

THE EFFECTS OF ILLNESS PERCEPTION ON IMMUNOSUPPRESSIVE MEDICATION ADHERENCE IN PATIENTS UNDERGOING LIVER TRANSPLANTATION

Tülay Kılınç, Atatürk University, Faculty of Nursing, Department of Surgical Nursing, Erzurum, Türkiye
Zühal Yetiş Demir, Atatürk University Health Practice and Research Hospital, Organ Transplantation Clinic, Erzurum, Türkiye

Corresponding Author : Tülay Kılınç, tlyhmsre@hotmail.com

Citation: Kılınç, T., & Yetiş Demir, Z. (2026). The effects of illness perception on immunosuppressive medication adherence in patients undergoing liver transplantation. *Journal of İnönü University Health Services Vocational School*, 14(1), 115–126.

doi 10.33715/inonusaglik.1756637

Received: August 01, 2025 / **Accepted:** October 27, 2025

Abstract

Illness perception directly impacts illness-related problems, coping with the current condition, emotions and thoughts, and adherence to therapy. The current work aimed to identify the effects of illness perception on immunosuppressive medication adherence in patients who had undergone liver transplantation. A descriptive correlational study was conducted between October 2024 and March 2025 at the organ transplantation outpatient clinic of a university hospital in eastern Türkiye. The study included 125 liver transplant patients. The Patient Information Form, Brief Illness Perception Questionnaire (BIPQ), and Immunosuppressive Medication Adherence Scale (IMAS) were used to collect data. The data were evaluated using descriptive statistics (percentages, means, counts), ANOVA, t-test, simple linear regression, and Pearson's correlation analysis. The study determined that patients who had a living-donor transplant and perceived their general health condition as moderate had high illness-perception scores and high mean scores on illness-perception subdimensions. Patients whose living donors were their parents, and patients for whom one year had passed since transplantation, had high cognitive illness perception; the latter group also had higher mean BIPQ scores ($p < 0.05$). The mean BIPQ score was 19.97 ± 10.19 , whereas the mean IMAS score was 47.34 ± 4.85 . Illness perception had a statistically significant negative impact on adherence to immunosuppressive therapy ($\beta = -0.244$, $p < 0.05$). Some clinical characteristics were found to affect patients' illness perception. Patients demonstrated a positive illness perception and high adherence to immunosuppressive therapy. Immunosuppressive therapy adherence was found to increase in patients with a positive illness perception.

Keywords: Liver transplantation, Illness perception, Medication adherence, Nurse

INTRODUCTION

Liver transplantation is the most effective treatment for end-stage liver failure that does not respond to medical treatment (Köken, Karahan, Sezer & Abbasoğlu, 2020). In recent years, advancements in early diagnosis, referral, and surgical techniques, as well as developments in organ storage, donor and recipient selection, pre-, intra-, and post-transplant care for donors and recipients, and postoperative complication management, have improved transplantation success rates (Altınbaş, 2017). Furthermore, regular follow-up and adherence to immunosuppressive therapy after successful transplantation have considerably improved the preservation of graft function, patients' quality of life, and survival rates (Özdemir & Talas, 2017). Despite a successful transplantation, patients must cope with post-transplant life and role changes, adverse side effects of treatment, social isolation, organ rejection, and complications such as infection (Yıldız, 2021). Organ transplantation is not only a physical experience but is also affected by numerous psychosocial factors, including illness perception, anxiety, and depression. Illness perception is a significant factor in predicting patients' adherence to the post-transplant process (Kartal, Karakaş & Kapıkıran, 2023; Tıǧlı, Ayvazoǧlu Soy, Aytar, Moray & Haberal, 2023).

Illness perception involves positive and negative illness beliefs that may impact the ability to cope with the illness, manage the illness, or perceive it as threatening (Sawyer, Harris & Koenig, 2019). Illness perception, which refers to thoughts, ideas, and beliefs about the illness during the illness and recovery periods, represents behaviors and coping mechanisms of individuals (Kartal et al., 2023). A patient's perception of their illness and treatment plays an essential role in their health status and quality of life (Gurkova & Soosova, 2018). The literature reports that an individual's motivation and self-confidence in managing their illness, negative thoughts about treatment effectiveness, and their level of knowledge and perceptions of their illness are among the factors affecting medication adherence (Kılıç & Öz, 2025; Prakash, Lucas, Jayaraman, George & Gowri, 2025). Studies with different samples have revealed a significant association between illness perception and quality of life, functional recovery, and therapy adherence (Gündüz & Yılmaz Karabulutlu, 2016; Karagülle & Can Çiçek, 2020; Karataş, Özen, & Kutlutürkan, 2017; Oǧuz, Yetim, Yalçın, Ünalın & Çamcı, 2016). Adherence to immunosuppressive therapy after liver transplantation is the most effective way to preserve graft function, prolong survival, improve quality of life, and prevent complications (Özdemir & Talas, 2017; Sandwijk, Bemelman & Berg, 2013). Hence, it is essential to administer immunosuppressive medications to prevent immunological rejection of allografts after liver transplantation, at the doses and times prescribed by the physician (Rodríguez-Perálvarez, De La Mata, & Burroughs, 2014; Sarıgöl Ordin, Karayurt, Ertan, & Yıldız, 2018). The prolonged treatment duration and the high number of medications used make adherence to immunosuppressive therapy challenging (Köken et al., 2020; Özdemir & Talas, 2017). Jain et al. (2019) reported that non-adherence to immunosuppressive therapy was 16.5% among patients undergoing liver transplantation. Another study of liver transplant patients showed that one in ten deaths was associated with nonadherence to immunosuppressive medications (Lamba et al., 2012). It has been stated that various demographic characteristics, economic and medical factors, treatment-related factors (e.g., medication dose, frequency of use, and side effects), and behavioral factors, including the level of knowledge of the patient, their perception and comprehension, and beliefs about the illness and treatment affect immunosuppressive medication adherence (Jones & Serper, 2020). In summary, the immunosuppressive therapy process is complex and requires continuous self-management.

Illness perception, which is a modifiable factor, directly impacts illness-related problems, coping with the current condition, emotions and thoughts, and therapy adherence (Vélez-Vélez & Bosch, 2016; Zhao et al., 2022). A positive illness perception can facilitate patients' adaptation to their new lives. Moreover, a positive illness perception can eliminate medication non-adherence, a preventable problem (Tıǧlı et al., 2019). Patients with a negative illness perception recover more slowly in later stages than other patients (Karataş et al., 2017).

Therefore, it is essential to understand the predictive impact of illness perception on adherence to immunosuppressive therapy to improve outcomes after liver transplantation. Nurses can provide training and counseling to develop a positive illness perception and thus create better strategies for disease management, increase therapy adherence, and improve coping methods. The literature review found no studies on the impact of illness perception on medication adherence among patients following liver transplantation in Türkiye. This underscores the originality of the present study. This study was conducted to investigate the impact of illness perception on adherence to immunosuppressive medication in liver transplant patients.

Research Hypotheses

H1: Descriptive and clinical characteristics influence illness perception in liver transplant patients.

H2: Descriptive and clinical characteristics influence immunosuppressive medication adherence in liver transplant patients.

H3: Illness perception influences immunosuppressive medication adherence in liver transplant patients.

MATERIAL AND METHOD

Type of Research

This descriptive and correlational study was conducted at the organ transplantation outpatient clinic of a university hospital in eastern Türkiye. The research data were collected from patients who had undergone surgery in the Organ Transplantation Clinic of the relevant hospital and who presented to the Organ Transplantation Outpatient Clinic between October 2024 and March 2025.

Population and Sample of the Study

The study population comprised patients who were followed up after liver transplantation at the Organ Transplantation Outpatient Clinic of a university hospital in eastern Türkiye, and the sample included patients who met the inclusion criteria. The power analysis carried out using G*Power 3.1 calculated the required sample size to be 89, with an effect size of 0.50, $\alpha = 0.05$, and power = 0.80 (Çapık, 2014). The sample size was determined to be approximately 107 patients, representing a 20% increase to compensate for potential data loss. The study included 125 patients to reduce the margin of error and increase generalizability to the population. The study included patients who were over 18, in whom a minimum of 6 months had passed since liver transplantation, who did not experience any problems that would prevent communication, were not diagnosed with a psychiatric illness, and agreed to take part in the study.

Data Collection Tools

The Patient Information Form, the Brief Illness Perception Questionnaire, and the Immunosuppressive Medication Adherence Scale were used to collect the research data.

Patient Information Form

This form, developed by the researchers, contains 12 questions about sociodemographic and clinical characteristics, including age, sex, employment and marital status, chronic illness and smoking status, donor type, kinship with a living donor, time since transplantation, previous transplantation, and perceived general health status.

Brief Illness Perception Questionnaire (BIPQ)

Karataş et al. (2016) conducted the Turkish validity and reliability study of the scale developed by Broadbent et al. (2006). The Turkish version of the scale comprises seven items and an additional item addressing causal factors. Except for item 8, which addresses the causal factors of the illness, the remaining seven items are scored on a Likert scale ranging from 0 to 10. The scale comprises two sub-dimensions: cognitive illness perception (items 2, 3, and 6) and emotional illness perception (items 1, 4, 5, and 7). Items 2, 3, and 6 are reverse-scored when calculating the scale score. A score between 0 and 70 can be obtained on the scale. A high score indicates that the illness poses a greater threat to patients and that illness perception is associated with negative reactions. Cronbach's alpha for the scale was 0.85 (Karataş et al., 2016). Cronbach's alpha was 0.82 in the present study.

Immunosuppressive Medication Adherence Scale (IMAS)

The scale developed by Köken et al. (2019) was designed to assess patients' adherence to immunosuppressive therapy after solid-organ transplantation. The scale can be administered to patients in whom a minimum of two months has passed since solid organ transplantation. The scale comprises 11 items and is unidimensional. A 5-point Likert-type

rating (never, rarely, sometimes, often, and always) is used for items 1–8, while a 2-point Likert-type rating (yes, no) is used for items 9–11. The scale includes positive statements (items 4 and 6) and negative statements (items 1, 2, 3, 5, 7, 8, 9, 10, and 11). Positive statements are scored from 1 to 5, whereas negative statements are scored from 5 to 1. Concerning ‘yes/no’ items, a ‘yes’ answer is assigned 1 point, whereas a ‘no’ answer is assigned 5 points. The lowest score on the scale is 11, while the highest one is 55. Medication adherence increases with higher scores on the scale and decreases with lower scores. Cronbach’s alpha coefficient was determined to be 0.61 (Köken et al., 2019). Cronbach’s alpha coefficient was 0.74 in the current work.

Data Collection

Research data were collected through face-to-face interviews conducted between October 2024 and March 2025. The researcher informed patients about the study, obtained patients’ verbal and written consent, and then administered the survey and scales, recording responses. Each interview lasted about 10-15 minutes.

Data Analysis

The research data were analyzed using the SPSS 21 software package (Statistical Package for the Social Sciences). The normality of the variables was evaluated. The data were analyzed using descriptive statistics (percentages, means, counts), ANOVA, and t-tests. Pearson’s correlation and regression analyses were conducted to assess the relationship between illness perception and adherence to immunosuppressive medication. The reliability of the measurements was assessed using Cronbach’s alpha. All results were interpreted at a significance level of $p < 0.05$.

Limitations of the Study

The current work is the first study to assess the impact of illness perception on adherence to immunosuppressive therapy in patients undergoing liver transplantation. However, the study has some limitations. First, because the study included patients who underwent liver transplantation at a single center, the generalizability of the findings was low. The study is limited to measurements collected in the study and to the participants’ self-reports. More comprehensive studies are needed to assess and better understand the correlation between illness perception and adherence to immunosuppressive therapy in patients undergoing liver transplantation.

Ethical Aspects of the Research

Prior to the study, approval was acquired from the Ethics Committee of the Faculty of Medicine of Atatürk University (Date: 27.09.2024, Decision No: 6/22). Written permission was received from the institution where the work would be carried out for data collection. All patients included in before data collection, research participants were informed about the purpose and importance of the study, and their written and verbal consent was obtained. Volunteer patients were enrolled in the study, and their personally identifiable information was kept confidential. The study was conducted in accordance with the Declaration of Helsinki.

RESULT

According to the study results, the patients' mean age was 49.03 ± 16.14 years. Among the patients, 53.6% were male; 80.0% were married; 50.4% had completed primary school; 72.8% were unemployed; 72.0% had no chronic illness; and 95.2% were non-smokers. No statistically significant differences in total scale mean scores were observed across patients' descriptive characteristics ($p > 0.05$; Table 1).

Table 1. Comparing Patients' Descriptive Characteristics and the Brief Illness Perception Questionnaire and Its Sub-dimensions and the Immunosuppressive Medication Adherence Scale Mean Scores (N=125)

Variables	n	%	Cognitive Illness Perception $\bar{X} \pm SD$	Emotional Illness Perception $\bar{X} \pm SD$	BIPQ $\bar{X} \pm SD$	IMAS $\bar{X} \pm SD$
Age ($\bar{X} \pm SD$): 49.03±16.14 (Min ±Max: 19-76)						
Sex						
Female	58	46.4	5.17±4.16	16.37±7.54	21.55±10.69	47.03±5.31
Male	67	53.6	4.64±4.64	13.97±7.01	18.61±9.61	47.61±4.44
			t=0.668	t=1.849	t=1.619	t=-0.662
			p=0.505	p=0.067	p=0.108	p=0.509
Marital Status						
Married	100	80.0	4.64±4.49	14.51±6.97	19.15±9.78	47.53±4.44
Single	25	20.0	5.88±4.04	17.64±8.31	23.52±11.09	46.60±6.27
			t=-1.258	t=-1.967	t=-1.966	t=0.856
			p=0.211	p=0.051	p=0.052	p=0.394
Educational Status						
Literate	16	12.8	5.93±5.32	13.93±6.27	19.87±9.39	47.68±3.97
Primary school	63	50.4	4.79±3.62	16.19±7.10	20.98±9.48	47.44±4.87
High school	32	25.6	4.50±5.40	12.87±8.28	17.37±12.07	47.50±5.55
University	14	11.2	5.00±4.38	16.50±6.46	21.50±9.37	46.14±4.18
			F=0.390	F=1.782	F=1.005	F=0.327
			p=0.760	p=0.154	p=0.393	p=0.806
Employment Status						
Employed	34	27.2	4.58±4.17	15.00±5.57	19.58±8.33	47.14±3.71
Unemployed	91	72.8	5.00±4.52	15.12±7.92	20.12±10.84	47.41±5.23
			t=-0.462	t=-0.082	t=-0.259	t=-0.276
			p=0.645	p=0.935	p=0.796	p=0.783
Presence of another chronic illness						
Yes	35	28.0	5.88±4.49	13.80±7.89	19.68±9.86	47.54±5.40
No	90	72.0	4.50±4.35	15.58±7.08	20.08±10.36	47.26±4.65
			t=1.584	t=-1.227	t=-0.198	t=0.285
			p=0.116	p=0.222	p=0.844	p=0.776
Smoking						
Yes	6	4.8	5.50±2.58	17.66±5.04	23.16±5.87	47.83±3.81
No	119	95.2	4.85±4.49	14.95±7.42	19.81±10.35	47.31±4.91
			t=0.347	t=0.882	t=0.735	t=0.252
			p=0.730	p=0.380	p=0.434	p=0.801

BIPQ, Brief Illness Perception Questionnaire; IMAS, Immunosuppressive Medication Adherence Scale; \bar{X} , Means; SD, Standard Deviation; t, independent sample t-test; F, ANOVA

Among the patients, 55.2% had a cadaveric transplant; for 45.2% the donor was their child; 78.4% had undergone transplantation two or more years previously; 97.6% had not undergone transplantation previously; and 76% perceived their general health status as good. Patients who had a living donor transplant and perceived their general health status

as moderate had higher mean total BIPQ scores and mean scores on the Cognitive and Emotional Illness Perception subdimensions than the other groups; these differences were statistically significant ($p < 0.05$). Patients whose living donors were their parents had higher mean total scores on the Cognitive Illness Perception subdimension, and patients for whom one year had elapsed since transplantation had higher mean total scores on the Cognitive Illness Perception subdimension and on the BIPQ compared with other groups; these differences were statistically significant ($p < 0.05$, Table 2).

Table 2. Comparing Patients' Clinical Characteristics and the Brief Illness Perception Questionnaire and Its Subdimensions and the Immunosuppressive Medication Adherence Scale Mean Scores (N=125)

Variables	n	%	Cognitive Illness Perception $\bar{X} \pm SD$	Emotional Illness Perception $\bar{X} \pm SD$	BIPQ $\bar{X} \pm SD$	IMAS $\bar{X} \pm SD$
Donor Type						
Cadaver	69	55.2	4.14±4.04	13.69±7.44	17.84±9.81	47.97±4.26
Living	56	44.8	5.80±4.71	16.80±6.88	22.60±10.11	46.57±5.43
			t=-2.116	t=-2.400	t=-2.663	t=1.614
			p=0.036	p=0.018	p=0.009	p=0.109
Kinship with a living donor						
Sibling	22	35.5	5.45±3.87	15.86±5.83	21.31±8.52	44.77±5.43
Spouse	4	6.5	1.00±1.15	16.00±6.68	17.00±7.25	49.00±2.16
Child	28	45.2	5.21±4.45	16.53±7.15	21.75±10.60	47.67±5.29
Parent	8	12.9	9.50±5.83	20.00±9.36	29.50±11.98	48.25±4.86
			F=3.734	F=0.715	F=1.880	F=1.842
			p=0.016	p=0.547	p=0.143	p=0.150
Time elapsed since transplantation						
1 year	9	7.2	8.88±5.84	19.88±11.15	28.77±15.64	46.66±8.55
1-2 years	18	14.4	4.94±5.17	13.38±7.23	18.33±8.45	47.44±4.20
2 years and more	98	78.4	4.51±3.97	14.95±6.83	19.46±9.59	47.38±4.57
			F=4.263	F=2.483	F=3.883	F=0.094
			p=0.016	p=0.088	p=0.023	p=0.910
Previous transplant status						
Yes	3	2.4	6.33±1.52	18.33±4.93	24.66±4.72	48.33±3.51
No	122	97.6	4.85±4.46	15.00±7.38	19.86±10.27	47.31±4.88
			t=0.572	t=0.774	t=0.806	t=0.356
			p=0.568	p=0.440	p=0.422	p=0.722
Perception of general health status						
Good	95	76.0	3.70±3.74	12.92±5.51	16.63±7.53	47.13±4.65
Medium	30	24.0	8.63±4.35	21.93±8.22	30.56±10.36	48.00±5.47
			t=-6.040	t=-6.867	t=-8.026	t=-0.848
			p=0.000	p=0.000	p=0.000	p=0.398

BIPQ, Brief Illness Perception Questionnaire; IMAS, Immunosuppressive Medication Adherence Scale; \bar{X} , Means; SD, Standard Deviation; t, independent sample t-test; F, ANOVA; Bold values represent $p < 0.05$

The total BIPQ mean score was 19.97 ± 10.19 ; the Cognitive Illness Perception sub-dimension mean score was 4.88 ± 4.41 ; and the Emotional Illness Perception sub-dimension mean score was 15.08 ± 7.33 . The total IMAS mean score was 47.34 ± 4.85 (Table 3).

Table 3. Brief Illness Perception Questionnaire and Its Sub-dimensions and Immunosuppressive Medication Adherence Scale Mean Scores

Scales	Min-Max	$\bar{X} \pm SD$
Brief Illness Perception Questionnaire total score	2-50	19.97±10.19
Cognitive Illness Perception sub-dimension	0-20	4.88±4.41
Emotional Illness Perception sub-dimension	0-36	15.08±7.33
Immunosuppressive Medication Adherence Scale total score	25-55	47.34±4.85

\bar{X} , Means; SD, Standard Deviation

As shown in Table 4, a statistically significant, weak negative relationship was identified between the patients' BIPQ (and its sub-dimensions) and the IMAS ($p < 0.05$).

Table 4. The Relationship Between the Brief Illness Perception Questionnaire and Its Sub-dimensions and the Immunosuppressive Medication Adherence Scale

		Cognitive Illness Perception	Emotional Illness Perception	Brief Illness Perception
IMAS	r^a	-0.263	-0.181	-0.244
	p	0.003	0.044	0.006
	n	125	125	125

IMAS, Immunosuppressive Medication Adherence Scale; ^aPearson's Correlation Analysis; Bold values represent $p < 0.05$

Table 5 shows that the simple linear regression analysis examining the effects of patients' illness perception on immunosuppressive medication adherence was statistically significant ($F = 7.781$, $p = 0.006$). Patients' illness perceptions explain 5.9% of the total variance in adherence to immunosuppressive therapy. Based on the regression coefficient, illness perception was significantly negatively associated with adherence to immunosuppressive therapy ($\beta = -0.244$, $p < 0.05$). Consequently, patients' adherence scores for immunosuppressive therapy decreased as their illness perceptions increased. a positive illness perception increased adherence to immunosuppressive medication.

Table 5. Regression Analysis Between the Brief Illness Perception Questionnaire and the Immunosuppressive Medication Adherence Scale

Variables		B	Standard Error	Beta	t	p
Immunosuppressive Medication Adherence	(Constant)	49.664	0.933		53.234	0.000
	<u>Brief Illness Perception</u>	-0.116	0.042	-0.244	-2.789	0.006
		R=0.244	R ² = 0.059	F=7.781	p= 0.006	

DISCUSSION

It is necessary to examine, in patients undergoing liver transplantation, the effects of illness perception on their adherence to immunosuppressive medication in order to better understand, manage, and treat psychosocial problems in this patient population. Developing a positive illness perception may help increase medication adherence. No research has examined the impact of illness perceptions on adherence to immunosuppressive medication in patients undergoing liver transplantation.

The research identified that patients who underwent transplantation from a living donor had high illness-perception scores and high subdimension scores. Most donors require 3–6 to resume activities of daily living, and 6–12 for liver volume to return to normal (Weng et al., 2012). Studies have also indicated that although living donors can return to their normal lives, their health-related quality of life decreases shortly after surgery (Clemens et al., 2011; Maple,

Chilcot, Weinman & Mamode, 2017; Mjoen et al., 2011; Wirken et al., 2015). Some patients experience feelings of guilt toward the donor, which, according to Schulz et al. (2015), may lead to increased psychological stress and non-adherence. Gündüz et al. (2020) revealed that recipients felt responsible and indebted to the donor. Our research found that patients whose living donors were their parents had higher mean total scores for cognitive illness perception. Illness perceptions and cognitive status affect the patient's illness course and response to treatment. A patient receiving an organ from a family member may feel excessive gratitude, responsibility, and guilt toward the donor (Ceyhun & Kirpınar, 2019; Schulz & Kroencke, 2015). According to the literature and research results, the postoperative health status of the living donor—especially that of the parent donor—along with quality of life, the recovery process, and the recipient's feelings of guilt, may have caused a negative illness perception.

Illness perception directly affects the emotional response to the illness, therapy adherence, and functional well-being (Karataş et al., 2017). Evidence indicates that the way patients perceive their illness, rather than the objective symptoms of their physical health, significantly affects patient outcomes (Petrie, Jago & Devcich, 2007). Researchers have reported a correlation between illness perception and quality of life (Karagülle & Can Çiçek, 2020; Şahin, Uçak, Atamyıldız, Sönmez & Sözeri, 2024). Our research determined that patients who perceived their general health status as moderate had high illness perception and its subscales dimension scores.

The information from the literature and research findings support our results. These results suggest that patients' continuous medication use, medication side effects, and the uncertainty and duration of the process adversely affect their well-being and lead to a negative illness perception.

Patients for whom one year had passed since transplantation had higher illness perception and cognitive illness perception scores. An increase in the illness perception score indicates that an individual perceives the illness as having a greater impact and considers it more worrisome. After liver transplantation, some characteristics specific to the surgical procedure, initiation of immunosuppressive therapy, infections, and various biliary tract complications are considered sources of stress (Ünay et al., 2020). Studies conducted after transplantation have reported increased anxiety and depression, as well as psychosocial problems, in patients (Baghernezhad et al., 2018; Heo, Noh, Oh, Chun, M & Kim, 2018; Yıldız, 2021; Yıldız & Kılınç, 2021). Therefore, the emergence of a negative illness perception in the early post-transplantation period is to be expected. As time passes after transplantation, patients accept their current condition, develop greater belief in recovery, adhere to treatment, and therefore have a positive illness perception. In our study, some clinical characteristics of patients were found to affect the perception of illness; hypothesis H1 was confirmed, but hypothesis H2 was not.

This study revealed that patients' illness perception was low; in other words, patients had a positive illness perception. Contrary to other research findings, Demir et al. (2022) found that patients who underwent liver transplantation reported moderately negative illness perceptions. The study by Kartal et al. (2023) also reported similar results. This situation is considered to have arisen because Demir et al. (2022) included patients in whom at most 6 months had elapsed since transplantation, whereas Kartal et al. (2023) included patients in whom at most 2 years had elapsed since transplantation. A large number of patients in our study for whom more than 2 years had elapsed since transplantation may have affected the results, as patients adapted to the process over time. Illness perception, one of the conditions impacting the post-transplant process (Kartal et al., 2023), is a modifiable factor that represents a person's feelings and thoughts about their illness (Zhao et al., 2022). The close follow-up of patients and the provision of online or face-to-face counseling services at the center where the research was conducted may also have contributed positively to the aforementioned result.

The study revealed that adherence to immunosuppressive medication was high. Most participants in the study by Köken et al. (2020) exhibited high adherence to immunosuppressive medications. A review of the literature found similar results (Güneş, Kavak & Beyoğlu, 2024; Kayaoğlu & Demir, 2023). In contrast to the current study's findings, Becker et al. (2021) found that 49% of patients did not adhere to immunosuppressive medications. The non-adherence rate in the study by Shafiekhani et al. (2023) among liver transplant patients was 41%. In their study of liver transplant patients, Promraj et al. (2016) reported that medication adherence was 83–94% in the first six months after transplantation but declined to 40–60% after the sixth month. The change in the study results can be attributed to the sample's demographic characteristics, different measurement methods, one-on-one follow-up by nurses, and training of patients by postgraduate nurses after transplantation.

The study's regression analysis showed that patients' were negatively associated with adherence to immunosuppressive medication. Patients' immunosuppressive medication adherence scores decreased as their negative illness perception increased. Adherence to immunosuppressive therapy increased in patients with a positive illness perception. This result supports hypothesis H3. Despite numerous studies of medication adherence and its determinants in liver transplant patients, the impact of illness perception on adherence to immunosuppressive medication has not been investigated. In their study of heart, lung, and liver transplant recipients, Kung, Koschwanez, Painter, Honeyman & Broadbent (2012) found that patients' perceptions of transplantation and immunosuppressive medications were associated with non-adherence. Studies conducted in different patient groups have also revealed a relationship between illness perception and therapy adherence (Shakya et al., 2020; Zhao et al., 2022). The work by Yaraghchi et al. (2012) stated that a positive illness perception ensured that patients sought appropriate treatment and that their quality of life improved. In another study, it was reported that individuals' health perceptions affect health -related behaviors and adaptation to treatment (Küçük & Yapar, 2016). The literature highlights that improving illness perception may be beneficial in achieving perfect adherence to therapy (Shakya et al., 2020). The results described above are consistent with our findings. patients who understand their illness, are aware of their illness and treatment, and control their treatment have better medication adherence. Furthermore, this result may have been caused by the fact that individuals have increased beliefs in their recovery process after liver transplantation, feel stronger, and can participate in care more effectively.

CONCLUSION

The study determined that patients who had a living donor transplant, who perceived their general health status as moderate, and who were 1 year post-transplantation had high illness perception scores. Patients whose living donors were their parents had higher cognitive illness perceptions. Patients demonstrated a positive illness perception and high adherence to immunosuppressive medication. Illness perception had a statistically significant negative effect on adherence to immunosuppressive therapy. Immunosuppressive therapy adherence scores decreased as patients' illness perceptions became more negative. Immunosuppressive therapy adherence increased in patients with a positive illness perception. Illness perception may change over time, which directly impacts coping with the current condition and therapy adherence (Vélez-Vélez & Bosch, 2016). Nurses should evaluate the feelings, thoughts, and knowledge of patients undergoing liver transplantation and develop interventions that can change their illness perception. Liver transplant patients should receive individualized counseling and psychological support to improve immunosuppressive medication adherence by addressing the impact of illness perception. Patients should be educated about the importance of post-transplant medication use, about how and when to take medications, and about medication side effects, using various educational materials, seminars, and mobile applications. Furthermore, regular follow-up protocols should be established to monitor adherence to immunosuppressive medications and to support patients' adherence to treatment. A multidisciplinary approach should be adopted, and patients' motivation for treatment should be enhanced. It is thought that these interventions will improve illness perception and, therefore, adherence to therapy. Determining illness perception in patients who have undergone liver transplantation will inform the planning of nursing interventions that increase adherence to immunosuppressive therapy and guide interventional studies in this field. It is recommended that the findings of this original work be validated and that similar research be carried out with larger samples and across diverse cultures, with the objective of improving illness perception and adherence to immunosuppressive medication in transplant patients.

Ethics Committee Approval: Ethical approval was obtained from the Ethics Committee of the Faculty of Medicine of Atatürk University (Date: 27.09.2024, Decision No: 6/22).

Informed Consent: All patients included in before data collection, research participants were informed about the purpose and importance of the study, and their written and verbal consent was obtained. Volunteer patients were enrolled in the study, and their personally identifiable information was kept confidential.

Peer-review: Externally peer-reviewed.

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

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

REFERENCES

- Altınbaş, Y. (2017). Organ Transplantation Nursing. Çevik, C. & Özyürek, P. (Ed.), *Liver Transplantation and Nursing Care* (ss.149-162). İstanbul, Nobel Medical Bookstores.
- Baghernezhad, M., Mani, A., Ayoobzadehshirazi, A., Roozbeh, J., Zare, M., Nikeghbalian, S., ... Bazargan-Hejazi, S. (2018). Psychologic evaluation in liver transplantation: Assessment of psychologic profile of end-stage liver disease patients before and after transplant. *Experimental and Clinical Transplantation*, 18(3),339–44. <https://doi.org/10.6002/ect.2017.0135>.
- Becker, J.H., Shemesh, E., Shenoy, A., Posillico, A., Knight, C.S., Kim, S.K., ... Annunziato, R.A. (2021). The utility of a pre-transplant psychosocial evaluation in predicting post-liver transplant outcomes, *Progress in Transplantation*, 31(1),4-12. <https://doi.org/10.1177/1526924820978605>.
- Broadbent, E., Petrie, K.J., Main, J., & Weinman, J. (2006). The brief illness perception questionnaire. *Journal of Psychosomatic Research*, 60(6),631-637. <https://doi.org/10.1016/j.jpsychores.2005.10.020>.
- Ceyhun, H.A., & Kirpınar, I. (2019). Psychiatric diagnoses in patients with renal transplantation or dialysis made due to end stage renal disease. *Anatolian Journal of Psychiatry*, 20,426-435. DOI: 10.5455/apd.12474
- Clemens, K., Boudville, N., Dew, M.A., Geddes, C., Gill, J.S., & Jassal, V. (2011). The long-term quality of life of living kidney donors: a multicenter cohort study. *American Journal of Transplantation*, 11(3),463-469. <https://doi.org/10.1111/j.1600-6143.2010.03424.x>.
- Çapık, C. (2014). Statistical power analysis and it's use in nursing studies: basic information. *Anatolian Journal of Nursing and Health Sciences*, 17(4), 268-274.
- Demir, B., & Demir, İ. (2022). Effects of illness perception on self-care agency and hopelessness levels in liver transplant patients: A descriptive cross-sectional study. *Clinical Nursing Research*, 31(3),473-480. <https://doi.org/10.1177/10547738211036983>.
- Gurkova, E., & Soosova, M.S. (2018). Illness cognitions and health-related quality of life of patients with inflammatory bowel disease. *Gastroenterol Nurs*, 41(1),29-37. DOI: 10.1097/SGA.0000000000000309.
- Gündüz, E., & Akyolcu, N. (2020). Psychosocial experiences of kidney transplant patients: a qualitative research. *Current Approaches in Psychiatry*, 12(Suppl 1),204-218. <https://doi.org/10.18863/pgy.774117>
- Gündüz, F., & Yılmaz Karabulutlu, E. (2016). The assess of illness perception, psychosocial adjustment and glycemic control in Type II Diabetic Mellitus patients. *Anatolian Journal of Nursing and Health Sciences*, 19(2),106-115. <https://doi.org/10.17049/ahsbd.51708>
- Güneş, H., Kavak, M., & Beyoğlu, S. (2024). The effect of fear of Covid-19 on immunosuppressive treatment compliance in patients with liver transplantation. *Celal Bayar University Journal of Institute of Health Sciences Journal*, 11(3),401-408. <https://doi.org/10.34087/cbusbed.1470879>.
- Heo, J., Noh, O.K., Oh, Y.T., Chun, M., & Kim, L. (2018). Psychiatric comorbidities among patients undergoing liver transplantation in South Korea: A nationwide population-based study. *Hepatology International*, 12(2),174-180. <https://doi.org/10.1007/s12072-018-9849-y>.
- Jain, M., Venkataraman, J., Reddy, M.S., & Rela, M. (2019). Determinants of medication adherence in liver transplant recipients. *Journal of Clinical and Experimental Hepatology*, 9(6),676–683. <https://doi.org/10.1016/J.JCEH.2019.03.003>
- Jones, L.S., & Serper, M. (2020). Medication non-adherence among liver transplant recipients, *Current Hepatology Reports*, 19(4),327-336. doi: [10.1007/s11901-020-00545-7](https://doi.org/10.1007/s11901-020-00545-7)
- Karagülle, Ç., & Can Çiçek, S. (2020). The effect of disease perception on quality of life of individuals with chronic obstructive pulmonary disease. *Turkish Journal of Science and Health*, 1(2),36-49.
- Karataş, T., Özen, Ş., & Kutlutürkan, S. (2017). Factor structure and psychometric properties of the brief illness perception questionnaire in Turkish cancer patients. *Asia Pac J Oncol Nurs*, 4,77-83. <https://doi.org/10.4103/2347-5625.199080>.
- Kartal, M., Karakaş, N., & Kapıkıran, G. (2023). The effect of illness perception levels of liver transplant patients

receiving immunosuppressive therapy on their rational drug use levels. *Heliyon*, 9(3),e14033. doi: 10.1016/j.heliyon.2023.e14033.

Kayaoğlu, K., & Demir, B. (2023). Determining the Relationship between Mindfulness and Compliance with Immunosuppressive Treatment in Patients with Liver Transplantation. *Gevher Nesibe Journal of Medical and Health Sciences*, 8(Special Issue), 873-881. <https://doi.org/10.5281/zenodo.8405140>.

Kılıç, B., & Öz, M. N. (2025). Beliefs about medications, health anxiety, and educational impact on treatment adherence in type 2 diabetes: A cross-sectional study. *Medicine*, 104(33), e43930. DOI: 10.1097/MD.0000000000043930.

Köken, Z.Ö., Talas, M.S., & Gökmen, D. (2019). Development and psychometric testing of the turkish immunosuppressive medication adherence scale. *Turk J Nephrol*, 28(2),120-6. doi: 10.5152/turkjnephrol.2019.3371.

Köken, Z.Ö, Karahan, S., Sezer, R.E., & Abbasoğlu, O. (2020). Immunosuppressive medication adherence in liver transplant patients: A single center experience. *Ahi Evran Med J*, 4(3),88-95. doi: 10.46332/aemj.78504.

Kung, M., Koschwanez, H.E., Painter, L., Honeyman, V., & Broadbent, E. (2012). Immunosuppressant nonadherence in heart, liver, and lung transplant patients: associations with medication beliefs and illness perceptions. *Transplantation*, 93(9),958-963. doi: 10.1097/TP.0b013e31824b822d.

Küçük, E., & Yapar, K. (2016). Health perception, health-related behaviors, and medication adherence of patients with Type II Diabetes: a study in the Black Sea Region of Turkey. *TAF Preventive Medicine Bulletin*, 15(4), 285-292. DOI: 10.5455/pmb.1-1446795532.

Lamba, S., Nagurka, R., Desai, K.K., Chun, S.J., Holland, B., & Koneru, B. (2012). Self-reported non-adherence to immune-suppressant therapy in liver transplant recipients: demographic, interpersonal, and intrapersonal factors. *Clin Transplant*, 26(2),328-35. doi: 10.1111/j.1399-0012.2011.01489.x.

Maple, H., Chilcot, J., Weinman, J., & Mamode, N. (2017). Psychosocial wellbeing after living kidney donation—a longitudinal, prospective study. *Transplant International*, 30(10), 987–1001. <https://doi.org/10.1111/tri.12974>.

Mjoen, G., Stavem, K., Westlie, L., Midtvedt, K., Fauchald, P., Norby, G., & Holdaas, H. (2011). Quality of life in kidney donors. *American Journal of Transplantation*, 11(6),1315-1319. <https://doi.org/10.1111/j.1600-6143.2011.03517.x>.

Oğuz, S., Yetim, M., Yalçın, Ö., Ünalın, Y.E., & Çamcı, G. (2016). Effect of illness perception of individuals with hypertension to treatment and diet compliance. *Cumhuriyet Nursing Journal*, 5(2),75-83

Özdemir, Z., & Talas, M.S. (2017). Immunosuppressive Medication Adherence After Solid Organ Transplantation *Anatolian Journal of Nursing and Health Sciences*, 20(4),304-310.

Petrie, K.J., Jago, L.A., & Devcich, D.A. (2007). The role of illness perceptions in patients with medical conditions. *Current Opinion in Psychiatry*, 20(2),163-167. DOI: 10.1097/YCO.0b013e328014a871.

Prakash, D. D., Lucas, A., Jayaraman, S., George, O. K., & Gowri, M. (2025). Medication adherence, self-efficacy, and attitude toward the management of coronary artery disease among elderly with coronary artery disease. *Journal of the Indian Academy of Geriatrics*, 21(2), 94-99. DOI: 10.4103/jiag.jiag_4_25

Promraj, R., Dumronggittiguleb, W., Sirivatanauksornb, Y., Ruenroma, A., Tovikkaib, C., Limsrichamrernb, S., Kositamongkolb, P., Mahawithitwongb, P., & Asavakarn, S. (2016). Immunosuppressive medication adherence in liver transplant recipients. *Transplantation Proceedings*, 48(4),1198-1201. <https://doi.org/10.1016/j.transproceed.2015.12.097>.

Rodríguez-Perálvarez, M., De La Mata, M., & Burroughs, A.K. (2014). Liver transplantation: immunosuppression and oncology. *Current Opinion in Organ Transplantation*, 19(3),253-260. <https://doi.org/10.1097/MOT.000000000000069>.

Sandwijk, M.S., Bemelman, F.J., & Berg, I.J.M. (2013). Immunosuppressive drugs after solid organ transplantation. *Netherlands The Journal of Medicine*, 71(6),281-89.

Sarıgöl Ordin, Y., Karayurt, Ö., Ertan, N., & Yıldız, S. (2018). Evaluation of adherence to immunosuppressive treatment with different methods in kidney transplant recipients. *Turkish Nephrology, Dialysis and Transplantation Journal*, 27(3),254–261. <https://doi.org/10.5262/tndt.2018.3147>.

- Sawyer, A.T., Harris, S.L., & Koenig, H.G. (2019). Illness perception and high readmission health outcomes. *Health Psychol Open*, 6(1), 1-11. <https://doi.org/10.1177/2055102919844504>
- Schulz, K.H., & Kroencke, S. (2015). Psychosocial challenges before and after organ transplantation. *Transplant Research and Risk Management*, 7, 45-48. <https://doi.org/10.2147/TRRM.S53107>
- Shafiekhani, M., Shahabinezhad, F., Tavakoli, Z., Tarakmeh, T., Haem, E., Sari, N., & Dehghani, M. (2023). Quality of life associated with immunosuppressant treatment adherence in liver transplant recipients: A cross-sectional study. *Frontiers in Pharmacology*, 14, 1051350. <https://doi.org/10.3389/fphar.2023.1051350>.
- Shakya, R., Shrestha, S., Gautam, R., Rai, L., Maharjan, S., Satyal, G.K., Bhuvan, K.C., & Rai, M.K. (2020). Perceived illness and treatment adherence to hypertension among patients attending a tertiary hospital in Kathmandu, Nepal. *Patient Preference and Adherence*, 14, 2287–2300. doi: [10.2147/PPA.S270786](https://doi.org/10.2147/PPA.S270786).
- Şahin, N., Uçak, K., Atamyıldız, S.U., Sönmez, H.E., & Sözeri, B. (2024). Impact of perception of illness on quality of life in juvenile systemic lupus erythematosus. *Lupus*, 33(13), 1476-1482. doi: 10.1177/09612033241285622.
- Tıgılı, A., Ayvazoğlu Soy, E.H., Aytar, A., Moray, G., & Haberal, M. (2019). Relationship between exercise perception with physical activity level, body awareness, and illness cognition in renal transplant patients: a pilot study. *Experimental and Clinical Transplantation*, 1, 270-276. DOI: 10.6002/ect.MESOT2018.P123.
- Ünay, M., Önder, A., Gizli, Ö.Ç., Atalay, A., Sürer, A.A., Artan, R., & Özatalay, E. (2020). Psychopathology, quality of life, and related factors in pediatric liver transplantation candidates and recipients. *Pediatric Transplantation*, 24(1). <https://doi.org/10.1111/petr.13633>.
- Vélez-Vélez, E., & Bosch, R.J. (2016). Illness perception, coping and adherence to treatment among patients with chronic kidney disease. *Journal of Advanced Nursing*, 72(4), 849-863. doi: 10.1111/jan.12873.
- Weng, L.C., Huang, H.L., Wang, Y.W., Chang, C.L., Tsai, C.H., & Lee, W.C. (2012). The coping experience of Taiwanese male donors in living donor liver transplantation. *Nursing Research*, 61(2), 133-139. doi: 10.1097/NNR.0b013e3182475688.
- Wirken, L., van Middendorp, H., Hooghof, C.W., Geziciler, M.M., Hoitsma, A.J., Hilbrands, L.B., & Evers, A.W.M. (2015). The course and predictors of health-related quality of life in living kidney donors: a systematic review and meta-analysis. *American Journal of Transplantation*, 15(12), 3041–3054. <https://doi.org/10.1111/ajt.13453>.
- Yaraghchi, A., Rezaei, O., Mandegar, M.H., & Bagherian, R. (2012). The relationship between illness perception and quality of life in Iranian patients with coronary artery bypass graft. *Procedia - Social and Behavioral Sciences*, 46, 3329–34. <https://doi.org/10.1016/j.sbspro.2012.06.061>.
- Yıldız, E., & Kılınç, G. (2021). The relationship between anxiety, depression and psychological resilience of liver transplant individuals. *Journal of Inonu University Health Services Vocational School*, 9(2), 554- 565. <https://doi.org/10.33715/inonusaglik.834318>
- Yıldız, E. (2021). The relationship between anxiety and intolerance of uncertainty levels in individuals who received liver transplant: A descriptive cross-sectional study. *Clinical Nursing Research*, 30(5), 548– 557. <https://doi.org/10.1177/105477382096291>.
- Zhao, M., Zhao, J., Chen, J., Li, M., Zhang, L., Luo, X., Zhang, Y., Xiong, C., Guo, Z., & Yan, J. (2022). The relationship between medication adherence and illness perception in breast cancer patients with adjuvant endocrine therapy: beliefs about medicines as mediators. *Supportive Care in Cancer*, 30(12), 10009-10017. <https://doi.org/10.1007/s00520-022-07411-w>.