Original Research

KOMPLIKASI PENYAKIT YANG DIDERITA DAN KADAR SERUM KREATININ PADA PASIEN DIABETES MELITUS

COMPLICATIONS OF DISEASES AND SERUM CREATININE LEVELS IN DIABETIC PATIENTS

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Diterima: 28 Juni 2025 Direvisi: 25 Juli 2025 Disetujui: 31 Juli 2025

Abstrak

Diabetes melitus, suatu penyakit metabolik, merupakan faktor pemicu utama nefropati diabetik. Kondisi ini ditandai dengan kerusakan ginjal dan hiperkreatininemia pada individu penderita diabetes. Nefropati diabetik merupakan kondisi multifaktorial, di mana komorbiditas memainkan peran penting dalam patogenesisnya.

Penelitian ini bertujuan untuk mengetahui hubungan antara komplikasi penyakit dan kadar kreatinin serum pada pasien diabetes melitus di Puskesmas Nania, Ambon. Desain penelitian yaitu analitik *cross-sectional* dengan pengambilan sampel acak sederhana. Pengukuran konsentrasi kreatinin serum dilakukan menggunakan Reaksi Jaffé (Metode Kinetik) di Laboratorium Rumah Sakit Khusus Daerah Provinsi Maluku. Data dianalisis secara statistik menggunakan uji *Chi-Square*.

Total 30 pasien dilibatkan dalam penelitian ini. Dari jumlah tersebut, 17 pasien (56,7%) memiliki komplikasi, 10 pasien (33,3%) memiliki kadar kreatinin tidak normal, dan 7 pasien (23,3%) memiliki kadar kreatinin normal. Sementara itu, 13 pasien (43,3%) tanpa komplikasi semuanya memiliki kadar kreatinin normal. Hasil uji *Chi-Square* menunjukkan adanya hubungan yang signifikan secara statistik (p = 0,001) antara komplikasi dan kadar kreatinin serum pada pasien diabetes melitus. Hal ini mengindikasikan bahwa keberadaan komplikasi meningkatkan kemungkinan kadar kreatinin serum yang tidak normal, sehingga turut meningkatkan risiko terjadinya nefropati diabetik.

Kata kunci: Diabetes Melitus, Komplikasi, Serum Kreatinin

Abstract

Diabetes mellitus, a metabolic disease, is a predisposing factor for diabetic nephropathy. This condition is defined by renal damage and hypercreatininemia in individuals with diabetes. Diabetic nephropathy is a multifactorial condition, with comorbidities playing a significant role in its pathogenesis. The purpose of this study was to determine the association between complicatin of diseases and serum creatinine levels among Diabetes Mellitus patients at the Nania Community Health Center, Ambon. The study adopted a cross-sectional design. A simple random sample was drawn for the study. The measurement of serum creatinine concentration is carried out using the Jaffé Reaction (Kinetic Method) at the Laboratory of the Maluku Province Special Regional Hospital. Chi-Square test was used to statistically

analyze the data. A total of 30 patients were included in this study. Of these, 17 patients (56.7%) had complicatin, 10 patients (33.3%) had abnormal creatinine levels, and 7 patients (23.3%) had normal creatinine levels. Furthermore, 13 patients (43.3%) without complication had normal creatinine levels. The results of the Chi-Square test demonstrated a statistically significant association (p = 0.001) was found between complication and serum creatinine levels in Diabetes Mellitus patients. The results of statistical analysis demonstrated a statistically significant association (p = 0.001) between complication of diseases and serum creatinine concentration in patients with Diabetes Mellitus. This suggests that the presence of complication increases the likelihood of abnormal serum creatinine, consequently raising the possibility of diabetic nephropathy.

Keywords: Complication, Diabetes Mellitus, Serum Creatinin

INTRODUCTION

Diabetes Mellitus is a group of metabolic diseases that are generally described by elevated blood glucose levels, also known as hyperglycemia, over a long period of time. Elevated blood glucose levels are associated with long-term disruption of the function of various tissues and organs such as the eyes, heart, blood vessels, and kidneys (1).

According to data released by the International Diabetes Federation in 2021, Indonesia has the fifth highest number of Diabetes Mellitus patients in the world behind countries such as China, India, Pakistan, and the United States (2). In 2018, Ambon City was recorded to have a prevalence of Diabetes Mellitus of 1.38% (3).

High blood sugar levels in patients with Diabetes Mellitus will trigger the occurrence of various chronic complications (4). Based on study conducted by Corina in Saputri (2020), it was found that the most chronic complications suffered by patients with type 2 Diabetes Mellitus were microvascular complications, namely 57% consisting of diabetic neuropathy (45.6%) as the most common complication, diabetic nephropathy (33.7%), and diabetic retinopathy (20.7%). The macrovascular complications were 43% consisting of diabetic foot (29.9%), coronary heart disease (27.8%), and cerebrovascular (19.4%) (5).

Diabetic nephropathy which is a condition of kidney damage is found in 35 - 45% of patients with Diabetes Mellitus. Kidney disease (nephropathy) is the leading cause of death and disability in patients with Diabetes Mellitus. About 60% of patients with diabetes and hypertension in Asia have diabetic nephropathy (6). Progressive diabetic nephropathic kidney disease can lead to several complications with high intensity and prevalence as kidney function declines. Complications that can occur are cardiovascular disease, hypertension, mineral bone disorder, metabolic acidosis, and anemia (7).

Serum creatinine test is one of the indicators to determine the level of damage to kidney function. Creatinine is an endogenous metabolic product of skeletal muscle which is then excreted through glomerular filtration and will then be discharged through urine and not reabsorbed by the renal tubules (8). The normal serum creatinine level in men is 0.7 - 1.3 mg/dL and in women is 0.6 - 1.1 mg/dL. The occurrence of an increase in creatinine levels is generally a sign of kidney problems (9).

Nania Community Health Center is a first-level health facility in Ambon located in Nania Village, Baguala Sub-district, Ambon City. Nania Community Health Center has two villages as its working area, namely Nania and Waiheru. Based on primary data obtained directly by researchers, the number of Diabetes Mellitus patients for the data period from January to November 2023 in the Nania Community Health Center working area has reached 127 patients. Until now, it is not yet known whether there is a significant relationship between serum creatinine levels and disease complications suffered by Diabetes Mellitus patients in the Nania Community Health Center working area. For this reason, this study was conducted to determine to determine the association between complications of disease and serum creatinine levels in diabetic patients in the Nania Community Health Center, Ambon.

METHODS

The desaign of this study was an analytical cross sectional study, which is a study to study the dynamics of the correlation between factors and the effects caused. Data collection in this type of cross sectional study is carried out in one period of time (10). The dependent variable in this study was serum creatinine levels and the independent variable was complications of Diabetes Mellitus. The independent variable was measured by the Diabetes Medication Adherence Scale (DMAS) questionnaire.

The population in this study were all Diabetes Mellitus patients in the Nania Community Health Center working area for the data period from January to November 2023. The sampling technique used was consecutive sampling. Population data (N) is 127, the sample size is obtained using the formula for determining the number of cross sectional study samples which results in a minimum sample of 18 respondents.

$$n = \frac{Z_\alpha^2 \quad p\,(1-p)N}{d^2\,(N-1)+Z_\alpha^2\,p(1-p)}$$

$$n = \frac{1{,}96^2 \times 0{,}0138\,(1-0{,}0138)127}{0{,}05^2\,(127-1) + 1{,}96^2 \times 0{,}0138(1-0{,}0138)}$$

$$n = 18{,}07$$

This study has been approved by the Health Research Ethics Committee of The Health Polytechnic of the Ministry of Health Maluku, with approval number DP.04.03/6.2/3448/2024. The study was started by applying for a sampling permit to the Ambon City Health Office and Nania Community Health Center. The researcher submitted a letter requesting permission to examine the sample to the Maluku Province Regional Special Hospital. Researchers then collected research data and then analyzed the data. The data analysis used the Chi-Square Test method where the significance value $\alpha < 0.05$ to determine the amount of factors that are significantly related.

RESULT AND DISCUSSION

Table 1. Characteristics of Respondent

Charasteristics		**n**	**%**
Gender	Male	10	33,3
	Female	20	66,7
Age	≥ 60 years old	12	40,0
	< 60 years old	18	60,0
Education	Elementary	12	40,0
	Continued	18	60,0
Duration of DM	≥ 5 years	8	26,7
	< 5 years	22	73,3
Blood Glucose	Abnormal	19	63,3
	Normal	11	36,7
Medication Adherence Rate	Bad	16	53,3
	Well	14	46,7
Complication	Yes	17	56,7
	No	13	43,3
Creatinine Level	Normal	20	66.7
	Abnormal	10	33.3

Table 2. Complications in Diabetic Patients

Complications	**n**	**%**
Hipertension	5	29,4

Hypercholesterolemia	2	11,8
Hyperuricemia	1	5,9
Eye problem of a diabetic	2	11,8
Hipertension + Hypercholesterolemia	2	11,8
Hipertension + Eye problem of a diabetic	1	5,9
Stroke + Diabetic Foot Ulcer	1	5,9
Eye problem of a diabetic + Hyperuricemia	1	5,9
Hipertension + Hyperuricemia	1	5,9
Hipertension + Eye problem of a diabetic + Hyperuricemia	1	5,9

Table 2. Complications in Diabetic Patients

Complications	A single disease complication	Two or more disease complications	Total (n,%)
Hipertension	5	5	10 (37,0%)
Hypercholesterolemia	2	2	4 (14,8%)
Eye problem of a diabetic	2	3	7 (25,9%)
Hyperuricemia	1	3	4 (14,8%)
Stroke	0	1	1 (3,7%)
Diabetic Foot Ulcer	0	1	1 (3,7%)

Table 3. Complications of Diseases and Creatinine Levels in Diabetic Patients

		Creatinine Level				p-value
		Abnormal		Normal		
		n	%	n	%	
Complications	Yes	10	33,3	7	23.3	0,001
	No	0	0,0	13	43,3	
	Total	10	33,3	20	66,7	

Data on the characteristics of respondents based on gender in this study shows that the population of respondents with female gender is more, namely 20 respondents (66.7%) than male with a total of 10 respondents (33.3%). This is in line with previous study which states that the total number of Diabetes Mellitus female patients at AWS Hospital in Samarinda City is 51% more than male patients (11).

Based on the analysis of age variable, respondents with an age range ≥60 years were fewer, namely 12 patients (40%) while respondents with an age range <60 years totaled 18 respondents (60%). This is in line with study conducted by Hestiana (2018) which shows that 75.4% of respondents in her study were Diabetes Mellitus patients with an age range of 25-59 years (12). The education variable, it is known that there are 18 respondents (60%) who continue their education and 12 respondents (40%) others only finished elementary school. This study is in line with a study conducted by Farihah et al., (2020) where 67.4% of respondents who were Diabetes Mellitus patients in their study continued their education (13).

Based on the characteristics of the respondents, it is also known that respondents with a length of time suffering from Diabetes Mellitus ≥ 5 years were 8 respondents (26.7%) and 22 respondents (73.3%) had Diabetes Mellitus for <5 years. This is in line with study conducted by Al-Hadi et al., (2020) where 65 of 126 respondents have had Diabetes Mellitus ≥ 5 years (14). Based on the Blood Sugar levels, it is known that there are 19 respondents (63.3%) in this study who have abnormal blood sugar levels and 11 respondents (36.7%) others have normal blood sugar levels. This study is in line with study conducted by Kriswiastiny et al., (2022) where more Diabetes Mellitus patients in their study 63.3% had a blood sugar level >200 mg/dl (15).

When viewed based on the level of medication adherence rate, 16 respondents (53.3%) of Diabetes Mellitus patients in this study were classified as bad adherence and 14 respondents (46.7%) were classified as well adherence. This is in line with previous study which states that the level of medication adherence rate in Diabetes Mellitus patients is low, namely only 82.8% (16).

Based on the complications of disease, it was found that more Diabetes Mellitus patients in this study had complications, namely 17 respondents (56.7%) than those who did not have complications, namely 13 respondents (43.3%). This study is in line with study conducted by Zaininda & Utama (2023) which it was found that as many as (64.9%) Diabetes Mellitus patients who were respondents had complications and only (35.1%) others did not have complications (17).

Analysis of the association between complications of disease and creatinine levels, obtained the results of 17 respondents (56.7%) who had complications, 10 respondents (33.3%) had abnormal creatinine levels and 7 respondents (23.3%) had normal creatinine levels. While all 13 respondents (43.3%) who did not have complications had normal creatinine levels. Based on the results of laboratory tests, it can be seen that Diabetes Mellitus patients who have disease complications have relatively higher creatinine levels than Diabetes Mellitus patients who do not have disease complications. This is in line with previous study which explains that uncontrolled Diabetes Mellitus patients with a high risk of complications have higher creatinine levels than those who are controlled and low risk of complications (18).

Based on study conducted by Arsono (2005) it was found that Diabetes Mellitus patients with diastolic hypertension complications have a higher risk of chronic kidney diseases compared to normal diastolic blood pressure (19). In addition, Diabetes Mellitus patients with complications of high cholesterol levels have a higher risk of terminal kidney failure than patients with normal

cholesterol levels. This is in line with study conducted by researchers where serum creatinine levels, which are one of the tests to determine abnormalities in kidney function, are higher in Diabetes Mellitus patients who have disease complications than Diabetes Mellitus patients who do not have complications.

CONCLUSION

Based on study that has been conducted, it was found that there was a significant association (p = 0.001) between serum creatinine levels and complications of diseases in diabetic patients in the Nania Community Health Center Ambon.

ACKNOWLEDGEMENTS

The authors would like to thank the Director of Health Polytechnic of Ministry of Health Maluku, the Government of Ambon City, and the Director of Regional Special Hospitals of Maluku Province for their participation and support so that this research can be completed.

CONFLICT OF INTEREST

The authors declare no conflict of interest

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