



Research Article

Treatment pattern and precision evaluation of diabetes mellitus therapy complications of chronic renal failure at RSUD Undata Palu

Dian Rahmawati^{[1]*}

¹ Diploma Program Pharmacy, STIFA Pelita Mas, Palu, Central Sulawesi, Indonesia

* Corresponding Author's Email: dianrahmawati.nf@gmail.com

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ABSTRACT

Diabetes mellitus (DM) is a chronic metabolic disease or disorder characterized by high blood sugar levels accompanied by disorders of carbohydrate, protein, and lipid metabolism, which can produce chronic complications due to the inability to function insulin. Uncontrolled DM can be a risk factor for kidney failure. Abnormalities that occur in the kidneys of people with diabetes are characterized by microalbuminuria. This study aimed to determine the pattern and treatment of DM patients with Chronic renal failure or Chronic Kidney Disease (CKD) at Undata Hospital Palu, whether it is following the standard. This research is a descriptive cross-sectional study with retrospective data collection on medical records. Sampling was done using a total sampling technique with medical record data of thirty patients based on inclusion criteria. Based on the results of the study, the use of drugs in patients with DM complications of CKD was fast-acting insulin as many as twenty three people (79.3%) because insulin is the leading choice for DM patients with complications of CKD, especially in patients undergoing hemodialysis. Evaluation of treatment in patients with DM complications of CKD follows the standard treatment used as a reference. Insulin is the primary choice for diabetes mellitus patients with chronic renal failure complications, especially in patients undergoing hemodialysis.

1. INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder or disease characterized by high blood sugar levels accompanied by disorders of carbohydrate, protein, and lipid metabolism, which can produce chronic complications as a result of the inability to function insulin (Almasdy, Sari, Suhatri, Darwin & Kurniasih, 2015; Simatupang, 2017). In other literature, DM is also a chronic condition that occurs when glucose levels in the blood increase so that the body cannot produce enough insulin or use insulin effectively, causing various chronic complications to the eyes, kidneys, nerves, and blood vessels (International Diabetes Federation [IDF], 2017).

Uncontrolled DM can be a risk factor for kidney failure. Abnormalities that occur in the kidneys of people with diabetes are characterized by microalbuminuria. Microalbuminuria is generally defined as albumin excretion of more than 30 mg per day. It is considered necessary for the development of diabetic nephropathy, which, if uncontrolled, will progress to proteinuria clinically and progress to decreased function of the glomerular filtration rate and end in renal failure (Trisna, 2015). In other literature, Chronic Kidney Disease (CKD) is defined as a condition where there is a decrease in kidney function over time, characterized by a decrease in the glomerular filtration rate to less than 60 mL/min/1.73 m³ (Tuloli, Madania, Mustapa & Tuli, 2019). It is

estimated that 30-40% of people with type 1 diabetes and 20-30% of people with type 2 diabetes will suffer from diabetic nephropathy at some point, which can end in a state of kidney failure (Rivandi & Yonata, 2015).

The prevalence of CKD increases with the increasing number of older adults and diabetes mellitus and hypertension incidence. The Basic Health Research results show that the prevalence of CKD increases with age, while the province with the highest prevalence in North Kalimantan at 0.64%, followed by North Sulawesi with 0.53%, and Central Sulawesi at 0.53%. (Pengurus Besar Perkumpulan Endokrinologi Indonesia, 2015; Kementerian Kesehatan Republik Indonesia [Kemenkes RI], 2018). Based on this background, the researchers are interested in knowing the use of drugs in DM patients with chronic kidney failure complications at Undata Hospital, Palu.

2. MATERIALS AND METHODS

This research is a descriptive cross-sectional study with retrospective data collection on medical records. The data were analyzed descriptively because the researchers aimed to describe the pattern of drug use and evaluate the accuracy of therapy in DM patients with CKD complications in the inpatient installation of Undata Hospital, Palu.

This study's sample was DM patients with complications of CKD who were given DM treatment therapy and according to the inclusion criteria. This sampling technique uses the total sampling technique with data for the last three years.

3. RESULTS AND DISCUSSIONS

Patients in this study were patients with a diagnosis of DM with complications of CKD who were treated at the Undata Hospital in Palu; this study was conducted in July 2020 - August 2020. Based on the preliminary study conducted in 2017-2019, thirty initial data on diabetes mellitus patients with CKD complications were obtained.

DM commonly referred to as diabetes, is a chronic condition that occurs when glucose levels in the blood increase so that the body cannot produce enough insulin or use insulin effectively. (IDF, 2017). DM is the leading cause of decreased kidney function in 44% of new cases in America in 2011 (Association American Diabetes, 2018). In other literature, DM is also a chronic condition that occurs when glucose levels in the blood increase so that the body cannot produce enough insulin or use insulin effectively, causing various chronic complications to the eyes, kidneys, nerves, and blood vessels (IDF, 2017).

Based on the results of research (Table 1), which was conducted on DM patients with complications of CKD at the Undata Hospital Palu in July - August 2017-2018 period, data were obtained based on gender, namely eighteen male patients (60.0%) and women (40.0%). This result shows that patients with DM complications of CKD in the 2017-2019 period based on gender are more male than female. This finding is in accordance with Basic Health Research, which states that patients who suffer more from chronic kidney failure are men (Kemenkes RI, 2018).

Furthermore, this research corresponds with the research conducted by Purwati (2018), which states that male patients have more CKD than women since men have a risk of experiencing CKD two times greater than women. The increase in urea levels in the blood can be influenced by gender and the pattern of drug consumption as well as the distribution of body fat, wherein men the fat is concentrated in the stomach resulting in metabolic disorders causing higher urea levels than women (Auliya, Oenzil & Rofinda, 2016; Sunita &

Table 1. Characteristics based on sex and age of diabetes mellitus patients with complications of chronic renal failure

Characteristics	Number of Patients	Percentage
Gender		
Male	18	60.0%
Women	12	40.0%
Total	30	100%
Age		
35-45 years old	3	10.0%
46-55 years old	13	43.3%
≥ 56 years old	14	46.7%
Total	30	100%

Source: Medical Record Data for diabetes mellitus patients with complications of chronic renal failure at Undata Hospital Palu for the period 2017-2019

Table 2. The pattern of treatment for diabetes mellitus patients with complications of chronic renal failure by type of antidiabetic therapy

No.	Group		Medicine name	Total	Percentage	
1	Insulin	Long Work	Lantus	1	2.8%	
			Levemir	5	13.9%	
			Total	6	16.7%	
2	Oral	Fast Work	Apidra	1	2.8%	
			Ezelyn	3	8.3%	
			Novorapid	18	50.0%	
			Novomix	1	2.8%	
			Total	23	63.9%	
3	Insulin + Oral	Sulfonylureas	Glimepiride	3	8.3%	
			Biguanide	Metformin	2	5.6%
				Total	5	13.9%
3	Insulin + Oral		Novorapid + Glimepirid	1	2.8%	
			Novorapid + Glimepirid + Metformin	1	2.8%	
			Total	2	5.6%	
Total				36	100%	

Laksono, 2019). Nevertheless, for diabetes itself, women have more diabetes because physical women have a greater chance of increasing the body mass index, monthly cycle syndrome (premenstrual syndrome), post-menopause, which can make body fat distribution quickly accumulated due to this hormonal process so that women are at risk. have diabetes (Hongdiyanto, Yamlean & Supriati, 2014; Samiyah, Hamidy & Yuki, 2017). Then women have relatively higher levels of estrogen and progesterone so that it can reduce insulin sensitivity. In addition to other factors, central obesity is more common in women than men (E. N. Sari & Perwitasari, 2013).

Besides, women are very maintaining their healthy and healthy lifestyles than men, so men are more at risk of chronic kidney failure than women (Purwati, 2018). In this study, patients with DM and CKD complications were more common in men because men had many habits and activities that could affect health, such as smoking, drinking coffee, alcohol, and supplementary drinks that could trigger the systemic disease. It causes decreased kidney function and impacts the quality of life (Mughtar, Tjitrosantoso & Bodhi, 2015).

In total, there are thirty patients with DM with complications of CKD, which was divided based on age distribution into three groups: 35-45 years old (10%), 46-55 years old (43,3%), and ≥ 56 years old (46,7%). This observation is in accordance with the research conducted by F. D. Sari, Inayah and Hamidy (2016), Samiyah (2017), Desiani, Anindhita and Effendi (2020), which shows the results of the age 51-60 (48.4%), 50-59 (38.8%) and the highest as many as 28 (93%) suffer from DM. Basic Health Research 2018 (Kemenkes RI, 2018), states that patients with CKD who have an age range ≥ of 56 years old are more at risk of developing CKD. Age category is very influential in the prevalence of DM incidence rate (Lira, Lolo & Wewengkang, 2017). This research agrees with the research conducted by Purwati (2018), which states that the higher the age level, the less kidney function and decreased glomerular excretion rate and deteriorating tubular function increasing age, the prevalence of CKD increases. The aging process is a process of anatomical, biochemical, and physiological changes in the body, and this can cause a decrease in the function of our organs, one of which is the kidneys (Trisna, 2015). This is also conforming to Mughtar et al., (2015) research, which states that the increasing age level, the less kidney function is due to a decrease in the rate of glomerular excretion and a decrease in tubular function in the kidneys. In the elderly, kidney function and blood flow to the kidneys are reduced, resulting in a decrease in glomerular filtration rate of about 30% compared to younger people. The decrease in renal function is progressive and aggravated by proteinuria, leading to the continued renal infusion (Altemtam, Russell & El Nahas, 2012).

Based on the results (Table 2), the types of antidiabetic therapy are divided into three, namely the types of insulin therapy, oral and insulin + oral. There are six long-acting insulin items for this type of insulin therapy (16.7%) and twenty three people for fast-acting insulin (63.9%). The type of oral therapy consists of the sulfonylurea group of 3 drugs (8.3%) and the Biguanide group of 2 drugs (5.6%). Meanwhile, insulin + oral therapy consists of Novo rapid insulin + glimepiride and Novo rapid insulin + glimepiride + metformin as much as one item (2.8%).

The type of antidiabetic therapy that is most widely used by DM patients with complications of CKD in Undata Palu Hospital for the last three years is the type of insulin therapy, in which the type of insulin most used is fast-acting insulin. The use of insulin is given if the DM patient's condition has dropped or has very high blood

Table 3. Evaluation of the suitability of drug therapy for diabetes mellitus patients with complications of chronic renal failure

No.	Drug	Total	Standard of Treatment (Dominijanni et al., 2017)	
			Corresponding	It is not following
1	Injection	Insulin	29	√
2	Oral	Glimepiride	3	√
		Metformin	2	√
3	Insulin + Oral	Novorapid + Glimepiride		√
		Novorapid + Glimepirid + Metformin		√

glucose levels. Patients with DM whose blood sugar levels are not controlled with the use of oral antidiabetic drugs should be considered, but insulin as combination therapy with oral drugs or single insulin (Selly, 2019). The result is because insulin is the leading choice for DM patients with chronic renal failure complications, especially in patients undergoing hemodialysis. The use of fast-acting insulin can allow the replacement of insulin at mealtime physiologically because of its fast action; another advantage of this fast-acting insulin is that it can be used before meals without controlling glucose control (Inayah et al., 2017). One of the fast-acting insulin that is most widely used in DM patients with complications of CKD is Novorapid because Novorapid has the same function as the fast-acting type of insulin, which allows the replacement of insulin at mealtime physiologically because of its fast action (Yulianti, Mukaddas & Faustine, 2014).

The use of drugs in patients with DM complications of CKD for this type of insulin therapy is following the standards issued by Dominijanni et al. (2017), which states that the use of insulin in patients, especially for all insulin classes, adjusts the dose based on the stage of the patient's CKD. In contrast, for the use of oral therapy type drugs in diabetic patients with CKD complications, there are only glimepiride and metformin drugs, which are only found in three patients.

All patients used the drugs glimepiride and metformin with dose adjustments in CKD under the standards issued by Dominijanni et al. (2017), where the dose of metformin and glimepiride used does not exceed the maximum limit of the drug. Then, adjust the dose in CKD for metformin, reduce the dose if the GFR <45 mL/min, and discontinue the GFR <30 mL/min, while for glimepiride drugs, reduce the dose if the GFR <30 mL/min. During hospitalization, the dose given to patients is for Metformin 500 mg three times daily, where this dose does not exceed the maximum dose of metformin, which is 3000 mg. As for the glimepiride drug, the dosage given to patients during hospitalization is 1 mg and 2 mg once daily, and the dose of this administration does not exceed the maximum dose of glimepiride which is 8 mg.

Metformin and sulfonylurea groups are the most widely used therapies in Indonesia. The use of metformin is adjusted to the CKD level because the decrease in metformin clearance is directly proportional to the decrease in the glomerular filtration rate so that at stage 4-5, the use of metformin should be stopped (Sihotang, Ramadhani & Tahapary, 2018).

4. CONCLUSIONS

In the results of the study, an overview of the pattern of drug use in DM patients with complications of CKD, namely the type of insulin therapy, which is a fast-acting insulin (79.3%), and the type of oral therapy, namely Glimepirid as much as three drugs (60.0 %) and metformin as much as two drugs (40.0%), and the type of combination therapy namely Novorapid Insulin + Glimepiride, and insulin Novorapid + glimepiride + metformin by one person (2.8%). Evaluation of treatment in patients with DM complications of CKD follows the standard of treatment used as a reference.

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