



The Relationship Between the Length of Hemodialysis with the Level of Depression in Patients in the Hemodialysis Room

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Abstract

Chronic Kidney Disease (CKD) stage 5 is a condition of chronic kidney function decline with GFR less than 15 mL/minute/1.73 m². CKD stage 5 requires renal replacement therapy either by transplantation or dialysis. Currently, the most common renal replacement therapy is hemodialysis. Hemodialysis is undergone by patients throughout their lives and is carried out in hospitals or hemodialysis centers. CKD patients stage 5 who undergo hemodialysis have many setbacks and limitations in their lives so that they are susceptible to depression. This study aims to determine the relationship between the length of time patients undergo hemodialysis and the level of depression. The design in this study was descriptive analytical with a cross-sectional approach with 31 respondents who underwent hemodialysis therapy at Ruteng Regional Hospital in September - October 2024. Depression data were taken using the Zung Self-rating Depression Scale questionnaire. Bivariate data analysis used the Spearman Rank test with a significant value at p-value <0.05. The Spearman Rank test showed a negative correlation between the length of time patients underwent hemodialysis and the level of depression with a p value = 0.002 (p <0.05) and a correlation coefficient (r = -.539) which showed that the longer the patient underwent hemodialysis, the lower the level of depression.

Introduction

The kidneys are vital organs that have several functions such as excretion of metabolic waste, acid-base regulation, hormone secretion, and regulation of body water and sodium levels (Kumar et al., 2018). Kidney disease can be acute or chronic. Chronic Kidney Failure (CKF) is a condition where there is a decrease in the glomerular filtration rate (GFR) of less than 60 mL/minute/1.73 m² for at least 3 months with various causes and/or persistent albuminuria (Kumar et al., 2018). In 2017, it is estimated that >10% of the world's population will suffer from kidney disease, with a figure reaching 850 million people, 700 million of whom will suffer from CKD, with a death rate reaching 1.2 million people (Cope et al., 2024). A study from the Global Burden of Disease explains that there has been a 41.5% increase in mortality due to CKD from 1990 to 2017.

Data from the 2023 Indonesian Health Survey showed that there were 638,178 CKD sufferers, with the most cases found in the 25-34 age range reaching 133,887 sufferers. The highest prevalence of CKD in Indonesia is in West Java province with 114,619 sufferers, while East Nusa Tenggara Province is ranked 15th with 11,853 sufferers. The 2018 Basic Health Research of East Nusa Tenggara Province recorded the highest prevalence of CKD in Kupang City with 2,477 sufferers, while Manggarai Regency is ranked fifth with 1,728 sufferers (Iqbal,

Budiyanto, and Bonifacius 2020). CKD is divided into 5 stages, if GFR is less than 15 mL/minute/1.73 m² it is Chronic Kidney Disease (CKD) stage 5. CKD stage 5 requires kidney replacement therapy either by transplantation or dialysis (Taiwo, 2018).

Most CKD patients are stage 5 until now it has been treated with hemodialysis (Murtagh et al., 2007). Hemodialysis aims to remove toxic substances from metabolic waste, regulate fluid, electrolyte, acid-base balance with the principles of osmosis and diffusion (Kallenbach, 2020). In 2018, there were 103 PGK sufferers in the province of East Nusa Tenggara who underwent hemodialysis therapy, while statistical data in 2023 showed that there were up to 1,259 PGK sufferers undergoing hemodialysis therapy (Colombo et al., 2022). CKD stage 5 patients undergone throughout life and carried out in a hospital or dialysis center, one hemodialysis takes 3-5 hours with a total time of around 12 to 15 hours per week.

Hemodialysis causes many limitations in patients. The number of medications, strict regulation of food and drink intake, high costs, obstacles in activities, decreased sexual activity can cause detrimental effects on the patient's mental health (Mollaioli et al., 2020). The most common mental health problems found in patients undergoing hemodialysis are depression with a proportion reaching 24 to 85%, physiological changes in patients with CKD stage 5 can be induced by depression, including increased inflammatory mediators such as C-reactive protein levels and pro-inflammatory cytokines (Wang & Gao 2022). Conducted a follow-up to determine the prevalence of hemodialysis patients experiencing depression. From the study, there was an increase in the prevalence of patients undergoing hemodialysis where at the initial meeting 71.3% of patients suffered from depression, then the second follow-up as many as 78.2% of patients experienced depression, and the third follow-up increased to 84.9% of patients experiencing depression.

In a study conducted by (Deswima & Yulianti, 2021) it was explained that out of 52 respondents, 5 (9.6%) patients experienced mild depression, 2 (3.8%) patients experienced moderate depression, and 45 (86.6%) patients experienced minor depression. This study found a significant negative correlation, namely the longer the patient underwent hemodialysis, the lower the level of depression experienced by the patient (Hou et al., 2014). Several previous studies have shown varying results. Therefore, this study aims to determine the relationship between the duration of hemodialysis and the level of depression in patients with CKD stage 5. at Ruteng Regional Hospital.

Methods

Design and Population

The design used in this study is a descriptive analytical study with a cross-sectional approach that aims to study the relationship between risk factors and effects through an approach, observation, or data collection at once at one time. Data collection was carried out from September to October 2024. The study population was all *CKD* stage 5 patients. who underwent hemodialysis therapy at Ruteng Regional Hospital, which is a regional referral hospital on Flores Island, East Nusa Tenggara Province, which serves patients covering the areas of Manggarai, West Manggarai, East Manggarai, Bajawa and Ngada Regencies.

Inclusion and Exclusion Criteria

All patients with *CKD* stage 5 aged over 17 years and undergoing hemodialysis at the hemodialysis center of Ruteng Regional Hospital were included in this study, including patients who were undergoing hemodialysis for the first time and were willing to participate. Meanwhile, patients with cognitive impairment, mental disorders, decreased consciousness, and inability to communicate effectively were not included in this study.

Research Sample

This study used a total sampling method according to the inclusion and exclusion criteria. A total of 34 patients undergoing hemodialysis at Ruteng Regional Hospital, and 31 people were taken as samples, while 3 people were traveling outside the area so they could not fill out the questionnaire.

Instruments and Data Collection

Data collection in this study used a research instrument in the form of the Zung Self-rating Depression Scale (SDS) questionnaire, which is a short self-questionnaire that assesses depressive symptoms and is widely used in various age groups. The SDS contains 20 statements with scores on a scale of 1-4. The total score of this questionnaire is between 20 - 80, the value obtained will be multiplied by 1.25 to convert it into an index score with a range of 25 - 100. The severity of depression is categorized based on the total score as follows: 25-49 normal, 50-59 mild depression, 60-69 moderate depression, 70 and above severe depression.

Statistical Analysis

After the data was collected, the data processing process was carried out, including editing, coding, entry, and cleaning data. The data was then processed using the SPSS version 27 program (IBM Corp., Armonk, NY, USA). Data analysis in this study included univariate and bivariate data. Univariate analysis is presented to determine patient characteristics in the form of statistical data including frequency and percentage. The bivariate analysis used in this study used the Spearman Rank test with a significant value at p-value <0.05.

Result and Discussion

Patient Characteristics

From a study conducted on 31 patients undergoing hemodialysis at Ruteng Regional Hospital, it was found that the age of patients undergoing hemodialysis was the same, namely 25.8% in the 50-59 years and 60-69 years age groups. The majority of patients undergoing hemodialysis were male at 77.4% while women were 22.6%. Based on education level, the most patients were at the high school level at 38.7% and followed by elementary school education at 35.5%. Patients undergoing hemodialysis were 67.7% no longer working due to physical limitations after experiencing illness, while 32.3% of patients were still working but with a more limited work proportion.

Ruteng Regional Hospital is one of the regional referral hospitals that serves hemodialysis patients from 4 surrounding districts, therefore some patients have to travel far from their homes. As many as 12.9% of patients have to travel up to 4 hours from their homes to the hospital, then as many as 19.4% of patients travel up to 2 to 3 hours, rarely the closest is <30 minutes as much as 22.6%. Travel time is multiplied by two for going and returning, this causes as many as 32.3% of patients to have to move residence either staying with family or staying in boarding houses close to the hospital. The majority of 67.7% of patients still live in their own homes and travel to and from every time they do hemodialysis.

Table 1. Characteristics of Hemodialysis Patients at Ruteng Regional Hospital

Characteristics	Total (f)	Percentage (%)
Gender		
Male	24	77.4
Female	7	22.6
Age		
20 - 29 years	4	12.9
30 - 39 years	4	12.9

40 - 49 years	7	22.6
50 - 59 years	8	25.8
60 - 69 years	8	25.8
Education		
Elementary School	11	35.5
Junior High School	2	6.5
Senior High School	12	38.7
Undergraduate	6	19.4
Employment Status		
Employed	10	32.3
Unemployed	21	67.7
Travel Time from Home to Hospital		
< 30 minutes	7	22.6
1 hour	8	25.8
2 hours	6	19.4
3 hours	4	12.9
4 hours	4	12.9
Residence During Hemodialysis		
At their place of residence	21	67.7
Rent or boarding house	10	32.3

Length of Time for Patients Undergoing Hemodialysis at Ruteng Regional Hospital

As many as 32.3% of hemodialysis patients have undergone hemodialysis for a period of <6 months, while patients who have undergone hemodialysis for a period of 25.8%. Based on the data, the patient who underwent hemodialysis the longest at Ruteng Regional Hospital until this study was conducted was for 73 months.

Table 2. Length of Patients Undergoing Hemodialysis at Ruteng Regional Hospital

Duration of Hemodialysis	Frequency (f)	Percentage (%)
< 6 months	10	32.3
6 - 12 months	2	6.5
13 - 19 months	1	3.2
20 - 26 months	4	12.9
27 - 33 months	6	19.4
> 33 months	8	25.8

Characteristics of Frequency Per Week and Duration of One Hemodialysis in Patients at Ruteng Regional Hospital

In this study, the majority of patients underwent 2 times of hemodialysis per week as much as 93.5% and 6.5% of patients underwent 1 time of hemodialysis per week. The duration of hemodialysis for 4.5 hours was the most accepted by patients at 48.8%, followed by a duration of 4 hours at 35.5%. The longest duration of hemodialysis was 5 hours undergone by 6.5% of patients.

Table 3. Characteristics of Frequency and Duration of Hemodialysis Patients in Ruteng Regional Hospital

Characteristic	Frequency (f)	Percentage (%)
Frequency of Hemodialysis per Week		
1 time	2	6.5
2 times	29	93.5
Duration of Each Hemodialysis Session		

3 hours	3	9.7
4 hours	11	35.5
4.5 hours	15	48.4
5 hours	2	6.5

Overview of Depression Levels in Patients Undergoing Hemodialysis at Ruteng Regional Hospital

In this study, most patients experienced mild depression at 38.7%, followed by patients who did not experience depression at 32.3%. In interviews conducted during data collection, patients who did not experience stress said they had accepted the illness they were suffering from and over time had become accustomed to the hemodialysis they underwent routinely. 19.4% of patients experienced moderate depression, and the remaining minority of 9.7% experienced severe depression.

Table 4. Depression Level in Hemodialysis Patients at Ruteng Regional Hospital

Depression Level	Frequency (f)	Percentage
Not Depressed	10	32.3%
Mild	12	38.7%
Moderate	6	19.4%
Severe	3	9.7%

Overview of Depression Level Based on Length of Hemodialysis in Patients at Ruteng Regional Hospital

From the data obtained, it is known that patients who experience depression the most in the group undergoing hemodialysis < 6 months where all patients experience depression with a mild depression rate of 12.9%, moderate depression 12.9%, and severe depression 6.5% of the total patients in this study. While in patients who have undergone hemodialysis > 33 months as many as 12.9% did not experience depression, followed by 9.7% of patients experiencing mild depression, and 32% of patients experiencing moderate depression.

Table 5. Depression level based on duration of hemodialysis in patients at Ruteng Regional Hospital

Duration of Hemodialysis	Not Depressed	Mild	Moderate	Severe
< 6 months	0	4 (12.9%)	4 (12.9%)	2 (6.5%)
6 - 12 months	0	1 (3.2%)	1 (3.2%)	0
13 - 19 months	0	1 (3.2%)	0	0
20 - 26 months	2 (6.5%)	2 (6.5%)	0	0
27 - 33 months	4 (12.9%)	1 (3.2%)	0	1 (3.2%)
> 33 months	4 (12.9%)	3 (9.7%)	1 (3.2%)	0

The Relationship between Length of Hemodialysis and Depression Levels in Patients at Ruteng Regional Hospital

Spearman Rank test shows a negative correlation between the length of time patients undergo hemodialysis and the level of depression with a *p value* = 0.002 ($p < 0.05$) and a correlation coefficient ($r = -.539$).

Table 6. Relationship between Duration of Hemodialysis with Depression Level

Description	Spearman Rank	
	r	p-value
Relationship between Duration of Hemodialysis and Depression Level	-0.539	0.002

The study found that *CKD* stage 5 conditions more in male patients (77.4%) than in female patients (22.6%). This is in line with the research of (Syarifa et al., 2024) where as many as 55.8% of male respondents experienced kidney failure and 44.2% occurred in women, this can be caused by systemic diseases such as hypertension, diabetes mellitus, lupus and others that often occur in men (Syarifa et al., 2024).

Research by (Riyadi et al., 2023) showed that 65% of male respondents experienced stage 5 *CKD*. and undergoing hemodialysis, while there are fewer women by 35%, the lifestyle of men is worse than that of women such as alcohol and cigarette use will affect the decline in kidney function (Riyadi et al., 2023). *CKD* in pre-menopausal women is less than in men, one of which is due to hormonal factors, the mechanism of the estrogen hormone in women causes vasodilation in the renal blood vessels, increased *nitric oxide*, reduced inflammatory effects and ischemic mediators which cause a reduction in the risk of endothelial dysfunction and kidney injury (Farahmand et al., 2021).

Based on the age range, this study found that the incidence of *CKD* requiring hemodialysis increased at the age of 40 years and above. And the highest in the age range of 50-59 years and 60-69 years, respectively, at 25.8%. Research from Zahran, Ahmend, and Issawi (20 2 0) showed almost similar results, where the incidence of *CKD* stage 5 most age group 50-59 years (30.8%), followed by age group 60-69 years (24.7%). Increasing age causes a decrease in the ability of nephron regeneration, this usually begins to occur at the age of 40-45 years and the decline occurs around an annual decline of about 1 ml / minute from eGFR per year 8ml / minute / 1.73m² per decade.

Furthermore, in this study, out of 31 patients who were respondents, it was recorded that 67.7% of patients experienced depression, either in the mild (38.7%), moderate (19.4%), or severe (9.7%) categories. There were 32.3% of patients who did not experience depression. The *Spearman Rank test* showed a significant correlation with a *p value* = 0.002 (*p* < 0.05) with a negative coefficient correlation (*r* = -0.539), which indicates that the longer the patient undergoes hemodialysis, the lower the level of depression they experience. This study is in line with research conducted by (Deswima & Yulianti, 2021) with the results of the Pearson test showing a significant correlation between the duration of hemodialysis and depression (*p* = 0.005, *p* > 0.05) with a negative coefficient correlation of -0.094 which means that the longer the duration of HD, the lower the depression score, this is most likely due to the better adaptation process in patients who undergo hemodialysis longer (Deswima & Yulianti, 2021). In dealing with a problem and the pressures of life, humans can adapt through a coping mechanism. (Zweiryadinda et al., 2023) in their research stated that the coping mechanisms most widely used by respondents in the study were religious coping, instrumental support, emotional support, and acceptance by patients from their living environment. The better the patient's coping mechanism, the lower the level of depression they experience (Zweiryadinda et al., 2023.).

The results of this study differ from research by Khan et al. (2019) conducted a *follow-up* to determine the prevalence of hemodialysis patients experiencing depression. In the study, at the initial meeting of a total of 220 respondents, 157 patients (71.3%) suffered from depression, then the second *follow-up* in the third month of a total of 216 respondents, 169 patients (78.2%) experienced depression, the increase continued until the third *follow-up* in the sixth month which reached 181 patients (84.9%) who experienced depression from a total of 213 respondents. *CKD* stage 5 patients Those undergoing hemodialysis are susceptible to depression due to several things, such as loss of income due to loss of work, increasingly limited freedom, decreased sexual function, loss of hope of having a longer life (Riyadi et al. 2023).

Conclusion

Based on the results of this study, it was found that 67.7% of patients undergoing hemodialysis at Ruteng Regional Hospital experienced depression when data collection took place in September - October 2024. The Spearman Rank test showed a negative correlation between the length of time patients underwent hemodialysis and the level of depression with a p value = 0.002 ($p < 0.05$) and a correlation coefficient ($r = -.539$) which indicates that the longer the patient undergoes hemodialysis, the lower the level of depression.

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