Description of Albuminuria Levels in Patients with Type 2 Diabetes Mellitus According to Length of Diagnosis at West Nusa Tenggara Provincial Hospital

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Abstract: Albuminuria is a condition in which there is albumin in the urine, albuminuria often occurs in patients with type 2 DM which occurs due to persistently elevated blood sugar levels and poor glycemic control. This will risk the occurrence of complications of them diabetic nephropathy but it takes about 5-10 years after the diagnosis of DM is established to become a significant problem of kidney damage. The purpose of this study was to find out how the description of albuminuria levels in patients with type 2 DM based on the duration of diagnosis at RSUP NTB. The method used was analytic observation with a cross sectional design. The results of this study analyzed 30 subjects, consisting of 14 men (47%) and 16 women (53%) with an age range of 30-71 years, with the prevalence of urine albumin levels based on the duration of being diagnosed with type 2 diabetes, which is ≤ 5 years. DM ≥ 5 years with a prevalence of 3 (10%) samples having normoalbuminuria levels, 18 (60%) samples having micro albuminuria levels, and 3 (10%) samples having macro albuminuria levels

Keywords: Albuminuria level; Diabetic Nephropathy; Old diagnosis; Type 2 Diabetes Mellitus

Introduction

Diabetes mellitus (DM) is a metabolic disorder caused by the pancreas not producing enough insulin or the body not being able to use the insulin it produces effectively. Insulin is a hormone that regulates the balance of blood sugar levels due to an increase in the concentration of glucose in the blood (American Diabetes Association, 2017). The 2014 Sample Registration Survey data shows that DM (diabetes mellitus) is the third largest cause of death in Indonesia with a proportion of 6.7%, after stroke (21.1%) and coronary heart disease (12.9%). DM sufferers often experience complications in other diseases such as heart attacks, strokes, severe foot infections and the risk of amputation, and end-stage kidney failure. In 2035 the number of DM is expected to increase to 592 million (Soelistijo Soebagijo Adi, 2019).

According to data from the World Health Organization (WHO) estimates that there is an increasing trend of the incidence and prevalence of type 2 DM in various parts of the world and the increasing number of people with diabetes mellitus is increasing every year, both in Indonesia and the world. Data from the International Diabetes Federation (IDF) in 2015, the number of people with diabetes mellitus in the world is around 415 million, and is expected to increase to 642 million (55%) in 2040. Data from the World Health Organization (WHO) predicts an increase in the number of people with DM in Indonesia from 8.4 million in 2000 to around 21.3 million in 2030 (IDF, 2015). The International Diabetes Federation (IDF) predicts that for ages 20-79 years the number of people with diabetes mellitus in Indonesia will go from 10 million people in 2015 to 16.2 million in 2040. With this figure Indonesia ranks 6th in the world in 2040 (IDF, 2015). Diabetes

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mellitus is spread in all provinces in Indonesia, one of which is in the province of West Nusa Tenggara (NTB). The prevalence of DM that has been diagnosed is 0.9% of the total population (Kesehatan & RI, 2013).

Patients with elevated glycemic levels are at risk for developing microvascular and macrovascular complications. Short-term complications that DM sufferers will experience are high glycemic levels in a long time which can cause tissue and organ damage that occurs when the body is unable to use glucose as energy due to a lack of insulin. Long-term complications of DM are eye damage, disorders of the heart and blood vessels, and diabetic nephropathy. Diabetic nephropathy attacks when DM triggers damage and the formation of scar tissue in the nephrons, namely the part of the kidney that functions to filter waste from the blood and also to remove excess fluid in the body, complications that occur not only cause kidney function to be disrupted, but also cause albumin protein to be wasted into the urine and not reabsorbed (ADA, 2014, Palladino et al., 2020).

Continuously high blood glucose levels can result in damage to the walls of blood vessels where damage to the walls of blood vessels can cause albumin in the urine. Albumin in the urine can be used as a sign of endothelial dysfunction, a sign of clinical albuminuria. Patients with diabetes mellitus (DM) type 2 which is a risk factor for decreased kidney function (Cendra et al., 2014, Faselis et al., 2020, Yang et al., 2022).

Albuminuria is a condition where there is albumin in the urine which indicates the possibility that an atherosclerotic process has occurred in DM patients. Early detection of endothelial dysfunction is done by examining urine microalbumin. A person with normal health conditions does not have albumin in the urine exceeding 30 mg/L, so the presence of albumin exceeding 30 mg/L in the urine can be said to be a sign of impending endothelial dysfunction and decreased kidney function in a person (Ummaysaroh3, 2020). In healthy kidneys, blood that passes through the kidneys will be filtered first by the glomerulus so that waste products and substances that are no longer needed by the body will be removed along with the urine, while albumin is a substance that is still needed in the body's metabolism so that when it passes through the kidneys albumin will be excreted. filtered by the glomerulus and redistributed back into the body (Elfiani et al., 2019, Levey et al., 2020, Benzing et al., 2021).

Based on the results of research conducted by Khanaya et al (2020) showed that out of a total sample of 76 samples of type 2 diabetes mellitus (DM) patients, 50 samples showed albuminuria levels above 30 mg/L (microalbuminuria) and 26 samples showed levels albuminuria below 30 mg/L (normoalbuminuria) (Ummaysaroh3, 2020). Research data conducted by

Elfiana, et al (2019) showed that of 35 samples of type 2 DM patients, 20 patients were DM with micro albuminuria and 15 patients were DM with macro albuminuria (Elfiani et al., 2019, Thipsawat, 2021).

This research was conducted because DM is the most common disease suffered by people throughout the world, one of which is in Indonesia, especially in the province of NTB, so it is necessary to see how the development and changes in the health condition of type 2 DM sufferers are related to albuminuria based on the length of time of diagnosis. Therefore, this study aims to determine how the level of Albuminuria in Type 2 Diabetes Mellitus (DM) sufferers is described based on the length of time of diagnosis.

Method

The research method used was analytic observation with a cross-sectional design. This research was conducted in June until July 2022. The population in this study were all Type 2 Diabetes Mellitus patients who were diagnosed with diabetes for five years or more and checked themselves at the NTB Provincial General Hospital. The sample in this study is the entire total population according to the inclusion and exclusion criteria, namely as many as 30 respondents who were determined using the purposive sampling technique. This study used random urine samples and the instrument used in this study was the Architect plus C4000 tool, with the enzymatic method. The examination procedure starts from the main menu, select orders, select patient orders, input position(P), enter SID, select the examination to be examined, press add order, repeat the above steps for each patient to be examined press F1 (EXIT) to return to the main menu screen, press RSH and processing i1000SR, press run (f8). The data analysis used in this study was a quantitative descriptive analysis by collecting data from initial observations and primary data obtained from the NTB General Hospital. The data obtained is entered into the table and then described.

Result and Discussion

Based on Figure 1, it can be seen that the percentage of the results of examining albuminuria levels found that 30% had normal albuminuria levels, 60% had micro albuminuria levels, 10% had macro albuminuria levels. This study analyzed 30 subjects with a distribution of research subjects who were more female than male, namely 16 women (53%) and 14 men (47%), this is almost the same as previous studies also found that the majority of DM sufferers type 2 is female (Fadilah et al.,, 2016, Bilgin et al., 2021). This was confirmed by the results of

the 2018 Riskesdas and Ristekdikti 2019 which reported that there are more women with DM in Indonesia than men. Many factors cause the high incidence of DM in women such as genetics, lifestyle, lack of physical activity, obesity to a history of gastric diabetes and a history of giving birth to babies weighing > 4000 grams (Rahayu, 2020).
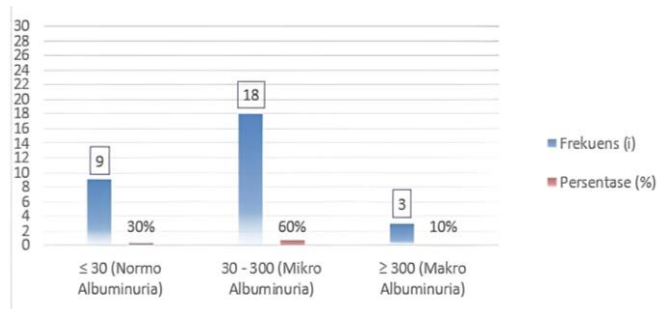

Figure 1. Percentage of Albuminuria Test Results

Another factor that influences the high incidence of DM in women is the hormonal and psychological changes experienced by women due to the phases of the menstrual cycle, pregnancy, breastfeeding, so that women have a greater risk of suffering from type 2 DM than men (Cendra *et al.*, 2014, Rahayu, 2020). Apart from gender, age was also included in this study.

This study obtained the highest proportion of DM diagnosed duration, namely those with a diagnosed duration of ≥ 5 years, 24 (80%) samples, while those with a DM diagnosis of ≤ 5 years, namely 6 (20%) samples. This is in line with previous studies where the onset or onset of type 2 DM was 7 years before the diagnosis was made, namely when the criteria for type 2 DM were met with complaints of polydipsia, polyphagia, polyuria, and supported by blood glucose examination results. In a study by M. Muslim (2014), also wrote that clinical diabetic nephropathy which is characterized by the presence of urine albumin will occur after 10-15 years of someone suffering from DM. Apart from gender, age and length of time diagnosed with DM, another thing to consider in this study was the level of albuminuria in type 2 DM patients (Muslim, 2014, Jabaan *et a*l., 2021, Wang *et al.*, 2021).

Based on the results obtained, it was found that 30% of the samples had levels of normoalbuminuria, namely. 60% had levels of micro albuminuria, and 10% had levels of macro albuminuria. Increased levels of albuminuria often occur in type 2 DM sufferers because blood sugar levels increase continuously over a long period of time and are uncontrolled. If this poor glycemic condition occurs for years it will cause complications, one of which is diabetic nephropathy (American Diabetes Association, 2017). Poor glycemic control is one reason. Poor glycemic control will stimulate kidney cells to produce humoral mediators, cytokines and growth factors that allow structural changes such as increased glomerular basement membrane permeability (Wu T *et al.*, 2023).

Conclusion

The results of a study of type 2 DM patients at NTB General Hospital concluded that in this study there were 30 samples with a prevalence of 30% of type 2 DM patients having normal albuminuria levels, 60% of patients having micro albuminuria levels, and 10% of patients having macro albuminuria levels. The results of this study can also be concluded that urine albumin levels are based on the length of time they have been diagnosed with type 2 DM, namely those with a diagnosis of DM ≤ 5 years as many as 6 (20%) samples have an average level of normoalbuminuria, whereas patients with a diagnosis of DM ≥ 5 years with a prevalence of 3 (10% of the samples had normal albuminuria, 18 (60%) of the samples had microalbuminuria, and 3(10%) of the samples had macroalbuminuria.

Conflicts of interest
The authors declare no conflict of interest.

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