Jurnal Analis Medika Biosains (JAMBS)
Vol.11, No.1, March 2024, pp. 23-28 http://jambs.poltekkes-mataram.ac.id/index.php/home
E-ISSN: 2656-2456 DOI: https://doi.org/10.32807/jambs.v11i1.339

Correlation of Blood Creatinine Levels with The Result of Urine Sediment Analysis in Chronic Kidney Failure Patient

Siti Zaetun[1] , Rohmi[2], Andi Dwi Oktaviani[3] , Lalu Srigede[4]
[1-4] Department of Medical Laboratory Technology, Poltekkes Kemenkes Mataram, Indonesia
*Email: zaetunsiti0371@gmail.com

Article Info

Article history :

Received January 10, 2024
Revised February 20, 2024
Accepted Maret 17, 2024

Keyword :

Chronic Kidney Failure,
Creatinine,
Urine Sediment

ABSTRACT

Chronic Kidney Failure is a condition caused by a gradual and chronic decline in kidney function. This situation can affect to creatinine levels. Creatinine is the result of endogenous metabolism that is useful for assessing glomerular function, in the event of renal dysfunction then the filtration ability of creatinine will be reduced and serum creatinine will increase. Urine sediment is produced from the results of urine concentration consisting of calcium salts. This concentrated urine comes from the kidneys with a variety of causes, one of which is chronic kidney failure, flows through the ureter to the bladder and continues to the urethra until the urethral. ***Objective****: To find out the correlation of blood creatinine levels with the results of urine sediment analysis in patients with chronic kidney failure.* ***Method****: This research is observational analytical with a cross sectional approach to determine the correlation between independent and dependent variables. The sample is taken purposive sampling by selecting a sample based on certain criteria. The collected data is then analyzed using Spearman statistical tests.* ***Results****: Examination of creatinine levels in chronic kidney failure patients obtained 6.67 mg/dl. The average urine sediment found erythrocytes as many 2-3/HPF to many/HPF.* ***Conclusion****: There is a correlation of blood creatinine levels with the results of urine sediment analysis in patients with chronic kidney failure.*

INTRODUCTION

Chronic Kidney Failure (CKD) is a condition caused by a gradual and chronic decline in kidney function. It takes place step by step, and is continuous and cannot be changed. Damaged kidneys cause metabolic waste and water to no longer be excreted. This can poison the body and cause tissue damage and even death (Nurani & Mariyanti, 2013).

According to World Health Organization (WHO), more than 500 million people suffer from chronic kidney failure globally. Around 1.5 million people have to undergo dialysis in their lifetime. In Indonesia, based on the Data and Information Center of the All Indonesian Hospital Association, the number of chronic kidney failure patients is estimated at around 50 people per million population, 60% of whom are adults and elderly (Haryanti & Nisa, 2015).

The prevalence of CKD in Indonesia is 0.2%, while the prevalence of CKD in West Nusa Tenggara province is 0.1%. Based on data from the Mataram City Regional Hospital's medical records from October to December 2021, there were 34 patients with chronic kidney failure. Kidney function can be easily assessed with various laboratory tests. Starting with a

How to cite:
Zaetun, S., Rohmi, R., Oktaviani, A., & Srigede, L. (2024). Correlation of Blood Creatinine Levels with The Result of Urine Sediment Analysis in Chronic Kidney Failure Patient. *Jurnal Analis Medika Biosains (JAMBS), 11*(1), 23-28

complete urinalysis examination, including urine sediment examination. Measuring serum creatinine levels is useful for assessing the overall picture of kidney function in general (Latifah et al, 2012).

Creatinine is a product of endogenous metabolism that is useful for assessing glomerular function. Creatinine is produced in the same amount and excreted in urine every day. Normal serum creatinine levels are <1.5 mg/dl (Suryawan et al., 2016). Increased creatinine levels are related to kidney function, especially the glomerulus, blood should be taken while fasting. However, assessment of kidney function based on glomerular filtration rate still uses creatinine, because it is easy to do and creatinine clearance is a good parameter for assessing kidney function (Rahmawati, 2018).

If renal dysfunction occurs, creatinine filtration ability will decrease and serum creatinine will increase. A two-fold increase in serum creatinine levels indicates a 50% reduction in kidney function. The high and low levels of creatinine in the blood are used as an important indicator in determining whether a person with impaired kidney function requires renal hemodialysis or not (Alfonso et al., 2016).

Urine sediment is produced from the concentration of urine which consists of calcium salts. This concentrated urine comes from the kidneys for various causes, one of which is chronic kidney failure, it flows through the ureters to the bladder and continues into the urethra until it leaves the body (Utami, 2010).

According to research conducted by Suryawan et al (2016), chronic kidney failure patients have high serum creatinine levels with an average level of 12.6 mg/dl (Suryawan et al., 2016). Another study conducted by Nura et al (2014) stated that the results showed that blood creatinine levels in chronic kidney failure sufferers were a minimum of 3.76 mg/dl, a maximum of 39.0 mg/dl with an average creatinine level of 10.40 mg/dl (Ma'shumah et al., 2014).

The novelty of this research is not only looking at the results of a picture of creatinine levels in the blood, but connecting with the results of analysis of urine sediment. "Based on this, researchers are interested in conducting research on the correlation between blood creatinine levels and the results of urine sediment analysis in CKD patients."

MATERIALS/METHOD

The type of research used in this study is analytical observational with cross sectional approach. This research was done by looking for the correlation between creatinine levels and the results of urine sediment analysis in CKD patients at the Mataram City Hospital on February to March 2022. The samples in this study were patients who underwent creatinine and urine sediment examinations, with the number of research samples being 32 samples. The samples used serum or plasma and urine (for sediment examination) from CKD patients, than sampling was carried out using a purposive sampling technique by looking at subjects based on certain criteria. The research data obtained with statistical tests the Spearman test.

RESULTS AND DISCUSSION

Based on research conducted on chronic renal failure patients, data on the results of examination of blood creatinine and urine sediment in patients with chronic renal failure were obtained as follows in Table 1:

Table 1: Examination results of creatinine and urine sediment (erythrocyte):

Sample No	Gender	Examinaton Results	
		Creatinine (mg/dl)	Urine Sediment (Eritrocyte/ HPF)
1.	F	6.39	3-5
2.	M	9.37	5-10
3.	F	7.38	3-5
4.	M	2.30	3-5
5.	M	12.79	>25
6.	M	9.93	3-4
7.	M	8.77	5-8
8.	M	14.16	>25
9.	F	3.50	>25
10.	F	10.32	>25
11.	F	2.17	2-3
12.	F	3.01	3-5
13.	F	9.70	5-10
14.	M	10.35	>25
15.	M	15.96	>25
16.	M	3.59	>25
17.	M	5.44	3-5
18.	F	10.32	5-10
19.	M	2.39	3-5
20.	M	3.41	>25
21.	M	2.52	3-6
22.	F	3.96	3-5
23.	F	3.50	2-3
24.	F	3.72	2-4
25.	M	3.42	5-7
26.	M	6.19	>25
27.	M	3.49	15-20
28.	M	10.61	3-5
29.	F	14.16	>25
30.	M	2.13	5-8
31.	M	4.39	>25
32.	F	4.12	10-17
Rerata		6.67	
Nilai Normal		0.5 – 1.2	

Examination of creatinine levels in patients with chronic renal failure found the lowest level to be 2.13 mg/dL and the highest level was 15.96 mg/dL, While examination of urine sediment (erythrocytes) found the lowest to be 2-3/HPF and the highest to be found to be

more than 25 or many erythrocytes/ HPF. In the results obtained, all patients experienced abnormal levels of creatinine and urine sediment (100%). The normal value for creatinine is 0.5-1.30 mg/dl.

The results of examination of creatinine levels and urine sediment in patients with chronic renal failure were analyzed using statistical tests. The normality test is used to determine whether the research data is normally distributed or not. The following are the results of the normality test using the Shapiro Wilk test:

Table 2: Normality Test Results

	Kolmogorov-Smirnov			Shapiro-Wilk		
Jenis Kelamin	Statistic	df	Sig	Statistic	df	Sig
Kreatinin Laki-laki	.195	19	.057	.886	19	.027
Perempuan	.261	13	.016	.874	13	.060
Eritrosit Laki-laki	.307	19	.000	.667	19	.000
Perempuan	.375	13	.000	.601	13	.000

Table 2 shows data on creatinine levels for males showing a sig value of 0.027 < 0.05, which indicates that the data is not normally distributed, while for females it shows a sig value of 0.060 - 0.05, which indicates that the data is normally distributed. Then, for examination of urine sediment (erythrocytes), the male gender shows a sig value of 0.000<0.05, which indicates the data is not normally distributed, the female gender shows a sig value of 0.000 < 0.05, which indicates the data is not normally distributed. Therefore, data that is not normally distributed does not need to be continued for the homogeneity test and continues with the non-parametric statistical test, that is the Spearman test.

The Spearman test is used to determine the level of closeness of the relationship (correlation) between two variables. This Spearman test was carried out with the help of the SPSS application.

Table 3 Spearman Test Results

			Kreatinin	Eritrosit
Spearman rho	Kreatinin	Corelation Coefficient	1.000	.395
		Sig. (2-tailed)		.025
		N	32	32
	Eritrosit	Corelation Coefficient	.395	1.000
		Sig. (2-tailed)	.025	
		N	32	32

Based on the table of Spearman statistical test results, the sig value is 0.025 <0.05, then Ho is rejected and Ha is accepted.

In this study, 32 samples were obtained with 19 male samples and 13 female samples. Based on research data, the lowest creatinine level was found to be 2.13 mg/dL and the highest level was 15.96 mg/dL, while examination of urine sediment (erythrocytes) found the lowest to be 2-3/HPF and the highest to be found to be many/HPF. In the results obtained, all patients had creatinine levels more than the normal value, specifically 1.30, while the urine sediment, especially erythrocytes, all patients showed results more than 0-2/HPF.

Chronic kidney failure is a kidney disorder characterized by abnormalities in kidney structure or function that last more than 3 months. Chronic renal failure is characterized by one or more signs of kidney damage, albuminuria, abnormalities in urine sediment,

electrolytes, histology, kidney structure, or a history of kidney transplantation, also accompanied by a decrease in glomerular filtration rate (Aisara et al., 2018)

Serum creatinine levels will increase along with a decrease in glomerular filtering ability. This serum creatinine level reflects kidney damage which is the most sensitive because it is produced constantly by the body. High serum creatinine levels in the blood can also be caused by a person's high protein intake, besides that increased creatinine levels can also be caused by excessive dehydration and lack of blood supply to the kidneys (Suryawan et al., 2016)

The creatinine test is always used to check kidney function in patients who are suspected of having kidney problems. If it is known that creatinine in urine is decreasing, it will result in a decrease in the glomerular filtration rate (kidney filtering function) which will cause creatinine to increase in the blood. The results of this study showed that the average creatinine level was 6.67 mg/dL with a percentage of 100%. The results of this study are in line with the results of research by Suryawan (2016) which showed that all chronic kidney failure patients studied had high serum creatinine levels. These results are similar to the results of research at RSU Margono Soekarjo Purwokerto of 52 kidney failure patients, all of whom (100%) had high serum creatinine levels with an average level of 12.6 mg/dL (Heriansyah et al., 2019).

Referred to the statistical test results showed that there was a correlation between creatinine levels and urine sediment, especially erythrocytes, with a low coefficient level (0.20-0.399) and in the same direction (positive). Kidney disease can, under certain circumstances, and depending on its severity, reduce the glomerular filtration rate.

Damage to blood vessels causes damage to the glomerulus which functions as a blood filter. When glomerular function is damaged, substances measuring >3-7 nm can pass through the glomerulus, including proteins and blood cells, therefore in patients with chronic renal failure erythrocytes can be found in their urine (Sinaga et al., 2016)

Erythrocytes in urine are elements that come from any part of the urinary tract, from the glomerulus to the urethral meatus and in women can come from menstrual blood contamination. These erythrocytes can appear in various forms, depending on the environmental conditions in the urine. If the urine specimen is fresh, the erythrocytes appear normal, yellowish in color, smooth surface, biconcave with a diameter of seven microns and a thickness of two microns. Erythrocytes do not have a nucleus and when seen from the side, they have an hourglass-like appearance. In hypotonic urine, erythrocytes swell and can undergo lysis, releasing hemoglobin into them. These lysed erythrocytes are also called ghost cells or shadow cells, which appear as colorless circles and empty erythrocyte membranes. Theoretically, no erythrocytes should be found, but in normal urine 0-3 cells/LPK can be found (Anandita et al., 2016)

CONCLUSIONS

The average blood creatinine level in chronic kidney failure patients is 6.67 mg/Dl, while the erythrocyte sediment in urine found 2-3 erythrocytes/HPF to >25 or many/HPF. There is a correlation between blood creatinine levels and the results of urine sediment analysis in patients with chronic renal failure with sig value is 0.025 <0.05.

ACKNOWLEDGEMENTS

Thank you to all those who have helped and supported the implementation of this research.

REFERENCE

Aisara, S., Azmi, S., & Yanni, M. (2018). Gambaran Klinis Penderita. Penyakit Ginjal Kronik yang Menjalani Hemodialisis di RSUP Dr. M. Djamil Padang. *Jurnal Kesehatan Andalas*, 7(1), 42.

Alfonso, A. A., Mongan, A. E., & Memah, M. F. (2016). Gambaran Kadar Kreatinin Serum Pada Pasien Penyakit Ginjal Kronik Stadium 5 Non Dialisis. *Jurnal E-Biomedik*, 4(2), 2-7.

Anandita, F. A., Fuadi, M. R., & Soetjipto, H. (2016). Korelasi Cara Pemeriksaan Sedimen Urine Eritrosit Dan Leukosit Secara Kuantitatif Dengan Metode Flowcytometry Dibandingkan Metode Shih-Yung. JUXTA: Ju*rnal Ilmiah Mahasiswa Kedokteran Universitas Airlangga*, 8(1), 13-16.

Haryanti, I. A. P., & Nisa, K. (2015). Terapi Konservatif dan Terapi Pengganti Ginjal sebagai Penatalaksanaan pada Gagal Ginjal Kronik. Majority, 4(7), 49-54.

Heriansyah, Humaedi, A., & Widada, N. (2019). Gambaran Ureum Dan Kreatinin Pada Pasien Gagal Ginjal Kronis Di Rsud Karawang. *Binawan Student Journal*, 01(01), 8-14.

Latifah, I; Suswardani, DL; Kusumawati, Y. (2012). Hubungan Antara Kadar Hemoglobin, Kadar Albumin, Kadar Kreatinin dan Status Pembayaran dengan Kematian Pasien Gagal Ginjal Kronik di RSUD Dr. Moewardi Surakarta. *Jurnal Kesehatan*, 5(1), 1-15.

Ma'shumah, N., Bintanah, S., & Handarsari, E. (2014). Hubungan asupan protein dengan kadar ureum, kreatinin, dan kadar hemoglobin darah pada penderita gagal ginjal kronik hemodialisa rawat jalan di RS Tugurejo, Semarang. *Jurnal Gizi Universitas Muhammadiyah Semarang*, 3(1), 22-32.

Nurani, V. M., & Mariyanti, S. (2013), Gambaran Makna Hidup Pasien Gagal Ginjal Kronik Yang Menjalani Hemodialisa. Jurnal Psikologi, 11(1), 1-13.

Rahmawati, F. (2018). Aspek Laboratorium Gagal Ginjal Kronik. *Jurnal Ilmiah Kedokteran*

Sinaga, G. S., Rambert, G. I., & Wowor, M. F. (2016). Gambaran eritrosit urin pada pasien tuberkulosis paru dewasa di RSUP Prof. Dr. R. D. Kandou Manado. *Jurnal E-Biomedik*, 4(2).

Suryawan, D., Arjani, I., & Sudarmanto, I. (2016). Gambaran Kadar Ureum Dan Kreatinin Serum Pada Pasien Gagal Ginjal Kronis (Ggk) Yang Menjalani Terapi Hemodialisis Di Rsud Sanjiwani Gianyar. Meditory: *The Journal of Medical Laboratory*, 4(2), 145-153.

Utami, K. A. (2010). Hubungan Antara Gagal Ginjal Kronis Dengan Gambaran Sedimen Urin Di Kandung Kemih Pada Pemeriksaan Ultrasonografi. International Institute for Environment and Development, 07/80(2), 125.