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PROFILE OF THE USE OF BIGUANIDE AND SULFONYLUREA COMBINATION DRUGS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT

Diabetes mellitus (DM) was disease caused by a disorder of the pancreas where the insulin produced cannot be used properly by the body. This study aimed to determine the profile of the use of a combination of biguanides and sulfonylureas in patients with type 2 diabetes mellitus. This research was non-experimental research with retrospective data collection method and descriptive research design. The data source used is the patient's medical record data. The sample in this study was all type 2 diabetes mellitus patients who used a combination of biguanide and sulfonylurea drugs at X Jember Hospital from October to November 2023 with a total of 50 patients. The sampling technique used the total sampling technique. The results showed that nearly half of the patients with type 2 diabetes mellitus were in the age range of 51-60 years by 20 (40%) and most of the patients were female, 32 (64%). The use of a combination of biguanide and sulfonylurea drugs, almost all patients used a combination of metformin and glimepiride as many as 65 (94.2%), for almost half the dose used metformin 500 mg and glimepiride 4 mg as many as 25 (36.2%) while the frequency of a small proportion used metformin 500 mg twice a day and glimepiride 4 mg once a day. Type 2 diabetes mellitus patients mostly suffer from the age range of 51-60 years and most of the patients are female. The use of a combination of biguanide and sulfonylurea drugs, most of the drugs used are metformin 500 mg twice a day and glimepiride 4 mg once a day.

Keywords: Diabetes Mellitus Type 2, biguanide, sulfonylurea

INTRODUCTION

Diabetes Mellitus (DM) is a chronic chronic disease caused by pancreatic disorders in producing sufficient insulin or the insulin produced cannot be used properly in the body. Genetic and environmental factors also play a role. Diabetes mellitus often causes macrovascular complications caused by insulin resistance and microvascular complications caused by chronic hyperglycemia (Febrinasari et al., 2020).

According to the Indonesian Endocrinology Association (PERKENI) therapy there are 2 ways to treat DM patients, namely pharmacological therapy and non-pharmacological therapy pharmacology. In the patient pharmacological therapy is recommended taking oral medications such as drugs with the sulfonylurea class, glinid, biguanides, thiazolidinediones (TZD), alpha glucosidase inhibitors, inhibitors Dipeptidyl Peptidase-IV (DPP-IV), and Sodium Glucose CO transporter 2 (SGLT2) inhibitors. Pharmacological therapy also uses insulin in injection form. Based on the duration of action, there are four characteristics of insulin namely short or fast acting insulin, medium acting insulin, working insulin long and mixed insulin (PERKENI, 2021).

According to Soelistijo (2021), sulfonylureas have the main effect of increasing insulin secretion by pancreatic beta cells. The main side effects of using this class are hypoglycemia and weight gain such as glimepiride, glibenclamide, gliclazid, glipizid, gliquidon. The biguanide group has the main effect of reducing hepatic glucose production and improving glucose uptake in peripheral tissues such as metformin.

The effects of uncontrolled blood sugar will cause severe damage to the nerves of the blood vessels in the long term. Many patients die from complications of diabetes mellitus. Complications arise as a result of the duration of the disease or the severity of the disease. To reduce the incidence and severity of type 2 diabetes mellitus, it is necessary to check blood sugar levels regularly to

find out the target blood sugar to be achieved, as well as take preventive measures such as changing lifestyles and taking medication such as using oral hyperglycemic drugs (Widodo, 2017).

MATERIALS AND METHODS

This research is a non experimental research with retrospective data collection method and descriptive research design. The data source used is the patient's medical record data. The sample in this study was all type 2 diabetes mellitus patients who used a combination of biguanide and sulfonylurea drugs at X Jember Hospital from October to November 2023 with a total of 50 patients. The sampling technique used the total sampling technique.

RESULTS

Patient characteristics based on age and gender can be seen in the table below:

Table 1. Patient characteristics based on age in type 2 diabetes mellitus patients at X Hospital

No	Age	Total (n)	Percentage (%)
1.	20-30 years	1	2%
2.	31-40 years	3	6%
3.	41-50 years	7	14%
4.	51-60 years	20	40%
5.	61-70 years	16	32%
6.	71-80 years	3	6%
	Total	50	100%

Source: Secondary data (medical records)

Table 1 shows that almost half of them were suffered by patients in the 51-60 year age range, 20 patients with a percentage of 40% compared to other age ranges.

Table 2. Patient characteristics based on gender in type 2 diabetes mellitus patients at X Hospital

No	Gender	Total (n)	Percentage (%)
1.	Male	18	36%
2.	Female	32	64%
	Total	50	100%

Source: Secondary data (medical records)

Table 2 shows that the majority suffered from female patients, 32 with a percentage of 64%.

The use of a combination of biguanide and sulfonylurea class drugs in patients with type 2 diabetes mellitus in terms of drug name, dose and frequency can be seen in the table below:

Table 3. The use of a combination of biguanide and sulfonylurea antidiabetic drugs at X Hospital

No	Combinations of Antidiabetic Drugs		Total (n)	Percentage (%)
	Biguanide	Sulfonylurea		
1.	Metformin	Glimepiride	65	94,2%
2.	Metformin	Gliklazide	4	5,8%
	Total		69	100%

Source: Secondary data (medical records)

Table 3 shows that almost all patients used a combination of glimepirid and metformin, namely 65 people with a percentage of 94.2%.

Table 4. The use of a combination of biguanide and sulfonylurea antidiabetic drugs in terms of dosage at X Hospital

No	Combinations of Antidiabetic Drugs		Dosage		Total (n)	Percentage (%)
	Biguanide	Sulfonylurea	Biguanide	Sulfonylurea		
1.	Metformin	Glimepirid	500 mg	1 mg	1	1,4%
2.	Metformin	Glimepirid	500 mg	2 mg	13	18,8%

3.	Metformin	Glimepirid	500 mg	3 mg	17	24,6%
4.	Metformin	Glimepirid	500 mg	4 mg	25	36,2%
5.	Metformin	Glimepirid	850 mg	3 mg	3	4,3%
6.	Metformin	Glimepirid	850 mg	4 mg	6	8,7%
7.	Metformin	Gliklazid	500 mg	60 mg	2	2,9%
8.	Metformin	Gliklazid	500 mg	80 mg	2	2,9%
Total					69	100%

Source: Secondary data (medical records)

Table 4 shows that almost half of them used a combination of metformin and glimepirid at doses of 4 mg and 500 mg, 25 patients with a percentage of 36.2%.

Table 5. The use of a combination of biguanide and sulfonylurea antidiabetic drugs in terms of frequency at X Hospital

No	Combinations of Antidiabetic Drugs		Dosage		Frequency		Total (n)	Percentage (%)
	Biguanide	Sulfonylurea	Biguanide	Sulfonylurea	Biguanide	Sulfonylurea		
1.	Metformin	Glimepirid	500 mg	1 mg	3	1	1	1,4%
2.	Metformin	Glimepirid	500 mg	2 mg	1	1	7	10,1%
3.	Metformin	Glimepirid	500 mg	2 mg	2	1	4	5,8%
4.	Metformin	Glimepirid	500 mg	2 mg	3	1	3	4,3%
5.	Metformin	Glimepirid	500 mg	3 mg	1	1	7	10,1%
6.	Metformin	Glimepirid	500 mg	3 mg	2	1	7	10,1%
7.	Metformin	Glimepirid	500 mg	3 mg	3	1	2	2,9%
8.	Metformin	Glimepirid	500 mg	4 mg	1	1	4	5,8%
9.	Metformin	Glimepirid	500 mg	4 mg	2	1	13	18,8%
10.	Metformin	Glimepirid	500 mg	4 mg	3	1	8	11,6%
11.	Metformin	Glimepirid	850 mg	3 mg	1	1	1	1,4%
12.	Metformin	Glimepirid	850 mg	3 mg	2	1	2	2,9%
13.	Metformin	Glimepirid	850 mg	4 mg	2	1	6	8,7%
14.	Metformin	Gliklazid	500 mg	60 mg	2	1	1	1,4%
15.	Metformin	Gliklazid	500 mg	60 mg	3	1	1	1,4%
16.	Metformin	Gliklazid	500 mg	80 mg	3	1	2	2,9%
Total							69	100%

Source: Secondary data (medical records)

Table 1.5 shows that a small proportion used a combination of metformin and glimepirid at doses of 500 mg and 4 mg with a frequency of metformin twice a day and glimepiride once a day, 13 patients with a percentage of 18.8%.

DISCUSSION

The results of research on the profile of combination use of biguanide and sulfonylurea drugs in patients with type 2 diabetes mellitus from October to November 2022, based on patient

characteristics in terms of age, show that almost half of this disease is suffered by patients over 40 years of age in the 51 age group. -60 years as many as 20 patients (40%). Patients over 40 years of age are more at risk of developing type 2 diabetes mellitus, as in this study, almost half of which occurred in the 51-60 year age group, 20 cases (40%), the reason being that the aging process at ages over 40 years results in components the body changes, causing damage to pancreatic β cells, target tissue cells, the nervous system and other hormones that affect glucose levels (Vadila et al., 2021). This also happens because at that age physiological body functions decrease due to insulin resistance so that blood sugar in the body is unstable.

Based on gender, it shows that the majority of type 2 diabetes mellitus is suffered by women, namely 32 cases (64%). Gender is one of the factors related to the occurrence of type 2 diabetes mellitus, where women have a higher risk of developing type 2 diabetes mellitus than men because women have higher cholesterol than men. The increase in body fat levels in women is higher than in men, where women are 3-7 times more likely to suffer from type 2 diabetes mellitus than men, namely 2-3 times (Gunawan & Rahmawati, 2021). The number of receptors that are less responsive to insulin is caused by a large accumulation of fat cells, so that the insulin receptor complex and the glucose delivery system are not normally combined. The consequences of this will disrupt insulin work and insulin resistance which does not meet the requirements to maintain blood sugar levels in normal conditions (Vadila et al., 2021).

In terms of the name of the drug, the combination of biguanide and sulfonylurea drugs shows that in patients with type 2 diabetes mellitus, more patients use the combination of glimepiride and metformin than the combination of gliclazide and metformin. The use of a combination of glimepirid and metformin is the most widely used combination of antidiabetic drugs because the combination of glimepirid and metformin has a mechanism of action that complements each other and has a synergistic impact because these two drugs have an effect on insulin sensitivity and can reduce HbA1c levels by around 0.8 -1.5% in type 2 diabetes mellitus patients (Artini et al., 2022).

The use of a combination of glimepiride and metformin drugs both provide mutual benefits because glimepiride, which is a sulfonylurea group, has a mechanism of action by triggering insulin secretion, while metformin, which is a biguanide group, has a mechanism of action by increasing the insulin sensitivity of type 2 diabetes mellitus sufferers (Kuna et al., 2022). The use of a combination of drugs given to type 2 diabetes mellitus patients is used to control blood sugar levels and is used to control comorbidities (Rasdianah & Pakaya, 2023). According to Timur (2022), the use of a combination of glimepirid and metformin will be more effective because metformin will work more effectively if pancreatic secretion in type 2 diabetes mellitus patients is stimulated directly by glimepirid and the combination of glimepiride and metformin is more effective compared to the others (Timur et al., 2022).

The use of a combination of biguanide and sulfonylurea class drugs in terms of dosage. PERKENI 2021 recommends a daily dose of metformin and glimepiride in accordance with the maximum dose setting for each drug, namely the daily dose of glimepiride is 1-8 mg/day while metformin is 500-3000 mg/day. The recommended dose for using metformin is an initial dose of 500 mg or 850 mg, after which the dose can be increased to 500 mg with use three times a day, for a maximum dose of 3000 mg/day (Furdiyanti et al., 2017). The initial dose for use of glimepirid is 1-2 mg, if the patient is sensitive to antidiabetic drugs then start with 1 mg, while for the maintenance dose the administration is 1-4 mg and the maximum recommended dose is 8 mg (Putri, 2019).

The use of a combination of biguanide and sulfonylurea class drugs in terms of frequency of metformin with a dose of 500 mg is recommended twice a day, a dose of 850 is recommended once a day and for an increased dose to a dose of 500 mg it is recommended three times a day after meals in the morning, afternoon and evening. The frequency of metformin at the initial dose is given twice a day and the frequency for the maintenance dose is given once a day. The frequency of use of the drug glimepiride at an initial dose of 1-2 mg is given once a day before meals, while for a maintenance dose of 1-4 mg is given once a day after meals and for a dose of 8 mg can be given once a day depending on the patient's blood glucose and HbA1c levels (Wulandari & Melati, 2021). According to Soelistijo in 2021, the frequency of metformin is 1-3 times a day with a duration of action of 6-8 hours, while for glimepirid it is once a day with a duration of action of 24 hours.

CONCLUSIONS

Type 2 diabetes mellitus patients mostly suffer from the age range of 51-60 years and most of the patients are female. The use of a combination of biguanide and sulfonylurea drugs, most of the drugs used are metformin 500 mg twice a day and glimepiride 4 mg once a day.

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