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Differences Albumin Value in Type II Diabetes Mellitus Patient and Type II Diabetes Mellitus With Nefropathi Diabetic Coinfection in Sumbawa Hospital

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ABSTRACT

Diabetes Mellitus (DM) is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin produced. Diabetes mellitus has a very dangerous impact because it can cause complications. Diabetic nephropathy is one of the complications that occur in patients with DM type II. This complication occurs due to kidney damage to the glomerulus resulting in kidney leakage which causes protein, especially albumin, to flow from the blood into the urine. Objective: To knowing the difference in Albumin levels in patients with DM type II and DM type II co-infection with Diabetic Nephropathy at Sumbawa Hospital. Methods: This study used an analytic observational method with a cross sectional approach. Samples were divided into two categories, DM type II patients and DM type II patients with diabetic nephropathy co-infection. Both serum samples were subjected to blood chemistry examination. Results: This study used 30 samples of DM type II patients and 30 samples of DM type II patients with diabetic nephropathy co-infection, with the results of the average DM type II albumin level was 4,03 g/dl, while DM type II with Diabetic Nephropathy co-infection with an average of 2,04 g/dl. Conclusion: There is a significant difference in the independent T-Test test on albumin levels in type II Diabetes Mellitus and type II Diabetes Mellitus co-infection with Diabetic Nephropathy with a probability of 0.000.

INTRODUCTION

Non-communicable diseases (NCDs) are one of the most serious health problems in developing countries, with low and middle-income. Of all deaths that occur in people aged less than 60 years, 29% are caused by NCDs, while in developed countries, they account for 13% of deaths. Non-communicable diseases, also known as chronic diseases, are not transmitted from person to person. NCDs have a long duration and generally progress slowly. The four main types of NCDs are cardiovascular diseases (such as heart attack and stroke), cancer, chronic respiratory diseases (such as chronic lung disease and asthma) and diabetes (Pangribowo, 2020).

Diabetes mellitus (DM) is a chronic disease that occurs when the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin produced (Kemenkes RI, 2020). Diabetes Mellitus (DM) has been increasing every year and has become a global health threat. The prevalence of type II Diabetes Mellitus accounts for 90%

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of all diabetes and is one of the most prevalent worldwide. In 2019 about half a billion people had diabetes. World Health Organization (WHO) data estimates 2.2 million deaths from diabetes mellitus every year. Diabetes mellitus is expected to continue to increase by around 600 million by 2035 (WHO, 2020).

Indonesia got fourth rank in cases of type II diabetes mellitus with a prevalence of 8.6% of the total population, estimated to increase from 8.4 million people in 2000 to around 21.3 million people in 2030. The results by Basic Health Research (Riskesdas) in 2018 showed that the prevalence of diabetes mellitus was 2.0%. The prevalence of diabetes mellitus is based on the results of blood sugar testing in the population aged ≥ 15 years (Riskesdas RI, 2018).

West Nusa Tenggara Province based on the results of Riskesdas in 2018 the prevalence of Type II Diabetes Mellitus was (1.2%), with 36,486 Type II Diabetes Mellitus patients divided into 10 city districts in NTB Province (Riskesdas RI, 2018). Sumbawa Regency is one of the districts that has a fairly high number of Diabetes Mellitus patients. Based on data from the Sumbawa District Health Office, in 2019 there were 5,085 people with Diabetes Mellitus. This also confirms that Sumbawa ranks 5th out of 10 cities/districts in NTB as the district with the most diabetes mellitus patients (Hamid et al., 2022).

Diabetes mellitus has a very dangerous impact because it can cause complications, the types of complications caused are chronic complications in the eyes, kidneys, nerves, and blood vessels. If it has fully developed clinically, diabetes mellitus is characterized by fasting and post prandial hyperglycemia, atherosclerosis and microangiopathic vascular disease (Utomo et al., 2018).

Diabetic nephropathy (DN) is one of the complications that occur in patients with type II diabetes mellitus (DM). This complication occurs due to kidney damage to the glomerulus resulting in kidney leakage which causes protein, especially albumin, to flow from the blood into the urine. The presence of albumin in urine can be used as a sign of endothelial dysfunction, the presence of albumin in urine besides being a sign of endothelial dysfunction can also be used as clinical proteinuria which is one of the risk factors for decreased kidney function (Khayana, 2020).

Microalbuminuria often occurs in type II diabetes mellitus (DM) patients because type II diabetes mellitus patients have insulin resistance where insulin cannot work properly in controlling blood glucose levels. Type II diabetes mellitus (DM) is a disease that arises due to a lack of insulin in the body both quantitatively and qualitatively marked by an increase in blood glucose levels. Microalbuminuria in patients with DM can be used as an early sign of kidney problems that can still be treated (Khayana, 2020).

In a study conducted by Poppy Bincar Khayana (2020) with the title Overview of Urine Microalbumin Levels in Patients with Type II Diabetes Mellitus at the Mojoagung Health Center and the results obtained were In research conducted at the Mojoagung Jombang health center, it was found that 18 respondent data (samples) were type II diabetes mellitus patients with microalbumin levels ranging from 30-300 mg / L, 12 respondent data (samples) are type II diabetes mellitus patients with urine microalbumin levels ranging from 0 - 30 mg / L and as many as 6 respondent data (samples) are type II diabetes mellitus patients with microalbumin levels exceeding 300 mg / dL.

This researcher is developing research that has been done by taking the parameter of albumin levels in the blood and will be seen in relation to type II diabetes mellitus examined at the Sumbawa Besar Hospital. In connection with these problems, researchers are interested in conducting research on the difference in Albumin levels in patients with Type II Diabetes Mellitus and Type II Diabetes Mellitus co-infection with Diabetic Nephropathy at Sumbawa Regional Hospital.

MATERIALS/METHOD

The type of research used in this study is analytical observational, namely making a situation or effect objectively on risk factors. This research was carried out by taking the steps of research sampling, data collection, classification, processing, making conclusions and reports. The population in this study were all outpatients and inpatients with type II diabetes mellitus and type II diabetes with co-infection of diabetic nephropathy at Sumbawa Hospital. The total samples used were 30 samples of type II diabetes mellitus patients without co-infection and 30 samples of type II diabetes mellitus patients with diabetic nephropathy co-infection. The sampling technique used was accidental sampling, namely by determining the sample based on the coincidence of meeting researchers at the research location and suitable as a data source. The study was conducted by checking the fasting blood glucose of DM patients and checking serum albumin.

RESULTS AND DISCUSSION

Based on research conducted on type II Diabetes Mellitus patients without co-infection and with co-infection of diabetic nephropathy (DN), data on respondent characteristics were obtained in Table 1.

Table 1. Gender of type II diabetes mellitus patients without co-infection and with co-infection of diabetic nephropathy

Gender	Type II DM		Type II DM with DN	
	n	%	n	%
Male	11	37	12	40
Female	19	63	18	60
Total	30	100	30	100

In table 1 shows the percentage of gender in patients with type II DM without co-infection, women 63% by 19 people more than male patients 37% by 11 people, and the percentage of gender in type II DM patients with diabetic nephropathy co-infection, was 60% women by 18 people more than 40% male patients with 12 people.

The results of the albumin level research on the complete sample are in Table 2 below:

Table 4. 2 Results of Albumin Level Measurements of Type II Diabetes Mellitus Patients with Type II Diabetes Mellitus Co-infection with Diabetic Nephropathy at the Sumbawa Regional Hospital Laboratory

No	Type II DM			Type II DM with DN		
	Sample A	M/F	Albumin (g/dl)	Sample B	M/F	Albumin (g/dl)
1.	01A	F	3,5	01B	M	2
2.	02A	M	4,1	02B	M	2,3
3.	03A	F	3,8	03B	M	2
4.	04A	F	3	04B	M	2
5.	05A	M	3,9	05B	M	2,4
6.	06A	M	3,5	06B	M	2
7.	07A	M	4	07B	F	2,1
8.	08A	F	3,9	08B	F	2,3
9.	09A	F	4,2	09B	M	2

No	Type II DM			Type II DM with DN		
	Sample A	M/F	Albumin (g/dl)	Sample B	M/F	Albumin (g/dl)
10.	10A	F	4,3	10B	F	2
11.	11A	M	4	11B	F	2,1
12.	12A	F	3,2	12B	F	1,9
13.	13A	M	4,3	13B	F	2
14.	14A	M	5,3	14B	F	2,1
15.	15A	F	5	15B	F	1,9
16.	16A	F	5,1	16B	F	2,2
17.	17A	F	4,9	17B	F	1,8
18.	18A	F	4	18B	F	2,2
19.	19A	F	4,2	19B	M	2,3
20.	20A	F	3,5	20B	M	2
21.	21A	M	3,9	21B	M	1,8
22.	22A	F	3,6	22B	M	1,8
23.	23A	F	3,7	23B	M	2,2
24.	24A	F	3,8	24B	F	2
25.	25A	F	4,3	25B	F	2
26.	26A	M	4,2	26B	F	2
27.	27A	M	3,5	27B	F	2
28.	28A	M	4	28B	F	1,7
29.	29A	F	4,4	29B	F	2
30.	30A	F	3,8	30B	F	2,1
	Total		120,9			61,2
	Rerata		4,03			2,04
	Highest value		5,3			2,4
	Lowest value		3			1,7

Table 2 shows that the mean albumin level of Type II DM patients is 4.03 g/dl and in Type II DM patients with diabetic nephropathy co-infection is 2.04 g/dl. The lowest albumin value in Type II DM patients was 3.0 g/dl and the highest was 5.3 g/dl, while in Type II DM patients co-infected with diabetic nephropathy the lowest albumin value was 1.7 g/dl and the highest was 2.4 g/dl with a normal value range of 3.5 - 5.5 g/dl.

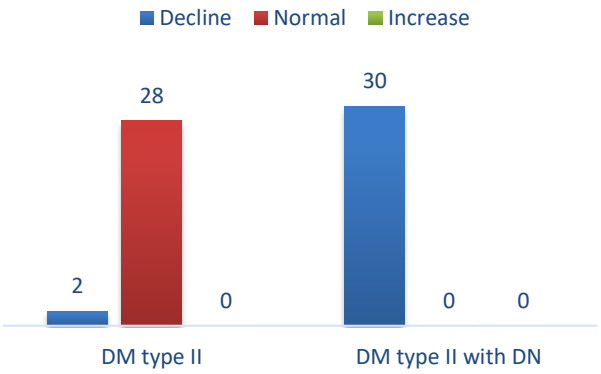

Figure 1. Number of Albumin Value Results in Type II DM and Type II DM Patients with Diabetic Nephropathy Coinfection

Figure 1 shows that the number of albumin values that decreased in Type II DM patients was 2 people (6.7%) and normal 28 people (93.3%), while in patients with Type II DM Coinfection ND are 30 patient samples (100%) had decreased albumin levels.

Normality test data with the Shapiro-Wilk method of albumin levels in type II diabetes mellitus patients with a probability value (p) 0.165 > 0.05, which means that the data is normally distributed, and albumin levels in type II diabetes mellitus co-infection with diabetic nephropathy with a probability value (p) 0.056 > 0.05, which means that the data is also normally distributed. Independent T-Test test of albumin levels in patients with type II diabetes mellitus and type II diabetes mellitus co-infection with diabetic nephropathy with a probability value (p) of 0.000 < 0.05 which indicates that there is a significant difference in the mean albumin levels in patients with type II diabetes mellitus (M = 4.0300, SD = 0.53443) and type II diabetes mellitus co-infection with diabetic nephropathy (M = 2.0400, SD = 0.16316).

Diabetic nephropathy is a clinical syndrome with diabetic complications in the kidneys that can cause terminal kidney disease. Kidney disease due to diabetes affects albumin (Elfiani et al., 2019). The results of albumin measurements in patients with type II DM and type II DM with diabetic co-infection obtained a decrease in levels more in patients with diabetic co-infection. Of the 30 samples 6.7% of type 2 DM patients experienced a decrease in albumin value, with an average of 4.03 g/dl. Whereas in patients with type 2 DM co-infection with diabetic nephropathy, 100% of samples were abnormal, with a decrease in albumin value and an average of 2.04 g/dl.

In line with the research of Nurhasanah et al (2020), a total of 45 people (47.87%) of type II Diabetes Mellitus patients at Banguntapan II Health Center experienced hypoalbuminemia. The results of research conducted by Poppy Bincar Khayana (2020) on Type II DM patients at the Mojoagung Health Center found that 18 samples were type II DM patients with microalbumin levels ranging from 30-300 mg/L, 12 respondent data (samples) were type II diabetes mellitus patients having urine microalbumin levels ranging from 0 - 30 mg/L and as many as 6 respondent data (samples) were type II diabetes mellitus patients with microalbumin levels exceeding 300 mg / dL.

Microalbuminuria can develop into massive albuminuria, if the situation continues and the patient is unable to supplement sufficient protein in the body, it will cause a decrease in blood protein levels which leads to hypoalbuminemia. In the condition of nephrotic syndrome, many proteins are excreted, especially albumin, resulting in hypoalbuminemia. Low serum albumin levels (hypoalbuminemia) are associated with inadequate fetoplacental circulation, as a result of multiorgan hypoperfusion and complete endothelial damage (Purba et al., 2020). In patients with type II diabetes mellitus co-infection with diabetic nephropathy, the inflammatory response is associated with decreased albumin levels or hypoalbuminemia with levels less than 35 g/L (Soeters et al., 2019).

CONCLUSIONS

The results of albumin examination in 30 patients with type II diabetes mellitus obtained a mean of 4.03 g/dl, while in 30 patients with type II diabetes mellitus co-infected with diabetic nephropathy with a mean of 2.04 g/dl. There is a significant difference in the independent T-Test on albumin levels in type II diabetes mellitus and type II diabetes mellitus co-infection with diabetic nephropathy with a probability of 0.000.

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