JURNAL KEPERAWATAN KOMPREHENSIF	VOL. 11	NO. 1	Bandung January 2025	ISSN 2354-8428	e-ISSN 2598-8727

Research Article

The Effect of the TEMAN SETIA Program Intervention on Immunosuppressant Medication Adherence in Post-Kidney Transplant Patients at RSCM Jakarta

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Abstract

Aims: Chronic Kidney Disease (CKD) poses a significant global health challenge, with an increasing number of kidney transplantations in Indonesia. The success of kidney transplants hinges on adherence to immunosuppressant medications to prevent organ rejection. Non-adherence among post-transplant patients can lead to infections, graft loss, or a return to dialysis. This study evaluated the impact of the TEMAN SETIA program on adherence to immunosuppressant medications among post-kidney transplant patients at Dr. Cipto Mangunkusumo National Referral Hospital (RSCM) in Jakarta.

Methods: A pre-post-test design with a control group was utilized. The sample included 28 post-transplant patients meeting inclusion criteria. The TEMAN SETIA program provided patient mentoring to improve adherence. Adherence was assessed before the intervention, one month after, and two weeks post-intervention using a validated questionnaire. Data were analysed using t-tests and repeated measures ANOVA.

Results: The control and intervention groups were comparable in demographic and clinical characteristics, though the intervention group had more non-working participants. The program significantly improved adherence (Cohen's d = 1.97) and knowledge (Cohen's d = 1.99). While family support increased in both groups, differences were not significant (Cohen's d = 1.02). A significant group-by-time interaction ($F_{(1.246, 26)} = 7.394$, $p = 0.007$, $\eta^2 = 0.221$) demonstrated greater adherence improvements over time in the intervention group.

Discussion: The findings demonstrate that the TEMAN SETIA program is an effective intervention for enhancing medication adherence and knowledge among post-transplant patients. The structured mentoring approach provided patients with the necessary support and education to improve their adherence behaviors. Although family support increased in both groups, the changes were not statistically significant, highlighting the need for further exploration of the role of familial involvement in adherence programs

Conclusion: The TEMAN SETIA program effectively enhanced medication adherence and knowledge in post-transplant patients. This structured intervention offers a promising strategy to improve outcomes and reduce risks of organ rejection.

Keywords:
Family involvement, immunosuppressant medication, kidney transplant, medication adherence, patient support

INTRODUCTION

Kidney transplantation has become the leading treatment option for end-stage renal disease (ESRD) due to its potential to greatly improve patient outcomes. Transplant recipients typically experience significant improvements in quality of life and overall survival compared to those who remain on dialysis. However, despite the high success rates in the short term, long-term graft survival remains a challenge. One critical issue that significantly impacts graft longevity is medication adherence, particularly adherence to immunosuppressive therapy, which is essential to prevent rejection episodes and maintain graft function (1) Studies have highlighted that non-adherence to immunosuppressive medication is a major contributor to graft failure, yet it remains an often-overlooked aspect of post-transplant care (2).

Non-adherence to immunosuppressive therapy is alarmingly common, contributing to significant adverse outcomes. Research indicates that approximately 20% of antibody-mediated rejection cases and 16% of early graft loss can be directly attributed to non-adherence (3,4). These statistics underscore the critical need for sustained medication adherence to prevent complications. Graft rejection due to non-adherence increases the risk of sensitization, which complicates the possibility of future retransplantation. Moreover, frequent rejection episodes lead to heightened immunosuppressive drug use, resulting in increased hospitalizations, higher healthcare costs, and an elevated risk of developing cardiovascular disease or cancer, further threatening patient survival (5,6).

The problem of non-adherence to immunosuppressive medications is not only prevalent but also tends to worsen over time. Approximately one-third of kidney transplant recipients are non-adherent, and this rate rises as time progresses. Studies show that every five years post-transplant,

the risk of non-adherence increases by about 20%, highlighting the need for ongoing support to ensure compliance (7). Despite the clear importance of adherence, research into methods for identifying non-adherence and designing interventions to promote compliance is still limited (8).

Educational and behavioural interventions aimed at both patients and their families have shown promise in improving medication adherence rates. Structured educational programs have been demonstrated to significantly enhance patient adherence to post-transplant medication regimens (9). These interventions not only provide essential knowledge about the critical nature of immunosuppressive therapy but also help patients develop the skills needed to manage their treatment regimen effectively. Educating patients and families about the risks of non-adherence and providing continuous support are key strategies in maintaining long-term graft function.

Building on the success of such strategies, multi-component programs like **TEMAN SETIA** have been developed to provide comprehensive support systems aimed at improving medication adherence. This program integrates educational and social support approaches, emphasizing the role of close family members and the surrounding environment in enhancing adherence. Studies have consistently shown that strong social and emotional support significantly improves medication adherence, contributing to better graft survival and overall patient outcomes (6,10,11). The TEMAN SETIA program addresses these critical aspects by fostering a supportive environment tailored to the unique needs of transplant patients, helping them overcome challenges related to adherence and promoting long-term health success.

By combining structured education with ongoing social support, interventions like TEMAN SETIA offer a promising solution to the problem of medication non-adherence in kidney transplant patients. These

programs not only improve adherence rates but also contribute to better overall outcomes by reducing the likelihood of graft rejection and associated health risks. Ensuring that patients receive the necessary support throughout the post-transplant period is critical for improving both graft survival and the quality of life for kidney transplant recipients (6).

The aim of this study is to evaluate the effectiveness of the TEMAN SETIA program on immunosuppressant medication adherence among post-kidney transplant patients at RSCM Jakarta. Specifically, the study seeks to determine whether the structured education and support provided through the TEMAN SETIA program can improve patient compliance with their prescribed immunosuppressive therapy, thereby enhancing long-term graft survival and overall patient outcomes.

METHODS

Study Design

The study consists of two phases. The first phase involves the development and validation of the e-booklet as an intervention tool. The second phase includes the implementation of the program. The study employs a quasi-experimental design with a pre-test and post-test control group. Participants are divided into two groups: the intervention group, which receives the e-booklet, and the control group, which receives standard care. Data is collected at three time points: before the intervention, one month after, and two weeks after the intervention. This design allows for a comprehensive evaluation of the program's short-term and slightly longer-term effects on the participants.

Sampling and Participants

The population for this study consisted of 105 kidney transplant patients treated at RSUPN Dr. Cipto Mangunkusumo from 2023 to March 2024. The sample size was determined using G power analysis for a repeated measures ANOVA (within-between interaction) with the following parameters: a medium effect size (0.25), a power of 0.80, and a significance level of 0.05 (12). To account for a potential 20% data loss, the final sample size included 28 participants, divided equally into two groups of 14. This sample size was deemed adequate to detect statistically significant differences in adherence outcomes, consistent with recommendations for behavioral intervention studies (13).

Participants were purposively selected based on specific inclusion criteria: they were aged 18 years or older, had undergone a single kidney transplant, were taking at least one prescribed immunosuppressant independently, and were not currently hospitalized. Additional requirements included mobile phone access and approval from their transplant physician. Cognitive impairment was a key exclusion criterion to ensure accurate self-reporting and adherence assessment.

Data Collection and Measurement

Demographics:
Demographic data collected in this study included variables such as age, gender, education level, occupation, ethnicity, religion, and duration of treatment. These factors were recorded to understand the background characteristics of the participants and provide context for the analysis.

Medication Adherence (MMAS-8)

Medication adherence data were gathered using the Morisky Medication Adherence Scale (MMAS-8), a validated instrument designed to assess long-term adherence to prescribed medications (14). The MMAS-8 comprises several short questions that evaluate patient adherence, with slight adjustments made to questions 5 and 8 for more accurate scoring. The total score classifies adherence into three categories: high adherence, which is indicated by a score of 8; medium adherence, indicated by a score of 6 to 7; and low adherence,

indicated by a score below 6. Initial measurements of adherence were conducted before the intervention, with follow-up assessments taken immediately after the intervention and again one month later to evaluate changes in adherence over time.

Family Support Questionnaire

The family support questionnaire consists of ten items designed to evaluate various types of family support received by participants. The items are categorized into three domains: emotional support (items 1–3), instrumental support (items 4–7), and informational support (items 8–10). Responses are measured on a four-point Likert scale: "always" (4 points), "often" (3 points), "sometimes" (2 points), and "never" (1 point). The total score ranges from 10 to 40, with higher scores indicating better family support. Family support is classified as *good* if the participant's total score meets or exceeds the mean or median value, and as *poor* if it falls below these thresholds.

The validity of the questionnaire was evaluated through testing with 30 respondents, resulting in corrected item-total correlation (r-values) ranging from 0.545 to 0.756, indicating satisfactory construct validity (15). Furthermore, the instrument demonstrated high reliability, with a Cronbach's alpha of 0.899, ensuring consistency in measuring family support in the context of post-transplant care.

Knowledge Questionnaire

The knowledge questionnaire is designed to assess participants' understanding of immunosuppressant medications. It covers topics such as the definition, indications, and potential side effects associated with improper use of the medications. The questionnaire includes ten items, each rated on a Likert scale with four response options: strongly disagree, disagree, agree, and strongly agree. Patient knowledge is classified as poor if the score is below the mean or median and as good if the score meets or exceeds these values.

The validity of the questionnaire was assessed through testing with 30 respondents, yielding corrected item-total correlation (r-values) ranging from 0.565 to 0.956. This demonstrates satisfactory construct validity. The reliability was high, with a Cronbach's alpha of 0.899.

The questionnaire was adapted from Visser R (2015)(16).

Ethical Approval

Ethical approval for this study was obtained from the Ethics Committee of Universitas Muhammadiyah Jakarta and the Institutional Review Board of RSCM (Approval Number: KET-1344/UN2.F1/ETIK/PPM.00.02/2024). Participants were informed that their data confidentiality would be maintained using a coding system rather than personal identifiers. They were also made aware of their right to withdraw from the study at any time or decline to answer specific questions without any negative consequences. The study ensured that participation would not involve any harm or risk to the participants.

Intervention Description

The TEMAN SETIA intervention employed a multi-component approach, incorporating tailored education, counselling, and monitoring over a one-month period to support medication adherence. Education was individualized based on each participant's knowledge level and specific concerns, covering the goals, benefits, side effects, and monitoring of immunosuppressive medications. Counselling sessions focused on enhancing self-efficacy by addressing psychological barriers, reinforcing motivation, and developing personalized strategies to manage adherence challenges.

Monitoring strategies were integrated into daily routines, with reminders to support consistent medication intake. Social support was also a key component, involving family members in medication management, including preparation, reminders,

prescription refills, and recognizing when to seek medical advice. This individualized approach ensured that participants received education and counselling tailored to their specific needs, directly addressing barriers to adherence. Additionally, participants provided feedback on the most helpful aspects of the intervention, allowing further refinement of the program.

Data Analysis

Data will be analysed using SPSS for Windows. Descriptive statistics will be used to summarize demographic data and health-related variables. A paired t-test will compare pre- and post-intervention adherence levels within each group, while an independent t-test will evaluate the differences between the intervention and control groups. Additionally, repeated measures ANOVA will be applied to examine changes in adherence over different time points, allowing for analysis of adherence, family support and knowledge patterns throughout the study.

RESULTS

Demographic Characteristics

Table 1 illustrates that the control and intervention groups were similar in terms of age and treatment duration. The mean age in the control group was 37.71 years, while the intervention group had a mean age of 33.86 years, with no significant difference observed (p = 0.244). The average treatment duration was 43.07 months for the control group and 26.07 months for the intervention group, also showing no significant difference (p = 0.526). This similarity ensures that any observed effects of the TEMAN SETIA program can be attributed to the intervention itself rather than baseline differences in age or treatment duration.

Table 2 provides a comparison of gender distribution, education level, and employment status between the groups. Gender distribution was balanced, with 57.1% of males in the control group and 42.9% in the intervention group, showing no significant difference (p = 0.450). Education levels were evenly distributed between the groups, with no significant difference (p = 1.000). Employment status approached significance (p = 0.058), with a higher proportion of non-working participants in the intervention group (66.7%) compared to the control group (33.3%).

Table 1. Distribution of Respondent Characteristics Based on Age and Treatment Duration

Variable	Group	n	Mean	Min - Max	SD	t	*p- value*
Age (year)	Control	14	37,71	23 – 59	12,288	-0,940	0,244
	Intervention	14	33,86	24 – 43	9,197		
Duration of Treatment (in months)	Control	14	43,07	6 – 132	34,819	-1,376	0,526
	Intervention	14	26,07	3 – 108	30,393		

*Levene t-test

Table 2. Distribution of Respondent Characteristics Based on Gender, Education, and Employment Status

No.	Variable		Group		Total n (%)	X^2	P Value
			Control n (%)	Intervention n (%)			
1	Gender						
		Male	8 (57,1)	6 (42,9)	14 (50,0)	0,571	0,450
		Female	6 (42,9)	8 (57,1)	14 (50,0)		
2	Education						
		Low	1 (100,0)	0 (0,0)	1 (3,6)	1.037	1,000
		High	13 (48,1)	14 (51,9)	27 (96,4)		
3	Job						
		No	5 (33,3)	10 (66,7)	15 (53,6)	3,590	0,058
		Yes	9 (69,2)	4 (30,8)	13 (46,4)		

Effectiveness of the TEMAN SETIA Program in Enhancing Medication Adherence, Family Support, and Knowledge

The TEMAN SETIA program demonstrated notable effectiveness in improving adherence, family support, and knowledge among participants in the intervention group.

Medication Adherence

As shown in **Table 3**, adherence in the intervention group significantly improved from pre-intervention (T0) to post-intervention (T2), with a mean difference (MD) of -1.214 (p = 0.001). This indicates that the program successfully fostered improved adherence to recommended practices. In contrast, the control group exhibited a slight, non-significant decline in adherence, with a mean difference of 0.500 (p = 0.303).

Family Support

Family support improved in both the intervention and control groups. **Table 3** reveals that in the intervention group, the mean family support score increased from 36.14 (T0) to 38.57 (T2), yielding a statistically significant mean difference of -2.428 (p = 0.031). In comparison, the control group also showed a significant improvement, with family support scores rising from 25.00 (T0) to 32.71 (T2), resulting in a mean difference of -7.714 (p = 0.036). This suggests that while both groups saw improvements, the intervention group's improvement in family support was more modest.

Knowledge

Knowledge scores increased significantly in both groups, reflecting the impact of the structured educational efforts. As illustrated in **Table 3**, in the intervention group, the mean score rose from 37.29 (T0) to 39.78 (T2), with a mean difference of -3.736 (p = 0.002), showing a clear improvement. The control group also demonstrated a significant improvement, with knowledge scores increasing from 27.57 (T0) to 35.29 (T2), resulting in a mean difference of -7.714 (p = 0.001).

Table 3. Effectiveness of the TEMAN SETIA Program on Medication Adherence, Family Support, and Knowledge: A Comparative Analysis of Intervention and Control Groups

Group	Time	Mean	SD	MD	t	df	Sig
Adherence							
Intervention	Pre (T0)	6.29	1.069	-1.214	-4.050	13	0.001
	Post (T2)	7.50	.650				
Control	Pre (T0)	6.29	1.437	.500	1,073	13	0.303
	Post (T2)	5.78	1.050				
Family Support							
Intervention	Pre (T0)	36.14	4.452	-2.428	-2.419	13	0.031
	Post (T2)	38.57	1.949				
Control	Pre (T0)	25,00	9.907	-7.714	-2,332	13	0.036
	Post (T2)	32,71	7.790				
Knowledge							
Intervention	Pre (T0)	37.29	2.463	-3.736	-2.500	13	0.002
	Post (T2)	39.78	.578				
Control	Pre (T0)	27,57	7.101	-7,714	-4,303	13	0.001
	Post (T2)	35,29	3.148				

Effectiveness of the TEMAN SETIA Program in Enhancing Medication Adherence, Family Support, and Knowledge: A Between-Group Comparison with Effect Size

The effectiveness of the TEMAN SETIA program in improving adherence, family support, and knowledge was compared between the intervention and control groups. The analysis, as shown in Table 4, includes the mean differences (MD) between the groups, statistical significance, and effect size (Cohen's d) to assess the magnitude of the intervention's impact.

Medication Adherence

The intervention group demonstrated a significant improvement in adherence from pre- to post-intervention (MD = -1.214), while the control group exhibited a slight, non-significant increase (MD = 0.500). The comparison of the two groups indicated a statistically significant difference in the change in adherence (p = 0.005), with the intervention group showing a greater improvement. The effect size (Cohen's d = 1.97) indicates a large effect of the TEMAN SETIA program on improving adherence.

Family Support

Family support increased in both groups; however, the intervention group showed a smaller improvement in family support (MD = -2.428) compared to the control group (MD = -7.714). Despite these differences, the comparison between the groups did not reveal a statistically significant difference (p = 0.138). The effect size (Cohen's d = 1.02) reflects a moderate to large effect of the intervention on family support, although other factors might have influenced the larger improvements in the control group.

Knowledge

Both the intervention and control groups showed significant improvements in knowledge, with the intervention group achieving an MD of -3.736 and the control group an MD of -7.714. The between-group comparison showed a significant difference in the change in knowledge (p =

0.011), with the intervention group demonstrating a more substantial improvement. The effect size (Cohen's d = 1.99) indicates a large effect of the TEMAN SETIA program on enhancing knowledge.

These findings, as outlined in Table 4, underscore the program's positive impact on adherence and knowledge, with a large effect size indicating a significant and meaningful improvement. Family support improvements were observed but were not significantly different between the groups, suggesting that further exploration of other contributing factors is needed.

Table 4. Comparative Analysis of Adherence, Family Support, and Knowledge Improvements Between Intervention and Control Groups (Pre-Post Intervention)

Time	Group	Mean	SD	MD	t	df	Sig	Effect Size (d)
Adherence Pre (T0) – Post (T2)	Intervention	-1.214	1.743	1.714	3.094	22.19	0.005	1.97
	Control	.5000	1.121					
Family Support Pre (T0) – Post (T2)	Intervention	-2.422	3.756	-5.285	-1.529	26	0.138	1.02
	Control	-7.714	12.375					
Knowledge Pre (T0) – Post (T2)	Intervention	-2.500	2.503	-5.214	-2.725	26	0.011	1.99
	Control	-7.714	6.707					

Impact of Group Assignment and Time on Medication Adherence: Mixed ANOVA Results

The analysis in Table 5 reveals the effects of group assignment (control versus intervention), time (three repeated measures of medication adherence), and their interaction. A significant main effect of group was observed ($F_{(1,26)} =10.97, p=0.03, \eta 2=0.29$), indicating that the intervention group demonstrated consistently higher medication adherence compared to the control group, regardless of time. However, the main effect of time was not significant ($F_{(1.246,26)} =1.252, p=0.282, \eta 2=0.046$), suggesting that adherence did not change significantly over time across both groups. Importantly, a significant group-by-time interaction ($F_{(1.246,26)} =7.394, p=0.007, \eta 2=0.221$) highlights that changes in adherence over time varied between the groups. Specifically, the intervention group showed greater improvements in adherence over the three measurement points, underscoring the effectiveness of the TEMAN SETIA program in enhancing medication adherence over time.

Table 5. Mixed ANOVA Results: Effects of Group, Time, and Their Interaction on Medication Adherence

	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Suare (MS)	F	p-value	Partial Eta Squared
Group	23.048	1	23.048	10.97	0.03	.297
Time	2.000	1.246	1.605	1.252	.282	.046
Group x Time	11.810	1.246	9.478	7.394	.007	.221
Error	41.524	26.00	1.597			

Figure 1
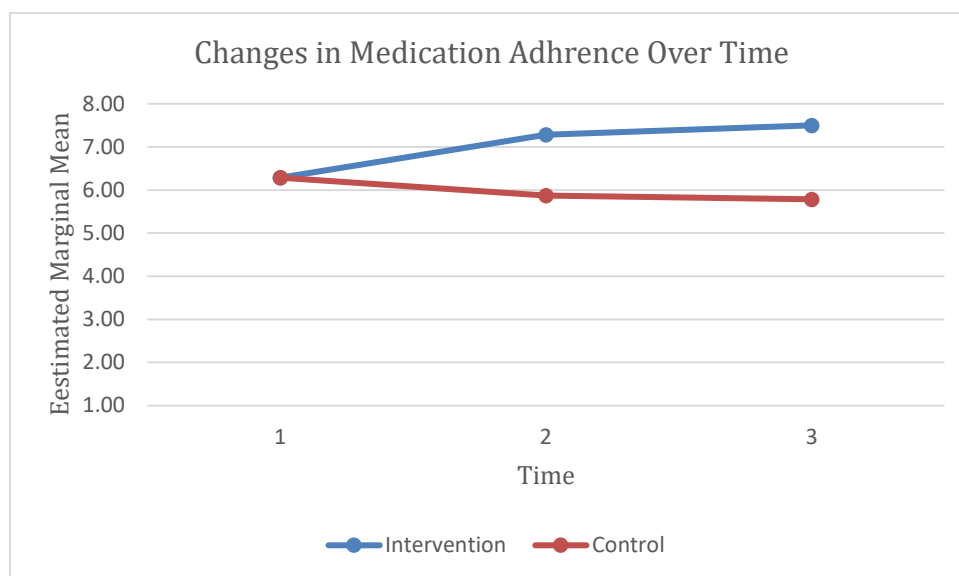
DISCUSSION

Effectiveness of the TEMAN SETIA Program

This study highlights the effectiveness of the TEMAN SETIA program in enhancing medication adherence, family support, and knowledge among transplant recipients. The findings emphasize the importance of structured educational interventions and family involvement in improving health outcomes for transplant recipients.

Medication Adherence

The TEMAN SETIA program demonstrated substantial success in improving medication adherence, which aligns with existing literature that underscores the role of patient education in enhancing adherence to prescribed treatment regimens. Studies have shown that increasing patient knowledge improves adherence, particularly in chronic conditions like kidney transplantation (17). By stressing the consequences of non-adherence, such as organ rejection, the program likely helped participants internalize the importance of following their medication regimen. The intervention group's significant improvement in adherence suggests that educational

programs focusing on patient empowerment can lead to better health behaviours and support positive outcomes in transplant care.

Family Support

Although family support is recognized as a critical factor in medication adherence, the improvement observed in this study was not statistically significant. Several factors may explain this. First, baseline family support levels were already relatively high, which could have limited potential for further improvement. This study was conducted at RSCM, a referral hospital and pioneer in kidney transplantation in Jakarta, where patients typically involve their families from the initiation of the procedure. When family involvement is already strong, additional interventions may have less impact. Furthermore, the TEMAN Setia intervention in this study incorporated family members for support and accompaniment, particularly during home monitoring of medication adherence. However, the intervention may not have been sufficiently targeted or intensive to produce substantial changes. More personalized or frequent family-oriented interventions, such as dedicated support sessions or specialized educational

programs, could further strengthen engagement. Previous research highlighted that active family participation, including structured involvement in the care process, can improve patient outcomes. Future studies should explore more intensive, family-centered interventions to better engage family members and enhance medication adherence (18).

Knowledge

The program was highly effective in improving participants' knowledge about their treatment, which is crucial for successful self-management. The increased knowledge in the intervention group aligns with findings that stress the importance of patient education in kidney transplant recipients (2). By providing patients with a better understanding of their treatment regimen and the risks associated with non-adherence, the TEMAN SETIA program empowered patients to make informed decisions and take responsibility for their health. This knowledge likely contributed to their improved medication adherence.

Impact of the TEMAN SETIA Program on Medication Adherence

The Mixed ANOVA results underscore the positive impact of the TEMAN SETIA program on medication adherence. The intervention group consistently exhibited higher medication adherence than the control group, indicating the program's effectiveness in promoting adherence over time. The large effect size suggests that the intervention had a significant and lasting impact on medication adherence, aligning with prior research highlighting the value of structured interventions in improving adherence behaviours in chronic disease management.

Role of Time in Medication Adherence

Interestingly, the main effect of time did not reach statistical significance, suggesting that adherence levels remained stable over time for both groups (Table 5, Figure 1). This highlights the complexity of medication adherence as a behaviour that does not naturally improve without targeted interventions. While time alone did not affect adherence, the TEMAN SETIA program's impact was evident, reinforcing the importance of consistent support and education in fostering long-term adherence.

Group-by-Time Interaction and Its Implications

The most compelling finding was the significant group-by-time interaction. Both groups showed changes in adherence over time, but the intervention group demonstrated greater improvements. This underscores the effectiveness of the TEMAN SETIA program in generating sustained changes in adherence that may not have occurred without such an intervention. The differential improvement between groups suggests that the program helped participants in the intervention group develop better medication habits, leading to sustained improvements across the study period.

Clinical Implications

These results carry significant implications for clinical practice, especially in the management of chronic conditions where medication adherence is vital for successful treatment outcomes. Healthcare providers may consider implementing multifaceted interventions like the TEMAN SETIA program to support patients in improving adherence. Such interventions not only address medication-taking behaviours but also empower patients through education, which can lead to improved health outcomes.

Future research could focus on the long-term sustainability of adherence improvements and whether similar programs can be tailored for other chronic conditions. Investigating the factors contributing to individual differences in the intervention's effects could also offer valuable insights into optimizing adherence strategies.

Study Limitations

This study's sample size of 28 participants, determined using G-power analysis for feasibility, may limit statistical power and

generalizability. Future research should aim for a larger sample size to enhance evidence robustness. The quasi-experimental design, lacking randomization, may introduce selection bias; randomized controlled trials (RCTs) would better support causal inferences. Additionally, the one-month follow-up may not fully capture long-term medication adherence trends. A follow-up period of six months to one year would provide more insight into the intervention's sustained effectiveness. Future studies should include longer follow-up periods to assess adherence persistence.

Implications for Practice

The findings highlight the importance of comprehensive educational interventions that engage both patients and their families. Healthcare providers should prioritize educating patients about the importance of medication adherence and consider involving family members more actively in the learning process to ensure long-term success. Integrating family support through dedicated educational sessions or resources could enhance the impact on adherence. Additionally, fostering an environment where patients feel informed and empowered may lead to sustained improvements in medication adherence and overall health outcomes.

CONCLUSION

In conclusion, the TEMAN SETIA program effectively enhanced medication adherence and knowledge, with significant improvements observed in both areas. While family support showed moderate improvements, further efforts to involve family members in the educational process could yield greater benefits. These findings highlight the critical role of educational interventions in transplant care and the potential advantages of integrating family support to improve adherence. A combined approach of patient education and family involvement could provide a more holistic solution for enhancing health outcomes in transplant recipients.

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