Araştırma Makalesi – Original Article

Examination of the Effect of Health Perception on Adherence to Immunosuppressive Medication Use in Kidney Transplant Patients*

Böbrek Nakli Olan Hastalarda Sağlık Algısının İmmünsupresif İlaç Kullanımına Uyum Üzerine Etkisinin İncelenmesi

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ABSTRACT

Objective: Adherence to immunosuppressive medication is critical for the successful maintenance of kidney transplant therapy. Patients' health perceptions are influenced by their lived experiences and cultural contexts. This study aimed to examine the impact of health perception on adherence to immunosuppressive medication among kidney transplant patients.

Methods: This descriptive, correlational, and cross-sectional study was conducted in a private hospital located in western Turkey. The data were collected from 165 kidney transplant patients aged between 19 and 69. The data collection tools included a Sociodemographic Data Collection Form, the Perception of Health Scale, and the Immunosuppressive Medication Adherence Scale. Data were analyzed using simple linear regression analysis.

Results: The mean scores of the participants on the Perception of Health Scale and the Immunosuppressive Medication Adherence Scale were 53.84 ± 10.04 and 48.18 ± 5.60, respectively. It was found that the level of health perception explained 8.8% of the variance in adherence to immunosuppressive medication ($F = 16.909$, $p < 0.001$, $R^2 = 0.094$, Adjusted $R^2 = 0.088$).

Conclusion and Recommendations: The study revealed that 8.8% of the variation in adherence to immunosuppressive medication was associated with health perception levels. Identifying health perception levels before kidney transplantation could help predict the risk of nonadherence to immunosuppressive medication, thereby preventing a significant proportion of rejections. Nursing interventions should focus on enhancing patients' health perception by addressing the focus on Center of Control sub-dimension and considering cultural contexts and beliefs.

Keywords: Kidney transplantation, Medication adherence, Immunosuppressive medication, Perception, Health.

ÖZ

Amaç: Böbrek nakli tedavisinin başarılı bir şekilde sürdürülebilmesi için immünsupresif ilaç kullanımına uyum kritik öneme sahiptir. Hastaların sağlık algıları ise yaşadıkları deneyimler ve kültürel yapıdan etkilenmektedir. Çalışmamız böbrek nakli olan hastalarda sağlık algısının immünsupresif ilaç kullanımına uyum üzerine etkisinin incelenmesi amacıyla gerçekleştirildi.

Metod: Çalışmamız tanımlayıcı, ilişki arayıcı ve kesitsel bir tasarıma sahipti. Veriler, Türkiye'nin batısında bulunan bir özel hastanede kayıtlı 19-69 yaş arası 165 böbrek nakli olan hastadan elde edildi. Veri toplama formu Sosyodemografik Veri Toplama Formu, Sağlık Algısı Ölçeği ve İmmünsupresif İlaç Kullanımına Uyum Ölçeği'ni içeriyordu. Veriler, basit doğrusal regresyon analizi ile incelendi.

Bulgular: Katılımcıların Sağlık Algısı Ölçeği ve İmmünsupresif İlaç Kullanımına Uyum Ölçeği puan ortalamaları sırasıyla 53.84±10.04 ve 48.18±5.60 idi. Katılımcıların sağlık algısı düzeylerinin, immünsüpresif ilaç kullanımına uyum düzeylerindeki varyansın %8.8'ini açıkladığı saptandı ($F = 16.909$, $p < 0.001$, $R2 = 0.094$, Adjusted $R2 = 0.088$).

Sonuç ve Öneriler: Çalışmamızda immünsüpresif ilaç kullanımına uyum düzeyi üzerindeki değişikliğin %8.8 oranında sağlık algısı düzeyi ile ilişkili olduğu belirlendi. Böbrek nakli olan hastalarda, sağlık algı düzeyleri böbrek nakli öncesi belirlenerek, immünsüpresif ilaç uyumsuzluk riski öngörülebilir. Bu şekilde rejeksiyonların önemli bir kısmının önüne geçilebilir. Hastaların sağlık algısını olumlu yönde etkilemek için Kontrol Merkezi alt boyutuna odaklanılmalı, kültürel yapı ve inançları ele alan hemşirelik yaklaşımları yapılmalıdır.

Anahtar Kelimeler: Böbrek nakli, İlaç uyumu, İmmünsuresif ilaçlar, Algı, Sağlık.

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Introduction

Kidney transplantation is the most successful treatment method for end-stage renal failure.[1] Globally, the most frequently transplanted solid organ is the kidney.[2] However, after surgery, there is a critical adjustment period. Patients who successfully manage this adjustment process tend to have longer graft survival, while those who do not adhere to the treatment face serious risks.[3] A reported 28.7% non-adherence rate has been documented among kidney transplant recipients. These high rates of non-adherence contribute to increased mortality and graft loss in these patients.[4] There are various factors contributing to non-adherence during the treatment process. One such factor is non-adherence to immunosuppressive medication.[5] The process of adhering to immunosuppressive therapy is managed by a multidisciplinary team, in which nurses play a critical role.[6] Education, counseling, and cognitive behavioral therapy are among the roles nurses perform. Through these roles, nurses help patients manage their medication regimens effectively and assist them in developing coping strategies for emerging issues.[7,8] Additionally, nurses can assess medication non-adherence by utilizing measurement tools that help identify patients at risk of non-adherence, enabling them to develop personalized nursing strategies before non-adherence becomes an issue.[9]

Many factors influence adherence to immunosuppressive medication. Some of these factors are immutable, while the majority is modifiable. Modifiable factors, such as forgetfulness, habit formation strategies, and reminders, can significantly reduce non-adherence.[10] Perceived social support is another factor affecting adherence. Involving family members and other social support systems in the care process can lead to improved outcomes.[11] Fear of rejection serves as a strong motivation for adherence, with 47% of patients citing this fear as a reason for their adherence.[12] Negative emotions and low self-esteem are important contributors to non-adherence.[13] Cognitive behavioral therapy addresses the psychological aspects of non-adherence, helping patients develop coping strategies and reducing non-adherence related to negative emotions and low self-esteem.[7] Interventions aimed at improving the perception and understanding of medications are also critical measures for reducing medication non-adherence.[14]

Health perception refers to an individual's overall expectations, both positive and negative, regarding their health.[15] In patients with chronic kidney disease undergoing hemodialysis, the perception of kidney transplantation is associated with increased life expectancy and greater freedom.[16] For kidney transplant recipients, health perception is influenced by factors such as the symptoms they experience, their knowledge of kidney transplantation, and their perception of their illness.[17] Additionally, even in the absence of physical symptoms, the perception of an invisible illness can complicate the adjustment process.[18] Therefore, the health perception of this patient group is critically important. This study aims to examine the impact of health perception on adherence to immunosuppressive medication among kidney transplant patients. By doing so, it seeks to prevent immunosuppressive medication non-adherence related to health perception. This could contribute to the preservation of the patient's health and reduction of treatment costs.

Material and Methods

Study Design and Sample

Our study had a descriptive, correlational, and cross-sectional design. The study sample consisted of patients aged 18 and above who had undergone kidney transplantation and were registered at an Organ Transplant Center located in the western part of Turkey. The sample size of the study was calculated using the G*Power 3.1.9.7 program. A sample size was calculated specifically for conducting a simple linear regression analysis. Using an effect size of 0.05, a 5% margin of error, and 80% power, the calculation

determined that a sample size of 159 was necessary.[19,20] The inclusion criteria for the study were (1) having undergone kidney transplantation, (2) being 18 years or older, (3) being able to use a smartphone, and (4) being able to take medications independently at home. The exclusion criterion was (1) having a history of mental pathology. A total of 165 patients were reached during the data collection process.

Data Collection Tools

Sociodemographic information was gathered using the Sociodemographic Data Collection Form, while participants' health perception levels were evaluated with the Perception of Health Scale (PHS), and their adherence to immunosuppressive medication use was assessed using the Immunosuppressive Medication Adherence Scale (IMAS).

Sociodemographic Data Collection Form

The Sociodemographic Data Collection Form consists of 14 questions related to participants' age, gender, education level, and donor type.

Perception of Health Scale (PHS)

Various conceptual frameworks, including the Health Belief Model and the Theory of Planned Behavior, have been proposed to understand how variations in health behaviors influence individual health outcomes. The Health Perception Scale was created based on these models and measures health beliefs in various aspects. The scale was originally developed by Diamond et al., with its Turkish validity and reliability assessed by Kadıoğlu and Yıldız.[21,22] Comprising four subdimensions and 15 items in total, the scale utilizes a five-point Likert scoring system. The subdimensions include Center of Control, Self-Awareness, Certainty, and Importance of Health. The total scores range from a minimum of 15 to a maximum of 75.[22] A higher score on the scale indicates that an individual believes their health behaviors positively affect their health status, while a lower score indicates the opposite.[21]

Immunosuppressive Medication Adherence Scale (IMAS)

This scale, developed by Özdemir Köken et al., is used to assess adherence to immunosuppressive medication in organ transplant recipients. The scale is unidimensional and consists of 11 items. For scoring, a 5-point Likert scale is used for the first eight items, and a 2-point Likert scale is used for the last three items. The minimum score on the scale is 11, while the maximum score is 55. A higher total score indicates better adherence to immunosuppressive medication.[23]

Data Collection

The data collection form was prepared via Google Forms. This form included an informed consent form, 14 questions related to sociodemographic information, PHS and IMAS. Between March 8, 2022, and June 3, 2022, patients registered at the organ transplant center were contacted by AÖ, who provided information about the study. For those who volunteered to participate and were able to use smartphones, the survey link was sent to collect data. Completing the survey took approximately 7-9 minutes. The STROBE checklist was used in reporting the data.

Statistical Analysis

The study data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 29.0.[24] Descriptive data were calculated as mean, standard deviation, and percentage values. The normality of the data distribution was assessed by calculating the kurtosis and skewness values. For normal distribution, kurtosis and skewness values between +2 and -2 were considered as the reference.[20] The effect of participants' PHS levels on their IMAS was analyzed using simple linear regression, while the effect of the

subscale scores of the PHS on IMAS was examined using multiple linear regression analysis.[25] The significance level was set at $p < 0.05$.

Ethical Considerations

Ethical approval for this study was obtained from the Scientific Research and Publication Ethics Committee of Gümüşhane University (Date: 23.02.2022, No: 2022/01). Permission to use the scales was obtained from the responsible authors via email. Participants who agreed to take part in the study were asked to fill out an informed consent form.

Results

The mean age of the participants was 43.24 ± 12.59 years. Of the participants, 67.9% were male, 77.0% were married, 46.7% had graduated from high school, 57.6% lived in urban centers, 41.2% had an income lower than their expenses, 61.8% were not employed, 89.1% had a living donor, 31.5% had undergone transplantation 6 months to 2 years ago, 67.9% found the discharge education adequate, and 61.2% had a chronic illness other than chronic kidney disease (CKD) (***Table 1***).

Table 1. Descriptive characteristics (n=165)

Variable	$\bar{X}$	±SS	Min.	Max.
Age	43.24	12.59	12.59	19
			n	**%**
Gender				
Female			53	32.1
Male			112	67.9
Marital Status				
Married			127	77.0
Single			38	23.0
Educational Level				
Primary School			46	27.9
High School			77	46.7
University			42	25.5
Residential Area				
Village			21	12.7
District			49	29.7
City			95	57.6
Employment Status				
Employed			63	38.2
Unemployed			102	61.8
Type of Donor				
Living Donor			147	89.1
Deceased Donor			18	10.9
Time Since Organ Transplantation				
0-3 Months			29	17.6
4-6 Months			23	13.9
7 Months-2 Years			52	31.5
3-5 Years			43	26.1
6 Years or More			18	10.9
Satisfaction with Discharge Training				
Satisfactory			112	67.9
Partially Satisfactory			37	22.4

Unsatisfactory	16	9.7
Presence of Chronic Diseases Other Than CKD*		
Yes	101	61.2
Hayır	64	38.8

*CKD: Chronic Kidney Disease

The mean score of participants' PHS was 53.84 ± 10.04, and the mean score of IMAS was 48.18 ± 5.60. Kurtosis and skewness coefficients were calculated to check the normality of scale scores, with values for both IMAS and PHS subscales ranging from +2 to -2, indicating normal distribution (***Table 2***).

Table 2. Mean Scores and Kurtosis-Skewness Values of the PHS and IMAS.

Scales	X̄	SD	Min.	Max.	Kurtosis	Skewness
***PHS**	53.84	10.046	30.00	75.00	-0.313	-0.008
****IMAS**	48.18	5.608	25.00	55.00	1.943	-1.130

*PHS: Health Perception Scale, **IMAS: Immunosuppressive Medication Adherence Scale

It was determined that the PHS total score significantly predicted the IMAS total score (F = 16.909, p < 0.001). Specifically, the level of health perception explained 8.8% of the variance in adherence to immunosuppressive medication (***Table 3***).

Table 3. Effect of Participants' PHS Scores on IMAS.

Independent Variable	Unstandardized Coefficients		Standardized Coefficients			95.0 % Confidence Interval for B	
	B	Std. Error	β			Lower Bound	Upper Bound
(Constant)	38.968	2.279		17.098	<0.001	34.468	43.468
PHS	0.171	0.042	0.307	4.112	<0.001	0.089	0.253

Notes: Durbin-Watson = 1.950; F = 16.909, p < 0.001, R = 0.307; R^2 = 0.094; Adjusted R^2 = 0.088,*Significance level was accepted as p < 0.05 *Dependent variable = IMAS.

It was found that the PHS subscale scores significantly predicted the IMAS score (F = 5.010, p < 0.001). Specifically, the Control Center subscale of PHS significantly influenced IMAS scores (β = 0.197, p = 0.016). However, the Self-Awareness, Certainty, and Importance of Health subscales did not have a statistically significant effect on IMAS scores (p > 0.05) (***Table 4***).

Table 4. Effect of Participants' PHS Subscale Scores on IMAS.

Independent Variable	Unstandardized Coefficients		Standardized Coefficients			95,0 % Confidence Interval for B	
	B	Std. Error	*β*			Lower	Upper Bound
(Constant)	38.403	2.482		15.473	<0.001	33.502	43.305
Center of control	0.206	0.085	0.197	2.424	**0.016***	0.038	0.374
Self-awareness	-0.005	0.158	-0.003	-0.032	0.975	-0.317	0.307
Certainty	0.184	0.102	0.147	1.809	0.072	-0.017	0.385
Importance of Health	0.323	0.175	0.153	1.847	0.067	-0.022	0.668

Notes: Durbin-Watson = 1.953; F = 5.010, p < 0.001, R = 0.334; R^2 = 0.111; Adjusted R^2 = 0.089
*Significance level was accepted as p < 0.05 *Dependent variable = IMAS.

Discussion

Adequate and homogeneous sample size is considered to be critical for the generalizability of the results of the study. In our study, the sample was homogeneous in terms of sociodemographic characteristics.

Therefore, its generalizability is high (Table 1). In a similar study by Doğan et al. there was a more heterogeneous distribution among sociodemographic characteristics.[26]

The primary goal of kidney transplantation is to extend life expectancy, improve quality of life, and minimize healthcare costs.[27] Achieving this goal requires high patient adherence.[28] In one study, patients with poor medication adherence had seven times more graft problems than those who adhered to their medication.[29] In a study by Torres-Gutiérrez et al., the general non-adherence rate was 28.7%, with immunosuppressive medication non-adherence being 23%.4 This highlights the critical level of immunosuppressive medication non-adherence among overall non-adherence cases. The consequences of non-adherence not only lead to graft loss but also impose a significant financial burden.[30]

Many factors influence immunosuppressive medication adherence. A study indicated that younger individuals experience more non-adherence compared to older individuals.[31] Another study found that higher education levels were associated with medication non-adherence due to the demands of a busy work life.[32] Joo et al., study showed that individuals living alone experienced more medication non-adherence compared to those with higher social support.[31] Approaches that reduce forgetfulness and address psychosocial barriers can improve adherence.[10,33] Recent developments in telemedicine, reminder systems, and digital technologies that facilitate communication with patients help ease the adherence process. Considering that the maximum IMAS score in our study was 55, the mean score of 48.18 indicates high compliance. In another study conducted in Turkey, the mean score was reported to be 48.10. This may be interpreted as successful management strategies for immunosuppressive drug compliance in our country.[33]

Post-transplant symptoms, previous rejection experiences, health beliefs, and cultural factors influence adherence to immunosuppressive medications.[34] These factors may alter a patient's health perception and require different solution strategies. Therefore, health perception can be seen as a summary of various factors influencing immunosuppressive medication adherence. In our study, the participants' health perception levels explained 8.8% of the variance in adherence to immunosuppressive medications (Table 3). Although there are no similar studies on health perception in the literature, in a study addressing illness perception, it was reported that an increase in illness identity, anxiety and illness coherence scores was associated with a higher risk of non-adherence.[35] Although health perception was addressed in our study, it was observed to have an effect on immunosuppressive drug adherence similar to that of illness perception. Therefore, it is thought that health perception and illness perception scales may yield similar results in other studies. A study by Massey et al. showed that while patients had a positive perception of their kidney grafts, this did not align with their medication adherence.[36] Therefore, the perceived meaning of an object, situation, or organ may have different effects on medication adherence. Hence, health perception should be evaluated in all its subdimensions when assessing the risk of immunosuppressive medication non-adherence.

Nursing interventions focusing on the subdimensions of PHS Control Center, Self-Awareness, Certainty and Importance of Health can enhance health perception. The Control Center subdimension addresses the perception of who controls health. In many societies, it is believed that God's will determines one's health. This belief may reduce patients' efforts and cause them to rely on divine intervention for their health. Therefore, responses to this subdimension may vary due to cultural factors. In our study, the Control Center subdimension explained 8.9% of the variance in IMAS scores (Table 4). To improve this subdimension, nursing approaches based on conceptual models addressing the cultural and spiritual aspects of individuals should be applied. Additionally, facilitating communication with other patients from the same cultural background who lead healthy lives may positively affect health perceptions.[37,38] The Self-

Awareness subdimension focuses on personal health awareness, which can be enhanced through continuous education before and after transplantation. The Certainty subdimension addresses the level of certainty about being healthy. For this patient group, continuous communication (either online or face-to-face) can help resolve uncertainties.[39] The Importance of Health subdimension examines the priority of health in the patient's life. Identifying other issues that may overshadow the Importance of Health and implementing eHealth-based cognitive behavioral therapy approaches could be a good solution.[40]

Conclusion

In conclusion, our study found that the change in adherence to immunosuppressive medication was related to health perception levels, explaining 8.8% of the variance. Maintaining adherence to immunosuppressive medications is critical for the success of kidney transplantation. Improvement and corrective interventions for immunosuppressive drug adherence and health perception will decrease the rate of nonadherence. Educational activities to increase immunosuppressive drug compliance, frequent follow-up of patients, therapy and corrective activities for the cause of non-compliance will significantly increase immunosuppressive drug compliance. Nursing interventions to improve health perception may improve the patient's quality of life, reduce refusal due to medication nonadherence and prevent potential treatment costs. Interventions to improve health perception should be addressed individually by determining the patient's health perception before treatment. It is recommended to focus on the Control Center sub-dimension of health perception in patients and to address the patient's cultural background and beliefs with individual therapies and nursing interventions. Environments can be created where therapy patients and patients from different cultures and patients with a positive relationship between health perception and medication adherence can engage in social activities and exchange ideas together.

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Ethical Approval

Ethical approval for this study was obtained from the Scientific Research and Publication Ethics Committee of Gümüşhane University (Date: 23.02.2022, No: 2022/01). Permission to use the scales was obtained from the responsible authors via email.

Author Contributions

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