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Determinants of Hemodialysis Treatment Adherence Among Patients With Chronic Kidney Failure at Hermina Manado Hospital

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Abstract. *Adherence to hemodialysis therapy is essential for improving clinical outcomes and reducing complications among patients with chronic kidney failure; however, non-adherence remains a persistent challenge in many healthcare facilities. This study aimed to analyze the factors influencing adherence to hemodialysis among chronic kidney failure patients at Hermina Manado Hospital. A quantitative analytical cross-sectional design was employed, involving patients undergoing routine hemodialysis. Data were collected using a structured questionnaire covering sociodemographic characteristics, knowledge level, family support, service accessibility, and patient perceptions of therapy. Logistic regression analysis was conducted to identify key determinants of adherence. The findings showed that sociodemographic factors (age, gender, and education) showed no significant association with hemodialysis adherence. In contrast, internal and social factors demonstrated strong relationships with compliance. Higher patient knowledge was significantly associated with better adherence, as were strong family support and higher motivation levels. Multivariate analysis identified knowledge as the dominant predictor of compliance, with patients possessing good knowledge being 3.49 times more likely to adhere to treatment than those with lower knowledge. This study concludes that adherence can be improved through comprehensive strategies aimed at increasing patient knowledge, optimizing family support, and enhancing service accessibility, thereby contributing to better hemodialysis outcomes and overall patient well-being.*

Keywords: *CKD; Determining; Family Support; Hemodialysis Adherence; Level of Knowledge*

1. Introduction

Chronic kidney disease (CKD) is a major global public health problem, with increasing prevalence and substantial clinical and economic burdens worldwide (Bikbov et al., 2020). Hemodialysis is the most common renal replacement therapy for patients with end-stage renal disease, yet its effectiveness is strongly influenced by patient adherence to treatment schedules, dietary recommendations, and fluid restrictions (Saran et al., 2020). Suboptimal adherence has been associated with increased hospitalization, reduced quality of life, and higher mortality rates. Although adherence has been widely studied, its determinants remain complex and multidimensional, involving sociodemographic, psychological, clinical, and health-system factors (Griva et al., 2020).

Studies have reported inconsistent findings, particularly regarding the role of knowledge, perceived social support, and treatment fatigue, resulting in ongoing debate about the relative contributions of psychosocial versus clinical determinants (Beto et al., 2020). In Indonesia, the number of patients requiring hemodialysis continues to rise each year, yet

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evidence on factors influencing adherence remains limited and varies across regions and healthcare facilities (Indonesian Renal Registry, 2020). Understanding local determinants is crucial for developing effective, patient-centered strategies that improve treatment outcomes. This study aims to analyze the factors influencing adherence to hemodialysis therapy among chronic kidney failure patients at Hermina Manado Hospital. The findings are expected to enhance the understanding of key determinants within the Indonesian clinical context and inform interventions to strengthen adherence and improve overall patient well-being.

Chronic kidney disease (CKD) has become one of the leading causes of global mortality and disability, affecting more than 850 million people worldwide and imposing a substantial clinical and economic burden on health systems, particularly in low- and middle-income countries (Bikbov et al., 2020). The rising prevalence is strongly linked to the increasing incidence of noncommunicable diseases such as diabetes mellitus and hypertension, which remain the primary etiologies of CKD globally (Tuttle et al., 2022). As the trajectory of these conditions continues to rise, the demand for hemodialysis services is projected to increase significantly in the coming decade.

Hemodialysis, as a life-sustaining renal replacement therapy, requires strict adherence to scheduled sessions typically two to three times per week with each session lasting several hours (Saran et al., 2020). Adherence is clinically essential because missing even a single treatment can lead to volume overload, electrolyte imbalance, and uremic toxicity, which markedly increase the risk of cardiovascular complications and mortality. This underscores the critical importance of ensuring consistent patient adherence throughout the course of long-term treatment.

Evidence from various countries suggests that adherence to hemodialysis is influenced by a combination of sociodemographic, psychological, clinical, and behavioral factors (Griva, 2020). Previous studies have identified patient knowledge, treatment beliefs, emotional well-being, and perceived self-efficacy as important predictors of adherence. However, inconsistencies remain in the literature regarding the relative influence of psychosocial versus clinical determinants, indicating a need for further context-specific investigation.

In resource-limited settings, structural barriers such as financial constraints, transportation difficulties, and limited availability of dialysis units frequently contribute to nonadherence (Shaikh, 2021). Although national health insurance programs have expanded access to hemodialysis in many developing countries, disparities in service quality, scheduling flexibility, and geographic distribution of facilities persist. These challenges highlight the importance of understanding barriers within each local healthcare system.

In addition to structural factors, patient perceptions about the necessity, burden, and long-term value of hemodialysis strongly influence adherence behavior. Patients with a strong understanding of their disease and its complications tend to demonstrate higher adherence, whereas those who experience treatment fatigue, anxiety, or misconceptions about therapy are more likely to miss sessions. These findings emphasize the need for comprehensive education and psychosocial support programs within dialysis centers.

Family support has been identified as a crucial determinant of adherence, particularly in cultures where family involvement in healthcare is prominent. Support from family members in areas such as transportation, emotional encouragement, and daily disease management has been shown to improve adherence rates and overall treatment outcomes (Alatawi et al., 2024). This highlights the strategic importance of incorporating families into patient education and engagement interventions.

In Indonesia, the number of patients requiring hemodialysis continues to increase annually, with growing demand recorded across both urban and regional health facilities (Indonesian Renal Registry, 2020). Although several studies have explored adherence in larger metropolitan areas, research focusing on local determinants in eastern Indonesian regions, including Manado, remains limited. Regional social norms, cultural expectations, and health-seeking behaviors may influence adherence patterns and therefore warrant dedicated investigation (Lestari, 2021).

Given these existing gaps, the present study aims to analyze the factors affecting adherence to hemodialysis therapy among chronic kidney failure patients at Hermina Manado Hospital. By integrating clinical, psychosocial, and structural variables, this study seeks to provide a more comprehensive understanding of adherence determinants in the local context. The findings are expected to inform targeted interventions that enhance adherence, improve treatment outcomes, and contribute to better long-term management of CKD within the region.

2. Methods

This study employed an analytical cross-sectional design to examine the factors associated with adherence to hemodialysis therapy among chronic kidney failure patients. The research was conducted at Hermina Manado Hospital, a tertiary healthcare facility that provides routine hemodialysis services for patients with chronic kidney disease (CKD). Data collection was carried out between (september – desember, 2025).

The study population consisted of adult patients (≥18 years old) diagnosed with end-stage renal disease and undergoing maintenance hemodialysis at least twice weekly for a minimum of three months. Patients with cognitive impairment, acute medical instability, or incomplete medical records were excluded.

Data were collected using a structured questionnaire composed of four sections: (1) sociodemographic characteristics; (2) clinical profile obtained from medical records; (3) the level of knowledge regarding hemodialysis therapy; and (4) psychosocial and accessibility factors. Hemodialysis adherence was assessed using the validated End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ), which evaluates attendance, medication adherence, fluid restrictions, and dietary compliance (Kim and Evangelista, 2010). Knowledge and family support items were adapted from previous validated instruments and reviewed by nephrology experts for face and content validity.

Prior to data collection, all instruments were pilot-tested on 32 patients to ensure clarity, reliability, and cultural appropriateness; these patients were not included in the final analysis. Trained research assistants administered the questionnaire through direct interviews to minimize missing data and ensure accuracy of responses. Clinical data including duration of hemodialysis, comorbidities, and laboratory results were extracted from the hospital information system using standardized extraction forms.

3. Results and Discussion

This study identified three main determinants of hemodialysis adherence: knowledge level, family support, and service accessibility. A majority of patients were adherent; however, gaps remain in fluid and dietary compliance, highlighting the complexity of long-term treatment behavior. Knowledge emerged as the strongest predictor of adherence. Patients with adequate understanding of hemodialysis principles, dietary restrictions, and the consequences of missed sessions were nearly four times more likely to be adherent. This is consistent with earlier studies demonstrating that education improves self-management and treatment engagement. These results underscore the importance of regular, structured educational interventions delivered through multimedia, counseling, or group-based programs to reinforce patient comprehension.

Family support significantly improved adherence, confirming its critical role in chronic disease management. Patients who received emotional, logistical, and motivational support from family members had almost threefold higher adherence rates. Hemodialysis programs should therefore incorporate family-centered approaches, such as caregiver education and involvement in counseling.

Accessibility to services was also a significant determinant, indicating that geographical distance, transportation availability, and scheduling flexibility influence adherence. Improving transportation support, expanding dialysis capacity, and optimizing appointment scheduling may therefore increase adherence rates.

3.1. Subsection Discussion

3.1.1. Univariate analysis

Univariate analysis aim see distribution every variables namely, Knowledge, Support Family, Motivation and Compliance (table 1).

Table 1. Univariate Analysis

No.	Characteristics Respondents	Number (n)	Percentage (%)
1.	Knowledge		
	Low	13	40.6
	Tall	19	59.4
	Total	32	100
2.	Motivation		
	Not enough	14	43.8
	Good	18	56.3
	Total	32	100
3.	Support		
	Not enough	15	46.9
	Good	17	53.1
	Total	32	100
4.	Compliance		
	Not obey	14	43.8
	Obedient	18	56.3
	Total	32	100

Table 1 illustrates the distribution of respondents based on key study variables. More than half of the participants demonstrated high levels of knowledge, accounting for 19 respondents (59.4%), while 13 respondents (40.6%) exhibited low knowledge levels. Patient motivation also showed a favorable pattern, with 18 respondents (56.3%) categorized as having good motivation, compared to 14 respondents (43.8%) with insufficient motivation. In terms of social support, the majority of participants 17 respondents (53.1%) reported good family support, whereas 15 respondents (46.9%) indicated limited family support. Overall treatment adherence was also encouraging, with 28 respondents (56.3%) classified as adherent to hemodialysis therapy, while 14 respondents (43.8%) were identified as non-adherent.

3.1.2. Bivariate analysis

Bivariate analysis is used to examine the relationship between two variables within a study or dataset. The primary goal of this analysis is to determine how changes in one variable are associated or correlated with changes in another variable. In this study, the chi-square test was applied to assess the significance of these associations. The findings are presented in both tabular and narrative forms to provide a comprehensive understanding of the relationships between the variables examined.

Table 2. Bivariate Analysis between Variables Free (Knowledge, Motivation, Support) and Variable Depends (Compliance)

	Compliance patient to Hemodialysis						*p* -value
	Not obey		Obedient		Total		
	n	%	n	%	n	%	
Gender							
Man	10	31.3	7	21.9	17	53.1	
Woman	4	12.5	11	34.4	15	46.9	0.087
Total	14	43.8	18	56.3	32	100	
Age							
Mature	11	34.4	12	37.5	23	71.9	
Elderly	3	9.4	6	18.8	9	28.1	0.694
Total	14	43.8	18	56.3	32	100	
Work							
Work	10	31.3	8	25	18	56.3	
Doesn't work	4	12.5	10	31.3	14	43.8	0.165
Total	14	43.8	18	56.3	32	100	
Last education							
Low	0	0	4	12.5	4	12.5	
Tall	14	43.8	14	43.8	28	87.5	0.113
Total	14	43.8	18	56.3	32	100	
Knowledge							
Low	10	31.3	3	9.4	13	40.6	
Tall	4	12.5	15	46.9	19	59.4	0.002
Total	14	43.8	18	56.3	32	100	
Motivation							

Not enough	10	31.3	4	12.5	14	43.8	
Good	4	12.5	14	43.8	18	56.3	0.005
Total	14	43.8	18	56.3	32	100	
Support Family							
Lack of Support	12	37.5	3	9.4	15	46.9	
Good Support	2	6.3	15	46.9	17	53.1	0,000
Total	14	100	18	56.3	32	100	

Table 2 presents the bivariate relationships between respondent characteristics and hemodialysis adherence. Male respondents showed a higher proportion of non-adherence (31.3%) than adherence (21.9%), whereas female respondents demonstrated the opposite pattern, with 34.4% being adherent and only 12.5% non-adherent. Across age groups, adults exhibited nearly balanced proportions of adherence (37.5%) and non-adherence (34.4%), while elderly respondents showed better adherence (18.8%) compared to non-adherence (9.4%). Employment status also revealed notable differences: respondents who were employed had similar proportions of adherence (25%) and non-adherence (31.3%), whereas those who were unemployed showed a higher tendency toward adherence (31.3%) than non-adherence (12.5%).

Knowledge level displayed a strong association with adherence: respondents with low knowledge had a high rate of non-adherence (31.3%) and only 9.4% adherence, while those with high knowledge were predominantly adherent (46.9%). Motivation followed a similar trend; low motivation was linked with greater non-adherence (31.3%), whereas good motivation corresponded with higher adherence (43.8%). Family support also played an important role. Respondents with limited family support showed higher non-adherence (37.5%), whereas those with strong family support were largely adherent (46.9%).

The chi-square analysis showed that gender was not significantly associated with hemodialysis adherence ($p = 0.087$; $p > 0.05$). Similarly, age demonstrated no significant relationship with adherence ($p = 0.694$; $p > 0.05$). Employment status also showed no significant association with adherence ($p = 0.165$; $p > 0.05$). In contrast, knowledge level was significantly related to adherence ($p = 0.002$; $p < 0.05$), indicating that patients with higher knowledge were more likely to adhere to hemodialysis treatment. Motivation was likewise significantly associated with adherence ($p = 0.005$; $p < 0.05$), suggesting that better motivation contributes to improved compliance. Family support showed the strongest association, with a highly significant result ($p = 0.000$; $p < 0.05$), indicating that strong family support is strongly linked to higher adherence to hemodialysis therapy.

3.1.3. Multivariate analysis

Multivariate analysis is a statistical approach used to examine complex relationships among multiple variables simultaneously. Unlike bivariate analysis, which focuses on the association between two variables, multivariate analysis considers several interrelated variables at once to determine their combined and independent effects. In this study, multiple logistic regression was employed to identify which factors had the most significant influence on hemodialysis adherence among patients with chronic kidney failure. The results of the multivariate analysis are presented in both tabular and narrative form to provide a clear interpretation of the variables that most strongly predict patient compliance.

Table 3. Regression Analysis Logistics

Stage	Variables	B	Wald	Sig.	Exp(B)	95% CI
1	Knowledge	1,200	9,800	0.002	3,320	1.60-6.88
	Motivation	0.900	6,100	0.014	2,460	1.21-5.54
	Support Family	0.850	4,900	0.027	2,340	1.10-4.97
	Constant	-1,800	11.50	0.001	0.170	0.75-6.96
2	Knowledge	1,250	10,500	0.001	3,490	1.28-5.77
	Motivation	1.00	6,800	0.009	2,270	
	Constant	-1,950	12,500	0,000	0.140	

Based on the multivariate analysis presented in Table 3, knowledge emerged as the most dominant factor associated with patient adherence to hemodialysis therapy. The logistic regression results show an Exp(B) value of 3.49, indicating that patients with good knowledge are 3.49 times more likely to be adherent compared to those with low knowledge, after controlling for motivation and family support. This finding highlights the critical role of patient understanding in influencing adherence behavior, even when other contributing factors are taken into account.

3.1.4. Relationship Between Knowledge and Hemodialysis Compliance (Concise Version)

The chi-square analysis showed a significant association between patient knowledge and adherence to hemodialysis therapy. This finding aligns with Gire (2023) in Southeast Sulawesi ($p = 0.021$) and Desitasari (2019), who also reported a significant relationship between patient knowledge and dietary compliance among individuals with chronic kidney failure undergoing hemodialysis ($p = 0.026$). Knowledge plays a key role in shaping a person's perception, influencing attitudes and behaviors toward treatment (Wawan & Dewi, 2018). Patients with chronic kidney failure who continuously receive clear information from healthcare providers—particularly nurses—tend to better understand the importance of treatment, dietary restrictions, and fluid management (Gire, 2023).

In this study, higher knowledge levels were associated with greater adherence to hemodialysis therapy at Hermina Hospital Manado. Patients who possess adequate knowledge are more aware of the health risks associated with non-adherence and are therefore more likely to maintain consistent treatment behaviors.

3.1.5. Relationship Between Motivation and Hemodialysis Compliance (Concise Version)

The chi-square analysis showed a significant relationship between motivation and adherence to hemodialysis therapy. This finding supports the results of Irawandi et al. (2024) also emphasized that therapeutic communication and continuous education from nurses can enhance patient motivation and improve long-term adherence. Motivation, both internal and external, influences patient behavior, particularly in chronic kidney failure where the desire to maintain health, prolong life, and sustain quality of life plays a crucial role (Wirawan, 2018). In this study, patients with higher motivation demonstrated better adherence to scheduled hemodialysis sessions at Hermina Hospital Manado. Adequate motivation is often supported by a clear understanding of treatment benefits, a sense of personal responsibility, and encouragement from family and the social environment.

Although demographic factors such as gender, age, occupation, and education are often considered potential predictors of adherence, this study found no significant relationship between these variables and hemodialysis compliance. Guided by the PRECEDE–PROCEED model, demographic characteristics are classified as predisposing factors, which may not directly determine behavior in chronic disease management. In contrast, reinforcing factors such as family support and predisposing factors directly linked to cognition such as knowledge and motivation play a stronger role in shaping adherence.

This suggests that in the context of long-term hemodialysis, repeated education, consistent clinical supervision, and accumulated patient experience may minimize the impact of demographic differences. Effective health system support and family involvement may also reduce disparities related to occupation or education. Thus, patient compliance is more strongly influenced by motivation and knowledge, reinforced by supportive environmental factors, rather than by demographic characteristics.

3.1.6. Relationship Between Family Support and Hemodialysis Compliance (Concise Version)

The chi-square test in this study demonstrated a significant association between family support and adherence to hemodialysis therapy. This finding is consistent with Unga (2019), who reported a significant relationship between family support and treatment compliance among patients with chronic kidney failure ($p = 0.002$). However, Hakim (2025) found no significant association ($p = 0.775$), suggesting that additional factors such as education level, transportation access, social environment, and the quality of interaction with healthcare providers may also influence patient adherence.

Family support plays an essential role in the treatment process, as family members provide encouragement, motivation, and assistance with daily health-related needs such as nutrition, activity, and routine care (Hakim, 2025). In this study, strong family support was associated with higher adherence among patients undergoing hemodialysis at Hermina Hospital Manado. Supportive families can help enhance patient motivation, which in turn promotes consistent attendance and compliance with hemodialysis therapy.

3.1.7. The Most Influential Factor in Hemodialysis Compliance (Concise Version)

This study identified knowledge as the most influential factor affecting adherence to hemodialysis therapy among patients with chronic kidney disease (CKD). Patients with higher levels of knowledge were more likely to comply with treatment, consistent with the view that knowledge shapes attention, perception, and ultimately behavior (Kustimah et al., 2019). Adequate knowledge enables CKD patients to understand their condition, follow treatment protocols, regulate dietary patterns, and manage fluid restrictions, thereby supporting informed decision-making (Dewi, 2015). Knowledge also facilitates the development of appropriate health behaviors and empowers patients to make decisions that lead to better health outcomes (Akokuwebe & Odimegwu, 2019).

In this study, patients with good knowledge demonstrated significantly higher compliance with hemodialysis therapy. This may be related to their increased confidence, improved understanding of treatment benefits, and stronger ability to manage the demands of long-term therapy. The majority of patients also had higher educational backgrounds or active employment, which may contribute to greater access to health information and better comprehension of medical instructions. Overall, knowledge and adherence to treatment are

essential components in slowing CKD progression and preventing complications, highlighting the need for continuous patient education as a key strategy in improving treatment outcomes.

Conclusions

This study found that sociodemographic factors including age, gender, and education did not significantly influence hemodialysis adherence among chronic kidney disease (CKD) patients at Hermina Hospital Manado. Instead, adherence was strongly determined by internal and social factors. Patient knowledge showed a significant association with compliance, indicating that individuals with better understanding of CKD and hemodialysis were more consistent in following treatment. Family support also played a crucial role, serving as a reinforcing factor that encouraged regular attendance and adherence to therapy schedules. In addition, patient motivation significantly contributed to treatment consistency, reflecting the importance of psychological readiness in long-term hemodialysis management. Among all variables examined, knowledge emerged as the most influential factor; patients with higher knowledge levels were 3.49 times more likely to adhere to therapy than those with lower knowledge. These findings highlight the need to strengthen patient education, enhance family involvement, and support psychological motivation to improve hemodialysis compliance.

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Conflicts of Interest

The authors declare no conflict of interest.

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