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Knowledge and Family Support in Nutritional Management of Productive Age Hemodialysis Patients

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ABSTRACT

Introduction: End-stage renal disease (ESRD) is a condition of total kidney failure whose prevalence continues to increase, mainly affecting productive age groups who contribute significantly to the family and country's economy. ESRD patients generally undergo hemodialysis, which causes high-cost burdens and significant changes in life due to physical impacts, absence from work, and effects of therapy. Quality and compliance with hemodialysis, including nutrition and fluid management, are essential because non-compliance can lead to decreased productivity, increased morbidity, and patient mortality. Optimal nutrition and fluid management require support and knowledge from the family. This study aimed to analyze the interaction of family knowledge and support with nutrition and fluid management in hemodialysis patients as measured by the results of clinical laboratory examinations in the productive age group.

Methods: This study used a quantitative approach with a cross-sectional survey design involving 191 hemodialysis patients using a purposive sampling technique with certain criteria in West Sumatra, an area known for its unique culture and dietary patterns.

The study was conducted in four hemodialysis referral hospitals. The knowledge instrument was compiled based on the Kidney Disease Questionnaire and chronic kidney disease nutrition guidelines, consisting of 23 statements, and the Family Support Instrument was adapted from the Family Support Scale (FSS) with 19 statement items. Nutrition and fluid management data were collected through observation sheets based on clinical laboratory results such as urea, creatinine, albumin, sodium, potassium, and IDWG. Spearman's rank correlation analysis was used with a significance level of $\alpha<0.05$

Results: The results showed no significant relationship between knowledge and Hemoglobin, creatinine, sodium, potassium, and Interdialytic Weight Gain (IDWG) ($p>0.05$). However, knowledge was related to urea ($p=0.037$) with weak strength and a negative direction ($r = -0.151$). Family support was not significantly related to Hemoglobin, urea, creatinine, sodium, potassium, and IDWG levels ($p>0.05$).

Conclusion: This study shows that knowledge is only related to urea levels, while family support has no significant effect on nutritional and fluid compliance. These findings emphasize the importance of personal education, intensive monitoring, and family involvement in supporting nutritional and fluid management in hemodialysis patients.

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INTRODUCTION

End Stage Renal Disease (ESRD) is a condition where the kidneys fail to carry out their function (1). ESRD prevalence continues to increase yearly, with an annual increase of around 6% to 8% (2). In Indonesia, the incidence of ESRD has increased from around 2.0% in 2013 to 3.8% in 2018 (3). ESRD attacks individuals in the age range of 15 to 75 years, with a prevalence of 35% of ESRD patients being in the 15 to 54 year age group. This age group represents society's productive workforce, and the impact of disease on individuals in this age range affects their ability to contribute significantly to their families and the nation's economy (4). Socioeconomic disadvantages occur throughout the life course before starting hemodialysis and associated with health outcomes in patients into old age (5).

Patients with End-Stage Renal Disease (ESRD) often require hemodialysis as a kidney replacement therapy (6,7). Among the patients who receive hemodialysis, approximately 58% are within the productive age group. Consequently, government spending on hemodialysis has notably increased over the years, rising from 3.2 trillion in 2016 to 5.2 trillion in 2021. The condition of patients undergoing hemodialysis causes a significant cost burden for sufferers and their families, including the sustainability of their careers. The lives of patients also experience drastic changes due to physical damage, frequent absence from work due to the need for medical consultations, treatment, recurrence of the disease, and side effects of renal replacement therapy (4,8).

Hemodialysis adequacy significantly influences patient mortality and morbidity, particularly through urea and creatinine clearance. Suboptimal clearance of these waste products can exacerbate kidney glomerular damage and reduce patient productivity. Compliance with treatment guidelines during hemodialysis is vital for successful outcomes (9). Non-compliance increases morbidity and mortality (6). However, it's concerning that only around 50% of patients adhere well to their treatment (10). Hemodialysis treatment compliance comprises four aspects: adherence to the hemodialysis program, treatment, diet program, and fluid restrictions (9). Nutritional management and fluid restriction pose significant challenges due to their complexity and the need for consistent implementation (11,12). This non-compliance can lead to complications, such as an intradialytic weight gain (IDWG) exceeding 4% (13), malnutrition (Protein Energy Waste or PEW) (14,15), and hyperkalemia.

In a 2017 cohort study, non-compliance with treatment led to hospitalizations, with 1,127 admissions due to fluid overload, 4,321 due to cardiovascular causes, and 11,209 due to other causes (16). An increase in IDWG is often the result of high fluid consumption and elevated sodium and potassium levels, which lead to fluid retention (17). Hemodialysis patients worldwide frequently experience malnutrition, known as Protein-Energy Wasting (PEW), with a prevalence ranging from 28% to 54% (18). PEW is primarily caused by inadequate protein intake and protein loss due to catabolism during dialysis (19). Insufficient protein intake exacerbates PEW due to the protein catabolism process. In Indonesia, in 2018, approximately 47% of hemodialysis patients experienced PEW, which was associated with a poor prognosis and high mortality rate (20). Parameters used to assess protein intake adequacy include levels of creatinine, urea, and albumin (21).

Several factors influence the compliance of hemodialysis patients in managing their nutrition and fluids. These factors include the duration of hemodialysis treatment (22), knowledge (10), perception (23), and family support (24). Knowledge is critical in shaping behavior and compliance, as it serves as the foundation for decision-making. Patients undergoing hemodialysis often rely on family support to meet their nutritional needs due to their dependence on others (25,26). Qualitative studies have shown that some hemodialysis patients may feel neglected by their families due to their busy schedules (27,28). The duration of hemodialysis also impacts nutrition and fluid management in patients with chronic kidney failure, as longer illness duration may lead to fatigue, depression, and reduced motivation to adhere to dietary and fluid management guidelines (22).

Various complications caused by the hemodialysis process and factors influencing fluid and nutritional management compliance affect patient productivity. Where patients have a low level of work during dialysis (29). Most patients stop working due to physical weakness and conflicts between their dialysis and work schedules (30,31). Lack of social and family support and rejection from family members also hinder patients from returning to society and working again (30). Therefore, it is essential to know the factors that influence patient compliance, which will later decrease hemodialysis patients' productivity.

Although there has been research on factors that influence nutrition and fluid management in patients, research that explores these factors in patients in the productive age group is still limited, especially in the West

Sumatra region. Productive-age patients typically carry heavier economic responsibilities, maintain active social and occupational roles, and experience greater difficulty in maintaining treatment adherence due to time constraints and competing priorities. Due to the dietary habits prevalent in West Sumatra, characterized by a high consumption of coconut, protein, and cholesterol, but relatively low intake of carbohydrates, individuals in this region exhibit a distinct dietary pattern (32). However, this dietary pattern contrasts with the nutritional requirements recommended for hemodialysis patients. Thus, managing the nutrition of such patients necessitates a deep understanding of the foods consumed and adept skills in selecting appropriate nutrition tailored to the patient's condition. Additionally, the Minangkabau culture, which is matriarchal and matrilineal with an extended family structure, emphasizes familial support, contributing significantly to an individual's ability to cope with health challenges (33). This research aims to analyze the interaction of knowledge and family support on nutrition and fluid management in hemodialysis patients as measured based on the results of clinical laboratory examinations in the productive age group.

METHOD

Research Type

This study used a quantitative approach with a cross-sectional survey design selected to efficiently assess the relationship between knowledge, family support, and clinical outcomes at a single point in time.

Population and Sample

The study population consisted of patients undergoing hemodialysis treatment. Moreover, considering the frequency of hemodialysis cycles and available bed capacity, 320 eligible patients were identified. Subsequently, we employed a purposive sampling technique aligned with the research objectives, resulting in a final sample of 191 respondents who met specific criteria: aged between 15 and 60 years, had undergone regular hemodialysis for at least 2 months, demonstrated willingness to participate, exhibited good health awareness and cooperation, and had received adequate education on nutrition and fluid management as per standard hospital protocols (Figure 1).

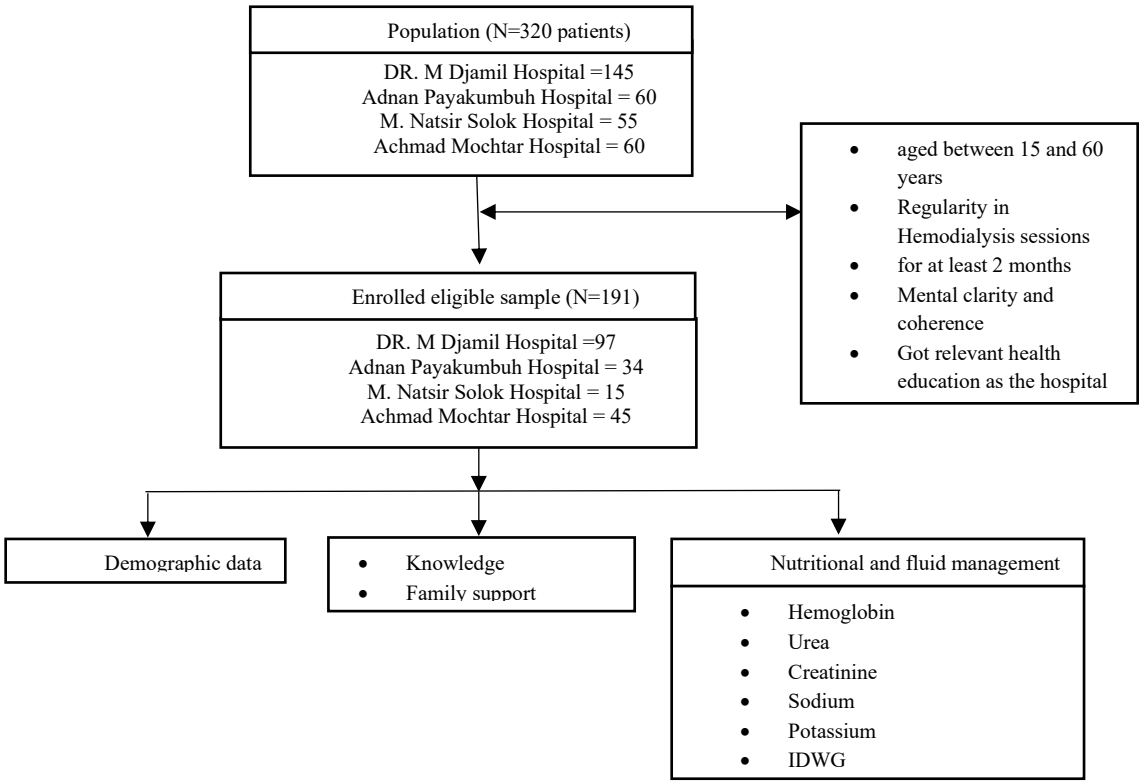

Figure 1. Enrollment of Population and Research Sample Flow

Research Location

This study was conducted at four hemodialysis referral hospitals in the West Sumatra region, namely in Padang City, Bukittinggi City, Payakumbuh City and Solok City, which reflect the four corners of West Sumatra.

Instrumentation and Data Collection Procedures

The knowledge instrument was adapted from two relevant sources: the Kidney Disease Questionnaire (34), consisting of 10 statements, and the consensus guidelines for nutrition in chronic kidney disease (35), which contains 13 statements. Before use, the questionnaire's contents were reviewed by a hemodialysis specialist. Subsequently, the questionnaire underwent validation and reliability testing. Validity was assessed using Cronbach's alpha coefficient, resulting in a score of 0.75, which exceeds the 0.7 threshold. The final knowledge questionnaire comprised 23 statements covering nutritional management and fluid management in hemodialysis patients. This questionnaire uses a three-scoring system, where correct answers are given one point, while wrong answers or do not know answers get zero points, with a maximum score of 23. The higher the score means the higher the level of knowledge.

The questionnaire for assessing family support was adapted from the family support scale (FSS) (36), consisting of 19 questions divided into five sections: instrumental support, informational support, emotional support, and assessment support. Participants provided responses on an ordinal scale (1-4), where 'always' corresponds to 4, 'often' to 3, 'rarely' to 2, and 'never' to 1, resulting in a total score range of 20-80. The validity of the questionnaire has also been tested resulting in a Cronbach alpha value of 0.9 (greater than the r table value) which shows its validity (36).

The observation sheet evaluates patients' fluid and nutritional management based on clinical laboratory results, including pre-dialytic urea, creatinine, albumin, sodium, potassium, and Interdialytic Weight Gain (IDWG). IDWG is calculated by subtracting the post-dialysis weight from the previous session's pre-dialysis weight, representing fluid intake from one dialysis session to the next.

Data Analysis

Statistical analysis for this research was conducted using IBM SPSS version 20. Demographic and clinical data were analyzed using descriptive statistics, including frequency, percentage, mean, standard deviation, minimum, and maximum values. Before analysis, the data were assessed for normality using the Kolmogorov-Smirnov test. Since the data did not follow a normal distribution, Spearman's rank correlation was employed to test the relationship between variables. The significance level was set at $\alpha<0.05$, with a confidence level of 95%.

Ethical Approval

This study received ethical approval (Approval number: 190/KEPK/2024) from the Health Research Ethics Committee at M Djamil Padang Central General Hospital. Patients provided informed consent, which included detailed information about the research objectives, procedures, confidentiality, and the right to withdraw during the study. This process ensured that patients were well-informed and participated voluntarily, respecting their autonomy and rights.

RESULTS

Characteristics of the Participants

Table 1 shows the frequency distribution of participant characteristics, including age, gender, education, work, length of undergoing HD, and comorbidity.

Table 1. Characteristics of the Respondents

Characteristics	Frequency	Percentage
Age		
17-25 years old (late adollescent)	9	4.7
26-35 years old (early addulthood)	18	9.4
36-45 years old (late addulthood)	43	22.5

Characteristics	Frequency	Percentage
Age		
46-55 years old (early elderly)	80	41.9
56-60 years old (late elderly)	41	21.5
Genders		
Male	115	60,2
Female	76	39.8
Education		
Elementary	24	12.6
Junior highschool	34	17.8
Senior highschool	88	46.1
College	45	23.5
Work		
Work	62	32.5
Unemployement	129	67.5
Length of Undergoing HD		
< 2 years	125	65.4
≥ 2 years	66	34.6
Comorbidity		
No comorbidity	1	0.5
1 comorbidity	133	69.6
2 comorbidity	51	26.7
>2 comorbidity	6	3.1

Source: Primary Data

Most respondents (41.9%) were in the 46-55 age range, categorized as early elderly. Most respondents were male (60.2%), and the most common educational level was senior high school (46.1%). Additionally, 67.5% of the respondents were unemployed. Of the total, 125 patients (65.4%) had undergone hemodialysis (HD) for less than 2 years. The most prevalent comorbidity among the patients was a single comorbidity (69.6%). The most prevalent comorbidity among the patients was a single comorbidity (51%), with hypertension being the dominant condition (45%), followed by diabetes mellitus (18.8%). A smaller percentage of patients had other comorbidities such as hepatitis B, hepatitis C, and cardiovascular disease (Table 1).

Table 2 describes the findings regarding patient knowledge of nutrition and hemodialysis fluids. The description of the questionnaire measuring family support can be seen in Table 3.

Table 4 shows that the average knowledge score is 17.87, the family support score is 63.37, and the average hemoglobin level is 9,069 g/dL. Urea levels were high at 65,20 mg/dL; creatinine levels were elevated at 9,572 mg/dL. Meanwhile, the sodium level averages 138,829 mmol/L, the average potassium level is 4,453 mmol/L, and the IDWG averages 3,349 % (Table 4).

Table 2. Description of knowledge questionnaire (n=191)

	Question	Correct f (%)	Don't know f (%)	Wrong f (%)
1	Intake that must be considered for hemodialysis patients is protein, potassium, sodium, and fluid	146 (76.4)	37 (19.4)	7 (3.7)
2	Types of diets and their administration based on the rest of the kidney function in the patient's body	141 (73.8)	42 (22)	7 (3.7)
3	High-potassium foods such as bananas, potatoes, tomatoes, sweet potatoes, avocados, spinach, cassava leaves are not recommended for patients undergoing hemodialysis	169 (88.5)	17 (8.9)	5 (2.6)
4	If there is edema / swelling in the legs and high blood pressure, it is necessary to reduce salt and avoid foods with sodium sources such as soft drinks, packaged drinks, salted fish and salted eggs	146 (76.4)	35 (18.3)	10 (5.2)
5	The impact of excess fluid in the body is weight gain, shortness of breath and swelling	123 (64.4)	39 (20.4)	29 (15.2)
6	The goal of a diet program for hemodialysis patients is to maintain fluid, electrolyte balance and nutritional status	155 (81.2)	10 (5.2)	26 (13.6)
7	Is too much protein in the urine not good for the kidneys	164 (85.9)	16 (8.4)	11 (5.8)
8	Whether patients with chronic renal impairment should be monitored for daily nutritional management	178 (93.2)	11 (5.8)	2 (1.0)
9	High-calorie foods such as syrup, honey and sweets are calorie boosters	160 (83.8)	18 (9.4)	13 (6.8)
10	Patients with kidney failure are at risk of metabolic disorders due to inadequate intake	107 (56)	51 (26.7)	33 (17.3)
11	Decreased kidney function causes can affect urine output	170 (89)	4 (2.1)	17(8.9)
12	The recommended food ingredients for patients undergoing hemodialysis are foods that have high nutritional value	112 (58.6)	64 (33.5)	15 (7.9)
13	In a day, tempeh consumption can be more than 2 medium pieces	161 (84.3)	17 (8.9)	13 (6.8)
14	In a day, the consumption of eggs allowed is only 1 egg, the white only	145 (75.9)	27 (14.1)	19 (9.9)
15	Is it okay to consume spinach as much as 100 grams in a day	134 (70.2)	31 (16.2)	26 (13.6)
16	The amount of salt consumption in a day allowed is less than 1/3 teaspoon	169 (88.5)	14 (7.3)	8 (4.2)
17	Vitamin E is necessary in patients with chronic renal impairment undergoing hemodialysis	182 (95.3)	4 (2.1)	5 (2.6)
18	Fluid intake in patients with renal failure is adjusted to urine production and fluid status	176 (92.1)	7 (3.7)	8 (4.2)
19	Good sources of animal protein for patients undergoing hemodialysis therapy are chicken, fish, meat	108 (56.5)	64 (33.5)	19 (9.9)
20	Good sources of carbohydrates for patients undergoing hemodialysis therapy are rice, team rice, and flour	181 (94.8)	6 (3.1)	4 (2.1)
21	Can patients with kidney disorders consume sweet oranges 2 pieces (80grams)	138 (72.3)	36 (18.8)	17 (8.9)
22	In a day, the consumption of eggs allowed is only 1 egg, the white only	179 (93.7)	8 (4.2)	4 (2.1)
23	Can patients with kidney failure consume 2/3 cup of non-fat yogurt	151 (79.1)	23 (12)	17 (8.9)

Source: Primary Data

Table 3. Description of family support questionnaire (n=191)

	Question	Never f (%)	Rarely f (%)	Often f (%)	Always f (%)
1	My family appreciates me	7 (3.6)	10(5.2)	11(5.7)	163 (84.9)
2	My family helps me in my daily activities	3 (1.6)	19(9.9)	28(14.6)	141(73.4)
3	My family helps me in worship activities	11 (5.7)	15 (7.8)	21 (10.9)	144(75)
4	My family gave me an emotional form	134(70.2)	14(7.3)	43(22.5)	0(0)
5	My family always listens to the problems I have	6(3.1)	15(7.9)	38(19.9)	132(69.1)
6	My family helped solve my problem	60(31.4)	40(20.9)	24(12.6)	67(35.1)
7	My family has always been careful about my food	0(0)	15(7.9)	35(18.3)	141(73.8)
8	My family cares about my health	0(0)	13(6.8)	31(16.2)	147(77)

9	I always feel satisfied when my family gives me support	0(0)	9(4.7)	29(15.2)	153(80.1)
10	My family always asked me for help to keep me happy	20(10.5)	30(15.7)	36(18.8)	105(55)
11	My family always cares about my sleep time	0(0)	11(5.8)	53(27.7)	127(66.5)
12	My family is always careful with the food I consume	2(1)	20(10.5)	41(21.5)	128(67)
13	My family gave me warmth	1(0.5)	13(6.8)	33(17.3)	144(75.4)
14	My family loves me	6(3.1)	11(5.8)	41(21.5)	133(69.6)
15	My family gives me useful information	0(0)	9(4.7)	35(18.3)	147(77)
16	My family shares important decisions with me	1(0.5)	20(10.5)	41(21.5)	129(67.5)
17	My family understands my personal desires	10(5.2)	13(6.8)	39(20.4)	129(67.5)
18	My family helps me to participate in social events	106(55.5)	17(8.9)	20(10.5)	47(24.6
19	My family helps in my treatment	15(7.9)	20(10.5)	35(18.3)	121(63.4)

Source: Primary Data

Table 4. Distribution of Average Scores of Knowledge, Family Support and Clinical Parameters Of Fluid Management And Nutrition Of Hemodialysis Patients

Variable	Mean ± SD	Min	Max
Knowledge	17.87 ± 3.656	3	23
Family Support	63.37 ± 8.726	36	35
Hemoglobin(g/dL)	9.069 ± 1.511	5.6	18
Urea (mg/dL)	65.20 ± 28.642	20	175
Creatinine (mg/dL)	9.572 ± 7.073	1.9	97
Sodium (mmol/L)	138.829 ± 7.576	46	145.8
Potassium (mmol/L)	4.453 ± 0.968	2.7	9.8
IDWG (%)	3,349 ± 2,018	0,00	9,58

Source: Primary Data

Table 5. Correlation Analysis of Knowledge, Family Support and Clinical Parameters of Fluid Management and Nutrition of Hemodialysis Patients

Variable	Knowledge		Family Support	
	***p* value**	**Correlation coefficient (r)**	***p* value**	**Correlation coefficient (r)**
Hemoglobin(g/dL)	0.926	0.007	0,643	-0,050
Urea (mg/dL)	0.037*	-0.151	0,258	0,120
Creatinine (mg/dL)	0.790	-0.019	0,976	-0,003
Sodium (mmol/L)	0.475	0.052	0,218	-0,131
Potassium (mmol/L)	0.944	0.005	0,115	0,167
IDWG (%)	0.774	0.021	0,853	0,020

Spearman's Rank Correlation; *p≤0,05
Source: Primary Data

Table 5 shows that the correlation tests between knowledge and the variables IDWG, Hemoglobin, creatinine, sodium, and potassium yielded p-values >0.05, indicating an insignificant relationship. However, knowledge exhibited a significant negative correlation (r = -0.151) with urea levels, as indicated by a p-value <0.05, suggesting a weak inverse relationship. The correlation test results showed that family support was unrelated to any clinical laboratory examination results.

DISCUSSION

In this study, the knowledge variable was found to be unrelated to the characteristics of IDWG, hemoglobin, creatinine, sodium, and potassium. However, it exhibited a negative and weak correlation with blood urea levels, indicating that higher knowledge was associated with lower urea levels. If we examine the knowledge score, which has an average value of 17.87 out of a possible range of 0-23, it indicates that patients already possess a good understanding of nutrition and fluid management. This is further substantiated by the question about protein (question number 22). In a day, the consumption of eggs allowed is only one egg, the white only, which received a high score.

This high level of knowledge may also be due to the patient's education, most of whom are in senior high school. This level of education is sufficient capital to analyze the information provided.

Despite the patients' high average knowledge score, their urea levels remained elevated, with an average urea level of 65.20 g/dL, exceeding the normal range of 10-50 g/dL. Urea levels ranged from a minimum of 20 to a maximum of 175 g/dL. This situation suggests that, while patients have a good level of knowledge, they may face challenges in effectively managing their nutrition, particularly protein intake, which leads to elevated urea levels (37). High blood urea levels can result in symptoms such as fatigue, nausea, vomiting, dizziness, and leg cramps, significantly impacting the patients' daily activities and productivity.

Better knowledge about managing a low-protein diet will likely lead to more controlled eating behavior, thus directly affecting urea levels (38). This is in contrast to other laboratory parameters such as creatinine, potassium, or phosphorus, which are influenced by food intake and other variables such as muscle mass, residual renal function, and medication use. Therefore, it can be assumed that nutritional knowledge contributes directly to controlling protein metabolism, as reflected in urea levels (39), but not directly to other more complex parameters.

The fact that only urea, and not any other biochemical markers can correlate meaningfully may suggest a broader behavioral pathway. Levels of urea are susceptible to protein intake, which can be typically addressed in dietary advice and easily modified by patients who are well-informed about dietary restrictions (40). Other markers, such as potassium, phosphorus, or creatinine, are regulated by various physiological and treatment-related variables, like residual renal function, muscle mass, or drug use, and thus would be less immediately amenable to intervention based on knowledge. This pattern highlights the possible facilitative role of nutritional knowledge in modulating protein metabolism per se, mainly focusing on urea as a more behaviorally sensitive marker in hemodialysis patients.

The results of this research are consistent with several other studies. It is important to note that having good knowledge does not necessarily guarantee good patient behavior, as shown in various studies (41–43). Knowledge is a primary predictor factor, but adherence to recommendations depends on factors like commitment. For example, studies found that despite good knowledge, many respondents consumed excessive amounts of protein, sodium, and phosphorus, exceeding their body's requirements (44). Additionally, most of them had food intakes that exceeded the recommended levels (45). On the contrary, another studies discovered that non-compliance with nutritional management among patients was primarily due to economic factors (46). However, this study reveals a different perspective, indicating that patients' non-compliance with nutritional management is not solely attributed to a lack of knowledge but is influenced by the inability to control their appetite.

In the cultural context of Minangkabau culture, the traditional diet emphasizes foods high in protein, sodium, and spices such as rendang, dendeng, and other delicious dishes (47). These cultural food preferences may pose significant challenges to dietary adherence among hemodialysis patients, even when they have good levels of nutritional knowledge. This cultural background provides a possible explanation for why knowledge does not consistently result in improved clinical outcomes. Although patients demonstrate adequate knowledge, especially regarding protein intake, applying that ingrained dietary habits and social norms around communal eating may limit understanding in daily life. These findings suggest that knowledge alone is not enough to ensure adherence and underscore the need for culturally tailored nutritional interventions that inform and support behavioral change in a realistic and culturally sensitive manner.

Another reason for the lack of significant impact is the variation in kidney development and functional ability among the participants. This study did not assess the residual kidney function in the metabolic processes of each respondent's body. For instance, patients with kidney function at 10% and those with kidney function at 15% would have differing filtration abilities, resulting in variations in clinical laboratory values. Therefore, in addition to dietary intake, the stage of disease development also plays a crucial role in determining the levels of toxic substances circulating in the bloodstream (48).

This study also identified no significant relationship between family support and patient nutritional compliance, as indicated by clinical parameter values (p-value > 0.05). These findings align with another research conducted in 2023. This study suggested that family support had no substantial impact on respondent compliance, as many respondents did not adhere to the recommended dietary guidelines and preparations provided by their families (22,42).

Although this study is inconsistent with the findings of several studies, which stated that family support significantly affects patient adherence due to its positive psychological impact (49–51), this study did not find a substantial effect of family support on patient adherence. The researchers asserted that, regardless of the level of family support, patient adherence ultimately depends on the individual's behavior and eating habits. The differences in study findings may be partly due to differences in measurement instruments. This study objectively assessed adherence using clinical laboratory values, not questionnaires.

According to the researchers, the primary goal of family support should not only be to promote treatment and nutritional compliance but also to prevent depression in patients and enhance their overall quality of life (52,53). Building trust within the family can encourage patients to follow recommendations. However, patient compliance with nutritional and fluid management is ultimately a personal choice. Additionally, families need to be educated about the specific nutritional and fluid requirements of the patient, particularly in cases where patients live in extended families. This can present challenges when trying to provide specialized food for the patient, leading to them consuming the same foods as other family members.

Finally, from the results of the research above, we can see the impact of this disease on patient productivity. Only around 32.5% of patients were able to work, the rest were no longer able to work. This condition is caused by disruption of activity due to their health (54,55). Some conditions such as lower hemoglobin levels and anemia are strongly associated with work disability and poor quality of life (56). Apart from that, the public assumes that patients undergoing hemodialysis therapy will experience many obstacles in working normally (8). So for now, the patient only has one comorbidity, but if all nutritional and fluid management is not controlled it will cause many subsequent complications (8). For this reason, family support and high motivation are needed to manage fluids and nutrition. A limitation of this study was that data collection for this study was challenging, as patients often preferred to rest. As a result, researchers had to schedule and coordinate interviews with patients carefully. Further research is recommended to use multivariate analysis to control and evaluate the interaction effects between variables to make the results more comprehensive and clinically valid.

CONCLUSION

In this study, it was found that the knowledge variable was only correlated with blood urea levels. Conversely, family support did not exhibit a significant relationship with nutritional and fluid compliance among hemodialysis patients, as assessed through clinical parameters like hemoglobin, urea, creatinine, sodium, potassium, and IDWG. These results suggest that, despite having good knowledge and family support, patients' ability to manage nutrition and fluids does not automatically improve. This study highlights that knowledge alone cannot change behavior, especially in culturally diverse and resource-poor situations. It emphasizes the need for nutrition interventions that are practically acceptable and culturally relevant, supporting not just education but long-term behavior change, too.

This research holds substantial implications for nursing practice. It underscores the importance of continuous, personalized education and counseling to boost patient motivation. Recognizing that patients operate within a family context, active family involvement is vital role in managing the patient's nutritional and fluid intake. Moreover, due to patients' distinct needs, intensive, individualized monitoring may be an effective strategy. It is hoped that this research can offer valuable insights to hospitals in developing interventions and policies to enhance patient abilities and motivation

AUTHOR'S CONTRIBUTION STATEMENT

All authors contributed equally in this study in substantial contributions to the conception or design of the work, analysis or interpretation of data for the work, drafting of the work, and final approval of the version to be published.

CONFLICTS OF INTEREST

The authors affirm that there were no financial or commercial conflicts of interest throughout this study and no competing interests with the funders.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

This manuscript uses ChatGPT and Grammarly's generative artificial intelligence (AI) tools only to support language refinement, improve clarity, or improve the overall readability and structure of the manuscript.

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