



RELATIONSHIP BETWEEN HEMODIALYSIS AND Hb LEVELS WITH LEVEL OF FATIGUE

IFAROIFAH¹, EKA NUR SO`EMAH², SRI SUDARSIH³

Bina Sehat PPNI health science institute Mojokertoregency East Java Indonesia

Email correspondence: roifah@yahoo.com

ABSTRACT	Keywords
<p>Hemodialysis was one of the interventions for patients with chronic renal failure which if done for a long time will cause fatigue symptoms as much as 82% to 90% of patients. The duration of the patient undergoing hemodialysis would increase fatigue levels; it would cause decreased concentration, malaise, sleep disturbances, emotional disturbances and reduce the ability of the patient's ability in daily activities. The exact symptom that occurs in patients with chronic renal failure is a decrease in Hb levels. The purpose of this study was to prove the long-standing relationship between hemodialysis and Hb levels with fatigue levels. The research design uses correlation analytic. The variables studied were hemodialysis duration, hemoglobin level, and fatigue level. The sample size in this study was 61 respondents with simple random sampling technique. Data analysis uses multiple linear regression. The results of the study simultaneously showed a long relationship between hemodialysis and HB levels with fatigue levels. Patients who have long undergone hemodialysis will have high levels of urea and creatinine. High urea will interfere with the production of the hormone erythropoietin. As a result of the number of red blood cells decreases, as a result, the patient will experience symptoms of fatigue.</p>	<p>Hemoglobin Level, Hemodialysis Length, Level of Fatigue</p>

INTRODUCTION

Hemodialysis is one of the best interventions for clients with acute kidney failure or terminal kidney failure who experience fluid imbalance. Patients who have undergone hemodialysis for a long time will have high levels of urea and creatinine which disrupt the production of erythropoietin hormones. As a result, the number of red blood cells is reduced which results in fatigue marked by fatigue, fatigue, lethargy (Davenport, 2006). Decreasing hemoglobin levels in hemodialysis patients causes a decrease in the amount of oxygen and nutrients channeled in the body, which results in fatigue and weakness in carrying out activities, which in turn can reduce the patient's quality of life (Rsup Prof R D Kandou, Malisan, Wantania, & A Rotty, 2015). Hemodialysis patients experience an increase in fatigue level which causes decreased concentration, malaise, sleep disturbances, emotional disturbances and reduces the ability of the patient's ability in daily activities. So that the measurement of fatigue levels is needed to determine the level and minimize progression and complications that occur due to fatigue in hemodialysis patients (Sulaiman, 2015).

WHO (World Health Organization) interprets in Indonesia there will be an increase in sufferers of kidney failure between 1995-2025 by 41.4%. In the world, around 2,622,000 people underwent End-Stage Renal Disease (ESRD) treatment at the end of 2010, as many as 2,029,000 people (77%) of whom underwent dialysis treatment and 593,000 people (23%) underwent kidney transplants. Cases of kidney failure in Indonesia, are still relatively high every year because there are

still many Indonesian people who do not maintain their diet and health. Based on the results of a survey conducted by PERNEFRI (Indonesian Nephrology Association) in 2015, the prevalence of chronic kidney failure in Indonesia was around 21050 new patients, and 30554 active adult patients in Indonesia suffered from chronic kidney failure. Death in patients undergoing hemodialysis during 2015 was recorded as many as 1,243 people with a long life with hemodialysis 1-317 months. The highest proportion of patients with long life with 6-12 months of hemodialysis (Indonesian Renal Registry (IRR), 2015).

In patients undergoing hemodialysis for a long time, fatigue symptoms were experienced in 82% to 90% of patients. Septiwi (2012) at the Gatot Soebroto Army Hospital in Jakarta, there were 10 respondents in the study with 1 respondent (10%) having a 4 fatigue level, while 3 respondents (30%) were at level 5, 4 respondents (40%) were at the level 6, and 2 respondents (20%) were at the fatigue level 7. Fatigue complaints in hemodialysis patients prevalence reached 60-97%.

The fatigue of hemodialysis patients is related to various factors based on several theories, namely unpleasant Middle Range Theory symptom, a multi-dimensional fatigue experience, and peripheral and central fatigue. There are three treatment options for patients with chronic renal failure to overcome the problem, namely untreated, chronic dialysis (peritoneal dialysis / hemodialysis) and kidney transplantation. Untreated choices are seldom chosen, most sufferers prefer to get treatment by means of hemodialysis or kidney transplantation in hopes of sustaining their lives. The purpose of this study was to prove the long relationship between hemodialysis and Hb levels with fatigue levels.

METHOD

The design of this study is an analytic correlation with the cross-sectional approach, namely research linking between variables with one-time data collection. The sample in this study all patients with chronic renal failure undergoing hemodialysis as many as 61 people with simple random sampling technique. Insrument penelitian menggunakan FACIT test. Data analysis using multiple linear regression test, with an error rate of 5%.

1. Characteristics of Respondents

Table 1 Characteristics of respondents undergoing hemodialysis in CKD patients at SakinahMojokerto Hospital in 2018

No	Variable	Frequency	Percentage
1	Gender		
	Male	33	54
	Female	28	46
2	Treatment History:		
	Habitual	60	98
	Seldom	1	2

The results showed in Table 1; it was found that 54% were male, while the treatment history showed 98% conventional treatment control in the hospital.

2. Results of Descriptive Analysis

Table 2 Results of descriptive analysis of hemodialysis length, hemoglobin level and fatigue level in CKD patients at SakinahMojokerto Hospital in 2018

No	Variable	Mean	Standard Deviation
1	Hemodialysis duration	8,29	6,61
2.	Hemoglobin level	8,56	1,14

3. Level of fatigue 20,87 7,29

The results showed in Table 2, the average length of hemodialysis in CKD patients was 8.29 months, the average hemoglobin level was 8.59mg / dl, and the average fatigue level was 20.87

3. Relationship of Long Hemodialysis and Hemoglobin Levels with ffatigue Level

Table 3 Simultaneous Significance Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	329,188	2	164,594	3,329	0,04324 ^a
Residual	2867,763	58	49,444		
Total	3196,951	60			

The results of the model test showed that the F value was 3.329 and p-value was 0.0432 <0.05. The results of the analysis can be concluded that together the old variables of hemodialysis and hemoglobin levels affect the variable level of fatigue.

Table 4 R² Determination Testing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,321 ^a	0,103	0,072	7,032

The test results of the coefficient of determination are 0.072, meaning that 7.2% of the fatigue level is influenced by the old variable hemodialysis and hemoglobin levels while other variables influence 92.8%.

DISCUSSION

1. Identifying Hemodialysis Length in CKD Patients at MojokertoSakinah Hospital

The results showed 61 respondents showed that the average length of hemodialysis in CKD patients was 8.29 months. Where each hemodialysis is carried out the dosage given during hemodialysis is different. Hemodialysis is an action that aims to take nitrogen substances that are toxic from the blood and remove excess water. The main purpose of hemodialysis is to relieve symptoms, namely controlling uremia, excess fluid and electrolyte imbalances that occur in patients with chronic kidney disease. Hemodialysis dose is generally given two times a week with 5 hours of hemodialysis or 3 times a week with every hemodialysis for 4 hours.

The duration of hemodialysis is closely related to the efficiency and adequacy of hemodialysis, so the duration of hemodialysis is also influenced by the level of uremia due to the progression of worsening of kidney function and its comorbid factors, as well as the speed of blood flow and dialysate flow velocity. The longer the hemodialysis process, the longer the blood is outside the body, so that more anticoagulants are needed, with the consequence of frequent side effects. (A, R, Rahman, Theresia M. D. Kaunang, & Elim, 2016).

2. Identifying Hb Levels of Hemodialysis Patients in CKD Patients at Sakinah Hospital in Mojokerto

The results showed that 61 respondents indicated an average hemoglobin level of 8.59 mg/dl, a decrease in hemoglobin in patients undergoing hemodialysis by the existing theory. Chronic kidney failure is the development of

progressive and slow kidney failure, where the kidneys lose the ability to maintain volume and composition of body fluids with a GFR of 25% -10% of average values. Hemodialysis is used as replacement therapy to replace deteriorating kidney function. Anemia in patients with Kidney Failure has started since the beginning of the disease. In line with progressive damage to kidney tissue, the degree of anemias will increase. Anemia is often found in patients with Chronic Kidney Failure (80-95%), except in patients with Chronic Kidney Failure due to the polycystic kidney.

Reported from 86 patients who underwent routine HD at Hasan Sadikin Hospital in Bandung 100% suffered from anemia. The main factor causing anemia is erythropoietin deficiency (EPO) as a result of damage to EPO-producing cells (peritubular cells) in the kidneys. Besides that, several factors aggravate anemia, including the presence of erythropoiesis inhibitors, thrombopathic bleeding, hemolytic anemia due to microangiopathy, blood loss due to blood was taken for laboratory tests or blood trapped or left in the hemodialysis apparatus, iron and nutrient deficiencies other, secondary hyperparathyroidism. Hemodialysis is a practical setting for the state of Kidney Failure, but erythropoietin secretion does not improve, and anemia continues. Patients with hemodialysis therapy have a decrease in folic acid levels as one of the occurrences of anemia due to loss of folate in the dialysis fluid. In the book Clinical Nephrology, the most important problem in patients with dialysis therapy is persistent anemia, with Hb levels ranging from 4-15 g / dl and an average of 8 g / dl. (Ulya, 2007)

3. Identifying the Fatigue Level of Hemodialysis Patients in CKD Patients at Sakinah Hospital in Mojokerto...

The results showed that the average fatigue level of 61 respondents was 20.87.

In research journals conducted by (Sulaiman, 2015) describe that Fatigue has a high prevalence in dialysis patients. In patients undergoing hemodialysis for a long time, fatigue symptoms were experienced in 82% to 90% of patients (Kring DL, 2009). Fatigue is an unpleasant subjective feeling of fatigue, weakness, and decreased energy and is the chief complaint of patients with dialysis (prevalence reaches 60-97%). Further impacts of fatigue on patients undergoing hemodialysis include disruption of physical function in carrying out daily activities, changes in relationships with others, social isolation, changes in sexual function, spiritual changes and quality of life (Lukbin& Larsen, 2006).

Patients who have long undergone hemodialysis will have high levels of urea and creatinine. High urea will interfere with the production of the hormone erythropoietin. As a result, the number of red blood cells decreases or is called anemia (Thomas, 2003). As a result, the patient will experience fatigue, fatigue, lethargy which is a symptom of fatigue. In addition to fatigue and weakness, complications that occur during hemodialysis are Dialysis Disequilibrium Syndrome (DSS). Dialysis Disequilibrium Syndrome is found to occur in the process of fluid secretion and urea from the blood that is too fast during hemodialysis. Signs of DSS include a sudden headache, blurred vision, dizziness, nausea, vomiting, heart palpitations, disorientation, and seizures. If the DSS is not detected the client can become a comma that ends in death (Zepeda-orocho & Quigley, 2012).

Based on the theory above shows that fatigue is often suffered by patients with chronic renal failure undergoing hemodialysis as an effect of increased conditions of urea and creatinine so that it can interfere with erythropoietin which

results in a decrease in red blood cells with manifestations of fatigue clinic.

4. Analyzing the Relationship of the Long Hemodialysis and Hb Levels with the Level of Fatigue in the Sakinah Hospital in Mojokerto

The results of the model test showed that the F value was 3.329 and p-value was 0.0432 <0.05. The results of the analysis can be concluded that together the old variables of hemodialysis and hemoglobin levels affect the variable degree of fatigue. The test results of the coefficient of determination are 0.072, meaning that 7.2% of the fatigue level is influenced by the old variable hemodialysis and hemoglobin levels while other variables influence 92.8%.

The duration of hemodialysis is closely related to the efficiency and adequacy of hemodialysis, so the length of hemodialysis is also influenced by the level of uremia due to the progression of worsening of kidney function and its comorbid factors, as well as the speed of blood flow and dialysate flow velocity. The longer the hemodialysis process, the longer the blood is outside the body, so that more anticoagulants are needed, with the consequence of frequent side effects (A, R, Rahman, Theresia M. D. Kaunang, & Elim, 2016). Patients who have long undergone hemodialysis will have high levels of urea and creatinine. High urea will interfere with the production of the hormone erythropoietin. As a result, the number of red blood cells decreases or is called anemia (Thomas, 2003). As a result, the patient will experience fatigue, fatigue, lethargy which is a symptom of fatigue.

Hemodialysis therapy will generally cause physical stress in patients after hemodialysis and other problems that arise during the hemodialysis process such as intradialytic hypotension, muscle cramps, headaches, nausea and hypertension, disequilibrium and so on. Patients will feel fatigue and cold sweat due to decreased

blood pressure due to the effects of hemodialysis (Black, 2005). Dialysis in patients with end-stage renal disease can help minimize the effects of uremic encephalopathy where one of the clinical symptoms that appear is fatigue.

CONCLUSION

1. The average length of hemodialysis in CKD patients at SakinahMojokerto Hospital is eight months. The longer the hemodialysis process, the longer the blood is outside the body, so that more anticoagulants are needed, with the consequence of frequent side effects.
2. The average Hb level of hemodialysis patients in CKD patients at SakinahMojokerto Hospital is 8.59mg / dl. The cause of anemia is erythropoietin deficiency (EPO) as a result of damage to EPO-producing cells (peritubular cells) in the kidneys. In patients with HD, therapy experienced a decrease in folic acid levels as one of the occurrences of anemia due to loss of folate in the dialysis fluid.
3. The average level of fatigue of hemodialysis patients in CKD patients at SakinahMojokerto Hospital is 20.87. Patients who have long undergone hemodialysis will have high levels of urea and creatinine. High urea will interfere with the production of the hormone erythropoietin. As a result, the number of red blood cells decreases or is called anemia. As a result, the patient will experience fatigue, fatigue, lethargy which is a symptom of fatigue.
4. The relationship between the duration of hemodialysis and Hb level with the fatigue level at Sakinah Hospital in Mojokerto is the result of the model test, the results of F value is 3.329 and p-value is 0.0432 <0.05. The results of

the analysis can be concluded that together the old variables of hemodialysis and hemoglobin levels affect the variable level of fatigue.

REFERENCES

- A, M. T. S., R, Rahman, Theresia M. D. Kaunang, C., & Elim. (2016). Hubungan antara lama menjalanihemodialisis dengan kualitasiduppasien yang menjalanihemodialisis di Unit Hemodialisis. *Jurnal E -Clinic (eCl)*, Volume 4, Nomor 1, Januari -Juni 2016, 4. Retrieved from <http://download.portalgaruda.org/article.php?article=431677&val=1001&title=Hubungan%252>
- Casiday.R. (2007). Hemoglobin and the Heme Group : Metal Complexes in the Blood for Oxygen Transport Introduction to the Chemistry and Physiology of Blood Oxygen Transport via Metal Complexes. *Hemoglobin*, 1–13.
- A, M. T. S., R, ahman, Theresia M. D. Kaunang, C., & Elim. (2016). Hubungan antara lama menjalanihemodialisis dengan kualitasiduppasien yang menjalanihemodialisis di Unit Hemodialisis. *Jurnal E -Clinic (eCl)*, Volume 4, Nomor 1, Januari -Juni 2016, 4. Retrieved from <http://download.portalgaruda.org/article.php?article=431677&val=1001&title=Hubungan%252>
- Casiday.R. (2007). Hemoglobin and the Heme Group : Metal Complexes in the Blood for Oxygen Transport Introduction to the Chemistry and Physiology of Blood Oxygen Transport via Metal Complexes. *Hemoglobin*, 1–13.
- Davenport, A. (2006). Intradialytic complications during hemodialysis.

- Hemodialysis International*, 10(2), 162–167.
<https://doi.org/10.1111/j.1542-4758.2006.00088.x>
- Ibrahim, K., H, Y. K., Rahayuwati, L., & Nurmalisa, B. E. (n.d.). Hubungan antara Fatigue , Jumlah CD4 , dan Kadar Hemoglobin pada Pasien yang Terinfeksi Human Immunodeficiency Virus (HIV) The Correlation of Between Fatigue , CD4 Cell Count , and Hemoglobin Level among HIV / AIDS Patients, 5.
- Kring DL, C. P. (2009). Factors affecting quality of life in persons on hemodialysis. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/19271620>
- Rsup Prof R D Kandou, D. D., Malisan, E., Wantania, F. E., & A Rotty, L. W. (2015). IHUBUNGAN KADAR HEMATOKRIT DENGAN KELAS NYHA PADA PASIEN GAGAL JANTUNG KONGESTIF OBESITAS SENTRAL YANG DIRAWAT JALAN DAN DIRAWAT INAP. *Jurnal eClinic*, 3(2), 15–24.
- Sam, R. (2014). Hemodialysis: Diffusion and Ultrafiltration. *Austin J Nephrol Hypertens. Austin J Nephrol Hypertens*, 1(1), 1010–2.
<https://doi.org/10.1mmol/L>
- Sulaiman. (2015). Fatigue Pada Pasien Gagal Ginjal di RS PKU Muhammadiyah Yogyakarta. Retrieved from <http://digilib.unisayogya.ac.id/id/eprint/237>
- Ulya, I. (2007). Perbedaan Kadar Hb Pra dan Post Hemodialisa pada Penderita Gagal Ginjal Kronis di RS PKU Muhammadiyah Yogyakarta The Difference of Hb Levels Pre and Post Hemodialysis in Chronic Renal Failure Patients at PKU Muhammadiyah Hospital Yogyakarta, 7(1), 29–33.
- Who, & Chan, M. (2011). Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. *Geneva, Switzerland: World Health Organization*, 1–6.
<https://doi.org/2011>
- Zepeda-orozco, D., & Quigley, R. (2012). Dialysis disequilibrium syndrome, 2205–2211.
<https://doi.org/10.1007/s00467-012-2199-4>
- Lukbin, L.L & Larsen, P.D. (2007). *Cronic Illness Impact and Interventions*. 6th edition. Jhon.
- Thomas, N. (2003). *Renal Nursing*. 2th edition. Philadelphia : Elsevier Science.
- Black & Hawks (2005). *Medical Surgical Nursing Clinical Manajemen For Possitive Outcome*. 7th Edition. Philadhelpia : WB Sounders Company