The Relationship of Hemodialysis Duration with Fluid Restrictions Compliance Among Chronic Kidney Disease Patient

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Abstract

Purpose: Chronic Kidney Disease is a condition of decreased kidney function, which occurs when the kidneys are unable to transport the body's metabolic waste or carry out their regular functions. This disease is characterized by irreversible and progressive worsening of kidney function.To identify the relationship between the length of time undergoing hemodialysis and compliance with fluid intake restrictions in patients undergoing hemodialysis

Method: Quantitative research type with analytical observational research design with a cross sectional approach. The population in this study was 254 hemodialysis patients with a purposive sampling technique, namely 72 hemodialysis patients. Data analysis used the Kendall Tau statistical test.

Results: Characteristics of respondents based on age, the majority of the elderly aged 56-65 years (33.3%), based on gender, the majority male (56.9%), based on education level, the majority high school/high school (38.9%), based on occupation the majority did not work (67.7%), based on the length of time undergoing hemodialysis, the majority in the old category was (54.2%), and the majority in the less compliant category had compliance with fluid intake restrictions (86.1%). There is a relationship between the length of time undergoing hemodialysis and compliance with fluid intake restrictions in chronic kidney failure patients with a value of p=0.003 (p value<0.01).

Keywords **:** Duration of Hemodialysis, Compliance with Fluid Restrictions, Chronic Kidney Disease

Introduction

Chronic Kidney Disease (CKD) is a condition of decreased kidney function, which occurs when the kidneys are unable to transport the body's metabolic waste or carry out their regular functions. A substance that is usually eliminated in urine accumulates in body fluids due to impaired renal excretion and causes disruption of endocrine and metabolic functions, fluids, electrolytes and acid bases [1]. This disease is characterized by irreversible and progressive worsening of kidney function. Chronic kidney disease will occur if *the Glomerular Filtrate Rate* (GFR) is <60 ml/minute/1.73 for three months or more, and is said to be in the final stage if the GFR reaches <15 ml/minute/1.73 with dialysis or not [2].

According to *the World Health Organization* (WHO) (2019), the incidence of chronic kidney disease worldwide reaches 10% of the population, while those undergoing hemodialysis reach 1.5 million people worldwide. Data in Indonesia, the incidence of chronic kidney disease is 0.38% or 3.8 per 1000 Indonesian population [3]. Chronic kidney disease sufferers are aged around 50 years and are of productive age. Data from *the Indonesian renal registry* (IRR) in 2018 who underwent hemodialysis were 66,433 patients, while active patients In 2018 there were 132,142 hemodialysis patients. According to Basic Health Research (RIKESDAS, 2018) in Yogyakarta

Special Region there are disease prevalence chronic kidney disease was 0.43%. The number of chronic kidney disease sufferers is more common among men (0.4%) than women (0.3%).

The results of a preliminary study in the hemodialysis room at the PKU Muhammadiyah Hospital in Yogyakarta on November 25 2023 showed that there were 254 routine hemodialysis patient data in a month. As an initial observation, there were 10 patients undergoing hemodialysis therapy in the hemodialysis room at PKU Muhammadiyah Hospital, Yogyakarta, with the patients experiencing thirst due to restrictions on fluid intake. There were 7 patients who said they were still unable to limit their fluid intake so they often experienced edema and shortness of breath due to the excess fluid volume, and 3 others were still able to comply with limiting their fluid intake by eating sweets to prevent the feeling of thirst a little. Of the 10 hemodialysis patients, the average length of time they underwent hemodialysis was 5 years.

In patients with chronic kidney disease, the inability of the body's organ function to maintain fluid and electrolyte balance can cause clinical manifestations such as uremia and decreased ability to concentrate urine which results in edema. Apart from edema, other impacts include anemia as a result of a decrease in the amount of erythropoietin production due to the age of red blood cells being less than optimal, the emergence of nutritional disorders, and the appearance of bleeding caused by the client's uremic condition [4]. Excess fluid in this case is a risk factor that can increase the morbidity and mortality rates of chronic kidney disease patients undergoing hemodialysis therapy . If this condition is allowed to continue, it will cause heart failure and can even lead to death [5].

One of the treatments for chronic kidney disease is hemodialysis which aims to improve kidney function and improve quality of life. Hemodialysis is a kidney replacement therapy carried out 2-3 times a week for 4-5 hours, which aims to remove the remains of protein metabolism and correct fluid and electrolyte balance disorders [6]. Therefore, chronic kidney disease patients must undergo hemodialysis regularly and implement good self-management [7].

Self-management in hemodialysis patients includes compliance with hemodialysis, medication, diet fluid and sodium. Restricting fluids and sodium in hemodialysis patients can reduce the consequences of increasing body fluid volume, reduce blood pressure and *Interdialytic Weight Gain (IDWG)* [8]. Interdialytic Weight Gain (IDWG) is an increase in the amount of fluid that causes weight gain as a basis for determining the amount of fluid received during the interdialytic period (Novia et al., 2020).

Based on previous research, the duration of hemodialysis has a significant correlation with compliance with fluid intake limits (P 0.014) with a negative correlation (r -0.0375), meaning that the longer undergoing hemodialysis, the lower the compliance with fluid restrictions [9]. Meanwhile, other research with the results of *Kendall's tau* analysis shows a calculated value (p) of 0.681. A calculated value above 0.005 indicates that the length of hemodialysis and compliance with fluid intake is not significant, the longer the patient undergoing hemodialysis is less compliant with limiting fluid intake because the patient has reached the acceptance stage [10]. Therefore, researchers are interested in conducting research on "the relationship between length of time undergoing hemodialysis and compliance with fluid intake restrictions in patients undergoing hemodialysis at PKU Muhammadiyah Hospital Yogyakarta".

Methods

The type of research used is quantitative research, with an analytical observational research design with a *cross sectional approach* , namely the measurement of the independent variable and the dependent variable is carried out simultaneously and only once for each respondent [11]. In this study, researchers used medical records to examine the relationship between length of time undergoing hemodialysis and questionnaires regarding compliance with fluid intake restrictions in patients undergoing hemodialysis at PKU Muhammadiyah Hospital Yogyakarta .

The population in this study was all people undergoing hemodialysis without distinguishing between gender, totaling 254 people. The sampling method was carried out using a *purposive sampling* method , The sample in this research is with criteria respondents who are over 18 years old, patients who undergo routine hemodialysis, patients who can have their weight weighed and can stand, undergo hemodialysis twice a week, undergo outpatient treatment, can communicate verbally, and are willing to be respondents at the PKU Muhammadiyah Hospital in Yogyakarta.

Data analysis uses *Kendall Tau* to determine the relationship between the independent variable and the dependent variable (Duarsa, 2021). In this study, the independent variable is the relationship between length of time undergoing hemodialysis and the dependent variable is compliance with fluid intake restrictions.

Results

This chapter will describe the research results which include data collection, data analysis and discussion of research results. The results of this research will be presented in table form. The research was carried out from February 15 to February 16 2024 in the Hemodialysis room at PKU Muhmadiyah Hospital Yogyakarta through interviews using questionnaires and observations regarding the relationship between the length of undergoing hemodialysis and compliance with fluid intake restrictions in patients with chronic kidney disease.

Data collection was carried out for 2 days, namely February 15 to February 16 2024 with a total of 72 respondents.

1. Respondent demographic data consisting of age, gender, education and occupation.

Table 4. 1Frequency Distribution of Respondent Characteristics at PKU Muhammadiyah Hospital Yogyakarta

No	Characteristics Respondent	Frequency n (72)	Percentage (%)
1	**Age**		
	17-25 (Teenagers End)	2	2.8
	26-35 (Adult Beginning)	5	6.9
	36-45 (Adult End)	13	18.1
	46-55 (Elderly Beginning)	19	26.4
	56-65 (Elderly End)	24	33.3
	≥65 (Seniors)	9	12.5
2	**Type Sex**		
	Man	41	56.9
	Woman	31	43.1
3	**Education**		
	elementary school	11	15.3

	JUNIOR HIGH SCHOOL	17	23.6
	high school/high school	28	38.9
	vocational school	1	1.4
	Bachelor	7	9.7
	Diploma	5	6.9
	No school	3	4.2
4	**Work**		
	Work	24	33.3
	No Work	48	66.7
	Total	**72**	**100**

Based on table 4.1 regarding the frequency distribution of characteristics of respondents at the PKU Muhammadiyah Hospital in Yogyakarta, it shows that the characteristics of respondents based on age are mostly elderly people aged 56-65 years as many as 24 people (33.3%). Characteristics of respondents based on gender showed that the majority of respondents were male, 41 people (56.9%). Characteristics of respondents based on level of education showed that the highest level of education of respondents was SMA/SLTA, 28 people (38.9%). Based on job characteristics, the largest number of respondents were not working, 48 people (67.7%).

2. Duration of Hemodialysis in Chronic Kidney Disease Patients

Table 4. 2Frequency Distribution of Respondents' Time Undergoing Hemodialysis at PKU Muhammadiyah Hospital Yogyakarta

No	Duration of Hemodialysis	Frequency	Percentage (%)
1	New (<12 months)	19	26.4
2	Medium (12-24 months)	14	19.4
3	Long (>24 months)	39	54.2
	Total	**72**	**100**

Based on table 4.2 regarding the frequency distribution of the length of time undergoing hemodialysis in chronic kidney disease patients with hemodialysis therapy at PKU Muhammadiyah Hospital Yogyakarta, it shows that the length of time undergoing hemodialysis in the old category was 39 people (54.2%), while it was 14 people (19.4%).) and only 19 people (26.4%).

3. Compliance with Fluid Intake Restrictions in Chronic Kidney Disease Patients

Table 4.3 Frequency Distribution of Compliance with Respondents' Fluid Intake Restrictions at PKU Muhammadiyah Hospital Yogyakarta

No	Obedience Restrictions Intake Fluid	Frequency	Percentage (%)
1	Not enough Obedient	62	86.1
2	Obedient	10	13.9
	Total	**72**	**100**

Based on table 4.3 regarding the frequency distribution of compliance with restrictions on fluid intake of respondents, it shows that compliance with restrictions on fluid intake in patients with chronic kidney disease in the less compliant category was 62 people (86.1%), in the compliant category was 10 people (13.9%).

4. Relationship between duration of undergoing hemodialysis and compliance with fluid intake restrictions in chronic kidney disease patients

Table 4. 5 Distribution Frequency Long Lasting Relationship Hemodialysis with Obedience Restrictions Intake Fluid Respondents at the PKU Muhammadiyah Hospital in Yogyakarta

Long serving Hemodialysis	**Obedience Restrictions Intake Fluid**		**Total**	**Correlation coefficient**	**Sign.**
	Not enough Compliant F (%)	Compliant F (%)	F (%)	-0.331	0.003
New	12 (16.7)	7 (9.7)	19 (26.4)		
Currently	13 (18.0)	1 (1.4)	14 (19.4)		
Long	37 (51.4)	2 (2.8)	39 (54.2)		
Total	**62 (86.1)**	**10 (13.9)**	**72 (100)**		

Based on table 4.5, it shows that the percentage of time undergoing hemodialysis in the new category with compliance with fluid intake restrictions in the non-compliant category was 12 people (16.7%), the length of time undergoing hemodialysis in the new category with compliance with fluid intake restrictions in the compliant category was 7 people (9, 7%), length of time undergoing hemodialysis in the moderate category with compliance with fluid intake restrictions in the less compliant category was 13 people (18.0%), length of time undergoing hemodialysis in the moderate category with compliance with fluid intake restrictions in the compliant category was 1 person (1.4 %), length of time undergoing hemodialysis in the old category with compliance with fluid intake restrictions in the less compliant category was 37 people (51.4%), length of time undergoing hemodialysis in the long category with compliance with fluid intake restrictions in the compliant category was 2 people (2.8%). The contingency result value is -0.331, which means the correlation between the two variables for the length of undergoing hemodialysis and compliance with limiting fluid intake with sufficient correlation. The results of the SPSS test with a p value *of* (0.003) (<0.01) which means that Ha is accepted, that is, there is a relationship between the length of undergoing hemodialysis and compliance with limiting fluid intake in patients with chronic kidney disease.

Discussion

1. Duration of Hemodialysis in Chronic Kidney Disease Patients

The results of this study show that the length of time undergoing hemodialysis for chronic kidney disease patients at PKU Muhammadiyah Hospital Yogyakarta is included in the long category, namely 39 people (54.2%). According to similar research conducted by [12], the majority of patients undergoing hemodialysis are in the old category, where hemodialysis is a therapy used to treat chronic kidney disease, namely a condition where the kidneys cannot function properly. Chronic kidney disease is a progressive condition that cannot be cured. Patients with chronic kidney disease need to undergo regular hemodialysis to help control blood urea, creatinine and electrolyte levels. The length of time a patient undergoes hemodialysis depends on the severity and overall health condition of the patient.

Patients who are non-compliant with hemodialysis, such as not following the hemodialysis schedule or not limiting fluid intake, may need to undergo hemodialysis for a long time [13].

Long-term treatment will have effects on sufferers, such as psychological pressure for sufferers without complaints or symptoms of illness when they are declared sick and have to undergo long treatment. [14] states that respondents who have undergone hemodialysis therapy for a long time tend to have lower levels of anxiety compared to respondents who have just undergone hemodialysis, this is because the longer a person undergoes hemodialysis, the person will be more adaptive to dialysis procedures. Patients who have been undergoing hemodialysis therapy for a long time may already be in the acceptance phase. Patients first diagnosed with chronic kidney disease must undergo long-term dialysis.

Long treatment is a burden in terms of the costs involved, the injections that take so long to receive are felt to be quite boring. The side effects of the drug, even though they are mild, will still make the sufferer feel uncomfortable. It is difficult to convince sufferers to continue treatment for a long period of time. The length of treatment requires tenacity and perseverance on the part of the sufferer himself [15].

2. Compliance with Fluid Intake Restrictions in Chronic Kidney Disease Patients

Based on the research results, it shows that compliance with limiting fluid intake in patients with chronic kidney disease at PKU Muhammadiyah Hospital Yogyakarta was highest in the non-compliant category at 62 people (86.1%).

Based on the research results, it is known that the majority of respondents undergoing hemodialysis therapy were aged 56-65 years, 24 people (33.3%) who were less compliant with limiting fluid intake. Because as age increases, the level of compliance with limiting a person's fluid intake decreases. The aging process can affect changes in kidney function [16]. This is in accordance with the opinion which states that the age of a person who has entered the age of 40 years and above has much better health behavior compared to those aged below or above, because at that age they have given maturity in thinking about behaving better for their health [17]. Elderly chronic kidney disease patients are less compliant with limiting fluid intake, which can be because the patient experiences memory loss. Elderly patients experience cognitive impairment so they forget the amount of fluid they have consumed.

Based on gender, the majority were men, 41 people (56.9%) who were less compliant with limiting fluid intake. Men get thirstier more easily so they are less compliant with fluid restrictions because men have more activity outside so they consume more fluids. This is in accordance with the opinion which states that the body composition of men and women is different, men tend to have more muscle tissue while women have more fat content in their bodies, so that women have less body fluids than men. resulting in women's thirst threshold being lower than men [18].

Based on education, the majority were high school/high school graduates, 28 (38.9%) were less compliant with limiting fluid intake. In line with research conducted by [19] that education is an important factor in being able to understand and regulate oneself in limiting eating and drinking. Research conducted by [20] states that there is a significant relationship between education of 60.4% and diet and fluid compliance in patients with chronic kidney disease, so that the greater the level

of education, the greater the level of understanding of diet compliance and fluid management. chronic kidney disease patient in the Hemodialysis room at Koja Regional Hospital, North Jakarta.

Based on work, the majority did not work as many as 48 people (67.7%) were less compliant with limiting fluid intake, due to lack of family support in controlling fluid intake. In line with research by [21], family support is also needed to ensure that patients remain consistent in controlling fluids because they interact directly with patients at all times at home. Good fluid intake regulation can prevent excessive IDWG. According to the research results, it was found that 64.9% of respondents received support from their families to undergo hemodialysis therapy and control fluid intake. The family functions as a starting point for behavior and provides a basic definition of health and illness. So the family also plays a role in influencing individual perceptions.

3. Relationship between duration of undergoing hemodialysis and compliance with fluid intake restrictions in chronic kidney disease patients

Table 4.5 shows that the highest percentage was undergoing hemodialysis for a long time in the long category with compliance with fluid restrictions in the less compliant category, namely 37 people (51.4%). Based on this research, in terms of age, the majority are 56-65 years old, where older people are less compliant with fluid restrictions, which could be because patients experience memory loss. Elderly patients experience cognitive impairment so they forget the amount of fluid they have consumed [17]. Based on gender, the majority are men, where men have more activity outside, causing them to consume more fluids so they are less compliant with fluid restrictions compared to women [18]. Based on the majority of high school/high school education, patients who have a high level of education make it easier to receive information so that a good perception regarding fluid restrictions is formed [22]. Based on occupation, the majority do not work, where people who do not work are less compliant with limiting fluid intake than people who work, because working people have a more regular schedule, which can help them to be more disciplined in following fluid intake restrictions [23].

Kendall Tau test produces an Ƭ value of -0.331 and a significant value (p) of 0.003, which is smaller than 0.01, so there is a relationship between the length of undergoing hemodialysis and compliance with limiting fluid intake in patients with chronic kidney disease at PKU Muhammadiyah Hospital, Yogyakarta. The coefficient value is negative, meaning that the longer you undergo hemodialysis, the lower the compliance with fluid restrictions and vice versa, the more recently you undergo hemodialysis, the higher the compliance with fluid restrictions.

The results were similar to previous researchers in that patients who had been ill for less than one year were more compliant with fluid restrictions. The longer the illness, the higher the risk of decreased compliance because the patient has reached the acceptance stage [24]. Similar results in a study in South Africa showed that non-compliance with fluid restrictions was 10-74%, non-compliance with compliance medication ranged from 3 to 80%, and non-compliance with diet was 2-39% [25].

The buildup of fluids in the body causes the function of the heart and lungs to become unstable or heavy, which results in the patient's physical response becoming quickly tired and tense, physical activity is also disturbed both when carrying out light and moderate activities.

Restricting fluid intake will change the lifestyle of patients who are considered to have an abnormality. And the recommended eating pattern is not liked by most sufferers so they often ignore their eating pattern [26].

Education is an important factor for hemodialysis patients to be able to understand and regulate themselves in limiting eating and drinking. This proves that education has an influence on compliance with limiting fluid intake in hemodialysis patients. It is hoped that the higher the patient's education, the more compliant the patient will be in limiting fluid intake [19].

Hemodialysis is a kidney replacement therapy carried out by patients with chronic kidney disease, a disease that will last a lifetime. The duration of hemodialysis affects compliance with fluid intake restrictions. Each patient requires a different level of compliance with fluid intake restrictions. The longer the patient undergoes hemodialysis, the more it is hoped that the patient will be more compliant and can control fluid intake restrictions properly, but this is inversely proportional to what is expected in limiting fluid intake. The longer patients undergoing hemodialysis therapy are less compliant in limiting fluid intake because the patient has reached the acceptance stage [27].

Limitations of this research include the researchers cannot see significantly the discipline, organization and effort in limiting fluid intake in patients with chronic kidney disease which can cause an increase in interdialytic weight gain if the patient is not compliant with limiting fluid intake, researchers do not know the significant factors that can cause an increase in interdialytic weight gain, for example efforts and how to control the patient's intake and output before undergoing hemodialysis therapy, and the results of measuring body weight are only seen from medical records and are not carried out directly when the patient is undergoing hemodialysis.

Suggestions for future researchers are that many patients undergoing hemodialysis are still in the category of less compliant with fluid intake restrictions, besides that the patient's family and health workers play an important role in increasing information regarding fluid intake restrictions so that it is hoped that patients with chronic kidney disease will always comply with the fluid restrictions they undergo so that complications such as edema, shortness of breath and fatigue did not occur.

Conclusion

Characteristics of respondents based on age, the majority of elderly people aged 56-65 years were 33.3%. Characteristics of respondents based on gender were mostly male at 56.9%. Respondent characteristics based on education level were mostly SMA/SLTA as much as 38.9%. Characteristics of respondents based on occupation, the majority were not working, 67.7%. Respondents undergoing hemodialysis were in the old category as much as 54.2%. Compliance with fluid intake restrictions in patients with chronic kidney disease on hemodialysis therapy was in the less compliant category at 86.1%. There is a relationship between the length of time undergoing hemodialysis and compliance with fluid intake restrictions in chronic kidney failure patients with a *p value* = 0.003, the correlation is -0.331, which is in the sufficient category, and the direction of the correlation is negative.

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