DISEASE KNOWLEDGE, PERCEIVED SUSCEPTIBILITY AND COMPLIANCE BEHAVIORS ON POST-KIDNEY TRANSPLANT REGIMEN AMONG ADULTS RESIDENTS OF HO CHI MINH CITY, VIETNAM

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Abstract

The study aimed to evaluate disease knowledge, perceived susceptibility and compliance behaviors of post-kidney transplant patients as well as assess relationship between disease knowledge, perceived susceptibility and compliance behaviors. A descriptive cross-sectional study conducted on 153 post-kidney transplant patients from March to June 2024 at Outpatient Department of Cho Ray hospital. The result showed that the majority of respondents have a lack of knowledge regarding medication and lifestyle change post kidney transplantation. While perceived susceptibility of respondents were at a fair level. Majority of respondents has a low level of perception regarding barriers to adherence and susceptibility to transplant rejection, while they have a good level of perception regarding benefits of adherence to treatment with immunosuppressive medication. Compliance behavior of post kidney transplant adults was at a good level. Majority of respondents had good compliance behavior regarding medication, while exercise and psychological adaptation was the lowest level of compliance behavior. There are positive relationships between Compliance behaviors and disease knowledge ($r = 0.49$, $p < 0.001$); perceived susceptibility ($r = 0.45$, $p < 0.001$) and perceived susceptibility plays a partial mediating role between knowledge and compliance behaviors and the mediating effect accounted for 31% of the total effect of disease knowledge on compliance behavior. The study also indicated that educational level ($\beta = 0.93$, $p = 0.020$), duration of transplant ($\beta = 0.20$, $p = 0.012$) are predictive factors of compliance behavior among post – kidney transplant patients. Educational interventions targeting both knowledge and health beliefs, particularly for older individuals, could improve adherence to treatment and overall health outcomes.

Keywords: compliance behaviors, disease knowledge, perceived susceptibility, post-kidney transplant patients

1. Introduction

Kidney transplantation (KT) is acknowledged as a major advance of modern medicine which provides high-quality life years to patients with irreversible kidney failure (end-stage

renal disease, ESRD) worldwide. There were 90306 kidney transplants, 32990 living donor kidney transplants (36.5%) and 57316 cadaveric donor kidney transplants (63.5%), in 2017 (Krishnan et al., 2021). Although kidney transplantation has been an optimal treatment choice for the ESRD patients, kidney transplantation patients face many complications regarding immunosuppressive and non-immunological complications following kidney transplantation, including multiple incidences of primary kidney disease, as well as complications such as cardiovascular diseases, infections and malignancy are the major factors that have contributed to the failure of kidney allografts (Thongprayoon et al., 2020).

Thus, after kidney transplantation, patients face a life-long regimen of medications, lifestyle changes, self-care and attending medical appointments. To support it, it needs the support of the health system, especially the healthcare profession who directly care for and advise the patient. At the same time, it is necessary to have a conscious understanding of long-term adherence to treatment after kidney transplantation as well as lifestyle changes after kidney transplantation (Gavriilidis et al., 2021).

In Vietnam, the number of kidney transplantation beneficiaries have been increasing, and there is a lack of study regarding adherence regimen after kidney transplantation. These kidney transplant beneficiaries are regularly monitored at hospital clinics as an outpatient case. However, there are a lack of studies regarding the assessment of knowledge about their disease, their beliefs about their health, and their compliance behaviors after kidney transplant. Besides, there is rarely an intervention program of nurses which aims to support kidney transplant beneficiaries adapting and attaining good quality of life after discharge.

The aim of this study was to evaluate the disease knowledge, perceived susceptibility and compliance behaviors after kidney transplant among adult residents of Ho Chi Minh City in Vietnam. In addition, the study aims at the relationships between their compliance behaviors and disease knowledge as well as perceived susceptibility. The predictive factors of compliance behaviors were also determined.

2. Research Methods

2.1 Research Design

A descriptive – correlational research design was conducted from March to June 2024 at the Outpatient Department of Cho Ray hospital.

2.2 Population, Sample Size and Sampling Technique

a) Population: Population of this study are residents of Ho Chi Minh City, Vietnam who have undergone kidney transplants in the past. The following criteria were set to include the sample in the study: renal transplants patients aged 18-59 years old; have had successful kidney transplant surgery in the past, at least 1 year ago at the time of recruitment.

b) Sample size: The sample size is determined based on G power software. The sample size was estimated by using the G Power software, version 3.1.9.2. Considering the effect size to be measured (ρ) at 20%, i.e., correlation coefficient between the variables at 0.20, power of the study at 80%, and margin of error at 5%, the total sample size was estimated to be 153.

c) Sampling Technique: A purposive sampling technique was used for the selection of samples.

2.3 Research Instrument

The questionnaire consisted of four parts.

Part I of the questionnaire pertains to the clinico-demographic profile.

Part II of the questionnaire pertains to the disease knowledge regarding kidney transplantation in terms of three domains: kidney transplant regimen, medication, lifestyle change recommendation (Rosaasen et al., 2017).

TABLE 1. Scores transfer from disease knowledge (Feleke et al., 2021).

Level of knowledge	**Total knowledge scores (%)**
Good	56 - 69 (80% – 100%)
Moderate	42 -55 (60% – 79%)
Poor	0- 41 (<60%)
Good	56 - 69 (80% – 100%)

Part III of the questionnaire pertains to perceived susceptibility in 4 domains: perceived susceptibility to transplant rejection; perceived severity of rejection; perceived benefits of adherence to treatment with immunosuppressive medication; perceived barriers to adherence (Kung et al., 2022).

Part II of the questionnaire pertains to compliance behavior in five domains: medication, exercise, hydration and nutrition, prevention and management of disease and symptom, and psychosocial adaptation (Ohashi & Akazawa, 2022).

TABLE 2. Level of perceived susceptibility / compliance behaviors

Mean Value	**Perceived susceptibility / compliance**
4.51 – 5.00	Very Good
3.51 – 4.50	Good
2.51 – 3.50	Fair a
1.51 – 2.50	Poor
1.00 – 1.50	Very Poor

2.4 Data Collection

Data was collected by using two self- administered questionnaires. Participants were interviewed face to face after they agreed for participants and signed in consent form.

2.5 Statistical Analysis

Data was analyzed by using Jamovi version 2.5.0. Multiple regression analysis was employed to identify any significant predictive factors of participants. Moreover, GLM Mediator analysis was employed in order to show any significant mediating relationship between variables. All of the significant differences in variables were considered if the p-value showed <0.05.

3. Results and Discussion

3.1 Baseline Characteristics of Participants

The result showed that the majority of participants were males (66.0%); and almost 83% were married. The participants' mean age was 40.3 years; the range of age was from 22 years to 59 years. The majority of respondents have attained postgraduate level (54.2%).

Of these, 68.8% of respondents have employed; the mean of participants' transplant duration was at 80 months while the range of transplant duration was from 10 months to 378 months (Table 2).

The participant demographic data of this study is in line with a previous study in Iran which indicated that the age of kidney transplant patients ranged between 22 and 72 years and 68% of participants were males. Of these, 73% of kidney transplants are married (Moradi et al., 2019). Besides, a study in Kuwait showed that the majority of renal transplants patients who were following up at the outpatient department of Hamed Al-Essa Organ Transplant Center of Kuwait were men (82.5%) and almost 64% were married (Kenawy et al., 2019).

TABLE 3. Baseline demographic, clinical profile of the participants (n=153)

Profile		**Mean (SD)**
Age (in years)		40.3 (8,13)
Duration of Transplant (in Months)		80 (61.8)
		Frequency (%)
Sex	Male	101 (66%)
	Female	52 (34%)
Occupational Status	Unemployed	44 (28.8%)
	Employed	105 (68.6%)
	Retired	4 (2.6%)
Highest Educational Attainment	Primary	6 (3.9%)
	Secondary	30 (19.6%)
	Tertiary	34 (22.2%)
	Post Graduate	83 (54.2%)
Civil Status	Single	15 (9.8%)
	Married	127 (83%)
	Divorced	8 (5.2%)
	Widowed	3 (2.0%)

3.2 Knowledge Disease of Post-Kidney Transplant Respondents

The result shows that the majority of kidney transplant adults have moderate knowledge regarding their disease (71.2%). However, the respondents have high and low knowledge levels which are similar, with 15%; 13.7% respectively. The result also shows that nearly a half of KT recipients has a high knowledge level regarding kidney transplant regimen (43.8%) while 42.5% of participants has moderate knowledge level and a few of these has low knowledge level regarding kidney transplant regimen. Meanwhile, knowledge regarding medication and lifestyle change were recorded at low and moderate level. A few participants have a high knowledge level regarding medication (3.9%) and lifestyle change (0.7%) after kidney transplants (Table 4).

According Urstad et al. (2021), lack of transplant related knowledge would lead to postoperative infection, and even death in severe cases for KT recipients. Low self-care ability after discharge seriously reduces the postoperative quality of life and decreases the survival of both patients and grafts. This research finding is in line with previous study in China which indicated that most KT recipients have kidney transplantation knowledge at middle level (Ma et al., 2023). Moreover, according to Li et al., 2020), the KT recipients should be known about self-monitoring, correct medication, reasonable diet, and proper exercise, along with their self-care abilities.

The disease knowledge among KT respondents is lower than many previous studies. The study in Thailand indicated there were gaps in patients' knowledge of the signs of transplant rejection (84%), infection (84-86%) and the timing of pregnancy following kidney transplantation (22%) (Thangto et al., 2022). A study on 702 patients after kidney transplantation showed that 70.9% corresponds to a moderate knowledge level regarding immunosuppressive medication and only 55.3% of KT patients know that they should have diarrhea or vomiting after taking medication (De Boer et al., 2022).

TABLE 4. Summary of level on the Disease Knowledge among post-kidney transplant respondents.

Domain of knowledge	**High n (%)**	**Moderate n (%)**	**Low n (%)**
Kidney transplant regimen	67 (43.8%)	65 (42.5%)	21 (13.7%)
Medication	6 (3.9%)	88 (57.5%)	59 (38.6%)
Lifestyle change	1 (0.7%)	70 (45.8%)	82 (53.6%)
Total knowledge disease	*23 (15.0%)*	*109 (71.2%)*	*12 (13.7%)*

3.3 Perceived Susceptibility of Post-Kidney Transplant Respondents

The result shows that the overall mean of perceived susceptibility was 3.40 interpreted as fair level. In this study most of the respondents showed good at the perceived benefits of adherence to treatment with immunosuppressive medication domain with an overall mean of 3.92. Meanwhile, the majority of post-kidney transplant adult respondents did not have good perception regarding barriers to adherence and susceptibility to transplant rejection with the mean of 3.01 and 3.37 respectively (Table 5).

The study suggests that the majority of KT respondents lack perception regarding barriers to adherence**.** This suggests that they may face challenges or obstacles that hinder their ability to adhere consistently to their medication regimen. Similarly, the respondents displayed moderate perceptions regarding susceptibility to transplant rejection. This finding is consistent with previous research conducted by Bünemann et al. (2022) in Germany, where only 41.4% of study participants expressed concern about the potential long-term effects of medication.

Perceived severity of rejection pertains to participants' individual awareness of the impact of renal transplant on survival and on life. *A* systematic review paper done by Ghelichi-Ghojogh et al. (2021) showed that the graft survival rate at one, three, five, and 10 years were 92.48%, 85.08%, 79.96% and 68.15% respectively. Additionally, the patient survival rates at one, three, five, and 10 years were 91.27%, 86.46%, 81.17% and 78.15% respectively (Ghelichi-Ghojogh, et al., 2021).

TABLE 5. Summary of levels on Perceived Susceptibility of post-kidney transplant respondents

Statements	**Mean (SD)**	**Level**
Perceived susceptibility to transplant rejection.	3.27 (0.70)	Fair
Perceived severity of rejection	3.64 (0.59)	Good
Perceived benefits of adherence to treatment with immunosuppressive medication	3.92 (0.72)	Good
Perceived barriers to adherence	3.01 (0.61)	Fair
Overall Mean	*3.55 (0.27)*	*Fair*

3.4 Compliance Behaviors of Post-Kidney Transplant Respondents

The result showed that the compliance behavior mean scores of post-kidney transplant respondents was at a good level with an overall mean of 3.97. It is clear that all of the domains regarding compliance behavior among post-kidney transplant patients is presented at a good level. The strongest domain of the compliance behavior is regarding medication with an overall mean of 4.04 interpreted as a good level. Prevention and management of disease and symptoms; Hydration and nutrition; Psychological Adaptation domains also recorded a good level with overall mean of 4.03; 3.94; 3.90 respectively. Meanwhile, compliance behaviors regarding exercise domain recorded as the weakest domain of compliance behavior with an overall mean of 3.88.

Overall, compliance behavior among post-kidney transplant patients was at a good level across all domains. This finding is in line with a previous study which indicated that the majority of respondents had never taken more (or less) than the prescribed dose of immunosuppressive drugs or any other medicine and never forgot to take medicine (Ganjali et al., 2019). Another study also indicated that kidney recipients have high compliance with immunosuppressive medication, it is of great importance that they can cope with GI symptoms (Bulbuloglu et al., 2022).

*TABLE 6***.** Summary of the mean scores the compliance behavior of compliance behavior

Statements	**Mean (SD)**	**Level of compliance beahviors**
Medication	4.04 (0.53)	Good
Exercise	3.88 (0.58)	Good
Hydration and nutrition	3.94 (0.52)	Good
Prevention and management of disease and symptoms	4.03 (0.58)	Good
Psychological Adaptation	3.90 (0.62)	Good
Overall Rating	*3.97 (0.38)*	*Good*

3.5 Predictive Factors of Compliance Behaviors of Post-Kidney Transplant Respondents

TABLE 7. Regression analysis between the demographic profile, disease knowledge, perceived susceptibility and compliance behaviors of post-kidney transplant respondents

Predictors	**R^2**	**Estimate**	**95% Confidence Interval**		**β**	**t**	**p**
			Lower	**Upper**			
Intercept [a]		2.017	1.271	2.953		4.97	0.000**
Disease Knowledge		0.014	-0.002	0.027	0.24	2.36	0.020*
Perceived Susceptibility		0.382	0.111	0.652	0.27	2.79	0.006**
Duration of Transplant	0.371	0.001	0.0002	0.002	0.20	2.53	0.012*
Educational level							
Secondary – Primary		0.183	-0.119	0.485	0.48	1.20	0.232
Tertiary – Primary		0.263	-0.051	0.578	0.69	1.65	0.100
Postgraduate – Primary		0.352	0.055	0.650	0.93	2.34	0.020*

*Note. * $p < 0.05$, ** $p < 0.001$*

Predictive Model:

Compliance Behavior (Y) *= 2,017 +0.24 (Disease knowledge) + 0.27 (Perceived Susceptibility) + 0.20 (Duration of Transplant) +0.93 (Educational level: Postgraduate – Primary)*.

R^2 is 0.371. This means that seven predictors including post-kidney transplant adult respondents' age, gender, education level, Civil status, duration of transplant, disease knowledge and health belief explain 37.1% of the variance in compliance behavior of post-kidney transplant adult ($R^2 = 0.371$, $F = 5.82$, $p < 0.001$).

The regression analysis result shows that educational level ($\beta = 0.93$, $p = 0.02$), duration of transplant ($\beta = 0.20$, $p = 0.012$), disease knowledge ($\beta = 0.24$, $p = 0.020$), Perceived Susceptibility ($\beta = 0.27$, $p = 0.006$) are statistically significant predictor of compliance behavior of post-kidney transplant respondents. These mean that an improvement in educational level, duration of transplant, disease knowledge, perceived susceptibility would predict the better enhancement in compliance behavior of post-kidney transplant respondents. This finding is consistent with a previous study which showed that duration after transplantation was a significant predictor of compliance and self- management among kidney transplant recipients was duration after transplantation ($\beta = 0.087$, $p < 0.001$) (Khezerloo et al., 2019)

3.6 The Relationship between Disease Knowledge, Perceived Susceptibility and Compliance Behaviors of *Post-Kidney Transplant Respondents*

TABLE 8. Correlation analysis between disease knowledge, perceived susceptibility and compliance behaviors of post-kidney transplant respondents

Variables		Compliance Behaviors
Knowledge Disease	Pearson's r	0.49
	p-value	0.00**
Perceived Susceptibility	Pearson's r	0.45
	p-value	0.00**

*Note. ** $p < 0.001$*

The analysis result shows that there were the positive correlations between compliance behaviors and disease knowledge ($r = 0.49$, $p < 0.001$) and perceived susceptibility ($r = 0.45$, $p < 0.001$). This finding is in line with a study done in the Czech Republic which indicated that their perceived treatment necessity beliefs of im-munosuppressants decreased, while their treatment-related concerns increased (Kostalova et al. (2021). A study in Germany also showed the positive relationship between perceived benefits and greater concerns and adherence medication. It also showed a higher perceived necessity was significantly associated with higher age and lower levels of depression and anxiety (Bünemann et al., 2020).

Besides, according to Ganjali et al. (2019), the primary obstacles identified included the simultaneous use of multiple immunosuppressants, limited understanding of the benefits of these medications, confusion surrounding medication administration, and struggles with remembering to take medications. These barriers would lead to a challenge in adherent behavior among KT patients These challenges collectively contribute to difficulties in maintaining adherence among kidney transplant patients (Ganjali et al., 2019).

TABLE 9. The summary test for direct effect, indirect effect and total effect of distributed disease knowledge on compliance behaviors

Type	Effect	Estimate	95% C.I.		β	z	p
			Lower	Upper			
Indirect	Knowledge ⇒ Perceived susceptibility ⇒ Compliance behavior	0.009	9e-4	0.017	0.14	2.18	0.029*
Component	Knowledge ⇒ Perceived susceptibility	0.030	0.025	0.034	0.69	11.89	0 .001**
	Health Belief ⇒ Compliance behavior	0.303	0.035	0.570	0.21	2.22	0.027*
Direct	Knowledge ⇒ Compliance behavior	0.020	0.009	0.032	0.34	3.53	0.000**
Total	Knowledge ⇒ Compliance behavior	0.029	0.021	0.038	0.48	6.90	0.000**

*Note. * p <0.001*

Table 9 presents the summary result for Direct effect, indirect effect, and total effect of distributed disease knowledge on compliance behavior among post-kidney transplant patients. The result shows that the total effect of disease knowledge on compliance behavior of post-kidney transplant respondents is 0.029 and the direct effect and indirect effect are 0.009 (β = 0.14; 95% CI, 0.0009 –0.017) and 0.020 (β = 0.32; 95% CI, 0.009–0.032), respectively. Both direct and indirect effects are statistically significant, indicating disease knowledge has an effect on compliance behavior of post – kidney transplant adults, perceived susceptibility plays a partial mediating role between disease knowledge and compliance behavior, and the mediating effect accounted for 31% of the total effect.

According to Li et al. (2021), perceived susceptibility can influence behavior, highlights the leading role of belief in behavior, and believes that individual decision-making behavior is greatly influenced by subjective psychology. The perceived susceptibility includes understanding of disease threat; self-efficacy; and prompting, influencing, and restricting factors. The cognition of disease threat refers to the individual's subjective cognition of disease and health, including the severity and susceptibility of the disease, and the effectiveness of prevention and obstacles in action (Li et at., 2021). The perception of disease susceptibility is the probability of the occurrence of the disease; the perception of the severity of the disease is the individual's understanding of the serious consequences of the disease; the perception of the benefits of healthy behavior is the individual's knowledge that it is good for their health to complete a certain behavior. The cognition of behavioral disorder is the individual's cognition of the obstacles and problems that may need to be faced to complete a certain behavior, including physical, psychological, time-related, economic, and other difficulties (Gavriilidis et al., 2021).

According to Barba et al. (2021) that personal disease knowledge and disease experience is one of the corrective factors that influence and modify an individual's perception of disease. The disease knowledge and disease experience would impact on the perceived susceptibility of a person's cognition. This contributes to impact on changing behavior (Barba et al., 2021).

4. Conclusion

The study was conducted on 153 post – kidney transplant patients who have followed – up at the outpatient department in Cho Ray Hospital, Vietnam. Disease Knowledge of post kidney transplant patients were at moderate level. Majority of respondents have a lack of knowledge regarding medication and lifestyle change post kidney transplantation. While perceived susceptibility of post kidney transplant adults were at a fair level. Majority of respondents has low level of perception regarding barriers to adherence and susceptibility to transplant rejection, while they have a good level of perception regarding benefits of adherence to treatment with immunosuppressive medication. Compliance behavior of post kidney transplant adults was at a good level. Majority of respondents had good compliance behavior regarding medication, while exercise and psychological adaptation was the lowest level of compliance behavior. There are positive relationships between compliance behaviors and knowledge disease; perceived susceptibility and perceived susceptibility plays a partial mediating role between knowledge and skills, and the mediating effect accounted for 31% of the total effect of disease knowledge on compliance behavior. Moreover, the duration of transplant and educational level are predictive factors of compliance behavior among post – kidney transplant patients. Educational interventions targeting both knowledge and health beliefs, particularly for older individuals, could improve adherence to treatment and overall health outcomes.

Conflict of Interest and Data Availability Statement

The authors state no conflict of interest and there is no data associated with this article.

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