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# Characteristics of Chronic Kidney Disease Patients Undergoing Hemodialysis at RSPAL Dr. Ramelan Surabaya from January to June 2022

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**A B S T R A C T**

Chronic Kidney Disease (CKD) is a persistent abnormality in kidney function or structure, with or without a decline in glomerular filtration rate (GFR) below 60 mL/min/1.73 m², lasting for more than three months. CKD diagnosis relies on markers of kidney damage and/or a reduction in GFR. Patients with advanced CKD, characterized by a GFR below 15 mL/min/1.73 m², typically require dialysis. In 2018, 60,852 individuals in Indonesia were reported to have CKD requiring lifelong dialysis. This study aims to assess the characteristics of CKD patients undergoing hemodialysis. This research employs descriptive design. The sample consists of all CKD patients undergoing hemodialysis, as recorded in the medical records of RSPAL dr. Ramelan Surabaya between January and June 2022. The findings reveal that more than half of the patients (52.7%) had been on hemodialysis for more than 12 months. Many of the patients (66.2%) were between 40 and 60 years old, with males accounting for 54.1% of the sample. Hypertension and diabetes mellitus were identified as the most common comorbid conditions (31.1%), while pain medication consumption was the least reported cause (2.7%). All patients had hemoglobin levels below the normal range (<13 g/dL for males and <12 g/dL for females) and relied on BPJS (Indonesia's national health insurance) to cover the cost of hemodialysis. Furthermore, most patients exhibited creatinine levels exceeding 1.5 mg/dL, blood urea nitrogen (BUN) levels above 24 mg/dL, serum iron (SI) levels between 45 and 158 µg/dL, and total iron-binding capacity (TIBC) levels below 250 µg/dL.

## INTRODUCTION

Chronic Kidney Disease (CKD) is an abnormality in the function or structure of the kidneys, with or without a reduction in the glomerular filtration rate (GFR) to below 60 mL/min/1.73 m², persisting for more than three months. Kidney damage can manifest as albuminuria, abnormalities in urine sediment, electrolyte imbalances, structural or histological changes in the kidneys, or a history of kidney transplantation (KDIGO, 2013).

According to the 2018 Basic Health Research (Riset Kesehatan Dasar), the prevalence of Chronic Kidney Disease (CKD) in Indonesia among individuals aged over 15 years is 0.38%. The prevalence is higher in males (0.42%) than in females (0.35%). In terms of age and employment status, the highest prevalence is observed in the 65–74-year age group (0.82%), followed by the unemployed population (0.48%) (Aisara, Azmi and Yanni, 2018; Riset Kesehatan Dasar, 2018).

Kidney damage in Chronic Kidney Disease (CKD) is irreversible and can result from various factors (Aisara, Azmi, & Yanni, 2018). Among patients with stage 5 CKD, the most common cause is hypertensive kidney disease (36%), followed by diabetic nephropathy (28%). Other causes include



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primary glomerulopathy (10%), obstructive nephropathy (3%), chronic pyelonephritis (3%), lupus nephropathy/systemic lupus erythematosus (SLE) (1%), gout nephropathy (1%), polycystic kidney disease (1%), unknown causes (12%), and other causes (5%) (PERNEFRI, 2018).

The diagnosis of CKD relies on markers of kidney damage and/or decreased GFR (Eckardt et al., 2009). Early stages of CKD are usually asymptomatic and symptoms do not manifest until stages G4 and G5 or when GFR falls to less than 30 mL/min/1.73 $m^2$ (Charles and Ferris, 2020).

CKD patients whose kidney function decreases and is characterized by a GFR of less than 15 mL/minute/1.73 $m^2$, begin to require dialysis. In this situation, the patient experiences uremia where there is an accumulation of toxins in the patient's body because his kidney function has experienced an extreme decline so that Renal Replacement Therapy (RRT) is needed to replace the function of the kidneys in eliminating toxins in the body so as not to cause increasingly severe symptoms (PERNEFRI, 2003).

Hemodialysis is a common form of dialysis therapy for End-Stage Renal Disease (ESRD) (Zazzeroni et al., 2017). Hemodialysis is expected to reduce albumin expenditure in CKD patients and reduce symptoms of uremia. This is because the toxic substances contained in the blood can be removed through hemodialysis so that it can improve the patient's clinical symptoms (PERNEFRI, 2003; Aisara, Azmi and Yanni, 2018).

Data regarding the characteristics of CKD patients undergoing hemodialysis in Indonesia, especially in Surabaya, is still available in small quantities, so this makes researchers interested in conducting research on the characteristics of CKD patients undergoing hemodialysis at RSPAL dr. Ramelan Surabaya Period January-June 2022.

## METHOD

This study employed a descriptive design with quantitative methods conducted between August and December 2022. The sample consisted of all CKD patients undergoing hemodialysis based on data from the medical records of RSPAL dr. Ramelan Surabaya for the period January–June 2022, selected using the total sampling technique. Data collection involved reviewing all medical records that met the inclusion and exclusion criteria established prior to the study. The collected data were analyzed descriptively.

The inclusion criteria for this study were: (1) complete medical records of CKD patients undergoing hemodialysis at RSPAL dr. Ramelan Surabaya during the specified period, (2) patients undergoing hemodialysis on a regular basis, and (3) patients who were alert and conscious. The exclusion criterion was any patient with an incomplete medical record data.


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## RESULT

This study was conducted on CKD patients undergoing hemodialysis at RSPAL dr. Ramelan Surabaya during the period January–June 2022. The data were obtained from patient medical records within this timeframe, and random sampling was used, resulting in a total of 152 CKD patients undergoing hemodialysis. After applying the inclusion and exclusion criteria, 74 patients had medical records that met the requirements for inclusion in the study.

Table 1. Frequency Distribution of Patient Age

| Age | Frequency | Percentage |
|---|---|---|
| <40 years old | 5 | 6,8 |
| 40-60 years old | 49 | 66,2 |
| >60 years old | 20 | 27 |
| Total | 74 | 100 |

Based on Table 1, many CKD patients undergoing hemodialysis fall within the 40–60-year age group, accounting for 49 cases (66.2%). This is followed by the >60-year age group with 20 cases (27%), while the lowest proportion is found in the <40-year age group, with 5 cases (6.8%).

Table 2. Frequency Distribution of Patient Gender

| Gender | Frequency | Percentage |
|---|---|---|
| Male | 40 | 54,1 |
| Female | 34 | 45,9 |
| Total | 74 | 100 |

Based on Table 2, many CKD patients undergoing hemodialysis were male, accounting for 40 cases (54.1%), while female patients comprised 34 cases (45.9%).

Table 3. Frequency Distribution of Patient Risk Factors

| Risk Factors | Frequency | Percentage |
|---|---|---|
| Hypertension | 22 | 29,7 |
| Diabetes Mellitus | 4 | 5,4 |
| Hypertension & Diabetes Mellitus | 23 | 31,1 |
| Gout | 3 | 4,1 |
| Kidney Stones | 4 | 5,4 |
| Pain Medication (Analgesic) | 2 | 2,7 |
| Others | 16 | 21,6 |
| Total | 74 | 100 |

Based on Table 3, the three most common risk factors among CKD patients were hypertension and diabetes mellitus, with 23 cases (31.1%), followed by hypertension alone, with 22 cases (29.7%). Additionally, diabetes mellitus and kidney stones were observed in 4 cases (5.4%) each. The least common risk factor was pain medication use, reported in 2 cases (2.7%).

Table 4. Frequency Distribution of Patient Hemodialysis Time

| Duration of Hemodialysis | Frequency | Percentage |
|---|---|---|
| <6 months | 19 | 25,7 |
| 6-12 months | 16 | 21,6 |
| >12 months | 39 | 52,7 |
| Total | 74 | 100 |



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Based on Table 4, many patients had undergone hemodialysis for over 12 months, with 39 patients (52.7%) in this category. In contrast, 19 patients (25.7%) had been on hemodialysis for less than 6 months, while 16 patients (21.6%) had undergone hemodialysis for 6 to 12 months.

Table 5. Frequency Distribution of Patient Creatinine Levels

| Creatinine Levels | Frequency | Percentage |
|---|---|---|
| 0,6-1,5 mg/dl | 2 | 2,7 |
| >1,5 mg/dl | 72 | 97,3 |
| Total | 74 | 100 |

Based on Table 5, it can be deduced that many patients, 72 (97.3%), had creatinine levels greater than 1.5 mg/dL, while only 2 patients (2.7%) exhibited normal creatinine levels, which range from 0.6 to 1.5 mg/dL.

Table 6. Frequency Distribution of Patient BUN Levels

| BUN Levels | Frequency | Percentage |
|---|---|---|
| 10-24 mg/dl | 25 | 33,8 |
| >24 mg/dl | 49 | 66,2 |
| Total | 74 | 100 |

Table 6 indicates that 49 patients (66.2%) had BUN levels greater than 24 mg/dL, while the remaining 25 patients (33.8%) had normal BUN levels within the range of 10–24 mg/dL.

Table 7. Frequency Distribution of Patient Hemoglobin Levels

| Hemoglobin Levels | Frequency | Percentage |
|---|---|---|
| Male | | |
| a. <13 g/dl | 40 | 54,1 |
| b. 13-17 g/dl | 0 | 0 |
| Female | | |
| a. <12 g/dl | 34 | 45,9 |
| b. 12-15 g/dl | 0 | 0 |
| Total | 74 | 100 |

Based on table 7, it can be stated that all male and female patients suffering from CKD and undergoing hemodialysis have hemoglobin levels below normal levels, namely <13 g/dl for male patients in 40 cases (54.1%) and <12 g/dl for female patients as many as 34 cases (45.9%).

Table 8. Frequency Distribution of Patient Serum Iron Levels

| Serum Iron Levels | Frequency | Percentage |
|---|---|---|
| <45 µg /dl | 18 | 24,3 |
| 45-158 µg /dl | 56 | 75,7 |
| Total | 74 | 100 |

Table 8 indicates that 56 patients (75.7%) had normal SI levels ranging between 45-158 µg/dl and 18 patients (24.3%) had SI levels <45 µg/dl.


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Table 9. Frequency Distribution of Patient TIBC Levels

| TIBC Levels | Frequency | Percentage |
|---|---|---|
| <250 µg /dl | 69 | 93,2 |
| 250-460 µg /dl | 5 | 6,8 |
| Total | 74 | 100 |

Based on table 9, it can be stated that as many as 69 patients (93.1%) had TIBC levels of <250 µg/dl and only 5 patients (6.8%) had normal TIBC levels ranging between 250-460 µg/dl.

Table 10. Frequency Distribution of Sources of Hemodialysis Costs for Patients

| Sources of Hemodialysis Costs | Frequency | Percentage |
|---|---|---|
| BPJS | 100 | 100 |
| General | 0 | 0 |
| Others | 0 | 0 |
| Total | 74 | 100 |

Based on Table 10, it can be presumed that the source of hemodialysis costs for all patients (100%) was covered by BPJS (Indonesia's national health insurance).

## DISCUSSION

1) Age

This study found that more than half of the cases (66.2%) were in the 40–60-year age group. These findings align with research conducted in 2020, which reported that 72% of chronic kidney disease patients undergoing hemodialysis fell within the 40–60 year age group (Afriansya, Sofyanita and Suwarsi, 2020). The 11th Report of the Indonesian Renal Registry indicated that, in 2018, the majority of hemodialysis (HD) patients were in the 45–54 year age group (30.82%), followed closely by the 55–64 year age group (29.31%) (PERNEFRI, 2018).

Increasing age is associated with a decline in kidney function, a reduction in the glomerular filtration rate (GFR), and impaired tubular function (Pranandari & Supadmi, 2015). Kidney function begins to deteriorate after the age of 40 years, as the number of nephrons decreases by approximately 20%, leading to a decline in kidney performance. This reduction results in a decrease of 10 mL/min/1.73 m² in GFR with each passing decade (Badariah, Kusuma and Dewi, 2017; Prasetyo, Pranowo and Handayani, 2018).

2) Gender

In this study, there were 40 male patients (54.1%) and 34 female patients (45.9%). Similarly, a study conducted at Rumkital Dr. Ramelan Surabaya in 2018 also found a higher proportion of male patients (56.6%) compared to female patients (43.4%) (Kurniawati and Asikin, 2018). The 11$^{th}$ Report of the Indonesian Renal Registry also shows the gender distribution of HD patients in 2018 consisting of 57% men and 43% women (PERNEFRI, 2018).

Most men pay less attention to their health and/or maintain a healthy lifestyle than women, so their chances of developing CKD are greater (Pranandari and Supadmi, 2015). Besides that, the lifestyle and



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eating patterns of male respondents who drink coffee and smoke more often also play a role in increasing the possibility of suffering from CKD (Utomo, 2018). There is a theory that states that men have a higher chance of experiencing systemic diseases (glomerulonephritis, lupus, diabetes mellitus, polycystic kidneys, and hypertension), and the possibility that a family history of inherited diseases can also increase the risk of experiencing CKD (Prasetyo, Pranowo and Handayani, 2018).

3) Risk Factors

Revelations from this study indicate that the three most common risk factors among patients were hypertension and diabetes mellitus, reported in 23 cases (31.1%), followed by hypertension alone in 22 cases (29.7%). Additionally, diabetes mellitus was identified in 4 cases (5.4%), the same frequency as cases associated with kidney stones. These findings align with research conducted at RSUD Dr. Soetomo, which reported that the most common comorbidities among end-stage renal disease (ESRD) patients undergoing hemodialysis were hypertension (61.3%), hypertension and diabetes mellitus (28.7%), and diabetes mellitus (5%) (Violita and Mardiana, 2022). In 2018, CKD that occurred in Indonesia was mainly caused by hypertension and diabetes mellitus with each disease accounting for 36% and 28% (PERNEFRI, 2018).

Patients with hypertension have a 3.2 higher chance of developing CKD than patients without hypertension, while patients with diabetes mellitus have a 4.1 higher chance of developing CKD than patients who do not have diabetes mellitus (Pranandari and Supadmi, 2015). This shows that hypertension and diabetes mellitus have a significant correlation with the occurrence of CKD (Purwati, 2018). Hypertension and diabetes mellitus are factors initiating CKD which can directly cause kidney damage and can turn into a progression factor if kidney damage becomes faster and worse due to uncontrolled (Eka Yuliandi, Mutiara Hikmah and Maulana Yusup, 2021). Hypertension can worsen damage to kidney structure and function because intraglomerular pressure increases, causing constriction of the afferent arteries (Purwati, 2018; Violita and Mardiana, 2022). Diabetes mellitus can cause the kidneys to become leaky because the kidneys have to work harder during the filtration process and later all the existing waste will no longer be able to be filtered by the kidneys (Kalengkongan, Makahaghi and Tinungki, 2018; Eka Yuliandi, Mutiara Hikmah and Maulana Yusup, 2021). As many as 50% of CKD patients on hemodialysis have hypertension as a comorbid history, 20% of patients have hypertension & diabetes mellitus, 6.67% of patients have diabetes mellitus, and 23.33% of patients do not have a history of both diseases (Eka Yuliandi, Mutiara Hikmah and Maulana Yusup, 2021).

4) Duration of Hemodialysis

This study showed that more than half of the patients had undergone hemodialysis for >12 months (52.7%). In line with the results of previous research which concluded that the majority of patients had been on hemodialysis for >12 months (Lolowang, Lumi and Rattoe, 2020).



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The length of time a patient undergoes hemodialysis indirectly influences their quality of life. Respondents interviewed by Wua et al (2019) stated that after undergoing hemodialysis their bodies felt much better and they were still able to carry out their usual activities (Fima L.F.G. Langi., 2019). This is supported by research which states that hemodialysis can prolong a patient's life which has an impact on the patient's perception of their quality of life (Lolowang, Lumi and Rattoe, 2020). Patients who regularly undergo hemodialysis and during the process have positive thoughts can have a better quality of life (Prasetyo, Pranowo and Handayani, 2018; Lolowang, Lumi and Rattoe, 2020).

5) Creatinine Levels

From this study, it was found that 97.3% of all patients had creatinine levels of >1.5 mg/dl. This is almost similar to research that has been conducted previously and stated that all of their research respondents had high creatinine levels (Afriansya, Sofyanita and Suwarsi, 2020; Misnawati et al., 2022).

Creatinine is mostly produced in skeletal muscle and is an endogenous substance that is freely filtered, does not undergo reabsorption in the renal tubules, but a small amount of creatinine is secreted by renal tubular cells so that creatinine clearance is a good parameter for assessing renal function because its plasma levels are relatively constant (Salazar, 2014; Alfonso, Mongan and Memah, 2016; Rahmawati, 2018). The patient's muscle mass influences plasma creatinine concentration due to the location of its production. Apart from that, the concentration is also influenced by the patient's body weight, age and gender. Daily creatinine excretion is influenced by dietary creatinine from meat (Salazar, 2014; Rahmawati, 2018). Normal serum creatinine levels in men are 0.7-1.3 mg/dl while in women it is 0.6-1.1 mg/dl (Alfonso, Mongan and Memah, 2016). Serum creatinine levels >1.5 mg/dl indicate impaired kidney function (Rahmawati, 2018).

As the function of the glomerulus in filtering creatinine decreases, creatinine levels in the blood will also increase, which indicates damage to the kidneys, so hemodialysis needs to be carried out to replace the main function of the kidneys, especially eliminating toxic metabolic substances such as creatinine (Afriansya, Sofyanita and Suwarsi, 2020; Ariami et al., 2022; Misnawati et al., 2022). A two-fold increase in serum creatinine levels indicates a 50% decrease in kidney function, and so on. Increased creatinine levels in the blood are also influenced by other factors, namely dehydration, excessive fatigue, consumption of nephrotoxic drugs, kidney dysfunction accompanied by infection, and uncontrolled hypertension (Alfonso, Mongan and Memah, 2016). Creatinine levels still cannot reach normal levels even though hemodialysis has been carried out and there is a decrease in creatinine levels shown (Eka Yuliandi, Mutiara Hikmah and Maulana Yusup, 2021). Serum creatinine levels that are still high after hemodialysis can be caused by the large molecular weight of creatinine, namely 113 daltons, so that this molecule is difficult to eliminate from the bloodstream during the hemodialysis process (Nuratmini, 2019).


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6) BUN Levels

This research showed that 66.2% of patients had BUN levels of >24 mg/dl. This data is slightly different from the results of research in 2020 and 2022 which stated that all patients had increased urea levels (Afriansya, Sofyanita and Suwarsi, 2020; Misnawati et al., 2022). However, as many as 91.3% of respondents with CKD stage 3-5 in Japan had BUN levels >23 mg/dl (Seki et al., 2019).

Ureum is the main metabolite derived from food protein and tissue protein turnover and is a small organic molecule (MW 60). Amino acids originating from protein breakdown are deaminated to produce ammonia which is then converted by liver enzymes into urea, so that urea is a non-protein nitrogen (NPN) waste product. Ureum is then freely filtered in the glomerulus but is not secreted, and is reabsorbed by the renal tubule. More urea is reabsorbed when there is a decrease in the rate of urine flow. Blood urea nitrogen (BUN) only measures the nitrogen component of serum urea (MW 28), so the urea value is approximately twice (60/28 = 2.14) the BUN value. Thus BUN 10 mg/dl is equivalent to urea 21.4 mg/dl. The reference value for BUN is 10-20 mg/dl and urea in serum or plasma is 20-30 mg/dl (Salazar, 2014; Higgins, 2016; Rahmawati, 2018; Seki et al., 2019).

BUN levels in the blood increase as glomerular filtration ability decreases. Kidney failure and uremia may be indicated if kidney function has decreased by <15%. Uremia syndrome can occur if the urea that accumulates in the body is not removed, therefore hemodialysis needs to be done (Afriansya, Sofyanita and Suwarsi, 2020; Misnawati et al., 2022). Increased BUN levels in the blood are also influenced by extrarenal factors, such as high protein intake, gastrointestinal bleeding, starvation, dehydration, increased protein catabolism, obstruction in the lower urinary tract, heart failure, and use of glucocorticoids. Decreased BUN levels in the blood can be caused by overhydration (hypervolemia), low protein intake, malnutrition, pregnancy, severe liver damage, consumption of phenothiazine drugs, and the addition of intravenous glucose fluids (Arjani, Suryawan and Sudarmanto, 2017; Rahmawati, 2018).

A decrease in BUN levels is indeed obtained after hemodialysis in CKD patients, but not all patients who have undergone hemodialysis can reach normal levels (Sari, 2020; Eka Yuliandi, Mutiara Hikmah and Maulana Yusup, 2021). BUN levels that return to normal after hemodialysis indicate that the hemodialysis carried out is effective. BUN levels that are still high after hemodialysis indicate a lack of hemodialysis adequacy, while BUN levels that decrease drastically can be caused by other factors affecting the patient's body, for example liver failure, excessive hydration, or negative nitrogen balance in malnutrition and malabsorption (Nuratmini, 2019).

7) Hemoglobin Levels

In this study, all hemodialysis patients (100%) both male and female had hemoglobin levels below normal levels. In accordance with previous research which stated that all hemodialysis patients at RSU "KH" Batu had hemoglobin levels below normal values (Agustina and Wardani, 2019).



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In CKD patients undergoing hemodialysis, a decrease in hemoglobin often occurs along with eGFR which also decreases so that the prevalence of anemia increases (McMurray et al., 2012; KDIGO, 2013). This is in accordance with research conducted in Japan which shows an increase in the prevalence of anemia in CKD patients as eGFR decreases, especially in hemodialysis patients (Akizawa et al., 2018). In fact, according to PERNEFRI, supporting therapy can be given to hemodialysis patients with hemoglobin levels <10 gr/dl (PERNEFRI, 2018). A decrease in hemoglobin concentration itself can be caused by a decrease in the effectiveness of erythropoiesis so that erythropoietin production is disrupted. Apart from that, it can also be due to a lack of iron intake, gastrointestinal bleeding, or blood loss during the hemodialysis procedure itself (Sumirah et al., 2022).

8) Serum Iron (SI) Levels

A total of 56 patients (75.7%) in this study had normal SI levels ranging from 45-158 µg/dl. This data is in line with the results of Djami and Tangkelangi's (2021) research which concluded that 60.8% of CKD sufferers who underwent hemodialysis had normal SI levels (Djami and Tangkelangi, 2021). Stage 5 CKD patients who routinely undergo hemodialysis have a mean SI level of 56.53 g/dl (Maulidya et al., 2022).

Serum Iron (SI) is the amount of iron concentration that can bind to transferrin and circulate in the blood. Patients who undergo hemodialysis can lose 10-20 times more iron than those who do not undergo it, because during this process iron can be lost as much as 3-5 grams per year. Apart from that, CKD patients also only have erythrocytes whose lifespan is approximately half that of normal erythrocytes (Maulidya et al., 2022). Therefore, one of the complications that can be encountered in hemodialysis patients is absolute iron deficiency anemia (Djami and Tangkelangi, 2021).

9) Total Iron-Binding Capacity (TIBC) Levels

In this study, 69 patients (93.1%) had TIBC levels below 250 µg/dL, while only 5 patients (6.8%) had normal TIBC levels within the range of 250–460 µg/dL. These findings differ from previous research, which reported that 67.4% of CKD patients undergoing hemodialysis had normal TIBC levels, and only 15.2% had reduced TIBC levels (Djami and Tangkelangi, 2021).

Total Iron Binding Capacity (TIBC) is the number of places that can bind iron to plasma transferrin (Gaweda, 2017). A decrease in total iron binding capacity can occur in anemia of chronic inflammatory diseases due to increased ferritin. Low TIBC levels indicate sufficient iron stores (ferritin), but not enough available in the blood circulation (serum iron), while TIBC levels that tend to increase indicate decreased iron stores (Maulidya et al., 2022).

10) Sources of Hemodialysis Costs

All patients (100%) in this study used BPJS as a source of funding for hemodialysis. In 2018, the payment method for all hemodialysis patients at RSUP Dr. Sadikin Bandung is through BPJS (Amalina, Ibrahim and Emaliyawati, 2018).


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Based on the 11th Report of the Indonesian Renal Registry by PERNEFRI, it is known that 91% of hemodialysis patients in Indonesia have received funding from BPJS through its JKN program (PERNEFRI, 2018). This shows an increase in hemodialysis patients using BPJS because in 2015 only 86% of patients received JKN funding (Kementerian Kesehatan RI, 2017). The increase in patients using BPJS is due to the decreased productivity of hemodialysis patients due to the long duration of each therapy so that their working hours are reduced and income disappears, while patients and their families have to bear quite high costs, such as direct non-medical costs (informal services, accommodation, transportation) and other costs not covered by BPJS (medicine and supplements) (Rahajeng, Sarnianto and Ramadaniati, 2020).

## CONCLUSION

This study concludes that the majority of CKD patients undergoing hemodialysis are male (54.1%) and fall within the 40–60 year age group (66.2%). Hypertension and diabetes mellitus are the most prevalent risk factors. Most patients have been on hemodialysis for over 12 months, with laboratory results showing creatinine levels >1.5 mg/dL, BUN levels >24 mg/dL, serum iron (SI) levels between 45 and 158 µg/dL, and TIBC levels <250 µg/dL. All patients, regardless of sex, have hemoglobin levels below the normal range, and their treatment is covered by BPJS (national health insurance).

## REFERENCES

Afriansya, R., Sofyanita, E.N. and Suwarsi, 2020. Gambaran Ureum dan Kreatinin pada Pasien Penyakit Ginjal Kronik yang Menjalani Hemodialisis. *Jurnal Laboratorium Medis E-ISSN 2685-8495 Analis, Jurusan Poltekkes, Kesehatan Semarang, Kemenkes*, [online] 02(No.01 Bulan Mei), pp.2685–8495. Available at: <http://ejournal.poltekkes-smg.ac.id/ojs/index.php/JLM/>.

Agustina, W. and Wardani, E.K., 2019. Penurunan Hemoglobin pada Penyakit Ginjal Kronik Setelah Hemodialisis di RSU "KH" Batu. *Jurnal Ners dan Kebidanan (Journal of Ners and Midwifery)*, 6(2), pp.141–146. https://doi.org/10.26699/jnk.v6i2.art.p141-146.

Aisara, S., Azmi, S. and Yanni, M., 2018. Gambaran Klinis Penderita Penyakit Ginjal Kronik yang Menjalani Hemodialisis di RSUP Dr. M. Djamil Padang. *Jurnal Kesehatan Andalas*, 7(1), p.42. https://doi.org/10.25077/jka.v7i1.778.

Akizawa, T., Okumura, H., Alexandre, A.F., Fukushima, A., Kiyabu, G. and Dorey, J., 2018. Burden of Anemia in Chronic Kidney Disease Patients in Japan: A Literature Review. *Therapeutic Apheresis and Dialysis*, 22(5), pp.444–456. https://doi.org/10.1111/1744-9987.12712.

Alfonso, A.A., Mongan, A.E. and Memah, M.F., 2016. Gambaran kadar kreatinin serum pada pasien penyakit ginjal kronik stadium 5 non dialisis. *Jurnal e-Biomedik*, 4(2), pp.2–7. https://doi.org/10.35790/ebm.4.2.2016.12658.

Amalina, R., Ibrahim, K. and Emaliyawati, E., 2018. Gambaran Status Fungsional Pada Pasien Gagal Ginjal Kronis Yang Menjalani Hemodialisis Di RSUP Dr. Hasan Sadikin Bandung. *Jurnal Keperawatan Sriwijaya*, [online] 5(1), pp.12–18. Available at:

<https://ejournal.unsri.ac.id/index.php/jk_sriwijaya/article/view/5097>.

Ariami, P., Zaetun, S., Gunaifi, A. and Diarti, M.W., 2022. Kadar Ureum , Kreatinin , Serum Iron ( SI ) dan Total Iron Binding Capacity ( TIBC ) pada Pasien Chronic Kidney Disease ( CKD ) Sebelum dan Setelah Hemodialisis. *Jurnal Analis Medika Biosains*, 9(2), pp.114–120.

Arjani, I., Suryawan, D.G.A. and Sudarmanto, I.G., 2017. Gambaran Kadar Ureum Dan Kreatinin Serum Pada Pasien Gagal Ginjal Kronis Yang Menjalani Terapi Hemodialisis Di Rsud Sanjiwani Gianyar. *Meditory : The Journal of Medical Laboratory*, 4(2), pp.145–153. https://doi.org/10.33992/m.v4i2.64.

Badariah, Kusuma, F.H.D. and Dewi, N., 2017. Karakteristik Pasien Penyakit Ginjal Kronik yang Menjalani Hemodialisis di RSUD Kabupaten Kotabaru. *Nursing News*, 2(2), pp.281–285.

Charles, C. and Ferris, A.H., 2020. Chronic Kidney Disease. *Primary Care - Clinics in Office Practice*, [online] 47(4), pp.585–595. https://doi.org/10.1016/j.pop.2020.08.001.

Djami, S.W. and Tangkelangi, M., 2021. Hemodialysis Duration with Levels of Hemoglobin, Hematocrit, Serum Iron and Total Iron Binding Capacity on Chronic Kidney Disease. *Jurnal Info Kesehatan*, 19(2), pp.197–205. https://doi.org/10.31965/infokes.vol19.iss2.523.

Eckardt, K.U., Berns, J.S., Rocco, M. V. and Kasiske, B.L., 2009. Definition and Classification of CKD: The Debate Should Be About Patient Prognosis-A Position Statement From KDOQI and KDIGO. *American Journal of Kidney Diseases*, 53(6), pp.915–920. https://doi.org/10.1053/j.ajkd.2009.04.001.

Eka Yuliandi, N., Mutiara Hikmah, A. and Maulana Yusup, E., 2021. Gambaran Kadar Ureum dan Kreatinin Serum pada Pasien Gagal Ginjal Kronis Setelah Terapi Hemodialisis di Rumah Sakit Patria IKKT Jakarta. *Jurnal Sehat Indonesia (JUSINDO)*, 3(2), pp.68–77. https://doi.org/10.36418/jsi.v3i2.27.

Fima L.F.G. Langi., W.P.J.K.T.C.M.W., 2019. Kualitas Hidup Pasien Hemodialisis Di Unit Hemodialisis Rumah Sakit Umum Pusat. Dr. R.D. Kandau Manado. *Kesmas*, [online] 8(7), pp.127–136. Available at: <file:///C:/Users/USER/Downloads/26562-54407-1-SM.pdf>.

Gaweda, A.E., 2017. Markers of Iron Status in Chronic Kidney Disease Diagnosing Iron Deficiency. *Hemodial Int.*, 176(1), pp.139–148. https://doi.org/10.1111/hdi.12556.Markers.

Higgins, C., 2016. Urea and the clinical value of measuring blood urea concentration. *Radiometer Medical ApS*, [online] (August), pp.1–6. Available at: <https://acutecaretesting.org/-/media/acutecaretesting/files/pdf/urea-and-the-clinical-value-of-measuring-blood-ans-approved.pdf%0Ahttps://acutecaretesting.org/~/media/acutecaretesting/files/pdf/urea-and-the-clinical-value-of-measuring-blood-ans-approved.p>.

Kalengkongan, D.J., Makahaghi, Y.B. and Tinungki, Y.L., 2018. Faktor-Faktor Risiko Yang Berhubungan Dengan Chronik Kidney Disease (CKD) Penderita Yang Dirawat Di Rumah Sakit Daerah Liunkendage Tahuna. *Jurnal Ilmiah Sesebanua*, [online] 2(2), p.104. Available at: <http://www.e-journal.polnustar.ac.id/jis/article/view/183>.

KDIGO, 2013. Official Journal of the international Society of nephrology KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *IFAC Proceedings Volumes (IFAC-PapersOnline)*, [online] 3(1), pp.30–130. Available at: <www.publicationethics.org> [Accessed 16 June 2022].

Kementerian Kesehatan RI, 2017. InfoDATIN Situasi Penyakit Ginjal Kronis.

Kurniawati, A. and Asikin, A., 2018. Gambaran Tingkat Pengetahuan Penyakit Ginjal Dan Terapi Diet Ginjal Dan Kualitas Hidup Pasien Hemodialisis Di Rumkital Dr. Ramelan Surabaya. *Amerta*

*Nutrition*, 2(2), p.125. https://doi.org/10.20473/amnt.v2i2.2018.125-135.

Lolowang, N.L., Lumi, W.M.E. and Rattoe, A.A., 2020. [ QUALITY OF LIFE OF PATIENTS WITH CHRONIC KIDNEY DISEASE WHO UNDERGO HEMODIALYSIS THERAPY ]. pp.21–32.

Maulidya, T.T., Nathan, D.S., Widanarti, E.T., Soenarso, E.H. and Liliana, A., 2022. Description of Iron Status In Chronic Kidney Disease (CKD) Stadium 5 with Regular Hemodialization at the Hemodialysis Installation of Dustira Hospital. *Pakistan Journal of Medical and Health Sciences*, 16(3), pp.662–665. https://doi.org/10.53350/pjmhs22163662.

McMurray, J.J.V., Parfrey, P.S., Adamson, J.W., Aljama, P., Berns, J.S., Bohlius, J., Drüeke, T.B., Finkelstein, F.O., Fishbane, S., Ganz, T., MacDougall, I.C., McDonald, R.A., McMahon, L.P., Obrador, G.T., Strippoli, G.F.M., Weiss, G. and Więcek, A., 2012. Kidney disease: Improving global outcomes (KDIGO) anemia work group. KDIGO clinical practice guideline for anemia in chronic kidney disease. *Kidney International Supplements*, 2(4), pp.279–335. https://doi.org/10.1038/kisup.2012.37.

Misnawati, Y., Novitasari, D., Triana, N.Y. and Sundari, R.I., 2022. Korelasi Asupan Nutrisi Dengan Ureum, Kreatinin dan Hemoglobin Penderita Gagal Ginjal Kronik. *Jurnal Kesehatan*, 15(2), pp.120–127.

Nuratmini, P.N., 2019. *Gambaran Kadar Ureum Dan Kreatinin Serum Pada Pasien Ggk Setelah Terapi Hemodialisis Di Rsd Mangusada, Kabupaten Badung*. *Journal of Chemical Information and Modeling*, .

PERNEFRI, 2003. *Konsensus Dialisis*.

PERNEFRI, 2018. 11th report Of Indonesian renal registry 2018. *Indonesian Renal Registry (IRR)*, pp.14–15.

Pranandari, R. and Supadmi, W., 2015. Faktor Risiko GAGAL GINJAL KRONIK DI UNIT HEMODIALISIS RSUD WATES KULON PROGO. *Majalah Farmaseutik*, 11(2). https://doi.org/10.1063/1.1655531.

Prasetyo, A., Pranowo, S. and Handayani, N., 2018. KARAKTERISTIK PASIEN GAGAL GINJAL YANG MENJALANI TERAPI HEMODIALISA DI RSUD CILACAP | PRASETYO | Prosiding Seminar Nasional dan Penelitian Kesehatan 2018. *Prosiding Seminar Nasional dan Diseminasi Penelitian KesehatanSTIKes Bakti Tunas Husada Tasikmalaya*, [online] (April), pp.1–6. Available at: <https://ejurnal.stikes-bth.ac.id/index.php/P3M_PSNDPK/article/view/335/293>.

Purwati, S., 2018. Analisa Faktor Risiko Penyebab Kejadian Penyakit Gagal Ginjal Kronik (GGK) Di Ruang Hemodialisa RS Dr. Moewardi. *(Jkg) Jurnal Keperawatan Global*, 3(1), pp.15–27. https://doi.org/10.37341/jkg.v3i1.44.

Rahajeng, S.K., Sarnianto, P. and Ramadaniati, H.U., 2020. STRUKTUR BIAYA SENDIRI DAN FAKTOR PENENTU KESULITAN EKONOMI PADA PASIEN GAGAL GINJAL KRONIS DENGAN TERAPI HEMODIALISIS DI RUMAH SAKIT SENTRA MEDIKA CIBINONG. 6(2).

Rahmawati, F., 2018. Aspek Laboratorium Gagal Ginjal Kronik. *Jurnal Ilmiah Kedokteran Wijaya Kusuma*, 6(1), p.14. https://doi.org/10.30742/jikw.v6i1.323.

Riset Kesehatan Dasar, 2018. *Laporan_Nasional_RKD2018_FINAL.pdf*. *Badan Penelitian dan Pengembangan Kesehatan*, Available at: <http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf>.

Salazar, J.H., 2014. Overview of urea and creatinine. *Lab Medicine*, 45(1), pp.e19–e20.

https://doi.org/10.1309/LM920SBNZPJRJGUT.

Sari, L.P., 2020. Kadar Ureum Sebelum dan Sesudah Hemodialisa pada Pasien Gagal Ginjal. *Jurnal Laboratorium Medis*, 02(02), pp.104–108.

Seki, M., Nakayama, M., Sakoh, T., Yoshitomi, R., Fukui, A., Katafuchi, E., Tsuda, S., Nakano, T., Tsuruya, K. and Kitazono, T., 2019. Blood urea nitrogen is independently associated with renal outcomes in Japanese patients with stage 3-5 chronic kidney disease: A prospective observational study. *BMC Nephrology*, 20(1), pp.1–10. https://doi.org/10.1186/s12882-019-1306-1.

Sumirah, M., Widiastuti, Y., Riana, A., Sobariah, E., Sumirah, M., Raya, J., No, K. and Kidul, K.B., 2022. Hubungan Asupan BCAA , Status Gizi Dengan Anemia Renal Pada Pgk Hemodialisa Di Rsu Kasih Bunda Cimahi. 3(2).

Utomo, B., 2018. Gambaran Faktor Penyebab Cronic Kidney Disease di Ruang Hemodialisa RSUD DR. Soegiri Lamongan 2017. *Journal of Chemical Information and Modeling*, [online] 10(3), pp.49–55. Available at: <http://lppm.umla.ac.id/wp-content/uploads/2020/09/49-55-Budi-Utomo.pdf>.

Violita, S. and Mardiana, N., 2022. KARAKTERISTIK PASIEN ANEMIA PADA END STAGE RENAL DISEASE (ESRD) DENGAN HEMODIALISIS DI INSTALASI HEMODIALISIS RSUD Dr. SOETOMO. *Syntax Literate: Jurnal Ilmiah Indonesia*, 7(1), pp.2548–1398.

Zazzeroni, L., Pasquinelli, G., Nanni, E., Cremonini, V. and Rubbi, I., 2017. Comparison of Quality of Life in Patients Undergoing Hemodialysis and Peritoneal Dialysis: A Systematic Review and Meta-Analysis. *Kidney and Blood Pressure Research*, 42(4), pp.717–727. https://doi.org/10.1159/000484115.