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# Relationship Between Gender, Age, Duration And Frequency Of Hemodialysis Therapy With The Creatinine Level reduction Of Pre And Post Hemodialysis

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**Abtract**: The kidneys are organs of the body that function to regulate water balance in the body, the concentration of electrolytes in the blood and acid-base balance and secretion of waste material. If the kidney fails to function, the patient will need immediate treatment and even undergo hemodialysis (HD) therapy. A critical indicator in determining whether a person with impaired kidney function requires HD therapy is to know the creatinine level. The study aimed to ascertain the differences in creatinine levels pre and post HD also study the relationship between the age, gender, duration and frequency of HD therapy of respondents with the decrease of creatinine levels pre and post. Type of research detailed survey with a cross-sectional design. The sample was taken using a total sampling technique of 35 respondents from H BadaruddinKasimHospitalin Tanjung with a sample examination technique using the Jaffe method. The examination results of creatinine levels average for pre and post hemodialysis was11,36 and 5,58 mg/dl, which decreased 51%. The analysis statistically used Paired T-Test has a p-value = 0,000, indicating a significant difference for creatinine levels pre and post HD. Relationship between Age, Gender, Duration, and Frequency of HD Therapy with the decrease of creatinine levels pre and post HD was analyzed with Spearmen correlation and had p values more than 0,05. It means there was no relation between them. Conclusion there were significant differences in creatinine levels reduction pre and post HD while the relationship between the four of respondent characteristics to the magnitude of creatinine reduction show that there was no significant relationship.
**Keywords**: creatinin; hemodialysis

## INTRODUCTION

The kidneys have an essential role in maintaining volume stability, electrolyte composition, and osmolarity of extracellular fluid. One of the other crucial functions of the kidney is to excrete end products or the rest of the body's metabolism, such as urea, uric acid, and creatinine. If the rest of the body's metabolism is allowed to accumulate, these substances can be toxic to the body, especially the kidneys. This important role will cause problems if the kidneys fail. Metabolites such as urea and creatinine will increase. If kidney function is only 5% or less, then dialysis or kidney transplant treatment is necessary. (Suryawan et al.,2016).

And Indonesia is one of the countries with high rates of chronic kidney disease (CKD). The survey by the Indonesian Nephrology Association (Pernefri) shows that there has been a decline in kidney function with persistent urea protein or a decrease in glomerular filtration rate (GFR) in 12.5% or 30 million people out of a total of 240 million Indonesians. While 433 per 1 million PGK patients continue to become End Stage Renal Disease (ESRD).(Mayuda et al.,2017)

Patients with non-functioning kidneys need to hemodialysis program. Kidney Replacement Therapy (KRT) or Renal Replacement Therapy (RRT) is an attempt to take over kidney function that has decreased using an artificial kidney (dialyzer) by dialysis or filtration techniques(Bellomo&Ronco,2012). Patients with kidney failure are usually equipped with blood tests to strengthen the diagnosis of the patient's disease. One parameter that regularly checked is creatinine levels. Serum creatinine is also very helpful in the treatment process of the disruption of the function of the kidneys. The low level of creatinine in the blood used as an important indicator in determining whether a person with a dysfunction of the kidneys is suffering from hemodialysis or not. ( National Institute for Health Research,2014)

One treatment option for CKD patients is hemodialysis (HD). Hemodialysis is carried out to remove metabolic waste or certain poisons from human blood circulation, such as excess urea, creatinine, uric acid, and other substances through semipermeable membranes. CKD patients undergo the hemodialysis process two to three times a week, where each time hemodialysis takes an average of between four and five hours (Bayhakki,2016)

In RSUP. Prof. Dr. R. D. Kandow and Advent Manado Hospital increased serum creatinine levels occurred in patients with stage 5 nondialysis chronic kidney disease (Alfonso et al.,2018). While in Ungaran General Hospital, with the number of GGK patients as many as 15 patients, the results of observations in 3 patients who performed hemodialysis using the fifth hollow fiber reuse were obtained and decreased urea and creatinine. In the use of the 1st hollow fiber, there was a decrease in urea and creatinine values of 60-70%, and in the 5th hollow fiber reuse, the urea and creatinine reduction was 60-65%. (Ipo et al.,2018)

Based on the survey results in the Hemodialysis Unit of H. Badaruddin KasimTanjung Hospital, it known that the number of patients undergoing hemodialysis therapy is 37 people, and once hemodialysis therapy lasts 4-5 hours. With the background above, the researchers wanted to know the relationship between the characteristics of patients based on age, sex, duration, and frequency of hemodialysis therapy with a decrease in creatinine levels before and after HD at H. Badaruddin Kasim Hospital Tanjung Indonesia.

## MATERIALS AND METHODS

This type of research is a descriptive survey with Cross-Sectional design. The population and sample were all patients undergoing hemodialysis therapy in the Hemodialysis Installation of H. Badaruddin Kasim Tanjung Hospital in March 2018, totaling 35 respondents. Instruments used by Biosystem A25. Ethical clearance taken From Health Research Ethics Committee Politeknik Kesehatan Banjarmasin.

Conduct sampling: Blood samples before hemodialysis were taken using a syringe, drained 3 ml of blood through a hose connection which released from the inlet

of the AV fistula, and immediately sent to the laboratory. Blood samples after hemodialysis were taken using a syringe, drained 3 ml of blood through a hose connection which released from the AV fistula outlet, and immediately sent to the laboratory.

Handling blood samples: Blood is inserted into a centrifuge tube. Then the blood in the centrifuge 3000 rpm for 5 minutes. Plasma is transferred to the sample cuvette to examined for creatinine levels.

## RESULTS AND DISCUSSION

Table 1. Characteristic Respondents

| Respondents Characteristic | Frekuensi | (%) |
|---|---|---|
| Gender | | |
| Male | 22 | 62.86 |
| Female | 13 | 37.14 |
| Age ( years old) | | |
| 41-50 | 12 | 34.28 |
| 51-60 | 15 | 42,86 |
| 61-70 | 8 | 22,86 |
| Duration HD Therapy | | |
| 2years | 15 | 42.86 |
| 3years | 8 | 22.86 |
| 4years | 5 | 14.28 |
| 5years | 1 | 2.86 |
| 6years | 4 | 11.43 |
| 7years | 2 | 5.71 |
| Frequency HD Therapy | | |
| 1 x/month | 1 | 2.86 |
| 2 x/month | 2 | 5.71 |
| 4 x/month | 9 | 25.72 |
| 8 x/month | 23 | 65.71 |

Table 2. Normality and Paired T Test (CI 95%)

| | Normality test p | Paired T Tes p |
|---|---|---|
| Pre HD Creatinin | 0,208 | 0,000 |
| Post HD Creatinin | 0,172 | |
| % Decrease of Creatinin | 0,10 | |

The results of statistical analysis Creatinine levels pre and post hemodialysis were tested using the Paired T-Test had a p-value = 0,000 <0,05. It means there was a very significant difference between creatinine level pre and post HD.

Table 3.Results of Spearman Correlation (CI 95%)

| Characteristic Respondents | Pre HD (mg/dl) | Post HD (mg/dl) | Creatinin Reduction (mg/dl) | Creatinin Reduction (%) | P |
|---|---|---|---|---|---|
| Age ( year old) | | | | | |
| - 41-50 | 11,26 | 5,47 | 5,79 | 48,95 | |
| - 51-60 | 11,46 | 5,40 | 6,06 | 52,64 | 0,373 |
| - 61-70 | 11,35 | 6,09 | 5,26 | 45,40 | |
| Gender | | | | | |
| - Male | 11,68 | 5,80 | 5,88 | 49,49 | 0,305 |
| - Female | 10,83 | 5,20 | 5,63 | 50,12 | |
| Duration HD | | | | | |
| - 2 years | 10,50 | 5,24 | 5,26 | 47,92 | |
| - 3 years | 12,68 | 6,39 | 6,29 | 49,60 | |
| - 4 years | 13,26 | 6,30 | 6,96 | 51,82 | 0,347 |
| - 5 years | 9,52 | 4,61 | 4,91 | 51,58 | |
| - 6 years | 11,90 | 5,56 | 6,34 | 52,33 | |
| - 7 years | 7,66 | 3,60 | 4,06 | 52,40 | |
| Frequency HD | | | | | |
| - 1x/month | 2,80 | 1,90 | 0,90 | 32,14 | |
| - 2x/month | 4,65 | 2,63 | 2,02 | 42,70 | 0,506 |
| - 4x/month | 11,81 | 5,73 | 6,08 | 50,47 | |
| - 8x/month | 12,14 | 5,93 | 6,21 | 50,80 | |

Creatinin level before HD minimum was 2,80 and maximum 13,26 mg/dl after HD was 1,90 and 6,39 mg/dl. Relationship between respondents characteristics for age, gender, duration, and frequency of hemodialysis therapy with the magnitude of the creatinine level reduction pre and post hemodialysis be analyzed using Spearman Correlation. The results did not indicate a significant relationship. Because all the results of the Spearman correlation test have p values 0, 373; 0, 305; 0,347; and 0,506 more than α (= 0.05).

The creatinine average before HD was 11,36 mg/dl with the lowest level of 2.80 highest 13.26 mg/dl. Levels that are very high compared to normal are 0.8-1.2 mg/dl for men and 0.6-1.1 mg/dl for women.

The increase in creatinine levels is due to decreased glomerular filtration so that creatinine clearance will decrease and serum creatinine levels will increase. Creatinine levels, blood urea nitrogen (BUN) also levels usually increase. Examination of blood creatinine with urine creatinine can be used to assess the ability of the glomerular filtration rate, that is by performing a creatinine clearance test, high and low blood creatinine levels also illustrate the severity of impaired renal function. Hemodialysis performed in severe kidney function disorders, namely if the creatinine level is more than 7 mg/dl serum. (Ipo et al.,2018)

After patients undergo HD, creatinine levels above 11,36 to5,58mg / dl. The level has decreased by 51%. The statistical results of the levels before and after hemodialysis tested with Paired T-Test showed significant differences in creatinine levels before and after HD.

**Relationship Age with decreased creatinine**

Age of respondents ranging from 40 to 70 years divided into three decades, the most significant respondents between the ages of 50-61 years are 42,86%. This result is almost the same as the research of Syaiful HQ et al. at Djamil Hospital in Padang, where the highest age range found at the age of 50-59 years, which was equal to 50.86%. (Syaiful et al,.2014)

The decreased average of creatinine before and after HD was 50.21% seen from the age group. The most significant decrease occurred at the age of 51-60 years, which is 52.88%, the smallest was 46,34% at 61-70 years old. Test using the Spearman Correlation of the age group with the magnitude of the decrease in creatinine having a p-value 0.373, means that there is no significant relationship between age and the magnitude of the decrease in creatinine.

**Relationship Gender with decreased creatinine**

In this study of 35 respondents, 62.86% were male, and 37.14% female. Syaiful's research, in 2014, then 61.01% of patients were male, and 38.99% were women. Comparison of male and female is 1.6: 1 and Alfonso's study, 2016, shows that 60% of CKD sufferers are men, and the rest are women. (Syaiful et al.,2014)

This can explain by Banerjee in Alfonso (2016). Creatinine is synthesized in the skeletal muscle so that its level depends on muscle mass. Men have higher muscle mass than women so that creatinine levels in men are higher than women. According to Zhang Qiu-Li in Armeyza (2016). Based on a meta-analysis of various studies in the population with risk factors found that the prevalence of CKD in women is 47 times higher than that of men. But men have the potential to experience a more progressive decline in kidney function, so they often require kidney replacement therapy than women. Factors that cause differences in the progression of kidney disease in men and women are still in the research stage, one of the theories that develop is low estrogen levels in men. Based on research with animals, it found that estrogen reduces the process of forming scarring in kidney damage.9And cause of the risk increased of hypertension incidence, diabetes, smoking, exposure to toxic substances, alcohol, and less attention to lifestyle to men. (Mayuda et al., 2017 and Leland et al., 2011)

Research on two hospitals in Manado with 35 non-dialysis stages 5 CKD patients had increased serum creatinine levels (100%) with an average creatinine level in men of 7.39 mg / dL and women of 6.39 mg / dL. These results indicate that men have higher creatinine levels than women. (Alfonso et al.,2016)

Spearmen correlation test results between gender with the decrease in creatinine have value 0.305, indicating that there is no significant relationship between gender with the magnitude of the decrease in creatinine before and after HD. The decreasing average in the male group was 49,49% and 50,12% in the female group.

**Relationship Duration HD Therapy with decreased creatinine**

Respondents of this study had a duration of HD therapy between 2 to 7 years. The largest group, 42.86%, is two years of treatment.

Mayuda's research in Kariadi Semarang Hospital from 44 respondents who participated in 28 people or 63.64% had undergone HD less than five years, while the

rest were more than five years. Length of time to undergo hemodialysis most is in under two years as many as 20 respondents or 58.8 %. (Mayuda et al.,2017)

The results of the statistical Spearmen correlation have p-value 0.347, revealing that there is no relationship between the duration underwent HD therapy of respondents and the magnitude of the decrease in creatinine. The decreased magnitude began from 47,92% to 52,40%; the most significant reduction occurred in 7 years of therapy while the smallest decrease occurred at two years of therapy.

**Relationship frequency HD therapy with decrease creatinine**

Respondents in this study were patients who underwent HD therapy with a frequency of once to 8 times a month and the largest at a rate of 8x a month or 65.71%. While the research of Ipo A in Mattaher Hospital, Jambi, from 89 respondents, 77.5% underwent HD with a frequency of 2 times a week, the remaining three times a week. (Ipo et al., 2018) And at Sulistini's research, there were 98,6% which underwent HD therapy two times a week. (Sulistini et al., 2012) But Rahayu in Bengkulu only classifies the frequencies between frequently and not frequently, which regularly reach 86.6 %. (Rahayu et al., 2018)

Hemodialysis is one of the replacement therapies to replace a portion of the kidneys in removing metabolic waste and excess fluid and substances that are not needed by the body. The frequency of hemodialysis measures varies depending on the amount of kidney function left, on average patients undergo hemodialysis 2 to 3 times a week, while the duration of the implementation of hemodialysis is at least 4-5 hours per therapy. Patients who undergo hemodialysis will continue to do hemodialysis regularly to make a living. (Suwitra, 2014)

The frequency of hemodialysis that respondents undergo depends on the level of kidney damage experienced by each respondent. The more severe kidney damage that occurs, the creatinine filtration ability will reduce as a result of the increase in creatinine levels in the blood. After hemodialysis with high frequency, the decrease in creatinine level will be greater. (Alfonso et al., 2016)

The results Spearman correlation obtained a p-value of 0.506; there was no significant relationship between the frequency with the magnitude of the decrease in creatinine before and after HD therapy. The lowest decrease was 32.14% at a frequency of once a month, and the highest was 50.80% eight times a month.

Age, sex, duration, and frequency of hemodialysis therapy were not the relationship with the magnitude of decrease in creatinine before and after hemodialysis; all variables had an average creatinine reduction of almost 50%. It doesn't matter before hemodialysis levels are low or high. So that even though the levels dropped it still could not reach normal levels. Because in dialysis, diffusion and osmosis occur, the waste products move from the area of higher concentration to a lesser. And because of a thinner artificial kidney, a wider surface, a wider range, and more possible forms so that only 50% of creatinine substances removed in screening (Smeltzer et al.,2010).

## CONCLUSION

There were significant differences in creatinine levels reduction pre and post HD while the relationship between the four of respondent characteristics to the magnitude of creatinine reduction show that there was no significant relationship.

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