.13±1.85	2.50±2.19	z=0.428, p=0.669
Perseverastive reaction	51.20±36.47	57.21±39.79	z=0.605, p=0.545
Perseverative errors	44.07±26.84	46.00±28.95	z=0.328, p=0.743
TMTpart A			
Seconds	53.43±17.93	63.08±40.80	z=0.402, p=0.688
Errors	0.57±0.90	0.21±0.47	z=-1.817, p=0.069
TMTpart B			
Seconds	162.70±118.42	166.61±99.84	z=0.519, p=0.604
Errors	2.20±1.52	1.95±1.97	z=-1.133, p=0.257
Stroop word			
Seconds	18.17±9.45	15.45±5.86	z=-0.885, p=0.376
Errors	0.97±1.87	0.61±1.26	z=-0.699, p=0.485
Correction	0.57±0.90	0.47±0.92	z=-0.697, p=0.486
Stroop color			
Seconds	25.50±13.20	24.03±11.98	z=-0.637, p=0.524
Errors	1.77±3.54	1.13±1.65	z=-0.494, p=0.621
Correction	0.97±1.30	0.95±1.37	z=-0.305, p=0.761
Stroop color word			
Seconds	35.83±18.14	32.63±14.81	z=-0.885, p=0.376
Errors	3.50±4.85	3.55±3.52	z=0.588, p=0.556
Correction	1.80±1.90	2.53±2.64	z=0.929, p=0.353

SD: Standard deviation, CVLT: California Verbal Learning Test, WCST: Wisconsin Card Sorting Test, TMT:Trail-Making Test.

Table 4. Predictive factors for violence behavior in patients with schizophrenia

	Violence behavior		
Independent Variables	**OR**	**95%CI**	**p**
Adherence to treatment			
Positive	1	-	-
Negative	5.927	1.073-32.726	p=0.041
Alcohol or substance abuse			
Positive	21.089	4.116-108.051	p=0.000
Negative	1	-	-
PANSS total	1.053	1.012-1.096	p=0.011
Constant	0,126	-	p=0.150

OR: Odds ratio, CI: confidence interval, PANSS: Positive and Negative Syndrome Scale, Nagelkerke R^2=0.513.

Regarding cognitive function, we observed no significant differences in cognitive characteristics with the exception of the long delay response subsection of the CVLT (t=-2.627, p=0.011), which is known to be in correlated with impaired verbal memory (Table 3).

Regression analysis was applied to identify independent predictors of violent behavior in schizophrenia using variables that differed significantly between the two study groups. Non-adherence to treatment (OR:5.927, p=0.041), history of alcohol or substance abuse (OR:21.089, p=0.000), and PANSS total score (OR:1.053, p=0.011) were identified as independent predictors of violent behavior in schizophrenia (Table 4).

DISCUSSION

The relationship between schizophrenia and propensity for violent behavior is important both for clinical psychiatric assessments and for shaping the public perception of people with schizophrenia. While 35 years ago the rate of violent behavior among schizophrenia patients was considered to be similar to the rate of violent behavior in the general society, further studies have reported a modest, but statistically significant, association between schizophrenia and violence (Kooyman et al. 2007). The current literature has emphasized that a specific subgroup, rather than all patients diagnosed with schizophrenia, is at greater risk of violent behavior (Belli et al. 2011). In particular, non-adherence to treatment and alcohol-substance abuse have been identified as critical risk factors for violence (Asher-Svanum et al. 2006). Similar to these reports, we observed higher rates of male gender, increased hospitalizations, non-adherence to treatment, alcohol-substance abuse history and suicide attempt history in patients diagnosed with schizophrenia with a history of violent behavior. Furthermore, our study data demonstrate that non-adherence to treatment and alcohol-substance abuse history can predict violent behavior in schizophrenia.

In the present study, the PANSS positive, general psychopathology sub-scale and total average scores were higher in the group with a history of violent behavior. Positive sub-scale scores were particularly high in this group of patients. In addition, the PANSS total score was predictive of violent behavior history. Prior studies have demonstrated a relationship between acute positive symptoms and violent behavior (Taylor and Gunn 1988, Beaudoin et al. 1993). However, this relationship was identified in patients who were not currently exhibiting violent behaviors but in the patients who had a history of violent. This is critical for predicting the future risk of violent behavior.

We observed no significant difference in BPAQ sub scale scores in patients with a history of violent behavior compared to patients with no prior history of violence. In a study comparing patients diagnosed with schizophrenia with an admitted history of aggression compared to patients with no history of aggression. Krakowski and Czobor (2012) determined that patients who falsely denied a history of aggression scored lower on the BPAQ than patients with no prior history of aggression. This study concluded that impairment of insight and executive functions was present in the group that denied a history of aggression, and that the BPAQ could predict future violent behavior only in those who admitted their aggression history (Krakowski and Czobor 2012). Krakowski and Czobor (2012) determined that 36.2% of schizophrenia patients included in their study and exhibited violent behavior denied this violent behavior. Our study did not evaluate whether the patients admitted to prior violent behavior. However, our study results must be interpreted with the knowledge that patients who falsely deny a history of violent behavior may score much lower on the BPAQ scale. Therefore, methods which could allow for a more objective assessment of the predictability of violent behavior in patients diagnosed with schizophrenia are a priority for improving clinical prediction of violence.

While some studies have reported impaired insight in schizophrenia patients with a history of violent behavior (Ekinci and Ekinci 2013, Arango et al. 1999, Buckley et al. 2004), other studies found no relationship between the level of insight and violent behavior (Lincoln and Hodgins 2008, Yen et al. 2002). Our study did not find a significant difference in insight scores between the patients with a history of violent behavior an those with no prior history. This could be a result of the relatively low number of patients included in our study or can could indicate that impaired insight is a primary indicator of schizophrenia and thus should be evaluated independently from violent behavior. Prior observations of impaired insight in patients with schizophrenia support our viewpoint (Joseph et al. 2015, Dankı et al. 2007). Lincoln and Hodgins (2008) monitored 209 patients diagnosed with schizophrenia for 2 years and determined that when positive symptoms were excluded, insight was unrelated to violent behavior. Likewise, Yen et al. (2002), monitored 74 schizophrenia patients with symptoms in remission or present at mild levels for one year and determined that insight levels did not predict violent behavior and that the relationship between insight and violent behavior can only be present in acute relapse periods. We propose that improved methodology for examining insight, including parameters such as SAI and excluding factors such as positive indication level and substance abuse history, will clarify this issue.

We observed significantly decreased CVLT long delayed response scores, which indicates impairment in verbal memory in schizophrenia patients with a history of violent behavior compared to those no prior history of violent behavior. Moreover, in those with a history of violent behavior, lower CVLT sub test scores were also observed, although this difference was not statistically significant. Chung et al. (2010) evaluated impairment in memory functions in patients diagnosed with schizophrenia and reported no difference between patients with a history of violence and those with no prior history of violent episodes. Impairment in cognitive functions can be a core symptom of schizophrenia. We found no difference between the two study groups in terms of executive function, yet we observed higher impairment of verbal memory functions in the group with a history of violent behavior. This may be an important finding for predicting violent behavior in schizophrenia, although additional studies including control subjects are necessary. We observed no difference in executive function between patients diagnosed with schizophrenia with a history of violent behavior and those with no prior history of violent behavior. Previous studies have reported that executive functions may be impaired in violent schizophrenia patients (Barber et al. 1988, Krakowski et al. 1989), however other studies have found no difference relative to patients with no prior history of violence (Lafayette et al. 2003, Chung et al. 2010). At least on study has also reported improved executive function among patients with a history of violent behavior (Naudts and Hodgins 2006). Our findings support the notion that impairment of cognitive functions can be a core symptom of schizophrenia rather than a specific indicator of violent behavior, as reported previously by Chung et al. (2010) and Barkataki et al. (2005). The present study included several important limitations in including a relatively low number of participants. Regarding cognitive function assessment, the study did not include a control group and patients who did not have a legal file at our clinic were not evaluated objectively for the prior incidence of violent behavior violent behavior. On the other hand, our study demonstrated that adherence to treatment, alcohol-substance abuse and PANSS total score can predict violent behavior in schizophrenia. We believe it is important to consider these factors in clinical practice. Impairment in memory may be related to violent behavior in schizophrenia.

Finally, the perception that schizophrenia patients have a tendency toward violence can be an important component of social stigmatization that does not apply to all patients. The results of our study demonstrate that it is possible to prevent

violent behavior in schizophrenia through the assessment of certain risk factors.

REFERENCES

Arango C, Calcedo-Barba A, Gonza´lez-Salv ador T et al. (1999) Violence in inpatients with schizophrenia: A prospective study. Schizophr Bull 25:493-503.

Arslan S, Günay KB, Karakılıç H (2000) İçgörünün Üç Bileşenini Değerlendirme Ölçeği güvenirlik ve geçerlik çalışması. Türkiye'de Psikiyatri 3:17-24.

Asher-Svanum H, Faries DE, Zhu B et al (2006) Medication adherence and long-term functional outcomes in the treatment of schizophrenia in usual care. J Clin Psychiatry 67:453-60.

Barber JW, Hundley P, Kellogg E et al (1988) Clinical and demographic characteristics of 15 patients with repetitively assaultive behavior. Psychiatr Q 59:213-24.

Barkataki I, Kumari V, Das M et al (2005) A neuropsychological investigation into violence and mental illness. Schizophr Res 74:1-13.

Beaudoin MN, Hodgins S, Lavoie F (1993) Homicide, schizophrenia and substance abuse or dependency. Can J Psychiatry 38:541-6.

Belli H, Ural C, Vardar MK et al (2011) Şizofrenide şiddet ve cinayet eylemi: risklerin değerlendirilmesi, önleyici tedbirler ve tedavide klozapinin yeri. Dusunen Adam 24:222-7.

Brower MC, Price BH (2001) Neuropsychiatry of frontal lobe dysfunction in violent and criminal behaviour: a critical review. J Neurol Neurosurg Psychiatry 71:720-6.

Buckley PF, Hrouda DR, Friedman L et al (2004) Insight and its relationship to violent behavior in patients with schizophrenia. Am J Psychiatry 161:1712-14.

Buss AH, Warren WL (2000) Agression Questionnaire: Manual. LA: Western Psychological Services.

Can S (2002) "Aggression questionnaire" adlı ölçeğin Türk popülasyonunda geçerlilik ve güvenilirlik çalışması. Gülhane Askeri Tıp Akademisi Haydarpaşa Eğitim Hastanesi Ruh Sağlığı ve Hastalıkları Servis Şefliği yayımlanmamış uzmanlık tezi, Istanbul.

Cangöz B, Karakoç E, Selekler K (2007) "İz sürme testi" nin 50 yaş üzeri Türk yetişkin ve yaşlı örneklemi için standardizasyon çalışması. Turk Geriatri Derg 10:73-82.

Chung S, Chung HY, Jung J et al (2010) Association among aggressiveness, neurocognitive function, and the Val66Met polymorphism of brain-derived neurotrophic factor gene in male schizophrenic patients. Compr Psychiatry 51:367-72.

Cohen RA, Brumm V, Zawacki TM et al (2003) Impulsivity and verbal deficits associate with domestic violence. J Int Neuropsychol Soc 9:760-70.

Cuesta MJ, Peralta V (1994) Lack of insight in schizophrenia. Schizophr Bull 20:359-66.

Dankı D, Dilbaz N, Okay İT et al (2007) Şizofreni tanısı olan hastalarda içgörünün aile öyküsü, pozitif ve negatif belirtilerle ilişkisi. Turk Psikiyatri Derg 18:129-36.

David AS (1990) Insight and psychosis. Br J Psychiatry 156: 798-808.

Delis DC, Kramer JH, Kaplan E et al (1987) California Verbal Learning Test: research edition. New York: The Psychological Corporation.

Ekinci O, Ekinci A (2013) Association between insight, cognitive insight, positive symptoms and violence in patients with schizophrenia. Nord J Psychiatry 67:116-23.

First MB, Spitzer RL, Gibbon M et al (1997) Structured Clinical Interview for DSM-IV Clinical Version (SCID-I/CV). Washington DC: American Psychiatric Press.

Golden CJ (1978) Stroop Color and Word Test: A Manual for Clinical and Experimental Uses. Chicago: Illinois p. 1-32.

Heaton RK (1981) Wisconsin Card Sorting Test Manual. Odesa (FL): Psychological Assessment Test Resources, Inc.

Hodgins S (1992) Mental disorder, intellectual deficency, and crime. Arch Gen Psychiatry 49:476-83.

Hodgins S, Mednick SA, Brennan PA et al (1996) Mental disorder and crime: Evidence from a Danish birth cohort. Arch Gen Psychiatry 53:489-96.

Jarvis PE, Barth JT (1986) Halstead-Reitan Test Battery: An interpretative Guide. Odessa FL: Psychological Assessment Resources, p. 38-46.

Joseph B, Narayanaswamy JC, Venkatasubramanian G (2015) Insight in schizophrenia: relationship to positive, negative and neurocognitive dimensions. Indian J Psychol Med 37:5-11.

Karakaş S, Irak M, Ersezgin ÖU (1998) Wisconsin Kart Eşleme Testi (WCST) ve Stroop Testi TBAG formu puanlarının test içi ve testler-arası ilişkileri. X. Ulusal Psikoloji Kongresi özet kitabı p.44.

Kay SR, Fiszbein A, Opler LA (1987) The Positive and Negative Syndrome Scale (PANSS) for Schizophrenia. Schizophr Bull 13:261-76.

Kooyman I, Dean K, Harvey S et al (2007) Outcomes of public concern in schizophrenia. Br J Psychiatry Suppl 50:29-36.

Kostakoğlu AE, Batur S, Tiryaki A (1999) Pozitif ve Negatif Sendrom Ölçeğinin (PANSS) Türkçe Uyarlamasının Geçerlik ve Güvenilirliği. Türk Psikoloji Dergisi 14:23-32.

Krakowski MI, Convit A, Jaeger J et al (1989) Neurological impairment in violent schizophrenic inpatients. Am J Psychiatry 146:849-53.

Krakowski MI, Czobor P (2012) The denial of aggression in violent patients with schizophrenia. Schizophr Res 141:228-33.

Lafayette JM, Frankle WG, Pollock A et al (2003) Clinical characteristics, cognitive functioning, and criminal histories of outpatients with schizophrenia. Psychiatr Serv 54:1635-40.

Lincoln TM, Hodgins S (2008) Is lack of insight associated with physically aggressive behavior among people with schizophrenia living in the community? J Nerv Ment Dis 196:62-6.

Monahan J (1992) Mental disorder and violent behavior: Perceptions and evidence. Am Psychol 47:511-21.

Morgan AB, Lilienfeld SO (2000) A meta-analytic review of the relation between antisocial behavior and neuropsychological measures of executive function. Clin Psychol Rev 20:113-36.

Naudts K, Hodgins S (2006) Neurobiological correlates of violent behavior among persons with schizophrenia. Schizophr Bull 32:562-72.

Özkürkçügil A, Aydemir Ö, Yıldız M (1999) DSM-IV Eksen I bozuklukları için yapılandırılmış klinik görüşmenin Türkçe'ye uyarlanması ve güvenilirlik çalışması. İlaç ve Tedavi Dergisi 12:233-6.

Reitan RM (1958) Validity of the Trailmaking Test as an indicator oforganic brain damage. Percept Mot Skills 8:271-6.

Swanson JW, Holzer CE, Ganju VK et al (1990) Violence and psychiatric disorder in the community: Evidence from the Epidemiological Catchment Area surveys. Hosp Community Psychiatry 41:761-70.

Taylor PJ, Gunn JC (1998) Homicides by people with mental illness: myth and reality. Br J Psychiatry 174:9-14.

Torrey F (1994) Violent behavior by individuals with serious mental illness. Hosp Community Psychiatry 45:653-62.

Tükel R, Gürvit H, Ertekin BA et al (2012) Neuropsychological function in obsessive-compulsive disorder. Compr Psychiatry 53:167-75.

Umut G, Altun ZÖ, Danışmant BS et al (2012) Bir eğitim hastanesinde yatarak tedavi gören şizofreni hastalarında tedavi uyumu, içgörü ve agresyon ilişkisi. Dusunen Adam 25:212-20.

Walsh E, Gilvarry C, Samele C et al (2004) Predicting violence in schizophrenia: A prospective study. Schizophr Res 67:247-52.

Weinberger DR, Berman KF, Zec RF (1986) Physiologic function of dorsolateral prefrontal cortex in schizophrenia. I. Regional cerebral blood flow evidence. Arch Gen Psychiatry 43:114-24.

Yen CF, Yeh ML, Chen CS et al (2002) Predictive value of insight for suicide, violence, hospitalization, and social adjustment for outpatients with schizophrenia: A prospective study. Compr Psychiatry 43:443-7.

Yeudall LT, Fromm-Auch D, Davies P (1982) Neuropsychological impairment of persistent delinquency. J Nerv Ment Dis 170:257-65.