Evaluation of Hemoglobin and Creatinine Levels in Chronic Renal Failure Patients Undergoing Hemodialysis Therapy

by Perpustakaan IIK Bhakti Wiyata

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Arshy Prodyanatasari[1*)], Mely Purnadianti[2]

[1*)]Physioteraphy Department, Faculty of Health, Institut Ilmu Kesehatan Bhakti Wiyata Kediri, Indonesia
[2] Medical Laboratory Medic Department, Faculty of Health Technology and Management, Institut Ilmu Kesehatan Bhakti Wiyata Kediri, Indonesia

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ABSTRACT

Chronic Renal Failure (CKD) is a disease that occurs when the kidneys fail to maintain the body's fluid composition. Hemodialysis is one of the therapies to replace deteriorating kidney function. Deteriorating kidney function conditions cause the ability of erythropoietin to be disrupted and anemia occurs, so checking hemoglobin levels is useful to control the patient's hemoglobin levels and creatinine examination to detect the severity of kidney function disorders. This study aims to determine the relationship of hemodialysis therapy with hemoglobin and creatinine levels in CKD patients at Baptist Hospital, Kediri City. This study is important to obtain information and provide education to patients regarding the significant effect of hemodialysis therapy for chronic renal failure patients so that chronic renal failure patients are motivated and disciplined to carry out hemodialysis therapy according to a set schedule. The design of this study was a cross sectional survey with independent variables being hemodialysis therapy in patients with chronic renal failure and dependent variables being hemoglobin and creatinine levels. 30 respondents were using the quota sampling method. The results of this study were the average examination results of hemoglobin levels is 9.0 g/dL and creatinine of 4.45 mg/dL. Based on the Pearson Correlation test, the correlation coefficient (r) is 0.369, and the p-value = (0.045) > alpha = 0.05 (5%), thus H$_1$ is accepted. The relationship between hemoglobin and creatinine levels in patients with chronic renal failure undergoing therapy hemodialysis at Baptist Hospital in Kediri City.

ABSTRAK

*) corresponding author

Physioteraphy Department, Faculty of Health, Institut Ilmu Kesehatan Bhakti Wiyata Kediri. Jl. Dr. Saharjo No. 10, Kel. Campurejo, Kec. Mojoroto, Kota Kediri, Jawa Timur, Indonesia 64114

Email: arshy.prodyanatasari@iik.ac.id

Gagal Ginjal Kronik (CKD) adalah penyakit yang terjadi ketika ginjal gagal mempertahankan komposisi cairan tubuh. Hemodialisa merupakan salah satu terapi untuk menggantikan fungsi ginjal yang memburuk. Kondisi fungsi ginjal memburuk menyebabkan kemampuan erythropoietin terganggu dan terjadinya anemia, sehingga pemeriksaan kadar hemoglobin bermanfaat untuk mengontrol kadar hemoglobin pasien dan pemeriksaan kreatinin untuk mendeteksi berat ringannya gangguan fungsi ginjal. Penelitian ini bertujuan untuk mengetahui hubungan terapi hemodialisa pada pasien gagal ginjal kronik dengan kadar hemoglobin dan kreatinin di Rumah Sakit Baptis Kota Kediri. Desain penelitian ini adalah Cross Sectional Survey dengan variabel independen terapi hemodialisa pada pasien gagal ginjal kronik, variabel dependen kadar hemoglobin dan kreatinin. Responden penelitian sebanyak 30 responden dengan menggunakan metode pengambilan Quota sampling. Hasil dari penelitian ini adalah rata-rata hasil pemeriksaan kadar hemoglobin 9,0 g/dL dan kreatinin 4,5 mg/dL. Berdasarkan Uji Korelasi Pearson didapat hasil koefisien korelasi (r) sebesar 0,369, nilai p= (0,045) > alpha = 0,05 (5%), dengan demikian H$_1$ diterima. Adanya hubungan antara kadar hemoglobin dan kreatinin pada pasien gagal ginjal kronik yang menjalani terapi hemodialisa di Rumah Sakit Baptis Kota Kediri.

INTRODUCTION

City life that demands everything to be fast and precise, especially in the work, is one of the causes of changes in the behaviors and lifestyle of urban communities. The need to compete with the era of globalization makes urban communities busy, leading to changes in lifestyle and eating patterns, such as irregular eating habits, consuming fast food, and consuming foods with unbalanced nutrition. These changes in diet have unwittingly influenced the epidemiological transition, increasing cases of non-communicable diseases (NCDs) such as chronic Kidney Failure (CKD) (Izzati & Annisha, 2017). According to the World Health Organization (WHO), in 2018 there were an estimated 1.4 million patients with CKD undergoing hemodialysis, and the incidence has increased by 8%. Indonesia has a high rate of patients with CKD, with data from Basic Health Research showing that the number of patients diagnosed with CKD in Indonesia was 18,613 patients (Riskesdas, 2018). In East Java, the proportion of hemodialysis in those aged over 15 years with CKD was 23.14% (Riskesdas, 2018). Based on Kediri Baptist Hospital Medical Record Data from July-September 2022, it is known that 1,739 patients underwent hemodialysis therapy.

Chronic Renal Failure (CKD) is a condition of structural abnormalities or impaired function in the kidneys that lasts more than three months. Impaired renal function results from intrinsic renal glomerular and vascular damage (Vaidya, 2018). Chronic Renal Failure (CKD) can lead to disturbances in the body's fluid and electrolyte balance, as well as complications due to hematological abnormalities (Hendardi, 2023). Kidney damage in patients with CKD can also cause a build-up of metabolic waste in the body (Siregar, 2020). Long-term accumulation of metabolic waste in the body can increase the occurrence of disease complications, such as cardiovascular, anemia, hypertension, bone mineral disorders, diabetes mellitus, and metabolic acidosis (Indonesia, 2011). Chronic Renal Failure (CKD) is characterized by urinary retention (Paath et al, 2020). Patients with CKD will experience a decrease in Glomerular Filtration Rate (GFR) which is a parameter to determine kidney function and stage of kidney disease (Veronika, 2019). Normal GFR values based on the National Kidney Foundation (2013) in young adults range from $120/ml/min/1.72m^2$, but these values must also consider age, gender, and body size. In the research results of Ammirati (2021), adult patients with CKD had a GFR $<60/ml/min/1.72m^2$.

Some conditions or diseases related to blood vessels or other structures in the kidney organ that lead to chronic kidney failure include diabetes mellitus and hypertension (khatiri, 2020). In addition, conditions that can lead to kidney damage and CKD, namely: (1) kidney disease and infection, (2) having narrow renal arteries, long-term use of drugs, (3) use of non-steroidal anti-inflammatory drugs (NSAIDs) such as celecoxib, ibuprofen, and the use of antibiotics, and consuming soft drinks and energy supplement drinks (Khatri, 2020). In CKD patients, lifestyle and dietary modifications must be considered. This can affect improvement of cardiometabolic health and tends to and will have a good long-term impact on the kidneys (Widjaja, 2023; Kalantar-Zadeh, 2021).

Research by Chang et.al (2013) on patients who participated in the Kidney Early Evaluation Program (KEEP) at the National Kidney Foundation Minneapolis obtained results showing that lifestyle is the most risk factor for end-stage chronic renal failure (ESRD). Because of diabetes mellitus (DM) and hypertension. Both of these diseases occur

due to an unhealthy lifestyle or lifestyle. In Ristienika's research (2014) conducted at RSUD Dr. Suroto Ngawi, East Java, it was found that lifestyle, such as smoking, consuming coffee, and the habit of consuming energy supplement drinks were the main risk factors for chronic kidney failure. A study by Hidayat et al (2008) found that consuming supplement drinks can increase the risk of kidney failure by 6.63 times. This is reinforced by research conducted by Delima & Tjitra (2017) which states that the consumption of energy drinks and fizzy drinks will increase the risk of chronic kidney failure by 1.56-9.37 times compared to individuals who do not consume these drinks.

The literature study conducted by Widyantara, et al (2023) stated that pre-hemodialysis hemoglobin levels decreased where the lowest level was 7.4 g/dl and post-hemodialysis increased where the highest level was 10.7 g/dl. Meanwhile, the number of platelets pre-hemodialysis decreased where the lowest level was 173.00 mm3 while post-hemodialysis increased where the highest level was 277,666 mm^3. This statement is in line with the results of research conducted by Rosdewi, et al (2023) found that the provision of regular hemodialysis therapy to patients with end-stage renal disease can increase hemoglobin levels and reduce creatinine levels in the blood.

This study aims to determine the effect of hemodialysis therapy on hemoglobin and creatinine levels in patients with chronic renal failure. This study hypothesizes that there is a significant effect on hemoglobin and creatinine levels in the blood of patients with chronic renal failure who undergo hemodialysis therapy. This research is important to do to obtain an overview of the importance of hemodialysis therapy in patients with GGK. This needs to be done to improve the quality of life of patients with CKD. In addition, it is important to educate patients with CKD about the importance of regular and disciplined hemodialysis therapy.

Chronic Renal Failure (CKD) patients will also often experience anemia. The more advanced the stage, the frequency of experiencing anemia will increase (Anggraini, 2023). Patients with stages 4 and 5 of CKD will experience anemia more often with a percentage of 50% (Tanjung, 2023). Whereas in patients with diabetes mellitus, the occurrence of anemia can take place earlier (Tanjung, 2023). Hemoglobin is one of the parameters that can be used to measure anemia (Tanjung, 2023; Ladesvita, 2021). Hemoglobin levels in the blood are categorized as anemia if they are <12 g/dl in women and <13.5 g/dl in men (Puspita et al, 2019). Anemia in patients with CKD can lead to renal tubular cell hypoxia due to the relationship between tissue oxygenation and hemoglobin concentration (Tanjung, 2023). In addition, decreased Hb levels occur in patients with CKD due to erythropoietin (EPO) deficiency (Hidayat et al, 2016). Erythropoietin (EPO) is a glycoprotein hormone that is mostly produced by cells in the interstitial peritubular area of the kidney. Erythropoietin (EPO) is a stimulant for erythropoiesis, where erythropoiesis is a metabolic pathway that produces erythrocytes (Hidayat et al, 2016). About 19.5-38% of anemia is also influenced by iron (Fe) deficiency. Total Iron Binding Capacity (TIBC) is the total iron (Fe) binding capacity and is used to diagnose anemia caused by iron (Fe) deficiency. Most patients with CKD will experience a decrease in TIBC because the amount of Fe reserves is sufficient but not sufficiently available in the blood circulation (Serum iron) so patients will experience chronic inflammation. Factors causing chronic inflammation in patients with CKD include (1) increased production of proinflammatory cytokines, (2) oxidative stress and acidosis, (3) chronic recurrent infections, (4) adipose cell

abnormalities, (5) microbiota dysbiosis in the gut, and (6) ignored sources of inflammation (Mihai et al, 2018).

To establish the diagnosis of renal failure, one way is to assess the serum levels of creatinine and urea as both can only be excreted by the kidneys. The breakdown of creatinine generates nitrogen-containing compounds that remain in the muscles. The amount of muscle mass should be proportional to the amount of creatinine produced and excreted (Shaleha, 2023). Creatinine exists in a phosphorylated form as free creatinine phosphate in muscles, brain, and blood, and in a free form in urine (Aryaningsih, 2023). Creatinine is primarily formed in the muscle through irreversible and non-enzymatic water transfer from creatinine phosphate (Abdullah, 2014).

One of the appropriate therapies for patients with CKD is hemodialysis therapy (Andayani & Prodyanatasari, 2023; Wulandari, 2019). This therapy does not cure or fully restore kidney function to normal and does not restore kidney disease but maintains the patient's quality of life (Wulandari, 2019). Hemodialysis therapy is carried out using a semi-permeable membrane (dialyzer), which functions a nephron so that it can help remove metabolic waste products and correct fluid and electrolyte balance disorders in patients with kidney failure (Lolowang, 2020). Patients on hemodialysis therapy must adhere to the treatment program provided so as not to cause complications due to non-compliance with the therapy program (Melianna, 2019). Low medication adherence in CKD patients undergoing hemodialysis therapy will lead to acute and chronic complications and increased mortality and morbidity (Kim et al, 2022). The key to successful hemodialysis therapy is patient compliance during the treatment program. If the patient is not compliant during the hemodialysis therapy program, the patient will experience a build-up of harmful substances in the body derived from the metabolic products in the blood. This condition will cause the patient to feel pain throughout the body and if not treated properly it can cause death (s, 2021). In general, patient non-compliance in undergoing hemodialysis therapy includes (1) non-compliance in following dialysis therapy, (2) non-compliance with fluid restriction, (3) non-compliance during the treatment program, and (4) non-compliance with diet (Iswara, 2021). Based on the description above, researchers are interested in finding out more about the Relationship between Hemodialysis Therapy in Chronic Kidney Failure (CKD) Patients with Hemoglobin and Creatinine Levels at Baptist Hospital, Kediri City.

METHOD

A. Research Design

The research design used is analytical using the Cross-Sectional Study design method, which is a research design to study the dynamics of the correlation between risk factors and effects using an observation approach or data collection at one time (Faridi, 2021). This study aims to determine the effect of hemodialysis therapy on hemoglobin and creatinine levels in patients with chronic renal failure.

B. Population and Sample

This research was conducted at the Baptist Hospital Laboratory, Kediri City on 6 - 11 February 2023. The population of this study were chronic renal failure patients undergoing hemodialysis therapy and were conducting routine examinations at the Baptist Hospital in Kediri at the time of the study, a population of 37 patients was obtained. The sample used in this study was 30 patients of hemodialysis therapy at Baptist Hospital Kediri City, which were determined proportionally.

C. Research Variables

Manipulation variable: hemodialysis therapy
Response variable: hemoglobin and creatinine levels. Frequency affects the results so researchers use a minimum sample of research using the Slovin formula so that the results obtained can be trusted.
Control variable: hemoglobin measurement. Hemoglobin measurement in the study used the hematology analyzer method or automatic method with whole blood samples with K3 EDTA anticoagulant, while the creatinine examination method used the Enzymatic colorimetric method with serum samples. Both methods used are gold standards in the laboratory and also meet the applicable SOP.

D. Data Collection

The sampling technique is a method used to obtain samples that will be used for research. The sampling method in this study was Quota Sampling, namely determining the sample from a population with certain characteristics until the desired number (quota) by considering the specified inclusion criteria (Sugiyono, 2021) using the correlation study test.

E. Data Analysis

The correlation test is a statistical tool that can be used to compare the measurement results of two different variables to determine the level of relationship between variables (Hidayat, 2021). Before using the correlation test, a normality test is carried out to determine the distribution of a data distribution (Nasrum, 2018). The correlation test used is Pearson for parametric tests because the data is normally distributed. Analytical testing was conducted using the SPSS 24.0 program with an alpha error rate of 0.05 (5%). If the p-value is obtained <0.05, H0 is rejected and H$_1$ is accepted (Santoso, 2019).

F. Ethical Considerations

In this study, epidemiological ethics were carried out, including (1) approval of respondents through filling out informed consent, (2) no intervention to prospective respondents and respondents to be willing to become respondents, and/or during the filling of informed consent, (3) maximizing benefits by communicating research results to respondents, and (4) evaluation in the provision of health services for the community under study. The other aspects outside the examination such as preanalytic aspects and certain conditions will be used as supporting data for researchers in conducting discussions.

RESULTS OF STUDY
A. Characteristic Respondents Based on Gender and Age

Based on research that has been carried out at the Installation Clinical Laboratory, Baptist Hospital, Kediri City, it's known the characteristics of respondents based on gender and age are as Figure 1 and Figure 2.
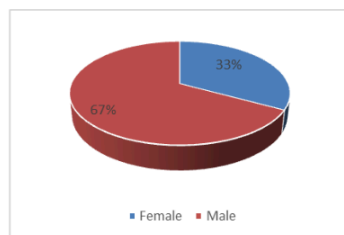
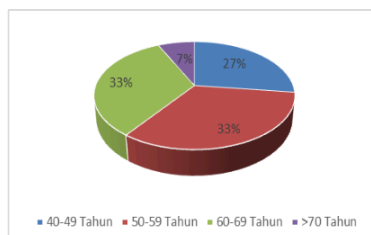Figure 1. The characteristics of respondents based on gender

Figure 2. The characteristics of respondents based on age

Table 1. The Resulting Test of Hemoglobin and Creatinine Levels

No.	Respondent	Gender	Age	Hemoglobin Levels (g/dL)	Categories	Creatinine Levels (mg/dL)	Categories
1.	Ny. J	P	51	6,2	Low	5,80	High
2.	Tn. A	L	69	10,3	Low	2,59	High
3.	Tn. T	L	50	7,3	Low	10,69	High
4.	Ny. S	P	70	13,3	Normal	1,65	High
5.	Tn. S	L	52	3,0	Low	5,47	High
6.	Tn. A	L	53	6,8	Low	6,26	High
7.	Ny. M	P	82	9,0	Low	1,38	High
8.	Ny. I	P	40	8,7	Low	3,81	High
9.	Tn. D	L	60	9,1	Low	5,60	High
10.	Ny. S	P	42	8,2	Low	4,20	High
11.	Tn. Y	L	40	11,1	Low	6,30	High
12.	Tn. D	L	58	8,2	Low	6,79	High
13.	Tn. S	L	69	12,5	Normal	2,70	High
14.	Tn. B	L	64	4,2	Low	0,89	Normal
15.	Tn. P	L	47	9,3	Low	3,61	High
16.	Tn. A	L	54	5,9	Low	7,45	High
17.	Ny. S	P	55	8,0	Low	5,30	High
18.	Ny. T	P	57	9,2	Low	3,94	High
19.	Ny. M	P	44	8,0	Low	6,40	High
20.	Tn. P	L	68	15,1	Normal	4,22	High
21.	Tn. S	L	44	12,2	Normal	1,29	High
22.	Tn. I	L	57	15,9	Normal	0,74	Normal
23.	Tn. S	L	63	10,4	Low	8,41	High
24.	Tn. L	L	58	9,4	Low	7,96	High
25.	Tn. A	L	61	5,0	Low	5,38	High
26.	Tn. S	L	49	9,3	Low	2,93	High
27.	Ny. L	P	62	8,0	Low	4,70	High
28.	Ny. D	P	40	8,3	Low	3,35	High
29.	Tn. R	L	60	9,1	Low	2,24	High
30.	Tn. S	L	68	10,4	Low	1,58	High

The normal values for hemoglobin levels:
Male   : 12,0 – 18,0 g/dL
Female   : 12,3 – 15,3 g/dL

Hemoglobin value based on examination results
Minimum: 3,0
Maximum: 15,9
Mean: 9,0

The normal values for creatinine levels:
Male   : 0,51 – 0,95 mg/dL
Female   : 0,67 – 1,17 mg/dL

Hemoglobin value based on examination results
Minimum: 0,74
Maximum: 10.69
Mean: 4,45

Source: personal research data

B. The result of hemoglobin and creatinine levels check

In this case, the result of the research will be described, including a description of the distribution of characteristics of respondents, and the relationship between hemodialysis therapy in chronic kidney failure patients with hemoglobin levels and creatinine levels at the Baptist Hospital, Kediri City. Based on the results of an examination of 30 respondents at Baptist Hospital in Kediri City, the characteristics of the research subjects were obtained as listed in Table 1.

C. The Statistical Analysis of Hemoglobin and Creatinine Levels Check

Based on Table 1 about the description of hemoglobin and creatinine levels above, a normality test is carried out to determine whether the data obtained is normally distributed. Data normality tests in SPSS that are often used are the Kolmogorov-Smirnov test and the Shapiro-Wilk test. The Kolmogorov-Smirnov test is used for samples of more than 50, while the Shapiro-Wilk test is for samples of less than 50 (Sugiyono, 2021). The sample used in this study was 30 samples, so the researchers used the Shapiro-Wilk Test can be shown in Table 2.

Table 2. Shapiro Wilk Test

	df	Sig
Hemoglobin	30	0,472
Creatinine		0,503

Data is said to be normally distributed if the sig value is more than alpha 0.05 (5%), while data is not normally distributed if the sig value is less than alpha 0.05 (5%). The significance value (sig) of hemoglobin level is 0.472 and creatinine is 0.503 because the sig value of hemoglobin and creatinine levels is more than alpha 0.05 (5%), so it can be concluded that the data above is normally distributed and can be continued in the Pearson Correlation Test.

The correlation value between the two variables (between hemoglobin levels and creatinine levels), obtained the result of 0.369 means low. probability value or p-value with Pearson Correlation test obtained the result 0.045 < alpha 0.05 (5%) which means H0 is rejected, there is a relationship between hemoglobin levels and creatinine levels in hemodialysis therapy patients in Table 3.

Table 3. Pearson Correlation Test

	Df	Coefficient	Sig
Hemoglobin	30	0,369	0,045
Creatinine			

Based on the Shapiro-Wilk normality test, the significance value (sig) of hemoglobin levels is 0.472 and the significance value (sig) of creatinine levels is 0.503. the sig value obtained is known that > 0.05 so it can be concluded that the distribution or distribution of data is normal. From the results of the normality test that has been obtained, the researchers continued the statistical test using the Pearson correlation test because the requirements of the Pearson test are normally distributed data. The results of the study using the Pearson correlation test showed that there is a relationship between hemoglobin levels and creatinine levels in patients undergoing hemodialysis therapy with a sig value of 0.045 so that the sig value < α (0.05) with a correlation coefficient 0.369, this means H_1 accepted and it can be concluded that there is a positive relationship with a low level of correlation between hemoglobin and creatinine levels in chronic renal failure patients undergoing hemodialysis therapy at Baptist Hospital, Kediri City. The results of this study are in line with Riani (2021) at RSU Zahirah Jagakarsa, which shows that there is a significant relationship between hemoglobin levels and creatinine levels in patients on hemodialysis therapy. This relationship exists because where the damaged kidney causes a high value of creatinine levels so that the erythropoietin hormone produced by the kidneys decreases to produce red blood cells which cause a decrease in hemoglobin levels.

Based on the results of the analysis conducted, it can be obtained that hemodialysis therapy can affect hemoglobin levels and creatinine levels in patients with chronic renal failure. In patients with CKD, there is a decrease in blood hemoglobin levels due to the deficiency of erythroproetin by the kidneys with other factors, where the life span of red blood cells in CKD patients is only half the life span of normal blood cells, which is 120 days. Low hemoglobin levels are caused by the loss of erythropoetin synthesis in the kidney or the presence of erythropoietin inhibitors. The severity of the decrease in hemoglobin levels in patients with GHGK is influenced by the length and extent of renal failure.

In GGK, creatinine levels increase due to decreased ability and even dysfunction of the kidney organ in carrying out the creatinine filtration process. Hemodialysis therapy for patients with CKD aims to replace the excretory function of the kidneys in removing metabolic waste in the body, such as ureum, creatinine, and other metabolic waste. Hemodialysis therapy for patients with CKD can increase blood hemoglobin levels and reduce creatinine levels in the blood of patients with CKD.

DISCUSSION

A. The characteristics of respondents based on gender and age

The characteristics of respondents based on gender above 30 respondents can be seen that most of the gender of male respondents are as many as 20 people (67%) and the lowest is female, namely 10 people (33%). According to Siska and Suryono (2018) states that women and men have the same risk, only the influence of lifestyle will cause someone to suffer from chronic kidney failure and have to undergo hemodialysis therapy. The results of this study are in line with Nurul and Noor's research (2021) that patients with chronic kidney failure were higher in men, namely 51.76% while in women it was 48.24%. The ESRD Incidence Study Group also states that there is an increase in the incidence of chronic kidney failure in men associated with poor lifestyles such as smoking, alcohol consumption, staying up late, and drinking less water (Wijayanti et al, 2017).

In the study, the age range was obtained using calculations using Ms.excel and obtained an age range of 10 while the hemoglobin levels above, it can be seen that the number of respondents checking hemoglobin levels was 30 respondents with a minimum value of 3.0 g/dL, a maximum value of 15.9 g/dL and the average (mean) results of checking hemoglobin levels were 9.0 g/dL and creatinine levels, it can be seen that the number of respondents checking creatinine levels was 30 respondents with a minimum value of 0.74 mg/dL, a maximum value of 10.69 mg/dL and the average (mean) results of checking creatinine levels were 4.45 mg/dL. Include a discussion of the sex and age distribution of participants and its relationship to the study findings.

B. Hemoglobin and Creatinine Levels Check

Chronic renal failure (CKD) is a disease that occurs when the kidneys fail to maintain the volume and composition of body fluids. Hemodialysis is one of the therapies to replace deteriorating kidney function. As kidney function deteriorates, the ability to reproduce erythropoietin is impaired and anemia can occur, so checking hemoglobin

levels is useful to control the patient's hemoglobin levels. Meanwhile, the laboratory examination to detect the severity of renal function impairment is the examination of creatinine level. Therefore, the examination of creatinine levels after hemodialysis therapy is very important to determine the success of hemodialysis therapy in replacing kidney function. The results of this study were an average hemoglobin level of 8.91 g/dL and a creatinine level of 4.69 mg/dL. Based on the Pearson correlation test, the correlation coefficient (r) was 0.403, p-value = (0.022) > alpha = 0.05 (5%), thus H1 was accepted. The research that has been done concludes that there is a significant relationship between hemoglobin and creatinine levels in chronic renal failure patients undergoing hemodialysis therapy at the Baptist Hospital in Kediri City.

Based on Table 1, 25 respondents had low hemoglobin levels with a mean value of 9.0 g/dl, and 28 respondents with elevated creatinine levels with an average value of 4.45 mg/dL. The decrease in hemoglobin levels can be caused by the patient's condition in severe conditions due to the underlying illness, the etiology of chronic renal failure disease includes hypertension and diabetes mellitus. The hemodialysis process can also affect hemoglobin levels, the most common problems that often arise are cardiovascular ability during dialysis the difficulty of obtaining vascular access, and the occurrence of blood retention in the dialyzer or tubing on the hemodialysis machine, causing a decrease in hemoglobin levels in the blood.

In hemodialysis therapy, in patients who have high creatinine levels due to chronic renal failure or patients with renal dysfunction, the ability of creatinine filtration will decrease and serum creatinine will increase. Increased creatinine levels in the blood can also be caused by consuming beef too often, heavy physical activity, and taking drugs including vitamin C, cephalosporin antibiotics, and aminoglycosides so patients should be able to reduce these foods and drugs.

Based on 1 obtained 5 respondents had normal hemoglobin levels and 2 respondents had normal creatinine levels. Normal hemoglobin levels in hemodialysis patients can be influenced by the administration of Erythropoietin Stimulating Agent (ESA) therapy which has an important role in strengthening the response of erythropoietin administration. Erythropoietin Stimulating Agent (ESA) therapy is carried out by administering Epoetin twice a week and Continuous Erythropoiesis Receptor Activator (C.E.R.A) every week. Every 2 weeks, monitoring of hemoglobin is done every month, which if done with the right procedures and compliance from the patient, will greatly affect the development of the patient's health.

In patients who have normal creatinine levels, it indicates that hemodialysis can reduce the condition of patients with chronic kidney failure for the better, but hemodialysis cannot completely replace kidney function even though patients undergo hemodialysis regularly because hemodialysis therapy is only limited to efforts to control the symptoms of uremia and maintain patient survival, not an action to cure chronic kidney failure. The length of time on hemodialysis affects serum creatinine levels because patients have reached the long-term adaptation stage, which is usually when patients are getting used to accepting limitations and complications. There was 1 respondent with normal hemoglobin and creatinine levels, and the respondent had undergone routine hemodialysis therapy for more than five years and had a good lifestyle so they had normal hemoglobin and creatinine levels.

Description of creatinine levels can be seen that of the 30 respondents who underwent hemodialysis therapy, the minimum value of creatinine levels was 0.74 mg/dL, the maximum value was 10.69 mg/dL and the average value was 4.45 mg/dL. In diagram V.4 regarding the characteristics of respondents based on the classification of creatinine reference values, it can be seen that the number of respondents based on creatinine levels who have normal creatinine levels is 2 respondents (7%) followed by abnormal (high) creatinine levels, namely 28 respondents (93%). This is by the results of research conducted by Heriansyah and Aji (2019), namely all patients with chronic kidney failure who receive hemodialysis therapy have creatinine levels above normal with an average of 4.0 mg/dL. The high and low examination of creatinine levels can give an idea of the severity of kidney function disorders. High creatinine levels are caused because in patients with chronic renal failure, there is renal dysfunction, the filtration ability of creatinine will decrease and serum creatinine will increase. Increased creatinine levels in the blood can also be caused by consuming beef too often, heavy physical activity, and taking drugs including vitamin C, cephalosporin antibiotics, and aminoglycosides so patients should be able to reduce these foods and drugs (Indriasari, 2015).

The conclusion is that there is a positive relationship with a low correlation level between hemoglobin and creatinine levels in patients with chronic renal failure undergoing hemodialysis therapy at the Baptist Hospital in Kediri City. The results of this study are in line with Elfirda Riani (2021) at RSU Zahirah Jagakarsa, which shows that there is a significant relationship between hemoglobin levels and creatinine levels in patients on hemodialysis therapy. This relationship exists because where the damaged kidney causes a high value of creatinine levels so that the erythropoetin hormone produced by the kidneys decreases to produce red blood cells which causes a decrease in hemoglobin levels. So that the possibility of anemia complications increases.

The conclusion that there is a positive relationship with a low correlation level between hemoglobin and creatinine levels in patients with chronic renal failure undergoing hemodialysis therapy at the Baptist Hospital in Kediri City. The results of this study are in line with Riani (2021) at RSU Zahirah Jagakarsa, which shows that there is a significant relationship between hemoglobin levels and creatinine levels in patients on hemodialysis therapy. This relationship exists because where the damaged kidney causes a high value of creatinine levels so that the erythropoietin hormone produced by the kidneys decreases to produce red blood cells which cause a decrease in hemoglobin levels. So that the possibility of anemia complications increases.

a. This study describes the complications that may occur in patients with CKD.
b. Perform hemodialysis regularly if you have been diagnosed with chronic renal failure as a kidney replacement therapy. If chronic renal failure has been diagnosed, it is necessary to pay attention to the intake of food and drinks consumed.
c. Language limitations because researchers cannot speak Javanese and most patients use Javanese so they do not understand the language used by respondents and the age of patients> 70 years makes it difficult for researchers to fill out questionnaires due to factors that decrease patient memory.

Deteriorating kidney function means that the kidneys cannot perform their function again or is called chronic renal failure. This research design is a cross-sectional survey

replaced by observational research where data are collected at a certain time and used to describe the characteristics of the population at a certain time. "City life that demands everything to be fast and precise" means that city people prefer fast food and soda drink and other unhealthy ways of life. The sampling method in this study was Quota Sampling, namely determining the sample from a population that has certain characteristics until the desired number (quota) by taking into account the specified inclusion criteria (Sugiyono & Lestari, 2021). The characteristics of respondents based on gender can be seen that the number of male respondents was 20 people (67%) and women were 10 people (33%). According to Siska and Suryono (2018), the female and male sexes have the same risk, only the influence of lifestyle will cause a person to suffer from chronic kidney failure and have undergo hemodialysis therapy. characteristics of respondents based on age, it can be seen that the prevalence based on age between 50 - 59 years and 60 - 69 years is as many as 10 people (33%), then second followed by age 40 - 49 years, totaling 8 people (27%), and the least number of respondents was age> 70 years, totaling 2 people (7%). Clinically, patients aged >50 years have a 2.2 times greater risk of developing chronic kidney failure compared to patients aged >70 years.

CONCLUSIONS AND RECOMMENDATION

Based on the results of data and analysis that have been done, the results show that the provision of hemodialysis therapy affects increasing blood hemoglobin levels and decreasing blood creatinine levels in patients with chronic renal failure. Hemoglobin levels in patients with CKD tend to be low due to erythropoietin deficiency by the kidneys. Hemodialysis therapy can help the body in maintaining blood hemoglobin levels at normal levels. Hemodialysis therapy can help the kidney function in excreting metabolic waste out of the body, such as ureum, creatinine, and other metabolic waste. The existence of this excretion process can help reduce creatinine levels in the blood so that creatinine levels become normal. The research conducted still needs to be developed related to chronic renal failure disease, such as the effectiveness of providing hemodialysis therapy in GGK patients to improve the quality of life of patients.

REFERENCES

Abdullah, D. and Anissa, M., 2014. Jurnal Kesehatan Saintika Meditory Jurnal Kesehatan Saintika Meditory. Jurnal Kesehatan Saintika Meditory, 2(4657), pp.62-72. Retrieve from: https://scholar.google.com/citations?view_op=view_citation&hl=en&user=inq4LJMAAAAJ&citation_for_view=inq4LJMAAAAJ:iH-uZ7U-co4C

Ammirati, A.L. 2021. Kidney Disease: Chronic Kidney Disease. FP Essentials, 509(Suppl 1), 20-25. Retrieve from: https://www.scielo.br/j/ramb/a/MSYFJQpZVgQdc69PGyqN3TS/?lang=en

Andayani, A., & Prodyanatasari, A. (2023). Korelasi Kadar Hemoglobin Terglikasi (HbA1c) dan Kreatinin pada Penderita Diabetes Melitus Tipe II. Judika (Jurnal Nusantara Medika), 7(2), 124-134. Retrieve from:

https://www.scielo.br/j/ramb/a/MSYFJQpZVgQdc69PGyqN3TS/?lang=en

Anggraini, S. and Fadila, Z., 2023. Kualitas Hidup Pasien Gagal Ginjal Kronik dengan Dialisis di Asia Tenggara: A Systematic Review. HEARTY: Jurnal Kesehatan Masyarakat, 11(1), pp.77-83. Retrieve from: https://ejournal.uika-bogor.ac.id/index.php/Hearty/article/view/7947

Aryaningsih, R.F., 2023. Gambaran Kadar Kreatinin Serum pada Penderita Hipertensi di RSUD Tabanan (Doctoral dissertation, Poltekkes Kemenkes Denpasar Jurusan Teknologi Laboratorium Medis 2023). Retrieve from: http://repository.poltekkes-denpasar.ac.id/10728/

Chang, T. I., Li, S., Chen, S. C., Peralta, C. A., Shlipak, M. G., Fried, L. F., ... & KEEP Investigators. (2013). Risk factors for ESRD in individuals with preserved estimated GFR with and without albuminuria: results from the Kidney Early Evaluation Program (KEEP). American Journal of Kidney Diseases, 61(4), S4-S11. Retrieve from: https://www.sciencedirect.com/science/article/abs/pii/S0272638613000036

Delima, D., & Tjitra, E. (2017). Faktor risiko penyakit ginjal kronik: Studi kasus kontrol di empat rumah sakit di Jakarta tahun 2014. Indonesian Bulletin of Health Research, 45(1), 17-26. Retrieve from: https://media.neliti.com/media/publications-test/74905-faktor-risiko-penyakit-ginjal-kronik-stu-ceeae152.pdf

Faridi, A., Susilawaty, A., Rahmiati, B.F., Sianturi, E., Adiputra, I.M.S., Budiastutik, I., Oktaviani, N.P.W., Trisnadewi, N.W., Tania, P.O.A., Ramdany, R. and Fitriani, R.J., 2021. Metodologi Penelitian Kesehatan. Retrieve from: https://repo.stikes-ibnusina.ac.id/xmlui/handle/123456789/1210

Hendardi, F.A., 2023. Hubungan Asupan Protein, Asam Folat Dan Zat Besi dengan Kadar Hemoglobin Post Hemodialisis Pada Pasien Penyakit Ginjal Kronis (Studi Observasional Di Unit Hemodialisis Uptdk RSUD Dr. Soekardjo Kota Tasikmalaya Tahun 2023) (Doctoral Dissertation, Universitas Siliwangi). http://repositori.unsil.ac.id/10347/

Hidayati, T., & Haripurnomo Kushadiwijaya, S. (2008). Hubungan antara hipertensi, merokok dan minuman suplemen energi dan kejadian penyakit ginjal kronik. Berita Kedokteran Masyarakat, 24(2), 90. Retrieve from: https://journal.ugm.ac.id/bkm/article/view/3600

Hidayat, A.A., 2021. Cara praktis uji statistik dengan SPSS. Health Books Publishing. Retrieve from: https://books.google.co.id/books?hl=en&lr=&id=Q6IaEAAAQBAJ&oi=fnd&pg=PA4&dq=Hidayat,+A.A.,+2021.+Cara+praktis+uji+statistik+dengan+spss.+Health+Books+Publishing&ots=5cssSwQDMe&sig=-EAP2Z6HQ8dldUM2n2agjLTYuw0&redir_esc=y#v=onepage&q&f=false

Hidayat, R., Azmi, S. and Pertiwi, D., 2016. Hubungan Kejadian Anemia dengan Penyakit Ginjal Kronik pada Pasien yang Dirawat di Bagian Ilmu Penyakit Dalam RSUP dr M Djamil Padang Tahun 2010. Jurnal Kesehatan

Andalas, 5(3). Retrieve from: http://jurnal.fk.unand.ac.id/index.php/jka/article/view/574/463

Indonesia, P.N., 2011. Konsensus manajemen anemia pada penyakit ginjal kronik. Jakarta: Pernefri. Retrieve from: https://www.pernefri.org/konsensus/Konsensus%20Nutrisi.pdf

Indriasari, Devi. 2015. *100% Sembuh Tanpa Dokter*. Yogyakarta: Galangpress.

Iswara, L. and Muflihatin, S., 2021. Hubungan kepatuhan menjalani terapi hemodialisa dengan kualitas hidup pasien gagal ginjal kronik yang menjalani hemodialisis: literature review. Borneo Studies and Research, 2(2), pp.958-967. Retrieve from: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Iswara%2C+L.+and+Muflihatin%2C+S.%2C+2021.+Hubungan+kepatuhan+menjalani+terapi+hemodialisa+dengan+kualitas+hidup+pasien+gagal+ginjal+kronik+yang+menjalani+hemodialisis%3A+literature+review.+Borneo+Studies+and+Research%2C+2%282%29%2C+pp.958-967.&btnG=

Izzati, W. and Annisha, F., 2017. Faktor-faktor yang berhubungan dengan kepatuhan pasien yang menjalani hemodialisis di ruang hemodialisa di rsud dr. Achmad mochtar bukittinggi tahun 2015. 'AFIYAH, 3(1). Retrieve from: https://ejournal.umnyarsi.ac.id/index.php/JAV1N1/article/view/73/175

Kim, H., Jeong, I.S. and Cho, M.K. 2022. *Effect of Treatment Adherence Improvement Program in Hemodialysis Patients: A Systematic Review and Meta-Analysis. International Journal of Environmental Research and Public Health*, 19(18), p.11657. Retrieve from: https://www.mdpi.com/1660-4601/19/18/11657

Ladesvita, F., 2021. Hubungan Laju Filtrasi Glomerulus Dengan Kadar Hemoglobin Dan Kalsium Pada Pasien Gagal Ginjal Kronik Yang Menjalani Hemodialisis. *Indonesian Journal of Health Development*, 3(2), pp.272-284. Retrieve from: https://ijhd.upnvj.ac.id/index.php/ijhd/article/view/101/55

Lolowang, N. N. L., Lumi, W. M., & Rattoe, A. A. (2020). Kualitas hidup pasien gagal ginjal kronis dengan terapi hemodialisa. *Jurnal Ilmiah Perawat Manado (Juiperdo)*, 8(02), 21-32. Retrieve from: https://ejurnal.poltekkes-manado.ac.id/index.php/juiperdo/article/view/1183/860

Melianna, R. and Wiarsih, W., 2019. Hubungan Kepatuhan Pembatasan Cairan Terhadap Terjadinya Overload Pada Pasien Gagal Ginjal Kronik Post Hemodialisa di Rumah Sakit Umum Pusat Fatmawati. JIKO (Jurnal Ilmiah Keperawatan Orthopedi), 3(1), pp.37-46. Retrieve from: http://ejournal.akperfatmawati.ac.id/index.php/JIKO/article/view/28/24

Mihai, S., Codrici, E., Popescu, I.D., Enciu, A.M., Albulescu, L., Necula, L.G., Mambet, C., Anton, G. and Tanase, C., 2018. Inflammation-related mechanisms in chronic kidney disease prediction, progression, and outcome. Journal of

Immunology Research, 2018. Retrieve from: https://www.hindawi.com/journals/jir/2018/2180373/

Nasrum, A., 2018. Uji normalitas data untuk penelitian. Jayapangus Press Books, pp.i-117. Retrieve from: http://book.penerbit.org/index.php/JPB/article/view/115

National Kidney Foundation. 2013. GFR (Glomerular Filtration Rate) A Key to Understanding How Well Your Kidneys Are Working. National Kidney Foundation. Retrieve from: https://www.kidney.org/atoz/content/gfr

Paath, C.J.G., Masi, G. and Onibala, F., 2020. Study cross sectional: Dukungan keluarga dengan kepatuhan hemodialisa pada pasien gagal ginjal kronis. Jurnal Keperawatan, 8(1), pp.106-112. Retrieve from: https://ejournal.unsrat.ac.id/v3/index.php/jkp/article/view/28418/27787

Puspita, A.A., Setianingrum, E.L.S. and Lidia, K., 2019. Pengaruh Frekuensi Hemodialisis Terhadap Perbedaan Kadar Hemoglobin Dan Indeks Eritrosit Pasien Gagal Ginjal Kronik Pre Dan Post Hemodialisis Di RSUD Prof. Dr. WZ Johannes Tahun 2018. Cendana Medical Journal (CMJ), 7(1), pp.102-111. Retrieve from: https://ejurnal.undana.ac.id/index.php/CMJ/article/view/1462/1160

Kalantar-Zadeh, K., Jafar, T. H., Nitsch, D., Neuen, B. L., & Perkovic, V. (2021). *Chronic kidney disease. The lancet*, *398*(10302), 786-802. Retrieve from: https://www.thelancet.com/article/S0140-6736(21)00519-5/abstract

Kementerian Kesehatan RI. (2018). Hasil Riset Kesehatan Dasar (RISKESDAS) 2018. Retrieve from: www.depkes.go.id/resources/download/info-terkini/hasil-riskesdas-2018.pdf

Khatri, M., Zitovsky, J., Lee, D., Nayyar, K., Fazzari, M., & Grant, C. (2020). *The association between serum chloride levels and chronic kidney disease progression: a cohort study. BMC nephrology*, *21*, 1-10. Retrieve from: https://link.springer.com/article/10.1186/s12882-020-01828-3

Restianika, N. (2014). Faktor Yang Berhubungan dengan Kejadian Gagal Ginjal Kronik pada Pasien Rawat Inap Ruang Penyakit Dalam Di RSUD Dr. Soeroto Kabupaten Ngawi. Retrieve from: https://repository.unej.ac.id/handle/123456789/60425

Riani, Sandi, E., 2021. Hubungan Kadar Hemoglobin dengan Kadar Kreatinin pada Pasien Hemodialisa di Rumah Sakit Umum Zahirah Jagakarsa (Doctoral dissertation, Universitas Binawan). Retrieve from: https://repository.binawan.ac.id/2565/

Rosdewi, R., Tola'ba, Y., Syahrul, M., & Tika, D. (2023). Pengaruh Hemodialisis Terhadap Nilai Hemoglobin Pada Pasien End Stage Renal Disease Di Rs. Stella Maris Makassar. *Jurnal Ners*, *7*(1), 68-73. Retrieve from: https://journal.universitaspahlawan.ac.id/index.php/ners/article/view/11021/8852

Santoso, S., 2019. Mahir statistik parametrik. Elex Media Komputindo. Retrieve from: https://books.google.co.id/books?hl=en&lr=&id=CTOyDwAAQBAJ&oi=fnd&pg=PP1&dq=Santoso,+S,,+2019.+Mahir+statistik+parametrik.+Elex+Media+Komputindo&ots=rHJg7yuEmB&sig=XnEwQawsmob1a1bXDrFwZeSiKv8&redir_esc=y#v=onepage&q=Santoso%2C%20S.%2C%202019.%20Mahir%20statistik%20parametrik.%20Elex%20Media%20Komputindo&f=false

Shaleha, R.R., Yuliana, A., Amin, S., Pebiansyah, A., Zain, D.N., Hidayat, T. and Alifiar, I., 2023. Penyuluhan Penyakit Gagal Ginjal Kronik Di Puskesmas Rancah Kabupaten Ciamis. To Maega: Jurnal Pengabdian Masyarakat, 6(3). Retrieve from: https://ojs.unanda.ac.id/index.php/tomaega/article/view/1867/1112

Siregar, C.T., 2020. Buku ajar manajemen komplikasi pasien hemodialisa. Deepublish. Retrieve from: https://books.google.co.id/books?hl=en&lr=&id=MjT4DwAAQBAJ&oi=fnd&pg=PP1&dq=Siregar,+C.T.,+2020.+Buku+ajar+manajemen+komplikasi+pasien+hemodialisa.+Deepublish&ots=wR_uRxSyUe&sig=d14M5jufBABsp0j2BEAovKhzAUA&redir_esc=y#v=onepage&q=Siregar%2C%20C.T.%2C%202020.%20Buku%20ajar%20manajemen%20komplikasi%20pasien%20hemodialisa.%20Deepublish&f=false

Sitanggang, T.W., Anggraini, D. and Utami, W.M., 2021. Hubungan Antara Kepatuhan Pasien Menjalani Terapi Hemodialisa dengan Kualitas Hidup Pasien Gagal Ginjal Kronis di Ruang Hemodialisa RS. Medika BSD Tahun 2020. Jurnal Medikes (Media Informasi Kesehatan), 8(1), pp.129-136. Retrieve from: https://www.jurnal.poltekkesbanten.ac.id/Medikes/article/view/259/215

Sugiyono, S. and Lestari, P., 2021. Metode penelitian komunikasi (Kuantitatif, kualitatif, dan cara mudah menulis artikel pada jurnal internasional). Retrieve from: http://eprints.upnyk.ac.id/27727/1/Buku%20Metode%20Penelitian%20Komunikasi.pdf

Tanjung, N.F. and Ladesvita, F., 2023. Hubungan Natrium dan Hemoglobin dengan Glomerulus Filtration Rate (GFR) pada Pasien Gagal Ginjal Kronik. Jurnal Keperawatan, 15(1), pp.439-450. Retrieve from: http://journal2.stikeskendal.ac.id/index.php/keperawatan/article/view/779

Vaidya, S.R. and Aeddula, N.R., 2018. Chronic renal failure. Retrieve from: https://europepmc.org/article/NBK/nbk535404

Veronika, E. and Hartono, B., 2019. Nilai Estimasi Glomerulus Filtration Rate (GFR) Menggunakan Persamaan Cockcroft and Gault Pada Masyarakat Terpajan Merkuri di Area Pertambangan Emas Skala Kecil (Pesk) Desa Lebaksitu Kabupaten Lebak Banten. In Universitas Indonesia: Forum Ilmiah (Vol. 16). Retrieve from: https://digilib.esaunggul.ac.id/public/UEU-Journal-20227-11_1370.pdf

Widjaja, Y., Santoso, A. H., Wijaya, D. A., Satyanegara, W. G., Kurniawan, J., Herdiman, A., ... & Lumintang, V. G. (2023). Peningkatan Kewaspadaan Masyarakat terhadap Penyakit Ginjal Kronis dengan Edukasi Gaya Hidup Dan Skrining Fungsi Ginjal. Community Development Journal: Jurnal Pengabdian Masyarakat, 4(6). Retrieve from: https://journal.universitaspahlawan.ac.id/index.php/cdj/article/view/22087

Widyantara, A. B., & Yaminawati, M. (2023). Literature Rivew: Profil Kadar Hemoglobin Dan Trombosit pada Pasien Gagal Ginjal Kronik (GGK) PRE DAN POST HEMODIALISIS. Jurnal Ilmiah Kesehatan, 12(1), 23-29. Retrieve from: https://ejournal.umpri.ac.id/index.php/JIK/article/view/1920/1081

Wulandari, E., 2019. Hubungan Lama Hemodialisa dengan Kejadian Pruritus Uremik pada Pasien GGK RSUD Dr. Hardjono Ponorogo. Jurnal Kesehatan Manarang, 5(1), pp.24-31. Retrieve from: https://jurnal.poltekkesmamuju.ac.id/index.php/m/article/view/90/74

World Health Organization, 2018. Monitoring progress on universal health coverage and the health-related Sustainable Development Goals in the South-East Asia Region: 2018 update. Retrieve from: https://r.search.yahoo.com/_ylt=AwrPrh1hhuZlSY4DSLTLQwx.;_ylu=Y29sbwNzZzMEcG9zAzMEdnRpZAMEc2VjA3Ny/RV=2/RE=1709635297/RO=10/RU=https%3a%2f%2fapps.who.int%2firis%2frest%2fbitstreams%2f1157658%2fretrieve/RK=2/RS=mt98uJD.KC81afcEqWaXSAA1T1M-

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