



The Relationship between Treatment Adherence and Antipsychotic Drug Side Effects and Sexual Dysfunction in Patients with Schizophrenia

Şizofreni Hastalarında Tedavi Uyumunun Antipsikotik İlaç Yan Etkileri ve Cinsel İşlev Sorunları ile İlişkisi

Deniz Kurtaran, Meral Kelleci

Psychiatric and Mental Health Nursing, Department of Nursing, Faculty of Health Sciences, Sivas Cumhuriyet University, Sivas, Turkey

Abstract

Aim: Treatment non-adherence remains a major challenge in schizophrenia and is strongly associated with relapse and poor clinical outcomes. This study aimed to investigate the relationship between antipsychotic drug side effects, sexual dysfunction, and treatment adherence among married outpatients with schizophrenia.

Material and Method: This descriptive and cross-sectional study was conducted with 70 patients receiving outpatient care in Sivas, Türkiye. Data were collected using the Personal Information Form, Morisky Medication Adherence Scale (MMAS), Liverpool University Neuroleptic Side Effect Rating Scale (LUNERS), and Arizona Sexual Experiences Scale (ASEX). Statistical analyses included correlation, independent samples t-test, Mann-Whitney U test, Kruskal-Wallis H test, Durbin-Watson test, and linear regression analysis.

Results: All participants reported at least one side effect, with psychological, extrapyramidal and hormonal effects being the most frequent. Moderate and low adherence rates were 64.3% and 27.1%, respectively. Sexual dysfunction was observed in both genders and was found to be significantly associated with decreased treatment adherence in females. ($r=-0.341$, $p<0.05$). Regression analysis showed that extrapyramidal and autonomic side effects were significant predictors of adherence ($R^2=0.637$, $p<0.05$).

Conclusion: It can be stated that medication side effects and sexual dysfunction in patients with schizophrenia receiving antipsychotic treatment may negatively affect treatment adherence. Targeted interventions focusing on side effect management may improve adherence and clinical outcomes

Keywords: Schizophrenia, antipsychotic drugs, side effects, treatment adherence, sexual dysfunction, psychiatric nursing

Öz

Amaç: Tedaviye uyumsuzluk, Şizofreni hastalarında önemli bir sorun olmaya devam etmekte olup, nöks ve olumsuz klinik sonuçlarla güçlü bir şekilde ilişkilidir. Bu çalışma, evli ayaktan tedavi gören şizofreni hastalarında antipsikotik ilaç yan etkileri, cinsel işlev bozukluğu ve tedaviye uyum arasındaki ilişkiyi incelemeyi amaçlamıştır.

Gereç ve Yöntem: Bu tanımlayıcı ve kesitsel çalışma, Sivas, Türkiye’de ayaktan tedavi gören 70 hasta ile gerçekleştirilmiştir. Veriler; Kişisel Bilgi Formu, Morisky İlaç Uyum Ölçeği (MMAS), Liverpool Üniversitesi Nöroleptik Yan Etki Derecelendirme Ölçeği (LUNERS) ve Arizona Cinsel Yaşantılar Ölçeği (ASEX) kullanılarak toplanmıştır. İstatistiksel analizlerde korelasyon analizi, bağımsız örneklem t-testi, Mann-Whitney U testi, Kruskal-Wallis H testi, Durbin-Watson testi ve doğrusal regresyon analizi kullanılmıştır.

Bulgular: Tüm katılımcılar en az bir yan etki bildirmiş olup, en sık görülen yan etkiler psikolojik, ekstrapiramidal ve hormonal etkiler olmuştur. Orta ve düşük düzeyde tedaviye uyum oranları sırasıyla %64,3 ve %27,1 olarak bulunmuştur. Cinsel işlev bozukluğu her iki cinsiyette de gözlenmiş ve kadınlarda tedaviye uyumun azalması ile arasında anlamlı düzeyde ilişkili bulunmuştur ($r=-0,341$, $p<0,05$). Regresyon analizi sonuçlarına göre, ekstrapiramidal ve otonom yan etkiler tedaviye uyumun anlamlı yordayıcılarıdır ($R^2=0,637$, $p<0,05$).

Sonuç: Antipsikotik tedavi gören şizofreni hastalarında ilaç yan etkileri ve cinsel işlev bozukluklarının, tedaviye uyumu olumsuz etkileyebileceği söylenebilir. Yan etkilerin yönetimine yönelik hedefe odaklı müdahaleler, tedaviye uyumu ve klinik sonuçları iyileştirebilir.

Anahtar Kelimeler: Şizofreni, antipsikotik ilaçlar, yan etkiler, tedaviye uyum, cinsel işlev bozukluğu, psikiyatri hemşireliği



INTRODUCTION

Schizophrenia is a severe psychiatric disorder characterized by impairments in thought, perception, emotion, and behavior. Due to its recurrent course and chronic nature, it significantly reduces individuals' quality of life and imposes a substantial burden on families and society.^[1,2] The lifetime prevalence of schizophrenia ranges between 1% and 1.4%, while its point prevalence varies between 0.21% and 0.7%.^[3] Approximately 80% of cases become chronic over the course of life, and various challenges arise during the treatment process.^[3,4] The effectiveness of treatment largely depends on patients' adherence to the prescribed therapeutic regimen. Treatment adherence is defined as the extent to which an individual follows the recommended medical treatment plan, whereas non-adherence includes not initiating treatment, discontinuing it prematurely, or failing to comply with the treatment protocol.^[5,6] Non-adherence increases the risk of relapse by approximately 3.7 times and is more prevalent among individuals with psychiatric disorders compared to those with physical illnesses. In psychotic disorders, this rate may reach up to 70–80%.^[5-7] Studies conducted among patients with schizophrenia have reported long-term non-adherence rates of approximately 25% and acute-phase rates of 51%.^[8,9] Üşenmez et al. (2022) and Üşenmez & Şanlı (2023) reported in their studies that approximately half of individuals diagnosed with schizophrenia demonstrated low adherence to treatment. However, in severe mental disorders such as schizophrenia that require long-term pharmacological treatment, non-adherence leads to early relapses, increased treatment costs, and reduced social functioning, thereby significantly diminishing the effectiveness of therapeutic interventions.^[8,10,11] Therefore, identifying and preventing the factors contributing to non-adherence is of critical importance in improving the success of the therapeutic process.^[6-8,11,12]

The assessment and management of sexual dysfunction associated with antipsychotic treatment may improve treatment adherence, reduce relapse rates and hospitalizations, and lower treatment costs by preventing related psychosocial problems. However, such issues are often insufficiently assessed by healthcare professionals and are frequently underreported by patients.^[13-16] Although limited, studies in the literature have examined the impact of sexual dysfunction on treatment adherence among individuals with schizophrenia receiving antipsychotic therapy, and these studies have consistently reported a negative effect on adherence.^[17-22] Determining the relationship between antipsychotic drug side effects, sexual dysfunction, and treatment adherence in individuals with schizophrenia may facilitate the development of more effective intervention programs aimed at improving adherence and preventing relapses. In line with their holistic care roles, psychiatric nurses have a

responsibility to ensure patients' adherence to treatment. In this context, identifying the barriers to treatment adherence is of critical importance.^[23] Therefore, the aim of this study was to examine the relationship between treatment adherence, antipsychotic drug side effects, and sexual dysfunction in patients with schizophrenia.

MATERIAL AND METHOD

Study Design

This study was designed as a descriptive and cross-sectional study.

Setting

This study was conducted with individuals diagnosed with schizophrenia who were receiving outpatient treatment at the Community Mental Health Center affiliated with the Sivas Provincial Health Directorate, the Psychiatry Outpatient Clinic of Numune Hospital, and the Psychiatry Outpatient Clinic of Sivas Cumhuriyet University Health Practice and Research Hospital. All interviews were conducted individually in designated interview rooms within these institutions.

Population and Sample

The population of the study consisted of 1,055 individuals diagnosed with schizophrenia who applied to the specified healthcare institutions within one year. Based on power analysis conducted in line with previous studies, the sample size was determined to be 70 patients, assuming a significance level of 5%, a standard deviation of 0.35, and an effect size of 0.15 (power=94.7%).^[24-26]

Inclusion Criteria

- Voluntary participation in the study
- Being between 18 and 65 years of age
- Having a diagnosis of schizophrenia according to DSM-5-TR criteria
- Being literate
- Being in the remission phase of the illness
- Being married

Exclusion Criteria

- Presence of comorbid psychiatric or physical illnesses
- Patients with sensory or cognitive impairments preventing effective communication

Data Collection Instruments

Personal Information Form: The Personal Information Form was developed by the researchers to assess participants' demographic characteristics, disease history, and treatment adherence status. The form consists of a total of 16 questions addressing age, gender, number of children, educational and employment status, economic level, family type, cohabitation status, illness duration, medications used, experience of side effects, and responses to these effects.^[14,26,27]

Morisky Medication Adherence Scale (MMAS): The Morisky Medication Adherence Scale was developed by Donald E. Morisky in 1986 to assess treatment adherence. The Turkish adaptation and validity study of the scale was conducted by Yilmaz (2004), and the Cronbach's alpha coefficient was reported as 0.63. The scale consists of four closed-ended (yes/no) questions. Responding "no" to all questions indicates high adherence (4 points), one or two "yes" responses indicate moderate adherence (2–3 points), and three or four "yes" responses indicate low adherence (0–1 point).^[38] In the present study, the scale was used to determine patients' levels of adherence to antipsychotic treatment. In the present study, the Cronbach's alpha coefficients were found to be 0.42.

Arizona Sexual Experiences Scale (ASEX): The Arizona Sexual Experiences Scale (ASEX) was developed by McGahuey et al. The scale consists of five items rated on a six-point Likert scale and includes separate forms for males and females. The Turkish validity and reliability study of the scale was conducted by Atilla Soykan in 2004. The Cronbach's alpha coefficients were reported as 0.89 for the male form and 0.90 for the female form. ROC analysis indicated that a cut-off score of 11 demonstrated good discriminative validity.^[33] In the present study, the Cronbach's alpha coefficients were found to be 0.87 for the male form and 0.88 for the female form.

Liverpool University Neuroleptic Side Effect Rating Scale (LUNSERS): The Liverpool University Neuroleptic Side Effect Rating Scale (LUNSERS) was developed by Day, Wood, Dewey, and Bentall in 1995. The Cronbach's alpha coefficient was reported as 0.89 in both the initial and subsequent administrations. The scale consists of 51 items across eight subdimensions: autonomic, extrapyramidal, anticholinergic, allergic, psychological, hormonal, general, and red herring (distractor) side effects. The total possible score ranges from 0 to 164 for females and from 0 to 156 for males. Total scores are classified according to the severity of side effects as follows: 0–7 indicates very mild, 8–27 mild, 28–58 moderate, 59–80 severe, and ≥ 80 very severe side effects.^[38] The Turkish validity and reliability study of the scale was conducted by Yilmaz and Buzlu in 2006, with a Cronbach's alpha coefficient of 0.89. In the present study, the Cronbach's alpha coefficients were found to be 0.81.

Data Collection Procedure

The study data were collected through face-to-face individual interviews. Participants were informed about the purpose of the study, and written informed consent was obtained. Interviews were conducted in a designated interview room with outpatients diagnosed with schizophrenia who met the inclusion criteria. Each interview lasted approximately 40–45 minutes. The Personal Information Form, Morisky Medication Adherence Scale, Liverpool University Neuroleptic Side Effect Rating Scale, and Arizona Sexual Experiences Scale were administered sequentially. During the administration of the LUNSERS, patients who were identified as unable to cope

with side effects or who scored 59 or above were referred to the institution's psychiatrist for medical support.

Statistical Analysis

The collected data were entered into SPSS for Windows version 22.0, and statistical analyses were performed under the supervision of a statistical expert. The analyses included frequency and percentage distributions, correlation analysis, the Durbin–Watson test, linear regression analysis, independent samples t-test, Kruskal–Wallis H test, Dunnett T3 post hoc test, and the Mann–Whitney U test.

Ethical Considerations

Ethical approval for the study was obtained from the Cumhuriyet University Health Sciences Research Ethics Committee, and written permissions were secured from the institutions where the data were collected. Written informed consent was obtained from all participants. The questionnaire was administered through face-to-face interviews, during which participants were informed about the aim and scope of the study. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Limitations of the Study

Since this study was conducted in an outpatient setting, it is difficult to generalize the findings to hospitalized patients who may have more severe conditions or different levels of side effects and treatment adherence. Therefore, the results may not fully reflect the characteristics of all individuals with schizophrenia. The self-report nature of the questions may also introduce bias in responses, which can be considered a limitation of the study. In addition, due to the cross-sectional design of the study, it is not possible to determine whether the findings would change over time. Another limitation is that the type of antipsychotic medications used was not assessed; therefore, potential differences in the severity of side effects across medication types could not be examined. Furthermore, the inclusion of only married individuals may limit the generalizability of the study findings.

RESULTS

Among the patients with schizophrenia, 51.4% were male, and 38.6% were in the 26–30 age group, with a mean age of 37.31 ± 8.72 years. A total of 55.7% of the patients were high school graduates, 2.9% had been married for 1–5 years, and 27.1% reported having no children. Additionally, 77.1% were unemployed, and 57.1% stated that their income was equal to their expenses. Regarding clinical characteristics, 67.1% of the patients reported being hospitalized once within the past year, and 58.6% had been using medication for 10 years or less. All patients reported experiencing side effects. When experiencing side effects, 52.9% of the patients reported informing their physician, 24.3% continued taking their medication despite side effects, and 22.9% discontinued their medication due to side effects.

Table 1. Descriptive and Disease-Related Characteristics of Schizophrenia Patients (n=70)

	n	%		n	%
Gender			Number of children		
Female	34	48.6	None	19	27.2
Male	36	51.4	1	18	25.7
Age			2	12	17.1
25 and under	16	22.8	3	9	12.9
26-30	27	38.6	4	12	17.1
31-35	21	30.0	Educational status		
41 and above	6	8.6	Literate	5	7.1
Duration of marriage			Elementary education	17	24.3
1-5 years	23	32.9	High school	39	55.7
6-10 years	18	25.7	Undergraduate	9	12.9
11-15 years	11	15.7	Working status		
16-27 years	18	25.7	Not working	54	77.1
Financial situation			Working	16	22.9
Moderate (Earnings equal to expenses)	40	57.1	Diagnosis period		
Poor (Earnings less than expenses)	24	34.3	10 years and under	37	52.9
High (Earnings exceed expenses)	6	8.6	10 years and above	33	47.1
Number of hospitalizations in the last year			Duration of medication		
1 time	47	67.1	10 years and under	37	58.6
2 times	19	27.1	10 years and above	33	41.4
3 times	2	2.9	Mental illness in the family		
4 times	2	2.9	Yes	36	52.5
Experience side effects			No	34	47.5
Yes	70	100			
No	0	-			
Response to side effects (Patient's statement)					
Tell your doctor				37	52.9
Stop taking the medication				17	24.3
Continue taking the medication				16	22.8
Variables (Average)				$\bar{x} \pm SD$	
Age				37.31±8.72	
Duration of marriage				10.95±7.66	
Average number of children				1.75±1.65	
Average diagnosis time				11.81±7.49	
Average duration of medication use				10.98±7.71	

Table 2. Distribution of Mean Scores Obtained from the Scales and Treatment Adherence Levels and Severity of Side Effects in Patients with Schizophrenia

Scale and Subscale	Min	Max	Mean	SD
Arizona Sexual Experiences Scale (Female)	15	30	20.88	5.63
Arizona Sexual Experiences Scale (Male)	11	27	16.19	4.57
Liverpool University Neuroleptic Side Effect Rating Scale Total	13	104	52.20	23.41
Extrapyramidal Side Effects Subscale	7	24	13.67	4.05
Anticholinergic Side Effects Subscale	0	10	3.53	2.56
Autonomic Side Effects Subscale	0	12	3.97	3.66
Allergic Side Effects Subscale	0	9	1.93	2.40
Psychological Side Effects Subscale	3	27	17.56	6.33
Hormonal Side Effects Subscale	0	20	7.07	5.58
General Side Effect Subscale	0	9	4.00	2.38
Redherring Effects Subscale	0	23	7.47	6.14
Morisky Treatment Adherence Scale Total	0	4	2.33	1.10
	n		%	
Treatment Compliance Level				
High treatment compliance	6		8.6	
Moderate treatment compliance	45		64.3	
Low treatment compliance	19		27.1	
Severity of Side Effects				
0-7 points very mild	0		0.0	
8-27 points mild	11		15.7	
28-58 points moderate	38		54.3	
59-80 points severe	12		17.1	
80 points and above very severe	9		12.9	

The mean score of the Arizona Sexual Experiences Scale (ASEX) was 20.88 ± 5.63 for female participants and 16.19 ± 4.57 for male participants, both exceeding the cut-off score of 11, indicating the presence of sexual dysfunction. The mean scores of the LUNSERS subscales were as follows: psychological side effects (17.56 ± 6.33), extrapyramidal side effects (13.67 ± 4.05), red herring effects (7.47 ± 6.14), and hormonal side effects (7.07 ± 5.58). The mean total LUNSERS score was 52.20 ± 23.41 , indicating that patients experienced side effects at a moderate level. The mean score of the Morisky Medication Adherence Scale (MMAS) was 2.33 ± 1.10 , reflecting a moderate level of treatment non-adherence. Among the patients, 64.3% had moderate adherence, while 27.1% demonstrated low adherence to treatment. In terms of side effect severity, 54.3% of the patients experienced moderate side effects, whereas 17.1% experienced severe side effects.

Table 3. Correlation Between ASEX, LUNSERS, and MMAS Scores in Patients with Schizophrenia

Scale and Sub-dimensions	Arizona Female		Arizona Male		
	p value*	r	p value*	R	
Total Morisky	0.048*	-0.341	0.750	0.055	
Side Effect Scale Total	0.009*	0.439	0.312	0.173	
Sub-dimensions	Extrapyramidal	0.040*	0.353	0.389	0.148
	Anticholinergic	0.001*	0.545	0.893	-0.023
	Autonomic	0.035*	0.363	0.233	0.204
	Allergic	0.388	-0.153	0.213	-0.213
	Psychological	0.296	0.185	0.436	0.134
	Hormonal	<0.001*	0.752	0.210	0.214
	General Side Effects	0.135	-0.262	0.140	0.251
	Red Herring Effects	0.044*	0.347	0.899	0.022

*p<0.05: Statistically significant, r: Pearson correlation, ASEX: Arizona Sexual Life Scale, LUNSERS: Liverpool University Neuroleptic Side Effect Rating Scale, MMAS: Morisky Medication Adherence Rating Scale

A weak but statistically significant negative correlation was found between the MMAS scores and the ASEX female form scores among patients with schizophrenia ($r=-0.341$, $p=0.048$). In addition, statistically significant positive correlations were identified between the ASEX female form scores and extrapyramidal side effects, anticholinergic side effects, autonomic side effects, hormonal side effects, red herring effects, as well as total LUNSERS scores ($p<0.05$).

The model explained approximately 79.8% of the variance in the dependent variable ($R^2=0.798$; adjusted $R^2=0.637$). Cohen's f^2 values ($f^2=3.950$; adjusted $f^2=1.755$) indicated a very large effect size for the model. At the variable level, the strongest predictor was extrapyramidal side effects, which showed a moderate negative effect ($r=-0.399$), followed by autonomic side effects with a small-to-moderate positive effect ($r=0.300$). Psychological side effects demonstrated a small effect at a borderline level of significance ($r=0.270$). The effects of the remaining variables were found to be small or negligible. These findings suggest that, in particular, extrapyramidal and autonomic side effects play a determining role in medication adherence from a clinical perspective. Furthermore, the results indicate that the current sample size is sufficient to demonstrate the explanatory power of the model.

DISCUSSION

The mean age of the patients included in the study was 37.31 (± 8.72) years, with 38.6% aged between 26 and 30 years. Of the participants, 51.4% were male, 77.1% were unemployed, and 57.1% had a moderate income level. In terms of clinical characteristics, 47.1% of the patients had been diagnosed for more than 10 years, and 41.4% were using medication.

Table 4. Results of Linear Regression Analysis for Predicting Morisky Medication Adherence Scale Scores

Variable	t	p	r	r ²	Effect Size	
Model Summary (n=70)						
	$R^2=0,798$	Düz. $R^2=0.637$	$f^2=3.950$	Düz. $f^2=1.755$	$F(16,53)=13.086$	$p<0.001$ Large
Model Overview (n=70, k=16)						
Constant	4.616	***	0.535	0.287	Large	
Arizona Sexual Experiences Scale (ASEX)						
Arizona Female	-0.969	ns	-0.132	0.017	Small	
Arizona Male	0.321	ns	0.044	0.002	Non-significant	
Extrapyramidal						
Extrapyramidal	-3.167	**	-0.399	0.159	Moderate	
Anticholinergic	-0.292	ns	-0.040	0.002	Non-significant	
Autonomic						
Autonomic	2.288	*	0.300	0.090	Small	
Alerjik	-0.721	ns	-0.099	0.010	Non-significant	
Psikolojik	2.038	~	0.270	0.073	Small	
Hormonal	0.458	ns	0.063	0.004	Non-significant	
Side Effect						
General Side Effect	-0.378	ns	-0.052	0.003	Non-significant	
Redherring Effects	0.310	ns	0.043	0.002	Non-significant	
Total Side Effects Scale	-1.021	ns	-0.139	0.019	Small	

Cohen (1988) criteria: $|r|<0.10$ =negligible; $0.10-0.29$ =small; $0.30-0.49$ =moderate; ≥ 0.50 =large. Model f^2 criteria: $f^2 \geq 0.35$ =large effect. The model's $f^2=3.950$ indicates a large effect size. *** $p<0.001$ ** $p<0.01$ * $p<0.05$ ~ $p<0.10$ ns=non-significant

Long disease duration and prolonged treatment processes may be associated with chronicity, side effects, treatment non-adherence, and a diminished belief in recovery.^[8,11,28,32,36] In the present study, 64.3% of the patients exhibited moderate adherence and 27.1% demonstrated low adherence, with non-adherence rates consistent with the existing literature. Treatment non-adherence in schizophrenia has been reported to reach up to 80% and is known to negatively affect both clinical prognosis and daily functioning.^[2,3,6,32] Dikeç and Kutlu (2014) reported a non-adherence rate of 85.1%, Yılmaz and Buzlu (2012) reported 43.6%, and Razali and Mzam (2014) reported 51%. These differences may be attributed to variations in measurement methods and sample characteristics. Medication side effects are among the most important factors influencing treatment adherence.^[23] Studies by Yılmaz and Buzlu (2012) and Sağlam (2017) have shown that side effects such as difficulty concentrating, fatigue, excessive sleep, and decreased sexual desire negatively affect adherence. Similarly, Gray et al. (2010) and Karow et al. (2007) reported that extrapyramidal symptoms, sedation, and sexual side effects significantly influence patients' well-being and adherence. Bağ (2011) reported a non-adherence rate of 81.25%, and several studies have demonstrated that long-term medication use contributes to non-adherence due to side effects.^[8,11,28,32,36] In this study, 54.3% of patients reported moderate side effects, while 17.1% reported severe side effects. In particular, side effects related to extrapyramidal, autonomic, and sexual dysfunction were found to be associated with poorer treatment adherence.

Notably, side effects related to extrapyramidal, autonomic, and sexual dysfunction were found to negatively affect treatment adherence. Sexual dysfunction is a significant adverse effect in psychiatric patients, leading to reduced quality of life and contributing to treatment non-adherence.^[8,11-12,18,32] The most common problems include decreased libido, erectile dysfunction, and orgasmic disorders in men, and reduced sexual desire, amenorrhea, and galactorrhea in women.^[4,15,19,37]

Antipsychotic-induced hyperprolactinemia has been strongly associated with sexual dysfunction in patients with schizophrenia. The prevalence of sexual dysfunction in this population has been reported to range between 30% and 80%.^[15,19,21,37] Abadal et al. (2016) reported that sexual dysfunction as a side effect of antipsychotic treatment occurs at similar rates in both men and women. In contrast, Hou et al. (2015), in a study involving 607 patients with schizophrenia, reported prevalence rates of 80.6% in women and 60.7% in men. Some studies have also indicated that these problems are more common among female patients.^[9,17] In the present study, sexual dysfunction was observed in both genders according to the Arizona Sexual Experiences Scale (ASEX); however, it was found to be more pronounced among women. This finding may be explained by the greater increase in prolactin levels associated with antipsychotic use in female patients. Elevated prolactin levels directly increase the likelihood of sexual dysfunction.^[11,15,19,32,37]

Sexual problems are more prevalent among female patients receiving antipsychotic treatment, and it has been reported that 91.3% of those with low sexual desire exhibit treatment non-adherence.^[31] In this study, a negative and significant correlation was found between MMAS and the female form of the ASEX scores, indicating that increased sexual dysfunction was associated with decreased treatment adherence. In addition, a significant relationship was observed in female patients between ASEX scores and hormonal, extrapyramidal, anticholinergic, and other side-effect scale scores. These side effects may be associated with increased sexual dysfunction, potentially due to women's greater sensitivity to bodily perceptions.

Lambert et al. reported in a sample of 213 patients with schizophrenia receiving typical antipsychotics that sexual dysfunction, extrapyramidal symptoms, and psychological side effects were more distressing than sedation and vegetative effects. Other studies have identified the most commonly reported side effects as drowsiness, dry mouth, difficulty concentrating, fatigue, and depression.^[30,31] Peluso et al. (2013) emphasized the importance of cardiovascular, sexual, and anticholinergic side effects, while Öztürk (2008) reported that psychological and anticholinergic side effects are among the most prevalent. Consistent with these findings, all patients in the present study experienced at least one side effect, with psychological, extrapyramidal and hormonal side effects being the most frequently observed. While Öztürk (2008) found no significant gender differences in side effects, Sağlam (2011) reported that hormonal side effects were significantly higher in women, whereas general side effects were more common in men. Yılmaz and Buzlu (2012) demonstrated that women experienced higher levels of extrapyramidal, autonomic and general side effects compared to men. In the present study, a significant difference was found between female gender and the total and subscale scores of the LUNSERS, particularly in EPS, anticholinergic, and hormonal side effects. This finding may be associated with the interaction of biological, hormonal, and psychosocial factors. It has been reported that a higher proportion of body fat in women, differences in drug metabolism, and hormonal variability may influence the pharmacokinetic and pharmacodynamic properties of antipsychotic medications. In particular, antipsychotics that affect prolactin levels may lead to more pronounced hormonal side effects in women. In addition, women's greater tendency to perceive, interpret, and report bodily symptoms may also contribute to higher side-effect reporting.^[27,29] Furthermore, the higher levels of hormonal and extrapyramidal side effects reported in women may have clinically important implications for treatment adherence. Antipsychotic-induced weight gain, menstrual irregularities, sexual dysfunction, and motor side effects may negatively affect individuals' quality of life and contribute to the development of negative attitudes toward medication use. In particular, female patients may evaluate such side effects more negatively in terms of social functioning, body image, and interpersonal relationships.

CONCLUSION

It was determined that all patients with schizophrenia experienced at least one side effect, with extrapyramidal and hormonal side effects being the most common. It was observed that the proportion of patients with high treatment adherence was very low, and an association was identified between increased side effects and decreased treatment adherence. It was also found that patients with schizophrenia experienced sexual dysfunction, and that this was particularly associated with treatment adherence in female patients. In light of these findings, it is recommended that psychiatric nurses primarily focus on treatment adherence, side effects, and sexual dysfunction in patients with schizophrenia. Furthermore, psychotherapeutic interventions aimed at eliminating the factors that reduce treatment adherence should be implemented and integrated into routine clinical care.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethical approval for the study was obtained from the Cumhuriyet University Non-interventional Clinical Research Ethics Committee (Date: 02.01.2019, Decision No: 2019-01/36).

Informed Consent: Written informed consent was obtained from all participants.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The author declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

- Öztürk O, Uluşahin A. Mental health and disorders. Ankara: Nobel; 2023.
- Townsend MC, Morgan KI. Concepts of care. Philadelphia: Davis; 2018.
- World Health Organization. Schizophrenia [Internet]. 2025 [cited 2026 Apr 18]. Available from: <https://www.who.int/news-room/fact-sheets/detail/schizophrenia>
- Kızılay P. Metabolic syndrome in schizophrenia [thesis]. Trabzon: Karadeniz Teknik Üniversitesi; 2015.
- Guo J, Lv X, Liu Y, et al. Medication adherence in schizophrenia. *Schizophr*. 2023;9:31.
- Shen Y, Wu X. Treatment adherence strategies. *Front Psychiatry*. 2026;17:1752130.
- Peluso MJ, Lewis SW, Barnes TRE, Jones PB. Side effects in schizophrenia. *Schizophr Res*. 2013;144:80–6.
- Dobber J, Latour C, de Haan L, et al. Medication adherence in patients with schizophrenia. *BMC Psychiatry*. 2018;18:135.
- Yılmaz S, Buzlu S. Side effects and adherence. *IÜ Hemşirelik Derg*. 2012;20(2):93–103.
- Park WY, Kim Y, Lee HL. Antipsychotic-induced sexual dysfunction. *World J Mens Health*. 2012;30(3):153–9.
- Sağlam E. Antipsychotic side effects and adherence [master's thesis]. Düzce: Düzce Üniversitesi; 2011.
- Cookson J, Hodgson R, Wildgust HJ. Prolactin, hyperprolactinaemia and antipsychotic treatment. *J Psychopharmacol*. 2012;26(5):42–5.
- Boer MK, Castelein S, Wiersma D, Schoevers RA, Knegtering H. The facts about sexual dysfunction in schizophrenia. *Schizophr Bull*. 2015;41(3):674–86.
- Abadal E, Del Cacho N, Saenz-Navarrete G, Arranz B, Cambra RM. How hyperprolactinemia affects sexual function in patients under antipsychotic treatment. *J Clin Psychopharmacol*. 2016;36(5):422–8.
- Doğu B, Güler J, Çıtak S, Altunkaynak Y, Alpay N. Şizofreni hastalarında cinsel yaşam. *Klinik Psikiyatri*. 2012;15:238–47.
- Kesebir S, Pırıldar Ş. Sexual function in schizophrenia. *Psikiyatri ve Klinik Psikofarmakoloji*. 2021;13(2):88–93.
- Kikuchi T, Iwamoto K, Sasada K, et al. Sexual dysfunction in schizophrenia. *Prog Neuropsychopharmacol Biol Psychiatry*. 2012;37:26–32.
- Kirino E. Prolactin and sexual dysfunction. *Ann Gen Psychiatry*. 2017;16:43.
- Korchia T, Achour V, Faugere M, et al. Sexual dysfunction in schizophrenia. *JAMA Psychiatry*. 2023;80(11):1110–20.
- Kuloğlu M, Ekinçi O. New antipsychotics and sexual dysfunction. *Klinik Psikiyatri*. 2015;11:191–9.
- Kumar SV. Sexual dysfunction and prolactin levels. *Indian J Psychiatry*. 2015;57:386–91.
- Lambert M, Conus P, Eide P, Mass R, Karow A. Side effects and adherence. *Eur Psychiatry*. 2004;19:415–22.
- Mahmoud SB, Zouari L, Dammak M, et al. Sexuality in chronic psychosis. *Sexologies*. 2013;22:59–63.
- Namlı Z, Karakuş G, Tamam L. Bipolar disorder and sexuality. *Psikiyatride Güncel Yaklaşımlar*. 2016;8(4):309–20.
- Hert M, Detraux J, Peuskens J. Antipsychotics and sexual dysfunction. *Expert Opin Drug Saf*. 2014;13(5):605–24.
- Dikeç G, Kutlu Y. Bir grup şizofreni hastasında tedaviye uyum ve etkileyen etmenlerin belirlenmesi. *J Psy Nurs*. 2014;5(3):143–8.
- Bağ N. Psikotik hastaların antipsikotik ilaç tedavisine uyumsuzluk hakkında görüşleri [master's thesis]. İstanbul: İstanbul Üniversitesi; 2011.
- Öztürk FM. Drug side effects in psychiatry [master's thesis]. İstanbul: Haliç Üniversitesi; 2008.
- Razali SM, Mzam Y. Adherence in schizophrenia. *East Asian Arch Psychiatry*. 2014;24:68–74.
- Sağlam D, Civil F, Tiryaki A, Özkorumak E. Antipsychotic side effects. *Türk Psikiyatri Derg*. 2017;28(1):11–6.
- Boardman G, McCann T, Kerr D. A peer support programme for enhancing adherence to oral antipsychotic medication in consumers with schizophrenia. *J Adv Nurs*. 2014;70(10):2293–302.
- Çetin M. Antipsikotik tedavinin hormonal yan etkileri. *Cerrahpaşa Tıp Fak Sürekli Tıp Eğitimi Etkinlikleri Sempozyum Dizisi*. 2008;66:61–71.
- Gray R, White J, Schulz M, Abderhalden C. Enhancing medication adherence. *Int J Ment Health Nurs*. 2010;19:36–44.
- Hou CL, Zang Y, Rosen RC, et al. Sexual dysfunction in schizophrenia. *Compr Psychiatry*. 2016;65:116–21.
- Karow A, Czekalla J, Dittmann RW, Schacht A. Compliance in schizophrenia. *J Clin Psychiatry*. 2007;68:75–80.
- Soykan A. Arizona sexual experiences scale. *Int J Impot Res*. 2004;16:531–4.
- Uslu E, Buldukoğlu K. Treatment adherence in schizophrenia. *Ankara Sağlık Bilimleri Derg*. 2018;7(1):61–72.
- Uzun S, Gürhan N. Motivational interviewing and adherence. *Euroasia Med Sci*. 2021;8(17):30–43.
- Yang JW, Yu K, Wang XQ, et al. Sexual needs in schizophrenia. *BMC Psychiatry*. 2023;23:147.
- Yılmaz S, Buzlu S. Liverpool side effect scale Turkish version. *Klin Psikofarmakol Bül*. 2006;16(3):147–54.
- Yıldırım Üşenmez T, Gültekin A, Erkan FM, Bayar BD, Can SY, Şanlı ME. The effect of mindfulness on medication adherence in individuals diagnosed with Schizophrenia: A cross-sectional study. *Perspect Psychiatr Care*. 2022;58:2585–91.
- Üşenmez TY, Şanlı ME. Effect of Negative Automatic Thoughts on Medication Adherence in Individuals With Schizophrenia. *Psychiatric Annals*. 2023;53(11):518–24.