

Cigarette Consumption and Related Factors in Schizophrenia, Schizoaffective Disorder and Delusional Disorder

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ABSTRACT

Cigarette consumption and related factors in schizophrenia, schizoaffective disorder and delusional disorder

Objective: The present study is designed to assess the rate of smoking and related factors in outpatients with schizophrenia, schizoaffective disorder and delusional disorder.

Methods: Medical records of 541 patients, diagnosed with schizophrenia, schizoaffective disorder and delusional disorder according to DSM-IV were examined retrospectively. Daily cigarette consumption, sociodemographic characteristics and medical data of the patients were evaluated. Logistic regression analysis was conducted to determine the factors associated with smoking. Correlation analysis was performed to assess factors related with daily cigarette consumption.

Results: Of the 541 patients, 242 (44.7%) were current smokers. Smoking rate was significantly higher in males. Although there were differences in sociodemographic characteristics and disorder related variables, there was no difference in smoking rates of patients with schizophrenia, schizoaffective disorder, and delusional disorder. In logistic regression analysis it was shown that smoking was associated with male gender and violent behavior after illness onset in psychotic disorders. Correlation analysis showed that mean number of daily consumed cigarettes correlated moderately with the duration of the illness.

Conclusions: In the study, similar smoking rates were found between psychotic disorders. Smoking is strongly related with male gender and violent behavior after onset of illness. The relation between smoking and violent behavior emerges as a new field deserving further investigation.

Keywords: Delusional disorder, psychotic disorders, schizoaffective disorder, schizophrenia, smoking



ÖZET

Şizofreni, şizoaffektif bozukluk ve sanrılı bozuklukta sigara tüketimi ve ilişkili etmenler

Amaç: Bu çalışmada ayaktan tedavi gören şizofreni, şizoaffektif bozukluk ve sanrılı bozukluk hastalarında sigara kullanma sıklığını ve bununla ilişkili etmenleri belirlemek amaçlanmıştır.

Yöntem: DSM-IV'e göre şizofreni, şizoaffektif bozukluk ve sanrılı bozukluk tanısı alan 541 hastanın dosyası geriye dönük olarak incelendi. Hastaların günlük sigara kullanma miktarı, nüfus özellikleri ve hastalıklarıyla ilişkili dosya verileri değerlendirildi. Sigara içimiyle ilişkili etmenleri belirlemek için lojistik regresyon, günlük sigara tüketimi miktarıyla ilişkili etmenleri araştırmak için korelasyon analizi kullanıldı.

Bulgular: Çalışmaya dahil edilen 541 hastanın %44.7'sinin (n=242) düzenli olarak sigara kullandığı belirlendi. Erkeklerin sigara kullanma oranı kadınlarınkinden anlamlı derecede yüksekti. Şizofreni, şizoaffektif bozukluk ve sanrılı bozukluk hastalarında çalışmada ele alınan nüfus özellikleri ve hastalıklarıyla ilişkili değişkenler açısından farklılıklar olmasına rağmen, sigara içimi sıklığı bakımından fark saptanmadı. Lojistik regresyon analizi uygulandığında psikotik bozukluklarda sigara kullanımının, erkek cinsiyet ve hastalandıktan sonraki şiddet davranışı ile ilişkili olduğu saptandı. Günlük tüketilen ortalama sigara sayısının ise hastalık süresiyle orta derecede pozitif bağlantılı olduğu bulundu.

Sonuç: Çalışmada psikotik bozukluklarda sigara kullanma oranları birbirine benzer bulunmuştur. Sigara kullanımı ile erkek cinsiyet ve hastalandıktan sonraki şiddet davranışı arasında kuvvetli bir ilişki olduğu görülmektedir. Şiddet davranışı ve sigara içimi arasındaki ilişki daha fazla incelenmeye değer yeni bir alan olarak belirmektedir.

Anahtar kelimeler: Sanrılı bozukluk, psikotik bozukluklar, şizoaffektif bozukluk, şizofreni, sigara içme

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INTRODUCTION

Epidemiological studies suggest that people with mental illness smoke at a higher rate than the rest of the society. Of the people with mental illnesses, 41% smoke, this rate is almost twice the prevalence reported for the general public (1).

Many opinions have been proposed to explain the link between mental illness and smoking. Among the most discussed ones are: (i) common environmental factors such as stress, that increase the onset of symptoms of mental illnesses and smoking; (ii) An effort to self medicate mental illness symptoms, drug side effects, and cognitive impairments via smoking; and (iii) the presence of common genetic factors predisposing to the mental illness and cigarette smoking (2). Smoking may be also a way of coping with boredom and loneliness resulting from deterioration of social and occupational functioning (3). Most frequently reported factors by smokers, as the cause of smoking are: it is stimulating or calming/relaxing; it helps to forget about problems, to cope with everyday problems; its socializing effect; and addiction (4,5). Patients with schizophrenia have also stated that the most common cause of smoking are its pleasing and anxiety relieving effects (6).

The assumption of self-medication is among the most studied topics in the context of smoking and psychotic disorders. Nicotine, by binding to nACh (nicotinic acetylcholine) receptors, facilitates the transmission of dopamine and GABA (gamma aminobutyric acid) in various brain regions such as the prefrontal cortex, thalamus, ventral tegmental area, and nucleus accumbens (7). Through these effects, it is reported that improvement is observed in negative symptoms, cognitive deficits in working memory, processing speed, attention areas in schizophrenia patients (8-12). Nicotine has also been shown to alleviate extrapyramidal symptoms caused by neuroleptics (13,14). Less akathisia has been reported in smokers (15). Atypical antipsychotics with a similar mechanism of action have also been shown to reduce smoking in schizophrenic patients (16).

Smoking improves sensory gating deficit measured

by P50 in patients with schizophrenia (17). P50 abnormalities are less pronounced in smokers with schizophrenia than non-smoker patients (18).

Genetic abnormalities related to the hippocampal α -7 nACh receptor have also been identified in schizophrenia (19). The α -7nACh receptor is less sensitive to nicotine than other nicotinic receptors, and by smoking, schizophrenic patients may be trying to activate this receptor (20).

Smoking or nicotine dependence in our country has been studied in various psychiatric patients. Smoking rates in schizophrenia patients have been reported to be 50-67% in outpatients, 57.5% in outpatients and inpatients, and 72.3% in inpatients (21-25). In another study involving schizophrenia, bipolar disorder and depression inpatients, the smoking rate was found as 70% (26). In another study assessing nicotine dependence in psychiatric outpatients, schizophrenia and schizoaffective disorder patients had lower smoking rate than bipolar mood disorder patients, but schizophrenia and schizoaffective disorder patients were in the first row in terms of number of daily smoked cigarette (27). We have not found any study examining all three psychotic disorders (schizophrenia, schizoaffective disorder, and delusional disorder). Smoking-related data in these disorders may provide new perspectives on nicotine-psychosis relation. In this study it was aimed to: (i) determine the rate of smoking in outpatient psychotic disorder patients, (ii) determine the factors affecting smoking and inter-group differences in these patients.

METHOD

Medical records of the patients who admitted to the psychotic disorders outpatient clinic of Kocaeli University Faculty of Medicine, Psychiatry Department were evaluated retrospectively for the past 5 years. The assessment was based on medical records. Data of 541 patients who were diagnosed with schizophrenia, schizoaffective disorder and delusional disorder according to DSM-IV out of 615 outpatients with psychotic disorder (28) were included in the study. Seventy-four patients who were diagnosed with

psychotic disorder due to another medical condition, substance-induced psychotic disorder, brief psychotic disorder, other psychotic disorder, and schizophreniform disorder were excluded from the study.

Measures

Sociodemographic characteristics including gender, age, education, marital status, average monthly income (as monthly income per person in the family); disorder related features including age of onset, duration, total number and duration of hospitalizations of patients with schizophrenia, schizoaffective disorder and delusional disorder were taken into account. Physical violence exercised at least once against a person or a property was considered as violence behaviour; an act that caused at least once judicial procedure was considered as criminal act; at least one attempt of suicide was considered as attempted suicide. Patients' daily smoked cigarettes were recorded as "average number of daily cigarettes smoked during the last six months" in their files. All data were recorded in line with the information received from both patients and their relatives.

Statistical Analysis

Statistical evaluations were done with SPSS 17.0 software package. Data were at first presented as percentages and mean±standard deviation (mean±SD). The t test was used to compare continuous variables, and the Chi square test was used to compare categorical and proportional variables. Logistic regression analysis was used to determine the factors associated with smoking. Variables that were statistically significant in univariate analyzes were included in the logistic regression analysis. Correlation analysis (Pearson's correlation analysis) was used to investigate factors associated with daily cigarette consumption. The statistical significance level was accepted as $p \leq 0.05$.

RESULTS

Of the 541 patients included in the study, 77.4% (n=419) were diagnosed with schizophrenia, 14.8%

(n=80) with delusional disorder, and 7.8% (n=42) with schizoaffective disorder. The group was composed of 69.9% male (n=324) and 40.1% female (n=217) patients. The mean age of the group was 35.5 years (SD=11.21, range=17-70) and the mean duration of the education was 8.93 years (SD=3.79). Of the patients, 23.5% (n=127) were married, 44.7% (n=242) were smokers and 55.3% (n=299) were non-smokers. Smoking rate was 53.1% in men; 32.3% in women. Smoking rate of men was significantly higher than women ($\chi^2=22.805$; df=1; $p < 0.001$).

The three groups of patients were compared in terms of demographics and disease-related variables. There were differences between patients who were diagnosed with schizophrenia and schizoaffective disorder in terms of demographics, whereas the disease-related variables and smoking patterns (frequency and quantity) were not different ($\chi^2=0.000$; df=1; $p=0.989$; $t=-0.609$; df=459; $p=0.543$). There was no difference between the patients who were diagnosed with schizophrenia and delusional disorder in the mean number of cigarettes consumed per day and the frequency of smoking ($t=1.694$; df=1; $p=0.091$; $\chi^2=0.456$; df=1; $p=0.500$). Similarly, there was no difference between the patients who were diagnosed with schizoaffective disorder and delusional disorder in the number of cigarettes consumed per day and the frequency of smoking ($\chi^2=0.179$; df=1; $p=0.672$; $t=1.778$; df=120; $p=0.078$).

Smoker and non-smoker patients in each disease group were compared in terms of sociodemographic and disease-related variables. When only the patients who were diagnosed with schizophrenia were evaluated, the rate of smokers in males was higher than that of females (52.5% vs 33.5%, $\chi^2=14.25$; df=1; $p < 0.001$). There was no difference between smokers and non-smokers in terms of the sociodemographic and disease-related variables studied in the study (Tables 1 and 2).

In the comparison regarding the antipsychotic drug groups used by schizophrenia patients, smoking rate was lower in typical antipsychotic users than in atypical, atypical+typical, and clozapine users ($\chi^2=9.53$; df=3; $p=0.023$). There was no statistically significant difference between atypical,

Table 1: Comparison of smoker and non-smoker patients with schizophrenia, schizoaffective disorder and delusional disorder in terms of sociodemographic characteristics

Characteristics	Schizophrenia (n=419)						Schizoaffective Disorder (n=42)						Delusional Disorder (n=80)									
	Smokers (n=190)			Non-smokers (n=229)			Smokers (n=19)			Non-smokers (n=23)			Smokers (n=33)			Non-smokers (n=47)						
	Mean	SD	%	n	df	p	Mean	SD	%	n	df	p	Mean	SD	%	n	df	p				
Age	34.38	10.33	34.92	11.71	0.503	415	0.615	32.58	9.51	37.22	10.71	1.468	40	0.150	41.61	11.26	39.02	11.24	-1.011	78	0.315	
Gender																						
Female	53	33.5	105	66.5	14.25	1	<0.001	7	30.4	16	69.6	4.497	1	0.034	10	27.8	26	72.2	4.902	1	0.027	
Male	137	52.5	124	47.5				12	63.2	7	36.8			23	52.3	21	47.7					
Marital status																						
Married	35	47.3	39	52.7	0.138	1	0.710	3	23.1	10	76.9	3.372	1	0.063	18	45.0	22	55.0	0.464	1	0.496	
Unmarried	155	44.9	190	55.1				16	55.2	13	44.8			15	37.5	25	62.5					
Education (year)	8.67	3.33	8.74	4.04	0.178	416	0.859	10.32	2.84	8.87	4.11	-1.295	40	0.203	8.97	4.11	10.17	4.00	1.305	78	0.196	
Income* (TL)	367.06	291.00	385.24	318.18	0.604	415	0.546	481.57	281.52	504.78	333.79	0.240	40	0.811	484.92	300.22	593.31	362.46	1.391	76	0.168	

*Monthly income per person in Turkish Liras, SD: Standard deviation, χ^2 : Chi square, t: t value, df: degree of freedom

Table 2: Comparison of smoker and non-smoker patients with schizophrenia, schizoaffective disorder and delusional disorder in terms of illness-related variables

Characteristics	Schizophrenia (n=419)						Schizoaffective Disorder (n=42)						Delusional Disorder (n=80)									
	Smokers (n=190)			Non-smokers (n=229)			Smokers (n=19)			Non-smokers (n=23)			Smokers (n=33)			Non-smokers (n=47)						
	Mean	SD	%	n	df	p	Mean	SD	%	n	df	p	Mean	SD	%	n	df	p				
Duration of illness (year)	9.78	7.92	10.91	9.01	1.338	411	0.182	8.42	7.42	7.42	10.65	0.806	40	0.425	7.43	5.71	6.95	6.99	-0.309	68	0.758	
Age at onset of illness	24.62	6.67	24.10	8.35	-0.702	411	0.483	24.26	7.17	26.78	10.22	0.905	40	0.371	34.69	11.85	32.40	11.15	-0.857	73	0.394	
Number of hospitalizations	1.90	2.38	1.57	2.31	-1.421	413	0.156	2.68	3.41	1.74	1.98	-1.120	40	0.270	0.84	0.95	0.46	0.75	-2.002	76	0.049	
Duration of hospitalization (day)	56.30	103.10	43.05	73.38	-1.511	405	0.132	76.68	102.90	48.26	68.19	-1.071	40	0.290	29.41	42.11	15.76	38.40	-1.483	76	0.142	
Antipsychotic treatment	2	1.1	2	0.9	9.53	3	0.023	-	-	-	1	4.3	0.402	2	0.818	-	-	1	2.1	0.175	1	0.676
No treatment	87	45.8	76	33.2				6	31.6	8	34.8			10	30.3	16	34.0					
Typical	82	43.2	125	54.6				12	6.2	12	52.2			23	69.7	30	63.9					
Atypical	11	5.8	9	3.9				1	5.2	2	(8.7			-	-	-	-					
Typical+Atypical Clozapin	8	4.2	17	7.4				-	-	-	-			-	-	-	-					
Violent behavior																						
Yes	142	74.7	160	69.9	0.909	1	0.340	17	89.5	13	56.5	5.536	1	0.019	28	84.8	24	51.1	10.598	1	<0.001	
No	48	25.3	69	30.1				2	10.5	10	43.5			5	15.2	23	48.9					
Criminal act																						
Yes	26	13.7	22	9.6	2.0333	1	0.154	2	10.5	2	8.7	0.040	1	0.841	6	18.0	6	12.8	0.472	1	0.492	
No	164	86.3	207	90.4				17	89.5	21	91.3			27	82.0	4	87.2					
Suicidal behavior																						
Yes	53	27.9	51	22.3	2.079	1	0.149	6	31.6	7	30.4	0.006	1	0.963	7	21.2	2	4.2			0.061*	
No	137	72.1	178	77.7				13	68.4	16	69.6			26	78.8	45	95.8					
BMI**	26.82	5.00	27.14	5.26	0.637	417	0.525	26.68	5.6	28.35	5.14	1.001	40	0.323	29.12	5.7	27.09	4.88	-1.711	78	0.91	

*: Fisher's test, BMI**: Body Mass Index, SD: Standard deviation, χ^2 : Chi square, t: t value, df: degree of freedom

Table 3: Results of the logistic regression analysis regarding the factors associated with smoking

Variable	Beta	Standard error	Wald	p	OR	95% CI (confidence interval)
Schizophrenia						
Male Gender	-0.830	0.198	11.662	<0.001*	0.436	0.296-0.643
Antipsychotics	-0.814	0.630	1.667	0.197	0.443	0.129-1.524
Schizoaffective Disorder						
Male Gender	-0.986	0.894	1.982	0.159	0.373	0.094-1.472
Violent behavior	-1.876	0.858	4.792	0.029*	0.153	0.028-0.822
Sanrılı Bozukluk						
Male Gender	-1.042	0.527	3.910	0.048*	0.353	0.126-0.991
Violent behavior	-1.746	0.626	7.781	0.005*	0.175	0.051-0.595
Number of hospitalizations	0.254	0.322	0.625	0.429	1.290	0.687-2.422
Entire Group of Psychosis						
Male Gender	-0.801	0.188	18.012	<0.001*	0.449	0.311-0.649
Violent behavior	-0.516	0.206	4.843	0.012*	0.597	0.399-0.894
Suicidal behavior	-0.399	0.217	3.384	0.066	0.671	0.439-1.026
Number of hospitalizations	-0.002	0.060	0.001	0.979	0.998	0.888-1.123
Duration of hospitalization	0.001	0.002	0.434	0.510	1.001	0.998-1.004

*: p<0.05, OR: Odds ratio

atypical+typical, and clozapine users in terms of smoking rates ($\chi^2=2.55$; $df=2$; $p=0.279$) (Table 2).

Logistic regression analysis (enter method) was applied to the schizophrenia group in order to reveal the determinants of smoking. Smoking was the dependent variable; gender and antipsychotic drug groups used by patients were the independent variables. When all schizophrenic patients were taken into account, it was found that male gender was associated with smoking (B=-0.830 standard error=0.198 OR=0.436; CI=0.296-0.643; $p<0.001$) (Table 3).

When the group of delusional disorder patients were analyzed separately, smoking rate of men was similarly, higher than women (52.3% versus 27.8%, $\chi^2=4.902$; $df=1$; $p=0.027$). The mean number of hospitalizations was higher in the smoker group ($t=-2.002$; $df=76$; $p=0.049$); the rate of violent behavior after illness onset was also higher in the smoker group ($\chi^2=10.598$; $df=1$; $p<0.001$) (Table 2). Patients with delusional disorder were on typical or atypical antipsychotics. There was no difference between the typical and atypical antipsychotics users ($\chi^2=0.175$; $df=1$; $p=0.676$) in the smoking rates (Table 2). In the logistic regression analysis in which smoking was the dependent variable and gender, number of hospitalizations, and violent behavior were

independent variables (B=-1.042, Standard error=0.527; OR=0.353; CI=0.126-0.991) smoking was found to be associated with male gender and violent behavior (for male gender B=-1.042 Standard error=0.527; OR=0.353; CI=0.126-0.991; $p=0.048$; for violent behavior B=-1.746 Standard error=0.626; OR=0.175; CI=0.051-0.595; $p=0.005$), but not with the number of hospitalizations in patients with delusional disorder (Table 3).

When the group of patients with schizoaffective disorder were analyzed separately, smoking rate of men was again, higher than women (63.2% versus 30.4%, $\chi^2=4.497$; $df=1$; $p=0.034$). The only difference between smokers and non-smokers in terms of sociodemographic and disease related variables was that, post-disease violence behavior were higher in smokers ($\chi^2=5.536$; $df=1$; $p=0.019$). Smoking rates were not different between antipsychotic drug groups ($\chi^2=0.402$; $df=2$; $p=0.818$) (Table 2). In the logistic regression analysis where smoking was the dependent variable and gender and violent behavior were independent variables, violent behavior was associated with regular smoking in patients with schizoaffective disorder (B=-1.876, standard error=0.858; OR=0.153, 95% CI=0.028 to 0.822; $p=0.029$) (Table 3).

When the characteristics of the smokers and

non-smokers of the entire study group were compared, the rate of smokers was higher in males ($\chi^2=22.50$, $df=1$; $p<0.001$), the number of hospitalization of the smokers was higher and the length of hospitalization of the smokers was significantly longer than that of non-smokers ($t=2.091$; $df=533$; $p=0.037$ and $t=2.012$; $df=410.9$; $p=0.045$, respectively). The rates of violent behavior and suicidal behavior were higher in smoker group ($\chi^2=7.91$; $df=1$; $p=0.005$ and $\chi^2=3.84$; $df=1$; $p=0.05$; respectively). There was no difference in smoking rates between antipsychotic medication groups ($\chi^2=6.54$; $df=3$; $p=0.88$). Logistic regression analysis (enter method) was applied to the entire group to reveal the determinants of smoking. In this analysis, smoking was the dependent variable; gender, number of hospitalizations, duration of hospitalization, violent behavior, and suicidal behavior were independent variables. It was determined that in psychotic disorders male gender ($B=-0.801$, standard error=0.188; $OR=0.449$; %95 $CI=0.311-0.649$; $p<0.001$), and post-disease-onset violent behavior ($B=-0.516$, standard error=0.206; $OR=0.597$; %95 $CI=0.399-0.894$; $p=0.012$), were more prominent than suicidal behavior, the number of hospitalizations, and duration of hospitalization in determining smoking habit (Table 3).

A correlation analysis was performed to determine the factors associated with the average number of cigarettes consumed per day. It was analyzed whether age, education, monthly income, age at onset of illness, duration of illness, total number of hospitalizations, and the duration of hospitalization correlated with the average number of cigarettes consumed per day. Average number of cigarettes consumed per day was moderately correlated with duration of illness; mildly correlated with total number of hospitalizations and the duration of hospitalization ($r=0.305$; $p<0.001$; $r=0.188$; $p=0.003$; $r=0.179$; $p=0.006$, respectively); but not correlated with other variables.

DISCUSSION

Smoking rates in our study were found as 45.3% in patients with schizophrenia; 45.2% in schizoaffective disorder; and 41.3% in delusional disorder patients.

Smoking rate in the entire study group is 44.7%. The rates determined in the study are much higher than the rate (27.4%) reported for Turkish society (29). Other studies conducted in Turkey also report rates close to our work. Uzun et al. (21) found a smoking rate of 50% in schizophrenic outpatients, and Uçok et al. (24) found as 57.5% in schizophrenic in/outpatients; Yildiz et al. (23) found smoking rate of 57%.

Smoking rates in the study group were found to be higher in males. Smokers were 53.1% of males; 32.3% of females. This difference also arises when the disease groups in the study are evaluated separately. It has been understood that male gender is a predictive factor in terms of smoking. Similarly, studies with schizophrenia patients report that cigarette use is associated to male gender (30-34). Smoking is also associated with male sex not only in people with schizophrenia but with other mental illnesses as well (35-37). Males have a higher smoking rate also in the general public sample (29). At this point, neurochemical factors may be considered in explaining the gender difference. Studies in healthy individuals without mental illness have found that the effects of nicotine on brain metabolism show gender-related differences (38). The determinants of smoking behavior differ between men and women: nicotine itself is rewarding for men when women are sensitized to non-nicotine stimuli (39,40). Men with nicotine dependence were found to have lower levels of striatal D2/D3 dopamine receptors, which may suggest that they are more susceptible to nicotine addiction (41).

Another gender difference in healthy people is the increase in nicotinic acetylcholine receptors containing the β_2 subunit (β_2^* -nAChRs) in brain, which is caused by smoking (42). β_2^* -nAChRs in the striatum, cortex and cerebellum of smokers are more than that of non-smokers. There is no such difference between smoker and non-smoker women. It is thought that female sex hormones particularly progesterone, which has an inhibitory effect on β_2^* -nAChRs may have role in this difference (42,43).

In a SPECT (single photon emission computerized tomography) study in which smokers with schizophrenia were compared with smokers without schizophrenia, β_2^* -nAChRs were found to be lower in

schizophrenic patients (44). The nACh receptor desensitization is necessary for restoration of nicotine withdrawal symptoms (45). In smokers with schizophrenia, low levels of $\beta 2^*$ -nAChRs may indicate that this mechanism cannot be exploited, and thus it may explain why nicotine dependence is seen higher in these people (44). There was no study evaluating nicotine-receptor interactions in terms of gender differences in patients with psychotic disorders. New studies that will address this issue will shed light on the reasons of gender differences in smoking in mental illnesses.

It has been reported that smoking is influenced by sociocultural factors in people with mental illness (46). In contrast to western societies, in countries where smoking of women is not culturally accepted, smoking among women with mental illness is found to be similar to women in the general population (33,36,47). Although smoking rates remain lower among women with mental illness, the rate of dependence among smoker women is higher in these societies (36). In our study, there were no such sociocultural factors related to smoking in women with psychotic disorders. The smoking rates in our study for the entire group and also for the disease groups are 2-3 times higher than that reported for women in the general public. Although smoking is associated with male gender in the study, psychotic disorder appears to increase the rate of smoking more in women.

Smoking rates in our study were not different in patients with schizophrenia, schizoaffective disorder, and delusional disorder. In a study evaluating psychotic disorders (schizophrenia spectrum, major depression, bipolar disorder and other psychotic disorders), also found similar rates of smoking in these disease groups, similar to our study. There was no difference between these rates after a 10-year follow-up (48). The hypothesis that people with a predisposition to schizophrenia have genetic predisposition to smoking (49) may also be applicable for other psychotic disorders. Genetic changes related to the hippocampal α -7 nACh receptor, which has been shown to be associated with smoking in schizophrenia patients, have also been observed in schizoaffective disorder-bipolar type patients (50). Although there is no such study on

delusional disorder patients, these findings may indicate a common biological trait in patients with schizophrenia, schizoaffective disorder, and delusional disorder.

One of the findings of the study is the association of smoking with the post-disease onset violent behavior. Post-disease onset violent behavior was found to be associated with smoking in patients with schizoaffective disorder and delusional disorder. A study examining the effects of smoking on mood, smoking has been reported to have a sedative effect on anger in women and on anger and sadness in men (51). Nicotine replacement has been shown to be effective in controlling agitation in smoking-dependent schizophrenia patients (52). It is thought that changes in stimulation of nACh receptors regulating anxiety and mood may play a role in the emergence of aggression-related behavioral situations (aggression, agitation, irritability) (53).

In our study, the average number of cigarettes consumed per day was found to be higher in the schizoaffective disorder group. The average number of cigarettes consumed per day is moderately correlated with the duration of the illness. This correlation may be explained by the increase in stress or negative symptoms with prolonged disease duration as well as by the presence of the depressive symptoms as proposed by Kotov et al. (48).

An important strength of this study is the fact that a high number of patients is compared, however there are some limitations of the study. Although it is aimed to maintain clear standards while keeping the records, since the records have been held by various people at different times, the results obtained are not free of the bias anticipated in such studies. The lack of a scale to determine whether the patients are nicotine dependent or not is a major limitation of the study. Besides, disease symptoms have not been evaluated. An analysis of the relationship between symptoms and smoking in different groups of psychotic disorders may contribute to clarifying the association between smoking and psychotic disorders. New studies that take into account these limitations will contribute to elucidating the relation between psychotic disorders and smoking.

In conclusion, the smoking rates in the study are higher than the general population. Smoking rates were not different in three groups of diseases (schizophrenia, schizoaffective disorder and delusional disorder) examined in the study. One of the interesting findings of the study is the relationship between smoking and the violent behavior after illness onset. In schizoaffective disorder and delusional disorder patients, violent behavior after illness onset is associated with smoking. When the entire group of psychosis was evaluated, it was determined that gender and violent behavior were related to smoking. The clarification of the effect of nicotinic agents on psychosis and violent behavior may be promising for new treatment options.

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Contribution Categories	Name of Author
Development of study idea	M.Y.
Methodological design of the study	M.Y.
Data acquisition and process	S.B.
Data analysis and interpretation	S.B., M.Y.
Literature review	S.B., M.Y.
Manuscript writing	S.B.
Manuscript review and revision	M.Y.

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